TOTAL QUALITY MANAGEMENT APPROACH TO THE INFORMATION SYSTEMS DEVELOPMENT PROCESSES: AN EMPIRICAL STUDY

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ABSTRACT

The purpose of this dissertation is to study the application of Total Quality Management (TQM) in the Information Systems (IS) development processes. The study describes and evaluates TQM concepts and techniques in the IS development processes and interprets sub-organizational elements in the application of TQM in the public sector.

This dissertation uses a multiple case study methodology to study the development processes of IS in three public agencies. This study attempts to examine what quality means across these public organizations and to discover the differences between IS development methodologies that do or do not apply TQM concepts and techniques.

The late Dr. W. Edwards Deming, regarded as "father" of post war Japanese economic miracle as well as leading advocate of the TQM movement in the United States, developed a systematic approach to solving quality related problems which aims to fulfill customer expectations. His system of management is adopted as the theoretical basis to this dissertation. The "lessons learned" from these case studies, empirically and in literature, reveal multiple experiences of TQM applications to IS development processes in the public sector.

DEDICATION

This dissertation is dedicated to the memory of my beloved mother, Kim-Cuc Thi Doan, who passed away before I re-started my doctoral studies. My four siblings and I were still in elementary school when my father passed away prematurely five decades ago. My then young mother worked hard since to raise us all by herself, in this turbulent life. Without her enormous personal sacrifice and unconditional love, we would have never become the individuals that we are today.

I had promised to make my mother proud by the achievement of this monumental academic goal and I hope that I have fulfilled that promise. I wish that she could still be alive today to share with me the celebration and the success of my graduation with a Doctor of Philosophy degree.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES - continued

CHAPTER 1 - INTRODUCTION

The quality improvement movement in general and total quality management in particular have become very popular in America during the past three decades. The force that generated this movement is the fierce competitiveness of the global market. As the relative decline of the American economy in the late 1970's became apparent, many U.S. industries began to transform the traditional way of doing business into an organizational approach focusing on continuous improvement in order to become competitive.

In the 1980's, America began to embark on the quality improvement movement journey. The most prominent symbol of America's quality revolution is the prestigious Malcolm Baldrige National Quality Award (Hiam, 1992). The purposes of the award are to "promote quality awareness, recognize quality achievements of American companies, and publicize successful quality strategies" (Hunt, 1992: 90). Established in 1987 by the U.S. Department of Commerce, this competitive award recognizes outstanding American companies that provide quality goods and services that demonstrate quality management processes, and demonstrate the commitment to continuously improve the quality of goods and services in the long-run. The ultimate goal of this quality revolution is that it is not only very important for American companies to produce quality goods and services today, but it also is of equal importance that American companies maintain a consistent commitment to continuously improve the quality of goods and services in the future.

In fact, quality has been one of the private sector's main preoccupations for a long time. It remains so today. In the early years of the quality trend, the focus on quality was structured around quality circles (Barra, 1983), quality control and quality assurance (Ishikawa, 1991). In the late 1980's and early 1990's, the definition of quality shifted its emphasis to a broader sense; quality is now defined and driven by customer demand and satisfaction (Deming, 1986). Since the 2000's, quality has often been referred to as the "Lean Six Sigma" process improvement management (Thomsett, 2005). Recently, another name is the "New Gold Standard" which has been mostly used

and applicable in the service and hospitality industry (Michelli, 2008). However, whatever the names that have been used by any specific industry, they all refer to quality as continuous improvement processes with a focus on the customer.

The drive for total quality management (TQM) has always been at the top of the agenda of many organizations in the private sector to improve quality, productivity, and competitive position (Hunt, 1992). TQM application in the private sector generates for the most part several successful examples (Dobyns & Crawford-Mason, 1991). Since the 1990's, TQM has begun to spread far beyond the private sector into the public sector as well (Carr & Littman, 1991). Academic research focusing on public productivity has grown significantly during this period and assumes that TQM practices are indeed applicable to government services (Milakovich, 1990). In recent years, the TQM program appears to continue to maintain its strong presence in several public organizations of modern times (Van Seaton, 2010).

Initially, in state and local governments TQM concepts and techniques were used to improve productivity of government programs and projects (Hunter, O'Neill & Wallen, 1987). Since then, several success stories of TQM application in the public sector had been reported (Walters, 1992). In addition, results from a 1993 nationwide survey conducted in U.S. cities with populations between 25,000 and one million (with a 46 percent response rate) indicated that TQM was on the rise at the city government level (Streib & Poister, 1995). Recently, an empirical case study suggests that TQM is indeed a successful experience in state and local governments due to the fact that it is guided by a leadership commitment and a common organizational vision which "results in significant quantifiable benefits" (Kluse, 2009: 31).

In the federal government, various productivity improvement programs, particularly those of the U.S. Environmental Protection Agency (Cohen & Brand, 1990) and the Internal Revenue Service (Chen & Sawyers, 1994), coalesced under the TQM banner (Federal TQM Handbook, 1991, 1992). Results from a survey of 2800 federal installations conducted by the U.S. General

Accounting Office (GAO) in 1992 indicated that about 1900 respondents (68 percent) said they were involved in TQM efforts (GAO, 1992: 9). This is an encouraging statistic for proponents of TQM. This 68 percent survey result indicated a wide level of support for TQM activities at the federal level.

However, TQM experience at the federal government level reveals a mixed picture over time. A recent study suggests that the U.S. Air Force, an early proponent of the TQM era since the early 1990's, embraced a new "partial quality" endeavor because the "total quality" of the past has been a failure, as they seem to be successful with this new endeavor to avoid the mistakes of the past (Rinehart, 2006: 37). Similarly, the U.S. Navy recently embarked on a new continuous improvement effort due to failed initial TQM efforts in the early 1990's because senior leaders did not "get on board." They are "more serious this time" (Symonds, 2009: 6).

Statement of the Problem

One issue that is still controversial from the literature on TQM is the definition of quality. To date, there is no consensus on this definition (Wicks, 2009). Quality has different meanings to different people in different institutions, public or private, depending on their specific perspective. For those with a focus on quality control, quality is a way of managing efficiently and effectively. It is often referred to as the organization's best investment in competitiveness (Feigenbaum, 1991). For those with a focus on the customer, quality is a way of measuring customer expectations (Whiteley, 1991). In order to measure customer expectations, quality is first defined as "meeting" customer expectations, then as "exceeding" customer expectations, and finally as "anticipating" customer needs (Wiggenhorn, 1991: 47). For that reason, Garvin (1988: 216) refers to quality as "both a problem and an opportunity for American companies." He elaborates further that it is a problem due to the fact that foreign companies often offer products and services that appear to be superior in quality than those offered by American companies, and with a better price. It is also an

opportunity because American consumers are becoming more aware of the quality of products and services that they are thinking of purchasing.

By whatever definition, different approaches to quality have been applied by different organizations depending on their specific objectives. The bottom line is that quality has become an important phenomenon. Crosby (1979: 250, 251) claims that although "quality is free, it's not a gift, but it is free." However, it should not be taken as given, because "the cost of quality is the expense of doing things wrong." Therefore it should be clearly defined and understood from ontological, epistemological and practical situations. Only then can the quest for quality be justified.

Yet it is still an empirical question whether or not TQM philosophy can be applied smoothly and successfully to any process, corporate environment or government agency (Aguayo, 1991). Some research suggests that TQM may have to be altered in the public sector to gain acceptance because of its different types of "customers" (Hyde, 1992). Other research suggests that TQM philosophy and practice do indeed produce visible and positive signs of a difference in federal productivity (Mani, 1995, 1996). However, the extent to which public policy dictates the conditions under which quality is defined and measured in political environments remains vague in contemporary public administration.

The body of empirical research on TQM focuses on the broader organizational framework. In the 1990's, TQM applications to a number of areas in the private sector had been reported successful, such as banking and financial institutions (Latzko, 1986), health care institutions (Cunningham, 1991), and manufacturing and services institutions (Walton, 1986, 1991). TQM applications continue to carry on this record of achievement with several success stories in recent years in the same areas of banking and financial institutions (Peschel & Ahmed, 2008), health care institutions (Joyce, Breen & Winch, 2006), and manufacturing and services institutions (Buckman, 2009). The "customers" in these applications are often understood as the consumers, the citizens, or

4

the "external customers" of the organizations.

This study focuses on TQM applications to the Information Systems (IS) industry. The basic difference between manufacturing and IS industries can be briefly described as follows. The manufacturing industry is a unit-production system that produces a "product" to be sold to external customers of an organization. On the other hand, the IS industry is an internal aspect of a process that delivers "information" to be used by internal customers of an organization. In other words, IS represents a mechanism for delivering information for the organization, and in this sense it is considered a service to the organization. The applicability of TQM to sub-units of organizations is an issue which requires further analysis. The applicability of this study concentrates on smaller units of analysis, or IS departments/groups, to test the actual applications of the quality construct. The "customers" in this study are the "users" of IS, or the "internal customers" within the organizations. The "users" of IS are defined as other functional departments/groups within an organization that utilize and rely directly or indirectly on IS in their daily activities and therefore are affected directly and indirectly by the way in which an IS development process is developed, implemented, maintained, and replaced.

A growing body of literature deals with many IS applications in the past two decades. In general, empirical research in organization and management theory, from the late 1980's (Allen & Hauptman, 1987; Beniger, 1986), to the 1990's (Forgionne, 1996; Rivers & Bae, 1999), and recently into the 2000's (Besseris, 2010; Coffee, 2006; Conti, 2010), had shown an increasing interest in the role of IS in modern organizations. These studies attempt to address the contemporary issues of importance to the area of IS and predict that the management of IS would likely be a critical issue which would stimulate further investigation in the fields of organization, management, public administration and policy. In particular, the literature of the 1990's discusses the general aspect of the increasing importance of IS in providing quality data to internal and external customers.

However, this literature did not deal with TQM applications to IS development processes in the public sector until recently (Garson, 2005; Gingrich, 2003; Shea & Garson, 2010). These newer studies address the development and implementation of quality IS projects in public organizations in the modern information age as we enter the 21st century and the impact of quality IS projects in government service delivery. The common theme is that IS is an important tool for improving government efficiency, effectiveness, and public support with an emphasis on making information accessible to the end-users. Therefore, IS plays an essential role in assessing the performance of government agencies. Research also indicates challenges to delivering quality IS projects in the public sector in a timely manner, within budget, and while maintaining accountability. For that reason, IS management is likely to become a critical aspect in the fields of organization, management, and public administration and policy in the 21st century. This study intends to contribute to that body of scholarship and to the conceptual treatment of the TQM literature in it.

Purpose of the Study

The purpose of this study is to describe and evaluate TQM concepts and techniques in the IS development processes by incorporating a case study methodology that involves three case studies in an open-ended "lessons learned" approach.

In practice, many organizations recognize that TQM is a philosophy to improve quality performance. However, many of them do not use the TQM label to describe their quality improvement programs, and others may be committed to TQM, but refer to their program simply as "our programs," or "the way we do things." This research will focus on TQM efforts in IS organizations regardless of how they are characterized.

In the quest for quality, systems development groups seek to assure that the systems they develop are the best systems they can create for their clients. However, different groups go about this assurance in different ways. Are these differences significant? And if so, in what way?

6

By doing a comparative analysis of several organizations that differ mainly in their application of TQM to IS development processes, this study attempts to examine what quality means across several organizations and discover the differences between an IS development methodology that applies TQM concepts and techniques and an IS development methodology that does not.

The case studies in this research will reveal the particular elements in the application of TQM which are significant predictors of higher quality. In particular, these case studies will highlight the importance of the participatory atmosphere in organizations which may contribute directly or indirectly to the level of customer satisfaction. As such, these investigations go beyond the mere presentation of the IS development of the organizations involved. They will be used as a basis for comparing and contrasting the applications of TQM in order to show the benefits of the process.

Additionally, this dissertation is built on a previous research project which was the first of a two stage process. The first stage dealt with Total Quality Management in Information Systems Development Processes in three public agencies. The second stage looks at what happened in this area since the initial research to identify what can be learned, between "then" and "today," empirically and in literature. This is a way to get the project back in real time to discover what it means today rather than in the past. Furthermore, the "lessons learned" results of these case studies over time, empirically and in literature, will reveal a perspective that helps provide insight into TQM in theory and in practice.

Research Design

Based on the purpose of this study as described above, the "lessons learned" design of the case studies allows me to frame this study as follows.

- What the literature and my empirical findings demonstrated before? The first part of this topic is addressed extensively in a comprehensive nature in the historical evolution of TQM literature of Chapter 2. The five TQM dimensions that are consistent with my research are presented and

discussed here. The second part is addressed in the first stage of the data collection cycle as presented in Chapter 4.

- How the literature and my empirical findings have changed? This is addressed extensively in a comprehensive nature in the current relevance of TQM literature of Chapter 2. The discussion then shifts from TQM in the private sector to that in the public sector, particularly with respect to TQM in IS. The second part is addressed in the second stage of the data collection cycle as presented in Chapter 4.

- What lessons were learned between then and now? Interpretation of the results of the presentation of cases is the basis for answering this question in Chapter 5.

Significance of the Study

This study is significant to the field of public administration and policy in two ways. First, from a theoretical perspective, the study is intended to contribute to the growing body of literature on quality management in the public sector in general, and at the same time contribute to the conceptual treatment of TQM applications to IS development processes in public organizations specifically. Second, three case studies will reveal how the application of Deming's management principle works in practice. Therefore, there is a potential for other public agencies to benefit from this study. Additionally, this study will focus on the IS departments/groups which are sub-units of organizations, illuminating how IS departments/groups can benefit from components of TQM.

The results of these case studies of three public agencies will reveal multiple experiences of TQM application to IS development in the public sector. The individual cases point out how different IS departments/groups manage the quest for quality. These studies show that attention to the "customers," the primary mandate of TQM, led to a focus on present and future needs which directly affects technological development. Moreover, illustrations from these cases point out how

IS departments/groups undergo the TQM application and implementation processes. IS departments/groups with TQM may identify more clearly where they think they are today and where they want to be tomorrow.

The introduction and effective use of TQM in IS development processes present an opportunity for dramatic changes and improvements in the way in which an IS organizational environment is operating in the public sector. In that regard, the critical dimensions of TQM that are consistent with this study are presented and discussed in Chapter 2. Deming's system of management, which is adopted as the theoretical basis to this dissertation, is the first TQM dimension to be presented and discussed. Relevant literature to this study will also be reviewed and discussed from the historical evolution to the current debate of the quality movement as it shifts the focus from the private sector to the public sector and IS sub-organizations. It is in this area that the remaining dimensions of TQM are presented and discussed.

Overview of the Dissertation

This dissertation is presented in six chapters, as follows.

Chapter 1, the present chapter, sets the stage for the dissertation research. In this chapter, the context and the rationale for the study are introduced and discussed. The potential applicability of this study to other public agencies is also discussed.

Chapter 2 reviews the principal literature pertinent to the research design. Areas of review include the historical evolution of TQM and its current relevance. The critical dimensions of TQM are presented and discussed. This literature review steers our attention from the private sector to the public sector, and to TQM application in IS development processes in the public sector.

Chapter 3 discusses the methodology for the dissertation research. In this chapter, the selection of samples, the data collection process in two distinct stages of the study, and the data analysis procedure are presented and discussed.

Chapter 4 presents the individual sites of the case study methodology in two distinct stages of the study. The conditions of each site for each stage of this research are summarized. The preliminary analysis of each site is briefly embedded in each individual report. Drafts of these reports have been presented to the public agencies where this study is being conducted to confirm the accuracy of the data collected as well as to gather feedback.

Chapter 5 presents the data analysis of the study. In this chapter, the interpretation of results of the case studies is expressed in a comparative context to interpret the constancy or change of the research findings between then and today. The empirical pattern found across cases over time is put in a perspective that provides insights into TQM with respect to lessons learned.

Finally, in Chapter 6, a discussion of the findings of the study again places this dissertation in the context of the empirical perspective developed in Chapter 2. Based on the conclusions and the limitations of this study, recommendations for future research into the application of quality management in the IS development processes in the public sector are suggested.

CHAPTER 2 - LITERATURE REVIEW

In a study, Reed, Lemark & Mero (2000) examine the work of five TQM experts (Crosby, Deming, Feigenbaum, Ishikawa, Juran) and identify the similarities of the following TQM dimensions between them, although there were differences in their approaches to (1) Customer Satisfaction, (2) Leadership Commitment, (3) Organizational Culture, (4) Teamwork, (5) Training and Education, and (6) Cost Reduction. Since Deming's approach to TQM is adopted as the theoretical basis to this study, I present the following five TQM dimensions to be consistent with Deming's philosophy, principles and particularly to be in line with the purpose of my research: (1) Customer Satisfaction; (2) Organizational Culture; (3) Leadership Commitment; (4) Teamwork; and (5) Management of an IS Development Methodology.

In this chapter, five streams of literature reflecting these dimensions are presented and discussed within the context of the Historical Evolution of TQM Literature. Other streams of literature reflecting the current debate of the quality movement as it shifts the focus from the private sector to the public sector and IS sub-organizations will be reviewed next and discussed accordingly within the context of the Current Relevance of TQM Literature.

Historical Evolution of TQM Literature

In the early 1900's, Frederick Taylor, founder of the "Scientific Management" movement, promoted his "one best way" method as a set of scientific principles to measure the efficiency and productivity of any given task (1911, 1947). His approach had a strong impact on managerial practices in America during that time. Taylor's basic principles require four tasks that can be described as follows: (1) The development of standards; (2) The fitting of a worker to a specific task; (3) The provision of means to encourage each worker to best utilization of his ability; and (4)

The organization controls the various phases of a project (Kanigel, 2005). Those tasks seem to be obvious today, but 100 years ago, in 1912, they were revolutionary. It is amazing how much Scientific Management is still around and exerts influence on modern management; Taylor is viewed as the "grandfather" of business process reengineering and the intellectual foundation for the work on business process change. In many respects, modern managerial practice grows largely out of Taylor's classical approach. For example, the Gant chart, invented by Henry Gant, one of Taylor's associates, is still widely used today (Huse & Bowditch, 1973: 15).

In the late 1980's, the quality improvement movement and its potential impact on organizational theory and practice, often under the banner of TQM, appear to have several parallels with Taylor's principles (Kronenberg & Loeffler, 1991). In this context, TQM is more than just a slogan or a program; indeed, its movement professes a fundamental change in values, theory, and practice of modern organizations. Enter Dr. W. Edwards Deming, "the man who discovered quality" (Gabor, 1992) and his principles with a focus on the customer and a potential impact on organizational theory and practice. Deming and his management principles are presented in this chapter as Customer Satisfaction, the first dimension of TQM.

Customer Satisfaction

Deming's management theory is thought provoking. He developed a quality management theory that would have transformed the style of American management (1982, 1986). Instead his ideas had a major effect on Japan where he was invited to teach about quality and productivity in the early 1950's. Deming convinced the Japanese business community that it was always cheaper to do the job right the first time than to let defects enter the production line. His advice was that focusing on quality, and producing products that did not fail, could make them a force in the world market. Adopting Deming's ideas and principles, the Japanese business community began embarking on the quality journey. As the years went by, Japan's economic strength increased

dramatically as it rose from the ashes of the war to an enormous industrial power in the world.

In fact, the Japanese have come to dominate consumer goods markets. Their success has been linked to product quality. In 1951, less than a year after Deming's lectures on quality, Japan instituted the Deming Prize for industrial achievement. Since then, Japan has yearly awarded the Deming Prize to companies that excel in management and production. Ironically, although Deming was held in high regards in Japan, he remained virtually an unknown figure in America, to the general public as well as to the academic community, until the 1980's during which time the American quality revolution took place. It was at this period that American companies anxious about foreign competition begun to seek Deming's advice. Since then, his teachings have been more readily embraced by American industrialists and some American companies. By applying Deming's teachings, significant improvement in productivity has overcome difficult times (Buckman, 2009). Deming's philosophy and approach were able to transform American companies into efficient organizations.

Deming's emphasis is on product reliability, achieved through statistical analysis and worker-management cooperation. Deming believes that quality is a learning process and American managers must take responsibility for control of quality and for boosting productivity. In other words, American managers must adopt a new philosophy and transform their managerial practices into a new style of management to be successful. Deming's management strategies are based on his "Plan – Do – Check – Act (PDCA)" cycle (Hunt, 1992: 65) and his famous "14-Points" to management to achieve this transformation (Deming, 1986: 23-24; Tribus, 1984). By putting energy and resources into producing high quality products, he believed that financial benefits will make their way into organizations. This new style of management consists of effective leadership that is based on a "System of Profound Knowledge" (Deming, 2000) that American managers must adopt. Influenced by Lewis's ideas about a theory of knowledge (1929, 1956), Deming's system of what we call profound knowledge consists of the following four components: (1) Knowledge of

System; (2) Knowledge of Variation; (3) Knowledge of Psychology; and (4) Theory of Knowledge. These four components are the main factor in building a good organization and the cooperative relationship between managers and workers. They interact with each other and cannot be separated. The transformation to understand the whole system starts from each component. From there it will affect other components, so that the system can reach its maximum potential and accomplish its goal. Deming believes a leader should apply this knowledge to change and improve the system, as condensed in his second point: "Adopt the new philosophy" (Deming, 1986: 23, 26). In this sense, Deming's system of profound knowledge could be considered as a robust, modern, and practical theory of management that offers a potential for societal transformation (White & Wolf, 1995).

Deming's approach to quality management theory focuses on "customers" as measures of achievement. In this sense, customers' ideas must be taken seriously and transformed into actionable information to evaluate the impact of the improvement efforts and to reinforce the customer focus within the organization. In order to achieve customer satisfaction, the quality process must be improved continuously until customer demands are met. An attempt to clarify the customer focus often requires clear responses to the following general questions: Who are the "customers"? How do we keep the customers happy? What makes the customers choose one product over another when the quality is equal? How do we keep the customers coming back year after year? How can quality be measured? How can the process be improved continuously? How do we know that we are doing the things that are not right? How can we avoid the error that we do not even recognize? Do we have the support and commitment from the top leadership of the organization in the quality mission?

Fortunately, those basic questions have been initially addressed by Crosby, Deming, Feigenbaum, Ishikawa, and Juran in the early days of the TQM movement. Crosby (1979, 1992) suggests that doing things right the first time adds nothing to the cost of a product. In fact, he argues that the cost of quality is the expense of not doing the right things. In addition, Crosby emphasizes

what he terms the "Four Absolutes of Quality Management" which must be understood by every person in an organization: (1) "Quality means conformance to requirements," with management establishing requirements and providing employees the means to meet them; (2) "Quality comes from prevention" rather than through inspection; (3) "Quality performance standard is zero defects;" and (4) Cost of quality or "quality measurement is the price of non-conformance" (Crosby, 1992: 36).

Deming (1986) believes that quality is whatever the customers expect. He encourages American managers to plan for the future and foresee problems to eliminate waste. To do that, quality must be designed and planned. He urges companies to involve workers in decision-making process. He believes that the organizations and the public share what he calls "a partnership in quality." In this partnership, steps must be taken to ensure cooperation within the organization, especially absolute support and commitment from top leadership in efforts to improve quality. In addition, Deming's "System of Profound Knowledge" encompassing the Deming's cycle "Plan – Do – Check – Act (PDCA)" and Deming's "14-Points" provide essential guidance and directions to American managers who need to learn how to achieve success by focusing on producing high quality products and services that the customers want.

Feigenbaum (1991) believes that quality is an organization's best investment in competitiveness. He defines quality as a way of managing and that customer satisfaction, lower costs, and the effectiveness of human resources are dependent on quality control. In order to improve the quality control process, he stresses the critical aspects of careful planning, product design, customer feedback, and the use of statistical tools. During the life cycle of this quality process, from the first stage of gathering product requirements until the last stage of product delivery, customers' expectations must be met.

Ishikawa (1991) approach to quality is built on Feigenbaum's concept of total quality control. He defines total quality control as a system of production methods which produces quality goods

and services that meet the needs of the consumers. He defines quality as the participation by all workers from top down, from the top management to the front line staff, so that all workers have a greater role to play. He also believes that quality begins with the customers and that the workers must be empowered to undertake the improvement efforts that meet the needs of the customers.

Juran (1988, 1989) builds his quality principles around the practices of quality planning, quality control, and quality improvement. Like Deming, he believes that customers must be the focus of quality planning. His strategies are centered on top management involvement, planning quality improvement project by project, and developing a training program for all employees. Like Deming, he emphasizes the need for continuous process improvement management in producing quality goods and services in customer-focused organizations. As such, Juran defines quality as fitness for use, as opposed to merely meeting specifications. Managers must set quality standards and provide measurements that assess the cost and effectiveness of the quality improvement program. He believes that his principles offer practical suggestions for organizations to achieve managerial performance, quality leadership, and strategic goals. He envisions organizations eventually achieving a new corporate culture in which quality improvement become part of every manager's strategy.

In the 1990s, a growing body of literature attempted to address these questions particularly on the practical aspects in business organizations. Whiteley & Hessan (1997) emphasize a customer-oriented approach which places the customers at the center of the business operations and listens to their needs. Customer listening is a continuous process, but in many respects, it is usually not well interpreted in many organizations. The idea is to find a way to create an atmosphere of cooperation throughout the organization. In this cooperative environment, employees are encouraged to stay focused on the needs of the customers. The focus on the customers will improve the organization's image in a way that would enhance its profits and success.

Gitomer (1998) goes a step further by emphasizing that improving customer satisfaction leads to customer loyalty.   To Gitomer, loyalty is a big step up from mere satisfaction, because loyal customers make voluntary referrals. The difference between a satisfied customer and a loyal customer is; one may do business with them again and may refer others to them, the other will do business with them again and voluntarily promote the business by proactively talking about their positive experience. Gitomer apparently believes that customer loyalty comes from superior and quality service by exceeding customer's expectations. The strategy for improving customer satisfaction is not just only about planning and executing a massive and transforming project in organizations; it's also about doing little things every day with every customer, to make their experience better. It makes an enormous difference in how customers perceive the business; therefore, the owners and leaders of the business must be truly committed to it. He emphasizes that a successful business organization consistently gives its best performance to attract and retain its customers, because they are its proof of profits and success, not only in monetary terms, but also because they act as voluntary advertising, telling others about the quality of the products and services provided by the company.

Those basic questions continue to generate interest in recent literature from Mauch, Micklewright, and Read. Mauch (2010) believes that the rise of complex organizations in modern times triggers the need for improving the implementation of TQM and the ability to measure it. TQM discipline is becoming more concerned with performance reporting to a diverse management audience. He believes that quality is an on-going practice and must be implemented throughout the entire organization to achieve continuous improvement and optimum results.

Micklewright (2010) examines how organizations today live up to the principles set out by Deming in his famous 14-points which focus on the concepts of leadership and respect for people. He offers an overview of America's current financial crisis and how it compares to the economic crisis of the 1980's when America began to discover Deming and the quality movement. "Culture" comes next in an organization that is staying competitive for survival. To this end, he is strongly advocating that American companies should adopt Deming's 14-Points, especially Deming's first point which emphasizes the need for a "constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs" (Deming, 1986: 23, 24).

Read (2010) believes that customer feedback is critical in guiding organizations on the right path in developing products and improving services. An effective way of gathering customer feedback is by survey. In modern times, customers are increasingly interested in voicing their concerns and opinions. Companies capture feedback from customer surveys to identify performance aspects impacting the level of customer satisfaction so appropriate improvement action can be taken.

The criteria for Deming's approach are that quality is defined and driven by customer satisfaction. This reflects the conventional wisdom that customer satisfaction is the driving force behind the quality uprising. In reality, however, quality is not easy to measure because it is one of the most elusive aspects of work to be controlled in organizations. One of the values of the quality theory is the anxious atmosphere of organizations which contributes to that level of customer satisfaction. This leads up to Deming's "partnership in quality," as condensed in his eighth point:

"Drive out fear, so that everyone may work effectively for the company" (Deming, 1986: 23, 59). These strategies lead to TQM's maxim that organizations that treat people well would do better in the long-run. This leads our discussion to the second TQM dimension, Organizational Culture.

Organizational Culture

Deming sees TQM as a theory of society rather than a theory of management. He suggests that the business goal of an organization is not just only to make profits, but also continue to exist and provide jobs, as condensed in his first point: "Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs" (Deming, 1986: 23, 24). Profits are understood as products of a system designed to keep an organization in business and to keep workers continuing to create products possessed of a social utility that enhances the quality of life. Quality of life can be achieved through the development of an organic system connecting top management commitment throughout organization, from workers to suppliers and consumers. This way, quality products can be achieved by making it everyone's responsibility. This cultural aspect is critical in modern and complex organizations. Through the adoption of his method, Deming argues that total social welfare is enhanced. Others see TQM as an "institutional system" because it requires the re-orientation of issues at both the organizational and societal level (Knonenberg & Loeffler, 1991). In other words, TQM is an attempt to introduce some critical radical humanist change concept into an otherwise functionalist world (Burrell & Morgan, 1988). Nevertheless, this focus on process and never-ending quality, as opposed to goal stipulation and prescriptive modeling, may be a welcome initiative in the field of public administration and policy.

Classical theorists such as Barnard, Selznick, Simon, and Weber offer a variety of perspectives to the thinking and practice of public administration and contribute a great deal to the work on organizations and organizational culture. Barnard (1968) sees organizations as "cooperative

19

systems" by putting more stress on psychological and social aspects as he examines complex organizations. He stresses a focus on the human side of employee management. Barnard's perspective is that human cooperation, management by consensus and voluntary effort interact with each other as a system of cooperation formed by individuals. Employees who are treated well will work well; managers should gain respect through kindness; and any workplace conflict signals a failure of the management. Barnard's insights on authority, executive morals, responsibility, formal and informal organization, organizational purpose, and decision making are fundamental to the understanding of human behavior in the organizational setting. His approach to the organization seems logical today.

Selznick (1948, 1984) analyzes the perspective of an organization seen as an institution. While an organization is a system of consciously coordinated activities, an institution is a responsive adaptive organism; the former is an instrument while the latter is natural product of social needs. Within organizations, there are social pressures seen through the informal structure and in rivalry among units, so one of the objectives of management is to control and redirect these social pressures resulting in an adaptive change. These issues provide grounds for the institutionalization process, reflecting the particular organizational history in the way it has adapted to its environment. As an organization acquires a distinctive identity, it becomes an institution. This process takes values, actions and beliefs that are deemed important for their own sake and goes far beyond survival. In the process of transforming an organization into an institution the purpose must be built into the social structure. In this sense, policy is rooted in the daily experience and saved from distortion by extended lines of communication. Robbins (1986: 430) sums up Selznick's institutionalization process as follows: "When an organization becomes institutionalized, it takes on a life of its own, apart from any of its members… Additionally, when an organization becomes institutionalized, it becomes valued for itself, not merely for the good and services it produces. It acquires immortality."

Simon (1997) relies on the concept of organizational structure; he sees structure as the relationship of the various functions in organizations, and the organizational function is to facilitate the flow of information and the making of appropriate decisions. Simon promotes the concept of rationality which can be described as follows. Organizations are created in order to enhance human rationality and to structure human behavior so that it may approximate abstract rationality. Individuals are limited in the degree of rationality they can obtain. Therefore they join collectives to achieve a higher degree of rationality. In other words, Simon's view is essentially a means-ends relation. Simon introduces the concept "means-ends hierarchy" to base the rationality on a robust foundation. Rationality is defined as the behavioral alternatives (means) that will help the organization's members achieve the stated ends above his level of hierarchy. That is, instrumental rationality is accepted. A rational organization maximizes efficiency. The problem within the organization becomes one of bringing individual members of the organization closer to the goal of maximizing efficiency.

Weber (1968) emphasizes the rational aspects of bureaucratic organizations. He sees organizational forms as deeply rooted in the social structure and as part of society. For Weber, bureaucracy was the most rational institutional response to the structural complexities and operational uncertainties inherent in modern capitalist societies. In this bureaucracy, organizational process is concerned with policy which results primarily from standard operating procedures. However, he is also aware of the potential dangers inherent in societies dominated by large-scale bureaucratic organizations. Therefore, he argues that human activities determine the character and behavior of social systems and the bureaucratic model is also a concern for human relations. Perrow (1986) adds further that concern for the organizational environment can also be traced back to Weber. This idea is also Weber's criterion for calling bureaucracy the most rational form of organization.

Organizational theorists such as Huse & Cummings, Katz & Kahn, Robbins, and Schein offer a

slightly different perspective. Huse & Cummings (1997) use the systems approach in defining organizations as "open systems" with a number of subsystems which are interdependent and interrelated. They argue that open systems maintain relatively steady states while exchanging information with their environments. Furthermore, open systems tend towards higher states of order and complexity. They also discuss organizations in terms of organizational development and change. The basic purpose of organizational development is not only to help organizations become more adept at self-renewal and survival, but also to ensure that the human values of organizational members are furthered. For Huse & Cummings, the term "organizational competence" stresses an overall systems approach to the organization and includes examining the organization from three different perspectives: structural design, flows through the system, and a concern with human resources.

Barnard (1968) made a distinction between organizational effectiveness, which is the accomplishment of the objectives of the organization and organizational efficiency, which includes the satisfaction of individual needs. Etzioni (1969) contended that organizational efficiency refers to the amount of resources an organization needs to use in order to produce units of output. The competent organization is both efficient and effective.

Katz & Kahn (1978) provide a clear map of the impact organizations have on their people, and consequently the impact the people have on the organizations. In predicting organizational performance and effectiveness, they propose three categories: first, people must join and remain in the organization; second, people must perform dependably the roles assigned to them; and finally, people must engage in innovative and cooperative behavior beyond the requirements of the role but

in the services of organizational objectives. Hence the organization is a structured framework and a compartmentalized baseline, against which multiple types of diversified organizations and multiple types of diversified individuals can be compared. In this sense, organizational culture can be understood as individuals work and live within the organizational context, within unique sets of rules, and within formal or informal regulations.

Robbins (1986) says that organizations involve people, either individuals or groups, and understand how and why they behave in group settings toward improving organizational effectiveness. He predicts behavior in organizations at three levels: the individual, the group, and the organization system. He examines an organizational culture in which people can make a difference in contributing to either success or failure in organizations.

According to Schein (2010), organizations involve goals and objectives, and people share the same goals within organizations. He provides a complex model for diagnosing culture and analyzing the values and assumptions of the organization. He also emphasizes the importance of understanding the dynamics of the organizational culture, prior to implementing change. Schein believes that culture can be transformed into a tool that can be used by managers to better understand the dynamics change in the organization. Stressing that culture is a phenomenon that always surrounds us; it is established by our interactions with others. Schein presents categories of values that groups routinely use to operate within an organization to foster shared ideas and feelings. He articulates the importance of understanding organizational culture as a means of implementing change. His theory is that the ability to manipulate culture is a key tool of modern management.

Contemporary authors, such as Evans, Fotopoulos & Psomas, and Pakdil, focus on TQM in the context of a high level of organizational performance. Evans (2007) states the principles of TQM lead to performance improvement. He relates quality theory to classical organization and management theories and introduces the readers to the ideas of the classical writers such as Crosby, Deming, and Juran. As a learning example, Evans also lists several empirical case studies of successful TQM application in the private sector as well as in the public sector. Fotopoulos & Psomas (2010) conduct a case study in several organizations to determine the relationships between TQM factors and organizational performance. They evaluate organizational performance with respect to customer satisfaction, employee satisfaction, protection of natural and social environments, and finally internal and external results. To them, leadership commitment is the driver of the quality management system. Pakdil's contribution (2010) is an empirical case study in several companies to examine the impact of TQM on corporate performance with respect to process performance, customer satisfaction, employee satisfaction, financial performance, and supplier performance. He found statistically significant differences in some corporate performance indicators after companies began to apply TQM.

Authors Harris & Wynett, Hur, Kerr, and Rother offer an organizational perspective to continuous quality improvement. Kerr (2006) presents a holistic approach to overcome organizational barriers to success, backed by real life examples. When organizations struggle with challenges, he supplies a framework by means of which best practices can be used to develop the action plans needed to remain successful. Kerr's principles and practices are supported by nearly 50 real-world case examples and excerpts from actual projects to

demonstrate how multiple organizations have institutionalized these best practices.

Rother (2010) discusses how organizations can achieve superior operational results while following a natural systems approach. He offers suggestions for organizations to be innovative and flexible while continually improving in the quest for excellence. The objective is not to win, but to develop the capability of the organization to keep improving, adapting, and satisfying dynamic customer requirements. He shows how companies can develop practices and thinking in their organizations to do just that.

Harris & Wynett (2010) discuss Peter Drucker's four lessons concerning business management. In these lessons, TQM is mentioned as the result of efficiency and human creativity to develop new ideas. In this TQM culture, employees are encouraged to pursue new knowledge to manage their lives not just to be successful but also significant. Hur (2009) examines how organizations react to TQM practices. He concludes that TQM practices bring about a new managerial approach that provides momentum for employees to think about customers and quality services, an aspect they do not consider seriously. This momentum creates a new organizational culture which transforms managerial style and allows employees to adjust their attitude and promote their knowledge of quality services, customer satisfaction, and teamwork.

From an IS perspective, Summerill, Pollar & Smith (2010) examine the role of organizational culture to ensure success of an IS implementation plan in a case study. They present the positive as well as the negative features that contribute to success or prevent the organization from reaching its full potential. The positive features are an involved leadership, a

competent workforce, a participative atmosphere, accountability, and a tendency for continuous improvement. The negative features are inflexibility, poor communication, and lack of awareness. Their results discover that when the whole organization, particularly effective leadership, advocates success, then the positive factors override the negative features. They conclude that the success and sustainability of an IS implementation plan in this case study are influenced by all those features of organizational culture.

We do not, of course, need to think about organizations as purely mechanistic and bureaucratic structures. Society is not static, it is always changing. Modern society involves continuous growth and evolution to perform diverse social roles. In the future, perhaps organizations of all types could have the capability to respond to technological and social changes. TQM is revolutionary in this respect because it requires new thinking about the role of organizations, their inventory of capabilities, the commitment of the leadership, and actions aimed at the future.

Deming emphasizes an organizational culture in which the transformation to quality is everyone's job, as condensed in his fourteenth point: "Put everybody in the company to work to accomplish the transformation; the transformation is everybody's job" (Deming, 1986: 24, 86). His premise is that workers want to be proud of their work, but barriers often exist that rob them of the pride of workmanship. This problem must be fixed, as condensed in his twelfth point: "Remove barriers that rob people of pride of workmanship" (Deming, 1986: 24, 77). Creating quality requires breaking down barriers between departments in an organization, in order for people to work as teams; this allows them to identify gaps between jobs, and identify what is preventing them from doing their job as best as they can. "Break down barriers between departments" is his ninth point

(Deming, 1986: 24, 62).   Deming insists that the leaders of the organization must be actively involved in the quality movement efforts believing that it's the only way to ensure the organizational competitiveness in the international market, as condensed in his seventh point: "Adopt and institute leadership" (Deming, 1986: 23, 54). This leads our discussion to the third TQM dimension, Leadership Commitment.

Leadership Commitment

Deming believes that the American style of management must be transformed. This new style of management consists of leadership based on a system of profound knowledge in which all components are integrated into a whole and cannot be separated. He urges the top leadership of organizations to improve their systems of production and service by determining the roots of problems in order to identify which problems were due to the workers and which problems were due to the system. This idea is condensed as his fifth point, "Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs" (Deming: 1986: 23, 49). Deming's theory of management regards it as the function of top organizational leadership to seek the causes of failure without emphasizing numerical quotas and goals, as condensed in his eleventh point: "Eliminate numerical quotas for the work force and eliminate goals for people in management" (Deming, 1986: 24, 70).

Since the 1960's, major theorists such as Blake & Mouton, Fiedler, Likert, and McGregor have been influential in the definition of leadership. They define leadership differently although they do have some points in common. Blake & Mouton (1972) developed the "managerial grid" which

consists of two basic dimensions of leadership: (1) The leader's concern for his subordinates; and (2) The leader's concern about things to be done by subordinates (Huse & Bowditch, 1973: 153). This powerful tool is designed for improving the process of managing work and people, solving conflict, handling organizational change, and developing strong leadership in organizations. Good managers need to bring people along, not drive them away. This way, instead of working for individual self interest, workers and managers should try their best to work for the organization. The ultimate goal of this framework is to achieve optimum organizational and personal productivity.

Fiedler (1967) developed a contingency theory of leadership stating "it all depends" as to what is the most appropriate leadership style (Huse & Bowditch, 1973: 155). Leadership effectiveness depends on the interaction of qualities of the leader and the demands of the situation, making simplistic "one best way" approaches to leader behavior. In order to determine the organization's effectiveness, Johnson, Kast, & Rosenzweigh (1973: 280-281) summarize Fiedler's model as consisting of three important factors: (1) the leader's power of position based on his formal authority in the organization, (2) the structure of the task, and (3) the interpersonal relationships between leader and members. In the past decades, the implication of contingency notions spread like wildfire in the field of organizational studies.

Likert (1967) focuses on the group and the organization in which the manager works. He is interested in empirical examining the human component of the organization. To him, the manager's most important task is to develop a better system of managing the human resources of an organization. According to Johnson, Kast, & Rosenzweigh (1973: 297-299), the systems

approach taken by Likert is a "new theory" of management called the "interaction-influence system." Likert's research methods (including the Likert scale), his findings, and his notions of effective management have held up over time and are clearly visible in the work being done today in the field of organization and management.

McGregor (1960) examines organizational theories on the behavior of individuals at work and classifies two basic leadership styles: (1) Theory X, whereby leaders use strong measures to control the behavior of subordinates to ensure that they work toward organizational goals and objectives; and (2) Theory Y, in which they develop a participative approach to foster an environment in which subordinates work toward individual and organizational goals (Huse & Bowditch, 1973: 149). Theory X is based on the traditional assumption that people do not typically like to work and would only work if they were threatened in some way. In this scenario, managers assume that employees would have a tendency to avoid work if at all possible. Based on this belief, managers attempt to control them in order to ensure that their work reaches organizational goals. Theory Y, by contrast, views people in a much more positive way. It is based on the assumption that people are willing to work and are basically honest. They will apply self-control and self-direction in meeting the objectives of the organization without external control or threats of punishment. McGregor's theory is as relevant today as it was then for leaders who want to motivate employees in a manner which recognizes their most human characteristics.

Authors such as Atkinson, Bennis, Katz & Kahn, and Schein also contribute significantly to the literature on leadership. Atkinson (1990) says that leadership is the key ingredient in promoting

commitment to TQM. He states that "without leadership, there's no change" in organizations. His approach to organizational culture change requires top leadership involvement in order for organizations to be responsive to customers' needs and expectations. Understanding that the organization is changing to provide a more streamlined products and services delivery, top leadership will determine the measures that are most critical in assuring that the organization is moving in the desired direction.

Bennis (1989) suggests three aspects of effective leadership in organizations. They can be summarized as follows: (1) Leaders are important to an organization's effectiveness; (2) Leaders are responsible to an organization's stability; and (3) Leaders are critical to an organization's integrity. He discusses the importance of reflection as a tool for effective leadership. Reflection is a way to take in the "big picture" of situations that surround us. In this sense, reflection is one of the real life lessons of self-knowledge. One should learn from mistakes and look back to see how mistakes instruct on how to make a better future. In other words, failure is part of becoming an effective leader. Also leaders must become more focused on who they are and where they want to go as distinct from where others want them to go. These concepts are significant to future growth. Also Bennis proffers three essential ingredients for effective leadership: (1) Vision; (2) Passion; and (3) Integrity. Taking these together, Bennis & Nanus (1986) argue that leadership is necessary to help organizations develop a new vision and then motivate organizational change toward that vision.

Katz & Kahn (1978) provide an in-depth look at the open systems theory, which is of particular importance to the areas of leadership attributes, development, influences of stress, and the requirements to sustain one's well-being. They define leadership as in terms of (1) Attributes of a position; (2) Characteristics of a person; and (3) Category of behavior. Peters & Waterman (1982) add the point that leadership involves "emotion" in that the leader must understand the

impact of their presence, actions, and behavior on others. Schein (2010) is more concerned about organizational culture in addressing the implications of the dynamic perspective of leadership. He concludes that the role of leadership is vital to present and future organizations. Schein theorizes that organizational culture reflects the leadership and vision of its founder, and that organizations become self-sustaining through buy-in to the culture. Hence the process of cultural creation and management are the essence of leadership. If leaders want to start evolutionary change, the process must be adaptive. In order for them to achieve this goal, they must first understand the dynamics of organizational culture.

Recent literature from Laohavichen, Fredendall, & Cantrell; Schein; Zaccaro & Klimoski contribute significant viewpoints to leadership theory and its relationship to quality performance. Laohavichen, Fredendall, & Cantrell (2009) integrate leadership theory and quality management theory by testing whether a higher level of leadership would lead to higher level of quality performance. Results from an empirical case study indicate that quality management practices and leadership are higher in those companies with a higher level of quality improvement. This finding suggests that leadership is associated with successful quality improvement.

Schein (2010) views organizational culture from an anthropological perspective. He talks about how leaders are chosen. He stresses the point that cultural understanding is critical for leadership, and is the determining factor in the choice of leaders within an organization. In short, leaders create culture by managing and sometimes changing culture. Schein theorizes that also organizational culture reflects the leadership.

Zaccaro & Klimosi (2001) examine leadership within the context of organizational culture. They present four key qualities of executive leadership: co-option of stakeholders, foresight,

systems thinking, and the creation of structure. Understanding leadership requires understanding the contextual dynamics under which the leaders influence organizational effectiveness and performance during critical moments. Recently, another aspect of leadership is recognized in the private sector, Burda (2010) says it is charisma. His results from an investigation suggest that organizational leaders who exhibit a strong leadership style as well as a commitment to using IS and modern technology to advance the strategic goals of the organizations can be clearly identified and recognized.   These recent studies indicate that contemporary authors are adopting a renewed emphasis on a management philosophy that relies on a rational decision making process based on empirical, scientific, and reproducible facts rather than relying on non-empirical, non-scientific, and non-reproducible works.

In today's organizations, leadership is recognized as one of the important elements of organizational survival. Leadership has become an intellectual activity and involves a more effective use of knowledge in dealing with the dynamics of change to provide coordination for the overall system of organizations and organizational culture. Bennis, Goleman, & O'Toole (2008) take on the difficult task of explaining the links between reality, trust and the truth. They describe their philosophical endeavor as being built on the virtues of being truthful, honest, and open in dealing with others. They suggest how leaders need to create a culture of candor among their followers through trust and collaboration. This concept is similar to Deming's concept of "partnership in quality" and Follett's idea of the "science of cooperation" in the 1940's, i.e., "participative management" or "teamwork" as it is often known today. This leads our discussion to the fourth TQM dimension, Teamwork.

Teamwork

Deming's theory of management is not just a theory of productivity and quality control; it also presents a theory of "optimization." In Deming's own words (Walton, 1991: 9), "Optimization of a system should be the basis of negotiation between any two people, between divisions of a company, between customer and supplier, between countries, between competitors. Everybody gains under optimization." Although the key to successful implementation of the Deming approach is still an empirical inquiry in the public sector, it does present itself as a radical change in the management paradigm by stressing the importance of the relationship between employees and management. The "partnership" approach does require that the traditional adversarial relationship between employees and management be abandoned to foster a climate of understanding, conflict resolution, and team building in order to enhance the total social welfare. It is a philosophical perspective from which management conducts the organization's business and survival on a long-term basis, a perspective that also provides guidance for day-to-day actions. This philosophy is driven by the force of quality and focuses on the "continuous improvement" of all processes to improve quality. Therefore, it is not a quick fix management technique. Rather, it is an organizational way of life.

Teamwork is a term used in daily organizational life today. In the literature of organizations and management theories, it is often referred to as participative management. The underlying principle of participative management is that goal-setting, decision-making, and other managerial activities should be involved in virtually all levels of organizational hierarchy, including among employees. Follett (1940), who was a major theorist of participative management, was best known for her work on "participation," "law of the situation," and "science of cooperation." She wrote about the advantages of exercising "power with" as opposed to "power over" which is basically one of the major premises of participative management: a sharing of power between management and employees. She believed in the notion of coordination to produce functional unity within the organization. Functional unity is best achieved through the interaction of ideas and the interpretation

33

of ideas in a pattern of integration, circular response, and evocation. This concept requires the participation of all members of the organization with each member contributing what they can contribute.

Coordination is a continuous process encompassing both planning and execution. From this perspective, Follett identified three leadership functions which are important elements of participative management: (1) Coordination, which involves the education and training of individuals and providing opportunities for participation; (2) Definition of purpose, so that all employees feel that they are working towards a common end of the organization; and (3) Anticipation, which entails understanding the long-term goals of the organization and creating situations in which its goals can be achieved. In this sense, Follett suggested that communication should not flow only vertically; instead, it should flow both vertically and horizontally.

Barnard (1968) follows Follett's theme with a far more comprehensive theory of "cooperative systems" in which an individual's efforts are coordinated toward a common purpose (Harmon *&* Meyer, 1986: 105). He indicates that the goals of organization and the goals of its employees are maintained in "cooperative systems." If the individual finds his or her motives are being satisfied by what he or she does, it is very likely that he or she will continue his or her cooperative effort. Barnard's insights on authority, executive morals, responsibility, formal and informal organization, organizational purpose, and decision making are fundamental to the understanding of human behavior in an organizational setting. From a theoretic point of view, he describes the organization, a concept that had been neglected before, and also does it from a practitioner's point of view. By doing this he makes a first rate contribution to management theory, not only defining business organizations but also from a broader scope. The work delves more fully than before into the dynamics of the organizational culture. Barnard's perspective is that of human cooperation, management by consensus, and voluntary effort. Employees who are treated well will work well; managers should gain respect through kindness; any workplace conflict signals a

failure of the management. Barnard envisions the executive as central to the cooperative process, whose main function towards it is the maintenance of communication, and being the correct person in the correct position. When describing his function, Barnard also states the formulation of purpose as well as the securing the essential services for individuals. In summary, Barnard's approach to the organization as a system of cooperation formed by individuals seems strongly logical today. Moreover, he considers the relevance of the recognition of informal organizations operating within the formal ones.

Many forms of participative management have been used in public and private organizations. Teamwork is the most common approach because, according to Robbins (1986: 465), "organizations are made up of people working together to achieve a common end" and teamwork is a process in which employees share a significant degree of decision making power along with their immediate supervisors. The underlying principle of teamwork is that employees have more to bring to the job. This is consistent with Deming's system of profound knowledge in which Deming conveys the teamwork approach. All components of his system are interrelated and cannot be separated. It is only when every person in the group agrees with each other that everyone can come together for one common purpose. Deming believes that everything and everyone could work together because every job is equally important. In his famous 14-points, Deming pushes teamwork and cooperation instead of incentive programs, such as commissions, because ultimately such programs turn into individual profit centers, thus leading to the collapse of the system.

In a study that addresses the team concept in the development of TQM in a private organization, Svetec (1995: 23) concludes that "the team concept of problem solving is a democratic process…As in any democratic process each member must be afforded an opportunity to present his or her case and express his or her views. Often it is not a matter of a right way or wrong way, but of a different way to attain the same objective." That's the essence

of teamwork and it cannot be truer!

In addition to understanding the concept of teamwork and participative management, Scholtes (1991) suggests a practical framework by which to comprehend the steps needed to construct and manage successful teams in organizations. Influenced by Deming's philosophy and based on Deming's 14-points, he provides organizations and teams with a set of tools and processes so they can improve their workplace at all levels of any organization. The purpose of these tools and processes is "to help project teams succeed in improving quality and productivity, and in all their efforts to improve processes" (Scholtes, 1991: 1-1). To promote the team's growth and development, Scholtes presents templates for practical application of techniques to improve work teams and cross functional teams. He also touches on subjects such as guidelines to overcome conflicts that can arise in a team, as well as in planning, conducting effective meetings, and ensuring good team dynamics. Conflict is natural, whether at home or in the working environment: to deal with it successfully, mutual trust, cooperation, and cohesiveness must be present. Nevertheless, conflict has the potential to destroy that trust, reduce cooperation, and create divisions between team members. Conflict is unavoidable in a team environment, but it can be managed so that the outcomes are productive. "As a spirit of teamwork invades the organization, employees everywhere will begin working together towards quality – no barriers, no factions, 'all one team' moving together in the same direction" (Scholtes, 1991: 2-8).

The Quality Circles (QC) concept is an extension of participative management. The essence of QC is that a small group of employees study and discuss work problems, and then plan and implement solutions to the problems. The guiding premise is that the real expertise of an organization is in its employees and that QC can help focus this expertise on real problems. The first objective of QC is to focus initially on improving the quality levels of products and services. This concept relies on a long-term approach to improve productivity with a focus on the quality of the organization's work effort (Patchin, 1983). The second objective of QC is that all QC members

supposedly function as equals.   An organization's leadership provides the opportunity for participation (Follett, 1940).   Decision making is by consensus. The QC chooses its own agenda, analyzes and studies the problems; suggests solutions; then implements them. Lack of this function can be a major deterrent to the accomplishment of objectives. Productivity enhancement is an effort for an organization to produce viable, optimal results with a minimum of outside interference. QC is not a high tech approach to productivity enhancement. In the essence of Follett's concept of "circular response" in which integration is achieved, the major idea of QC is to constantly evaluate what works and how well it works within the organization and its environment.

Recently Peotter (2009) reported on a process to acknowledge organizational team-based efforts via competition. Criteria for selecting winning teams include everything necessary for team success, i.e., project selection, impact on organizational goals, implementation, progress, and results. Productive and focused meetings are seen as the backbone of the high performance teams. It is where information is collected and analyzed, improvement opportunities evaluated, and quality decisions made. Each team selects different projects, employs different ideas, uses different tools, and all are "united in the quest for excellence and better their organizations" (Peotter, 2009: 36). In another recent study, Porter, Gogus, & Yu (2010) suggest that there are two aspects of teamwork on team performance. They identify the first as "backing up behavior" and the second as "performance monitoring." Then they set out to examine the conditions for the positive effects of these two aspects of teamwork on team performance. Their empirical results provide insights regarding when team members should devote and coordinate their own individual resources to assist members in other teams. Performance improvement objectives, together with the means to improve the process, permit the teams to focus their collective talents and energies on products and services that exceed customer expectations. These recent studies indicate that the teamwork concept in organizations remains a critical element to ensure organizational success today.

In summary, Follett's "law of the situation" and "science of cooperation" as well as Barnard's

"cooperative systems" appear to have several parallels with Deming's "partnership for quality." Participative techniques such as teamwork, quality circles, quality control, and quality assurance are just the beginning of the evolution and transformation to TQM in organizational life. Meaningful team goals, targets, and performance indicators that support the organizational mission are essential elements in the continuous improvement of TQM philosophy. Tools and processes in team building as presented by Scholtes represent practical and technical aspects of TQM. These tools and processes will help organize the data collected by the team, select a process driver to work on, help establish criteria in which to value top ideas, and help the team develop ideas for the implementation plan. This systems approach is in fact the foundation of the organization's process-improvement strategy. This indicates a complementary and mutual relationship between theoretical and practical aspects of TQM. This also leads our discussion to the technical aspect of this dissertation: management of an IS development methodology. This is also the last TQM dimension of this study.

Management of an IS Development Methodology

Deming sees the need to devise a system that allows for systematic incorporation of employee created information into daily work. This to be done by having workers engage in statistical analysis of their work and using information in quality control circles to identify problems and solve them. Deming's focus was thus primarily statistical quality control. His emphasis was on physical measurements, and he urged managers to focus on the problems of product variability and their causes. What Deming called "process improvement" or "ever-increasing quality" meant continually reducing the amount of variability in the process, thus reducing the variability in the resulting products and services. This is condensed in his thirteenth point: "Institute a vigorous program of education and self- improvement" (Deming, 1986: 24, 86). Deming believed that everyone in the company must learn the basics of statistical quality control in order to define quality related

problems and their causes, as condensed in his sixth point: "Institute training on the job" (Deming, 1986: 23, 52).

In modern organizational life, IS grows at a tremendous pace since the first development of computers in the late 1940's. Today, organizational success heavily depends on information technology and effective information flow within the organizations. IS allows the organizations to collect and organize data and to create the information needed at all levels. The organizations then use IS as the key information tool to identify, prioritize, and solve problems. Managers at different levels need different types of information in a timely manner so that managerial decisions can be made without delay based on up-to-date information. A well designed IS offers significant benefits as a tool for efficiency that increases internal customer satisfaction with timely responses. In this sense, user interface is the key to a successful IS. As an IS becomes known as reliable and timely, it will immediately be recognized, trusted, and used more often by the user community. That user satisfaction element is the essence of a quality IS.

The systems life cycle is a process in which an information system is developed, implemented, maintained, and replaced. Depending on specific goals and objectives of the organizations, a specific approach for a system life cycle development is adopted. Generally, a system life cycle consists of phases, stages or steps. Each phase, step or stage consists of tasks, sub-tasks, and activities which can all be quite substantial and therefore a great deal of coordination is often required. As an IS development process goes from concept to implementation, it passes through the various phases of a typical system life cycle: "(1) Systems Analysis; (2) Systems Design; (3) Equipment Selection and Requisition; (4) Programming; (5) Testing and Conversion; (6) Installation; (7) Operations; (8) Maintenance; and (9) Follow-Up Evaluation" (Lord, 1983: 396). During this process, coordination must take place at all levels, from technical to non-technical staff, from management to non-management, and from the start to the end of an IS development life cycle. In other words, coordination must be able go across organizational lines to reach mutual

agreement and understanding with other groups. In this sense, the IS development life cycle is a process that can always be improved in the quest for efficiency and effectiveness to increase quality and meet the needs of the internal customers in order to achieve the organizational goals and objectives.

It is interesting to note that, from a process viewpoint, the phases of an IS development life cycle appear to have several parallels with the systems approaches developed by Dunn; Greenberger, Crenson & Crissey; Hillier & Lieberman; Manheim & Rich; and Rubinstein. Let us briefly show the process of each model. Each one has its own process depending on its environment, but all start with identification of a problem and end with a solution for that problem.

Dunn's process in policy analysis (1981: 44) suggests that the "knowledge of what is (fact), what is right (values), and what to do (action) requires the production of five types of information." These are Policy Problems, Policy Alternatives, Policy Action, Policy Outcomes, and Policy Performance. These five types of information are related and interdependent. Greenberger, Crenson & Crissey's formal model (1976: 64) is "determined by its choice of Theory, Data, and Methodology. These three factors are interdependent so that the choice of one impinges both upon the other two and upon the formal model itself." Another process is Hillier & Lieberman's operations research model in management theory (1974: 738). They summarize its phases as follows: "(1) Formulating the Problem, (2) Constructing a Mathematical Model to Represent the System Under Study; (3) Deriving a Solution from the Model; (4) Testing the Model and the Solution Derived From It; (5) Establishing Control Over the Solution; and (6) Putting the Solution to Work: Implementation." In the political science arena, Manheim & Rich (1986: 5) examine several research methods and suggest that the "research process consists of six distinct but highly interrelated stages: (1) the Formulation of Theory; (2) the Operationalization of that Theory; (3) the Selection of Appropriate Research Techniques; (4) the Observation of Behavior; (5) the Analysis of Data; and (6) the Interpretation of Results." Finally, Rubinstein's process model (1986: 7) "focuses

on three main elements: Initial State, Goal State, and Processes. A process may consist of actions that can bridge the gap between the initial and goal states. The goal state must include what we wish to achieve as well as what we wish to avoid." In summary, each of these models represents a unique approach in problem solving by utilizing the systems approach which has been defined as follows: (1) a way of thinking, (2) a method or technique of analysis, and (3) a managerial style (Johnson, Kast & Rosenzweig, 1973: 19).

Although the impacts and effects of technological change and IS are seen in organizations today, earlier literature on organizations either failed or ignored to recognize them. IS is regarded as technical rather than an organizational process or change. During the 1980's, scholars began paying attention to the role of IS and its impacts and effects on organizations to some degree (Beniger; Huber; Martin & Overman). In a study based on systems theory, Beniger (1986) suggests that the increasing role of IS in organizations is in fact fundamental to the nature of the relationship between information and control. In this sense, IS within organizations is just an extension from which control can be achieved in order to advance the organizational agenda and accelerate needed organizational changes. Huber (1990) attempts to address the role of IS in organizations. He focuses on how and to what extent IS activities play in this role. His intention is to discover a link between IS and organizational activities and how close is the relationship between them. Martin & Overman (1988) offer a hypothetical conceptual linkage between the role of IS and organizational theory in a study. Based on their research findings, they suggest that, despite the centrality of the organization to the notion of an IS, there's still a lack for a serious debate of technology and IS in the foundation of organizational theory.

When the TQM movement became a phenomenon in the early 1990's, many organizations began to rethink the way in which they increase productivity, reduce costs, and improve profitability. People started thinking seriously about how technology and IS can contribute to this process (Chou, Yen & Chen; Jurison; Matta, Chen & Tama; Ravichandran & Rai). In a study to

examine the software quality management in organizations, Chou, Yen & Chen (1998) propose a "TQM-based IS auditing framework" with a commitment to provide software quality to software's users. They provide a linkage between the IS development life cycle and the Deming's PDCA (Plan-Do-Check-Act) cycle. By aligning the IS life cycle with TQM disciplines, they suggest that the proposed "TQM-based auditing framework" could enhance effectiveness and efficiency in organizations. Based on systems theory, Jurison (1994) presents a conceptual model that provides a framework for understanding the principles of TQM and their effects on IS in organizations. He suggests that TQM introduces changes in organizations and consequently creates new requirements for IS. This conceptual model also provides a framework for understanding the limits and opportunities of TQM and other process improvement efforts in organizations. Matta, Chen & Tama (1998) stress the role of IS in implementing TQM in organizations. They suggest that "TQM is an information-intensive management system" and present evidence from an empirical study that information technology and IS are critical elements of TQM. They then develop a model using data flow diagrams to indicate information requirements in TQM organizations. Their purpose is to demonstrate that information technology and IS are becoming critical elements in organizations. Ravichandran & Rai (2000) identify the following factors critical for a quality IS from an organizational perspective: leadership, infrastructure, process efficacy, and teamwork. They favor a total systems approach over a piecemeal approach in the IS development process.

Recent studies by Lin; Siddiqui & Rahman offer an additional TQM perspective in IS development processes in organizations. Lin (2010) develops an empirical model to study the effects of IS quality and management commitment on IS usage and tests his data collected from several companies via survey. Results indicate that IS quality affects IS usage through user perceptions of usefulness and satisfaction of the system. Results also reveal that leadership commitment influences perceived usefulness and IS usage. The study concludes that high quality IS

design increases user satisfaction. When users perceive IS as improving their job effectiveness, it is very likely that they have a greater satisfaction with the system.   Siddiqui & Rahman (2007) conducted a case study to evaluate the role of TQM in IS to realize organizational goals. Four areas of concern were addressed: (1) management support for TQM in IS; (2) benefits of TQM in IS; (3) relationship between TQM in IS and management support; and (4) relationship between benefits of TQM in IS and TQM principles. Results of this empirical study suggest that TQM and IS can be helpful in improving the quality of products and services offered to the customers.

The theoretical foundation consisting of the five TQM dimensions has been explored, reviewed, and discussed. Within this context, Deming's "System of Profound Knowledge," Deming's "Plan – Do – Check – Act (PDCA) cycle" and Deming's "14-points" are embedded in the review and discussion of each of the five TQM dimensions. As such, this theoretical foundation serves as a basis of the purpose of this dissertation. The next questions will be: Is TQM literature still relevant today? Is Deming's philosophy still relevant today? This leads our discussion into the next section.

Current Relevance of TQM Literature

Recent literature indicates that over time as TQM has entered its maturity, it also has become more controversial. Some writers ask whether there is such a thing as TQM (Hackman & Wageman, 1995). That line of inquiry provides a basis for further study of TQM in theory and in practice (Gregory et al., 2009; Gummer, 2000; Schwartz, 2005; Symons & Jacobs, 1995; Westphal, Gulati & Shortell, 1997). In addition, TQM case studies have become more popular for examining the organizational culture (Cameron & Sine, 1999; Kannan, Tan, Handfield & Ghosh, 1999; Kristmundson, 2003; Oakland & Porter, 1994; Vass & Kincade, 1999). Furthermore, TQM as a field of study has been recognized with the introduction of many

textbooks that provide concepts and principles of TQM theory and in practice (Brown, 2006; Dale, 1999; Lederer & Karmarkar, 1997; Swift, Ross & Omachonu, 1998; Zink, 1998). Within the context of the examination of the state of TQM today, four streams of recent literature will be reviewed: (1) TQM Matures; (2) TQM Expands to the Public Sector; (3) TQM and IS; and (4) Bringing TQM and IS together in the Public Sector.

TQM Matures

As TQM matures the literature tends to focus on the practical aspects (Creech; Ross & Perry; Summers). From this perspective, Creech (1994) praises Deming for what he contributed to the quality movement, but also places his contributions in the needed perspective of those seeking real results in real life. For that reason, Creech offers a practical approach to structure and manage organizations for success. His management philosophy, while mindful that most organizations are not democracies, is essentially a variation on the golden rule embodying basic decency toward others as a core unifying theme. His approach is summarized as empowerment with accountability and is based on the realization that loyalty is a two-way street and that an organization can only be as successful as those at the bottom are willing to make it. Creech's emphasis is on the need to attend to all five pillars of TQM: (1) Product; (2) Process; (3) Organization; (4) Leadership; and (5) Commitment. Creech's approach focuses on a properly trained and empowered workforce that share in the rewards and successes of the organization. It is only when all five pillars are in alignment that organizations begin to get dramatically better results since a piecemeal approach would only produce minor improvements. According to Creech, organizations need to get a clear picture of what constitutes quality in their products and services; organize the work processes with small teams; provide appropriate training to everyone, from top leaders to employees; and provide clear feedback on how well the organizations are doing. This advice is the backbone of Creech's approach.

Ross & Perry (1999) define TQM as the management approach of an organization centered on quality, based on the participation of all its members and aimed at long-term success through customer satisfaction as well as benefits to all members of the organization and society. They explain the concept of TQM as a management strategy that seeks to embed awareness of quality in all organizational processes. TQM requires that organizations maintain quality standards in all aspects of the business. As such, the concept of TQM involves the integration of all functions and processes in an organization to ensure that it achieves continuous improvement of its products and services to meet customer needs. The bottom line is that quality starts with understanding customer needs and ends when those needs are satisfied. This approach ensures that things are done right the first time and that defects and waste are eliminated from operations. Specifically, from a business aspect, marketing processes should establish the true requirements for products or services; and these must be communicated properly throughout the organization in the form of specifications. Excellent communications between customers and suppliers are the key to a total quality performance; for this, organizations must establish feedback systems to gather customer information. Appropriate research techniques should be used to understand the "market" and customers in order to maintain the external perspective. Hence, IS personnel must understand customers' requirements and consider delivering customer satisfaction as their primary goal. The approach is inherently simple - listen to the customers and respond to what they say. According to Ross & Perry, an organization should have a wide range of methods for listening to their customers, ranging from market research to asking customers detailed questions about how they feel about a specific transaction with the organization. From this data, an organization can build quantitative models of customer satisfaction drivers which enable it to ensure that internal measures are aligned with what customers truly want.

Summers (2007, 2009) provides the basic tools and techniques supported by examples, cases, and problems from real life experiences of people who apply them in their daily activities. She

makes an excellent connection between quality and ethics. Although the topic of morality may make some uneasy, she argues that it is an important issue to be addressed. She also suggests solutions for the fragmentation of today's organizations and its negative consequence on quality. Summers details the concepts, and through cases and surveys, measures the perceptions of people in organizations. She provides insights into a real organization's pursuit of excellence by exploring how quality management has progressed from an emphasis on the management of quality to a focus on the quality of managing, operating, and integrating all aspects of the organization encompassing customer service, marketing, production, delivery, information, and finance. In an ever-changing world, Summers concludes that the philosophies, tools, and techniques of quality management helps organizations manage their business effectively.

Several names have been applied to TQM since the first days of the quality movement: Just-In-Time (JIT) and Total Quality Control (TQC) in the 1980's, Total Quality Management (TQM) in the 1990's, and then the Lean Six Sigma since the 2000's. However, by whatever the names its carries, these names all refer to quality and continuous improvement process in organizations with a focus on the customer. In other words, TQM has not gone away; it has just been renamed over time.

Since the 2000's, "lean" processes have often been referred to in studies on quality improvement processes (Gitlow; Mann; Schonberger). Generally, a "lean" process is a data-driven quality management system for improvement of organizational processes. This process calls for specific tools and techniques that the organization needs once this quality foundation is established. Lean processes focus on the basic measurement and analysis techniques that can actually be used and understood by managers at all levels, without the ambiguity and fear of "statistical process control" terminology. Along this line, Gitlow (2009) provides guidance to help corporate managers learn and practice "lean" principles as a roadmap for setting the proper

foundation of a Six Sigma program. Gitlow also explains how to build a "lean" organization that both encourages and values the input of quality teams, and details the steps they must take to implement and maintain "lean" projects to make a solid impact on the organizational business. Backing up his points are data from a number of case studies to ascertain what works, and more importantly why. He demonstrates the implementation of quality improvement in all areas of organizations and explains the reasons for why Six Sigma should be the preferred approach to quality improvement in today's "lean" organizations.

Mann (2010) provides a practical and actionable guide for "lean" leaders or those who strive to become "lean" leaders. He helps make concrete the vague notion of a "lean culture" and spells out steps leaders can take to start moving in that direction. He does not promise quick fixes, but instead suggests the right path to develop an organization's people, leaders, and problem solving capability. This includes providing a prescription to help management get itself realigned with standard roles and specific daily tasks at all levels. Mann challenges organizations to change their "management system" in order to change the culture. Once focus is put on the "management system," organizations can observe and measure the impacts which will then translate into cultural shifts. He identifies the old habits and behaviors in organizations that must be extinguished before the new system can prosper. With the root causes of problems firmly identified, Mann then states three elements for organizational long-term success: (1) "Leader Standard Work" models that set expectations, measure performance and adjust publicly; (2) "Visual Controls" that ensure that standards, measurements and adjustments are employed everywhere; and a (3) "Daily Accountability System" at three levels to ensure that visual

controls work and that process improvement opportunities are identified and translated into action.

For his part, Schonberger (2008) provides a big picture of leanness and how companies can succeed using "lean" principles. He offers management a detailed examination of "lean" process improvement strategies, and how to focus the processes on four key goals to be met in behalf of customers: (1) Better Quality; (2) Quicker Response; (3) Greater Flexibility; and (4) Higher Value. He also provides an in depth look at what "lean" actually means in today's competitive market. This is done by examining companies with the world's longest, steepest rates of improvement in leanness and analyzing how they have achieved their success. Schonberger classifies the companies in several ways and evaluates several common practices in terms of their effects on "lean." It is clear he has spent a considerable amount of time reviewing numerous companies to determine what makes them successful. He rates their "lean" progress based on changes in their inventory turnover data and includes many observations of these companies spanning multiple years.

The drive for TQM has always been at the top of the agenda of many organizations in the private sector. In the past decades, TQM began to spread far beyond the private sector into the public sector (Blundell & Murdock, 1997; Bowman & Hellein, 1998; Koehler & Pankowski, 1996; Miller, 1998; Poister & Harris, 1997). However, whether or not TQM philosophy can be applied with equal success to the public sector was unknown in early literature (Berg, 1997; Hedley, 1998; Jurkiewicz, Massey & Brown, 1998; Kearney & Berman, 1999; Morgan & Murgatroyd, 1994). Yet as TQM expands further to the public sector, recent literature reveals

48

challenges and opportunities (Bovaird & Loffler, 2009; Farazmand, 2005; Rinehart, 2006; Symonds, 2009). Sometimes TQM has been hailed as a success at the local and state government level (Kluse, 2009). However, whether or not TQM philosophy can be applied to the public sector overall still remains an empirical question (Al-Hakim, 2007; Ingraham, 2007; Stupak & Leitner, 2001). This leads our discussion to the next topic, TQM Expands to the Public Sector.

TQM Expands to the Public Sector

In the public sector, the sharing of ideas, philosophies, techniques, strategies and processes involving quality and productivity provide insights for organizational change and improvement. The transformation from a traditional bureaucracy process to a customer oriented process offers many opportunities for public organizations to reduce operating costs and increase the delivery of quality customer service. TQM has been proven to be an extremely powerful tool in the private sector. However, making the switch to TQM is not a minor decision for many public organizations. Experimentation with quality circles, quality assurance, or quality control represents relatively incremental changes, but implementing a total quality philosophy such as TQM is indeed a major undertaking.

Can TQM live up to the expectations of organizations that adopt it? Little is known about the extent to which TQM is being used and how effective public organizations perceive it to be. Terminologies such as quality, customer service, teamwork, continuous improvement, empowerment, and employee involvement have gained recognition in a dedication to change the nature of work in the United States. In many respects, the philosophy of TQM is not always

consistent with traditional and conventional organizational theory or management theory. TQM application to the public sector is one of the most pressing issues in American society. Nevertheless, since the 1990's, the fact is that TQM has gained a substantial foothold in the public sector and achieved acceptance among those government agencies that are most active TQM tool users, is an encouraging development.

However, TQM experience in the public sector reveals a mixed picture over time (Boyd; Holzer, Charbonneau & Kim; Van Seaton). In an empirical study of state-level administrative reforms and organizational changes in Pennsylvania, Boyd (2009) noticed that TQM was implemented with success in some agencies but not others. The reason for this mixed result is that, as Boyd summarized, "TQM was typically conceived within a department, and sometimes shared with other agencies, but it was never a priority of the governor or upper level executive staff. Where it did take hold, it was promoted by the top executive leader of an agency or bureau and implemented at multiple levels or in pockets of an organization" (Boyd, 2009: 235). Simply stated, it was just a product of a piecemeal approach of TQM implementation. Only when TQM was seriously taken by the next governor, who instituted a top down vision of the state by advancing a number of policy goals in the process of "reinventing government," did the desired outcomes of TQM in administrative reforms and organizational changes become the desirable results. The success of Pennsylvania state government was due largely to the fact that it is associated with "reinventing government" and noticed that real successes were being achieved in other states (Boyd, 2009: 246). Another contributing factor to the success of Pennsylvania was that, as Boyd noticed, "the governor knew he was the CEO of the state, so he turned to CEO input to understand and use a

business change process model inside government" (Boyd, 2009: 245).

In an attempt to review and analyze the public-service quality improvement in the United States in the past twenty five years, Holzer, Charbonneau & Kim (2009) formulate a new focus on citizen satisfaction. They suggest that, "As in the private sector, quality improvement in government requires more than just increased efficiency. It is now viewed by public sector practitioners and academics as an effective vehicle for achieving public organizations' goals that citizens had been promised and that they expect to be fulfilled to their satisfaction" (Holzer, Charbonneau & Kim; 2009: 404). As the TQM movement does not now occupy the public spotlight as it did in the 1990's, they visualize a new conceptual foundation of the research trend on public quality improvement. This trend can be classified into three categories: "quality circles [QC], total quality management [TQM], and citizen satisfaction." They call these the "conceptual pillars in the quality improvement trend" in the United States. Although research on citizen satisfaction was present before those of QC and TQM, it became less visible when literature on QC and then TQM came into the picture. Thus, only when literature on TQM started to fade away, did literature on citizen satisfaction return. They suggest that it is now the "mainstream of the quality and quality improvement literature [because] relying on citizen satisfaction data to determine improvement of quality in public services makes sense" (Holzer, Charbonneau & Kim; 2009: 408).

In a recent empirical study, Van Seaton (2010) examines the implementation of Six Sigma's concepts and techniques in a government agency in Florida. In the early 1990's, TQM was introduced to the public sector in many forms, following increased use by the private sector.

TQM techniques include quality circles, customer surveys, quality control, and quality assurance. The purpose of these TQM techniques is to identify and analyze organizational problems, as well as develop optimal solutions to improve performance in order to meet expectations of the citizens. Since the 2000's, escalating pressures for improved performance have encouraged the adoption of more comprehensive approaches to reinvent the way business is done with regard to quality. As a result, many public organizations have adopted quality innovation approaches with varying degrees of success. The quality measurement performance management system such as Six Sigma is considered one of them. Van Seaton defines Six Sigma as a "rigorous application of principles-based continuous process improvement methods, tools, and a statistics-based analysis of processes" in this study to examine its "effects and organizational culture impacts" in a state agency in Florida. His methodology is to employ both qualitative and quantitative research techniques including "a non-experiment, concurrent, mixed research design using semi-structured interviews and a survey questionnaire" (Van Seaton, 2010: 77). Results from his study indicate that, (1) The implementation of Six Sigma was expected to provide for improvement in operating results and also to bring a cultural standard for quality and operations measurements; (2) The organizational culture among various groups is commonly shared which means that there is no difference in perceptions among the groups investigated; and (3) Without an effective long-term training program, no organization can successfully implement Six Sigma (Van Seaton, 2010: 90). Based on this study, Van Seaton believes that a quality management system such as Six Sigma could be as powerful a tool in the public sector as it had been in the private sector. Its practices provide public organizations a framework to increase productivity and improve competitiveness. For state government agencies, since they have been the most recent

organizations to adopt TQM techniques, it encourages them to turn their attention to the citizens they serve by providing accurate and reliable information that they need.

In organizations, public or private, accurate and reliable information must be carefully processed and measured prior to being released. The primary purpose of the measurement process is to provide information and data to organizations so that organizations could continually strive to improve performance, reduce costs, satisfy customers, and achieve organizational goals and objectives. In fact, the measurement process is an essential tool for reaching organization's goals and objectives. In addition, when employees understand their role in the organization's goals, strategies, and objectives, they work in an environment of trust, in which a favorable environment for measuring a quality performance will follow. Similarly, IS development is a process in which accurate and reliable information and data are collected, processed, and provided to the user community in an effort to advance common organizational goals and purposes. In this sense, the IS development process is in fact a measurement process. This leads our discussion to the next topic, TQM and IS.

TQM and IS

In the later years of the 20th century, empirical research in organization and management theory has shown an increasing interest in the role of IS in modern organizations (Ahire, Golhar & Walter, 1996; Anderson, Rungtusanathan, Schroeder & Devaraj, 1995; Black & Porter, 1996; Flynn, Schroeder & Sakakibara, 1995) as well as in many European countries (Boddy, Boonstra & Kennedy, 2002; Drew & Edgeman, 1999; Bergman, Klefsjo, Edgeman & Dahlgaard, 1999). IS had grown rapidly in the past decade and become essential to modern organizations. As today's IS is confronted by an increasing number of fully informed and well educated users with

the help of the Internet revolution, questions about the quality of information provided by IS have frequently surfaced (Armitage & Keeble-Allen, 2007; Draper & Ames, 2000; Surplus, 2000; Weimer & Munyan, 1999).

Additional research has specifically put strong emphasis on the application of TQM thinking in an IS setting (Braithwaite, 1994, 1995; Devagrass, 1995; Keyes, 1995; Dawes, Bloniarz, Connelly, Kelly & Pardo, 1999; St Clair, 1997). IS must produce sufficiently good information to satisfy users' needs (Bamford & Deiber, 2004; Zahedi, 1995). In the academy many doctoral dissertations on the subject have been written since the 1990's (Winchell, 1999: 71-74). Doctoral dissertations with a strong emphasis in TQM have also been written in the same period (Winchell, 2000: 74-82), and some contribute importantly.

Braithwaite (1994) presents a set of principles for any IS organization regardless of whether or not it elects to implement TQM. Some are broad in nature such as: (1) Managing by Prevention; (2) Identifying and Measuring the Cost of Quality; and (3) Measuring the Performance of the Business Processes in which IS are chartered to support. Furthermore, Braithwaite discusses TQM within IS as found in the systems development processes. Areas such as IS service delivery, support and production are covered. He begins by discussing perceptions within organizations regarding IS users, "bottom line" issues, and the IS development processes. He suggests a model to implement TQM in IS with a strong emphasis on the user community. This model incorporates specific TQM elements with a focus on the involvement of internal users in the systems development process that would support TQM initiatives in three specific phases of the system life cycle: (1) the requirements phase; (2) testing phase; and (3) delivery phase. Influenced by Deming's "14-Points," Braithwaite aligns each of these points to the IS development processes and proposes four different elements to address the

structure and approach for institutionalizing management of change in organizations. They are: (1) management; (2) measurement; (3) education; and (4) employee involvement. He suggests that this approach would address three main areas of concern for a TQM within IS such as: (1) creating a quality culture within IS; (2) ensuring that all major stakeholders in organizations are involved; and (3) preventing IS from operating in a vacuum. He concludes his study with a discussion of future directions for IS within the context of TQM that include organizational long-term vision, organizational change perceptions of the user community, and the organization through IS performance.

In another study, Braithwaite (1995) discusses the power of IS and information technology (IT) in modern organizations. He presents a business-oriented approach to IS and IT planning and implementation. Managing and implementing IS with IT knowledge in mind are becoming critical in modern business management. IS could be considered an effective tool in helping organizations make decisions about IS and IT related issues, he argues. As such, gaining an understanding of the highly complex world of today's rapidly evolving technology is critical to business leaders. Braithwaite contends that IS leaders need to be particularly thoughtful when evaluating systems and alternatives. His central theme is to ensure that any potential investment in technology is thoroughly examined against critical factors that arise in the IS development life cycle, such as technical, operational and economic factors. A secondary theme is to examine each of those factors using feasibility and trade-off analysis. The purpose of his approach is to perform this analysis at each stage of the IS development life cycle with an emphasis on performing the most rigorous analysis early on in the requirements and design stages. In this

study, Braithwaite does not focus on details of the systems; instead he concentrates on the results of the systems. An underlying theme is that IS should not be explored and implemented just because IT is out there, but only when and where IS is needed and will provide benefits to the organizations while having the cost justified within the context of TQM.

Recent empirical research indicates that interest in the role of IS in modern organizations, public and private, still remains strong in organization and management theory (Gingrich, 2003; Guimaraes, Amstrong & Jones, 2009; Mchardie, 2007; Zhu, 2010). Additional research has specifically put a strong emphasis on the application of TQM in an IS setting to achieve continuous improvement and satisfy customer needs (Coffee, 2006; Hoyle, 2009; Land & Walz, 2006; Nanda, 2005; Opara, 2010). Furthermore, TQM literature has begun paying attention to the relationship between an IS development process and other dimensions of TQM such as leadership commitment, organizational culture, teamwork, and customer satisfaction (Burda, 2010; Cronley & Patterson, 2010; Ryan & Raducha-Grace; 2009; Summerill, Pollard, & Smith, 2010). In order to support the organization's objectives, *quality* IS is required.

Measuring IS quality must be a joint effort of both the IS and the user community. To address this issue, Guimaraes, Amstrong & Jones (2009: 42) begin with the following statement in their study: "Information Systems (IS) are of critical importance to most organizations for many reasons: they are basic to most business processes, they are integral parts of many products and services, they support decision-making at the operational and strategic level, and whole industry sectors are very dependent on them for their very existence. Needless to say, the quality of something so important must be assured." The point cannot be truer. As information technology (IT) continues to grow in

the Internet age with the invention of new technologies, IS must follow suit; indeed this is happening in the Internet age.

Therefore, the issue of measuring IS quality becomes central today. Guimaraes, Amstrong & Jones use an existing system-quality model to evaluate and examine the different aspects of a comprehensive measure of IS quality in practice. In their study, IS and systems perspectives on quality lead to the following worrisome observations: "A common theme among the organizations supporting this study is that while system quality is clearly recognized as very important to the company in general and to the IS departments in particular, limited human resources and time constraints prevent them from pursuing system quality to the necessary extent" (Guimaraes, Amstrong & Jones, 2009: 49).

In an effort to address the economic aspect of IS, particularly the concept of cost-benefit analysis and return on investment, Ryan & Raducha-Grace (2009) provide a framework and methodologies that can guide IS and IT organizational leadership through the process of transforming their customer relationships in this direction. Their purpose was to show the way in which leaders can bridge the gap of information with the IS and IT community by addressing the following technical processes in the framework: (1) event management, (2) incident management, and (3) configuration management. They examine four specific areas of IS and IT business practices such as: (1) improving services and costs, (2) managing costs and values, (3) measuring IS and IT performance with a goal of improving services and lowering costs, and (4) improving customer relationships. Their goals are to predict and lower costs and to meet customer objectives repeatedly. The framework that they suggest will help IS and IT leaders

57

understand the process in order to gain valuable knowledge of the human systems that support IS and IT in organizations. This framework is especially helpful for organizations that seek to improve IS and IT business practices such as IS development processes and IT investments, IS and IT financial management, and IS and IT performance management. It is critical that organizations allow such a framework as this to gain control of the processes in order to achieve the goals of efficiency and effectiveness in products and services and maximize the effects of IS and IT investments. As such, this framework requires a fundamental change in organizational culture and the way in which business is done. Most importantly, it should start at the right phase and end at the right phase, whether to improve existing practices or to introduce new products and services. The measurement of tasks, items, or actions of each phase in the framework must be done within the organizational context in which each phase operates. In summary, with this study, Ryan & Raducha-Grace aim to provide IS and IT leaders with practical methods to achieve greater business discipline throughout IS development processes and IT investments, collaborate more effectively, increase organizational attention to customers, and gain greater value from IS and IT investments.

So far, I have discussed the centrality of TQM application to IS sub-organizations. However, the nature of this dissertation requires an exploration of TQM and IS in the public sector to which we now turn.

Bringing TQM and IS together in the Public Sector

As TQM comes of age, it generates new perceptions. However, it should be noted that, from Deming's perspective, quality is a journey and not a destination. It starts with a long-term

vision which requires an understanding and support from all members of organizations, public or private, from managers to employees, and to customers. The journey to TQM has been more eventful to some organizations and not with others. This is understandable due to the fact that organizations are not equal. In fact, organizations are indeed different, either private or public. This complicates the question to be addressed here, how to bring TQM and IS together in the Public Sector?

In the early days of TQM, literature that explores its relation to IS in the public sector has been almost nonexistent. Recent literature has gradually begun to fill this gap (Baranzelli, 2009; Shea & Garson, 2010). In an empirical case study, Baranzelli (2009) explains how the Illinois Department of Transportation (IDOT) achieved ISO 9001:2000 certification. The International Organization for Standardization (ISO), claims it "is the world's largest developer and publisher of International Standards" ("*About ISO*") and ISO 9001:2008 "is the standard that provides a set of standardized requirements for a quality management system, regardless of what the user organization does, its size, or whether it is in the private, or public sector" ("*ISO 9000 Essentials*"). In July 2009, IDOT became the first state transportation agency in the United States to attain certification under this ISO. Baranzelli details the way in which this was done. In essence, he interprets the ISO 9001 standard as a checklist of specific actions that need to be taken to implement them in IDOT within the context of quality management principles. Every requirement is systematically explained with regard to implementation, procedures and records, and the way certification auditors will verify conformance. He illustrates with particulars the abstract concept of Deming's "Plan – Do – Check- Act (PDCA)," making it more relevant to internal auditors and enhancing their ability to conduct value-added assessments of IDOT.

Based on this case study, Bazanzelli suggests that a quality management information system based on the requirements of the ISO 9001 standard can improve the ability of public organizations to implement their strategy and achieve their goals in what is called a "process approach."

As the field of public information systems has continued to evolve in the 21st century, Shea & Garson (2010) examine the use of IS and the growth of information technology (IT) in government agencies. This evolution has presented many issues that public administrators have to deal with as they enter the information age. Most of the issues that are examined fall into two categories: (1) Delivering IS and IT projects on time and within budget, and (2) Maintaining privacy, security, and accountability. Technically, this breaks down into (1) modern IS and IT needs, and (2) development of e-governments. Shea & Garson offer a holistic approach to IS and IT management in the public arena that emphasizes communication, understanding, and participation from top leadership, IS and IT teams, and end users. They examine current policy issues in several empirical case studies to demonstrate several applications of IS and IT projects in the public sector.

However, interrelationships between political environments, organizational environments, and technological capabilities are often difficult to summarize and predict in the public sector. Additionally, the impacts of IS and IT projects on government service delivery are neither simple nor routine. Addressing these challenges and opportunities effectively would provide public administrators a path to a better understanding of the issues and successful implementation of IS and IT projects in the public sector.

Summary and Outlook

The literature review in this section has covered two basic theoretical aspects to form a foundation for the purpose of my dissertation: (1) the historical evolution of TQM literature; and (2) the current relevance of TQM literature. On the basis of this literature review, I track down how the conversations and debates in the literature have evolved over time, leading up to my own contribution that justifies the significance of my lessons learned between a then and today comparative project.

In today's competitive atmosphere, many organizations are pursuing TQM in order to improve quality and to satisfy customer demands. IS groups play an important role in this transformation (Tang, Duan, & Chin, 2007; Jen & Chao, 2008; Wang, Chen, Jiang, & Klein, 2005). The core themes from my literature review suggest that Deming's system of management requires a successful IS development effort to adopt all five TQM dimensions for effective transformation: Customer Satisfaction, Organizational Culture, Leadership Commitment, Teamwork, and Management of an IS Development Methodology. An organizational success must be understood to include all those five TQM dimensions at all levels in order to be consistent with Deming's "System of Profound Knowledge" in which all components are interrelated and cannot be separated. A lack of ability to grasp that reality and to cover those areas can translate into a failure, or at least a lack of success.

CHAPTER 3 - METHODOLOGY

In this chapter, we will navigate from the abstract to the concrete. This research employs a case study approach (Yin, 1985: 23; O'Sullivan & Rassel, 1989: 34). The rationale for using a case study is that it is suitable for both qualitative and quantitative research. Qualitative data are obtained from literature and interviews. Quantitative data are obtained and analyzed from surveys. These sources provided a solid foundation for uncovering the lessons learned from the then and the today situations.

Case Study Methodology

The case study methodology is used to systematically and rigorously describe phenomena. According to O'Sullivan & Rassel, 1989: 34), "Case studies provide detail that shows how something happened and why it happened." In this research, the case study methodology is applied to the description and analysis of TQM application to the IS development processes in three public agencies in an open-ended lessons learned approach. The case study approach was chosen over others because it is not only an effective evaluation method, but it also provides an appropriate research design well suited to this study where "contemporary events" are examined (Yin, 1985: 23). Also it provides a framework to explore the study's open-ended lessons and allows me, the researcher, an opportunity to understand the "how" and the "why" of the then situation as it relates to the today situation.

The study incorporates the methods from ethnographic research which is a four-phase process of qualitative research: "(1) Invention, (2) Discovery, (3) Interpretation, and (4) Explanation" (Kirk & Miller, 1986: 62). Since qualitative data and quantitative data are both captured, we benefit from the advantages of both. As has been noted, "Technically, a 'qualitative observation' identifies the

presence or absence of something, in contrast to 'quantitative observation' which involves measuring the degree to which some feature is present" (Kirk & Miller, 1986: 9). By comparing and contrasting various components of the application of TQM in three public agencies, I am able to discover the differences between IS development methodologies that do or do not apply TQM and identify the benefits of the process in an open-ended lessons learned approach between then and today.

Data Collection

The data collection process has been performed in two different and distinct stages and will be described as follows.

In the first stage of the study, I was formally introduced to the top executives of the three public agencies by two Virginia Tech colleagues. These two colleagues, one of them a PhD graduate, were high ranking officials with extensive contacts within those agencies, but were not working directly in the IS departments. In a formal setting, I met with the executive in each agency and presented the Research Plan (Appendix A), Interview Guide for Management (Appendix B), Interview Guide for Technical Staff (Appendix C), Interview Guide for Project Team (Appendix D), Survey Questionnaires for Employee (Appendix E) and Survey Questionnaire for Customers (Appendix F) to obtain approval for field research. The office of the executive of each agency made all of the arrangements for the data collection process, including the selection of interviewees for face-to-face interviews, selection of people in the user community to receive written Survey Questionnaire, and the scheduling of the meetings. As such, the data collection process consists of both qualitative and quantitative data. After the completion of all interviews, qualitative data

captured from interviews that had been summarized in the form of an Interview Summary Report are shared with each agency for accuracy and feedback. This report is presented in Chapter 4. After receiving survey responses by the agreeable timeframe, quantitative data obtained from surveys were analyzed and reported by a simple descriptive statistical summary and shared with each agency so the readers could make their own judgments about the precision of the findings. This report is also presented in Chapter 4.

In the second stage of the study, I attempted to reconnect with the same agencies in an effort to continue with the research. However, the organizations involved had undergone tremendous changes since the first stage of the research and the executives present were no longer working there. In addition, the two Virginia Tech colleagues who helped me establishing contacts with the agencies were also relocated to other states. Fortunately, during this critical time, two other Virginia Tech colleagues stepped in, offered assistance, and formally introduced me to the new executives of the three agencies. These two Virginia Tech colleagues, both of them PhD graduates, were also high ranking officials with extensive contacts at those agencies during this recent period, but were not directly working in the IS departments. Again, in a formal setting, I met with the executive in each agency and presented the Research Plan (Appendix G), Interview Guide for Management (Appendix H), Interview Guide for Technical Staff (Appendix I), and Interview Guide for End User (Appendix J) to obtain approval for field research. Only qualitative data were needed for this second stage of the study. Again, the office of the executive of each agency made arrangements for the data collection process, including the selection of interviewees for face-to-face interviews and the schedule of the meetings. After the completion of all interviews, qualitative data captured from interviews that had been summarized in the form of an Interview Summary Report

are shared with each agency for accuracy and feedback. This report is presented in Chapter 4.

In both stages of the study, organizations were not identified in the final dissertation product. Each organization was assigned a coded identifier and referred to as Agency 1, Agency 2, or Agency 3. One critical aspect of the strengths of the case study methodology is that it involves multiple sources of evidence in the data collection process (O'Sullivan & Rassel, 1989: 34). To maximize that strength, the data for this study had been collected and analyzed from documentation, survey questionnaire, interviews, direct observations, and secondary materials to include journals, books, articles, and newspapers. Each source is described in further detail below.

Documentation (Yin, 1985: 92) includes reports, memos, newsletters, and other materials voluntarily furnished by the organizations involved upon request. This data collection technique was used in both stages of the study. In an effort to not compromise the security concerns of the organizations, I requested only TQM-related documents that are not confidential or secret. These documents include but are not limited to: organizational charts, TQM policies, training policies, and system life cycle methodology. These are primary data and are necessary to corroborate and augment evidence from other sources. This is an important aspect of the case study approach in which I was given access to a degree not available to the general public (Yin, 1985: 92).

Since multiple sources enhance the reliability of the results (Kirk & Miller, 1986: 41; Manheim & Rich, 1986: 63; Bainbridge, 1989: 219), other relevant materials obtained by my own efforts were added to the data base for analysis. In both stages of the study, the leadership of the agencies was very open, cooperative and provided necessary and helpful documentation to support this research effort upon request.

Interviews (Yin, 1985: 61; Manheim & Rich, 1986: 116) were conducted at several levels of management, technical staff, project teams, and end users. This was done in both stages of the study. The purpose of these interviews is to capture the respondents' perception of their own experience in developing a computer system. During the course of the preparation steps for the interviews, interview guides were prepared and presented to the IS Department Head for review and feedback.

The format of the interview was "focused" in that I followed a set of prepared questions. In the second stage of this dissertation project, these questions were prepared to relate to the purpose of the study and covered five dimensions of the study: (1) customer satisfaction, (2) organizational culture, (3) leadership commitment, (4) teamwork, and (5) management of an IS development methodology. On the other hand, in the first stage of this dissertation project, the first dimension of the study, Customer Satisfaction, was covered by questions from the Customer Survey Questionnaire. Separate sets of questions were prepared for IS management, the IS project team and IS technical staff, as listed in the appendix. For the first stage of study, there were three interview guides: Interview Guide for Management (Appendix B), Interview Guide for Technical Staff (Appendix C), and Interview Guide for Project Team (Appendix D).

Appendix B, the Interview Guide for Management (IGM-1), consists of twenty nine questions and addresses three areas: (1) management's perception about the organization in general and the systems development process in particular; (2) management's perception about leadership style and effective management practices; and (3) suggestions for improvement.

Appendix C, the Interview Guide for Technical Staff (IGS-1), consists of thirty six questions and addresses four areas: (1) technical staff's perception about the organization in general and the

systems development process in particular; (2) technical staff's perception about the work environment; (3) technical staff's perception about teamwork; and (4) suggestions for improvement.

Appendix D, the Interview Guide for Project Team (IGT-1), consists of twenty six questions and addresses three areas: (1) the team's perception about the organization in general and the systems development process in particular; (2) the team's perception about teamwork; and (3) suggestions for improvement.

For the second stage of the study, there were three interview guides: Interview Guide for Management (Appendix H), Interview Guide for Technical Staff (Appendix I), and Interview Guide for End User (Appendix J).

Appendix H, the Interview Guide for Management (IGM-2), consists of twenty nine questions and addresses three areas: (1) management's perception about the organization in general and the systems development process in particular; (2) management's perception about leadership style and effective management practices; and (3) suggestions for improvement.

Appendix I, the Interview Guide for Technical Staff (IGS-2), consists of thirty six questions and addresses four areas: (1) technical staff's perception about the organization in general and the systems development process in particular; (2) technical staff's perception about the work environment; (3) technical staff's perception about teamwork; and (4) suggestions for improvement.

Appendix J, the Interview Guide for End User (IGC-2), consists of twenty one questions and addresses three areas: (1) the perception of the end users about the IS organization in general and the systems development process in particular; (2) how do systems developers and the IS

organization pay attention to the end users as the customers?; and (3) how can the systems development process be improved to better meet the customers' needs?

The preliminary interview guides were pretested through discussions with peers and other IS professionals. Notes were taken extensively throughout the data collection process in order to build an extensive data base for the case study (Miles & Huberman, 1984: 50). All conversations were tape recorded by consent and were later transcribed. The tape recording of the interviews was perhaps the most feasible choice for me in my efforts to ensure that accurate information was captured in a natural and complete way. The transcripts of the interviews were carefully analyzed in order to provide a written summary to the agencies. They were also used in Chapter 4 and Chapter 5. In the first stage of the study, most of the interviews were carried out on a one-to-one basis. In the second stage of the study, most of the interviews included two interviewees in one session. A summary of all interviews was prepared and shared with the IS Department Head.

On an average, each meeting lasted about one hour. Although the information they provided was used and quoted in the study, respondents' identities were kept confidential. Each respondent was assigned a coded identifier such as Manager 1, Manager 2, Developer 1, Developer 2, End User 1, or End User 2 in this final report. In both stages of the study, the interviewees, especially people in a leadership position, were very open, cooperative and helped provide the necessary answers to the interview questions to support this research effort.

The Survey Questionnaire (O'Sullivan & Rassel, 1989: 142; Manheim & Rich, 1986: 105) is designed to measure individual behavior. This data collection technique was used in the first stage of the study. IS professionals were surveyed including managers or team leaders within the IS

Department of each agency. In addition, surveys were distributed to the "customers" or "clients" to obtain evidence of customer satisfaction. The questionnaire was prepared and presented to the IS Department Head for review prior to distribution. It contained the following items: (1) a cover letter which states the purpose of the research project, (2) an introductory paragraph explaining the survey tool, and (3) a stamped return envelope.

In the survey, respondents were asked to use a Likert scale 1 (strongly disagree) to 7 (strongly agree) with a series of items measuring their perceptions of the systems development process. The respondents' identity was kept confidential. The survey instrument was pretested through discussions with my peers and colleagues, most of them IS professionals. The pretest exposed some potential difficulties with the survey and allowed rewording of those questions which were unclear. Since this technique was conducted only in the first stage of the study, two surveys were conducted: the Employee Survey Questionnaire (Appendix E), and the Customer Survey Questionnaire (Appendix F).

Appendix E, the Employee Survey Questionnaire (ESQ-1), consists of sixty four questions. Its purpose is to capture the IS developers and managers' perceptions of quality in the systems development process. This survey serves two purposes: (1) to compare perceptions of quality across systems development departments; and (2) to shed some insight on perceptions of work and leadership style in the IS Department. The survey was divided into four parts and contained sixty-one closed-ended and three open-ended questions. The closed-ended questions provided greater uniformity; the open-ended questions allowed the respondents more freedom to answer. Part 1 consists of questions 1 to 20, for all respondents, and focused on respondents' perceptions about the systems development process, relationships, and quality. Part 2, for Technical Staff only,

consists of questions 21 to 43 and centers on respondents' perceptions of work in the department. Part 3 is to be answered by Managers only, consists of questions 44 to 61, and queried leadership style. And finally, Part 4, consists of questions 62 to 64, was for everyone, and requested respondents' suggestions for improving the systems development process.

Appendix F, the Customer Survey Questionnaire (CSQ-1), consist of twenty one questions. Its purpose is to capture the stakeholders' perceptions of quality in the systems development process. This survey serves two purposes: (1) to compare perceptions of quality across systems development; and (2) to shed some insight on perceptions of the IS Department. The survey was divided into three parts. Within the three parts, there were eighteen closed-ended and three open-ended questions. The closed-ended questions provided greater uniformity. The open-ended questions allowed the respondents more freedom to answer. Part 1 consists of questions 1 to 14 and asks the respondents to express their perceptions about the IS Department in general, and the systems development process in particular. Part 2 consists of questions 14 to 18 and asks the respondents to describe how the IS Department and the systems developers pay attention to them as a customer. And finally, Part 3 asked the respondents to express freely how the systems development process can be improved to better meet their needs.

Direct Observations (Yin, 1985: 92) of work had also been conducted. This data collection technique was used only in the first stage of the study. I met with a team from each agency, and asked the team members questions and observed their reactions. This approach included a set of formal questions following the preliminary interview guides. Questions were prepared and presented to the IS Department Head for review. A summary of all interviews was prepared and

shared with the IS Department Head. Since this technique had only been conducted in the first stage of the study, there was only one interview guide: the Interview Guide for Project Team (Appendix D).

Appendix D, the Interview Guide for Project Team (IGT-1) consists of twenty six questions and addresses three areas: (1) the team's perception about the organization in general and the systems development process in particular; (2) the team's perception about teamwork; and (3) suggestions for improvement.

Secondary Data (Manheim & Rich, 1986: 123) from journals, books, articles, and newspapers substantiates information derived from the primary sources described above. I examined these in both stages of the study.

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Data Analysis

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The evidence assembled as a result of the research highlighted the critical elements of TQM in IS development processes. In this chapter, I assembled the findings, assimilated and interpreted them, and then transformed them into useful information that is significant for the study. During the process, the interview materials were transcribed and converted into interview transcripts. The transcripts were then carefully analyzed, summarized, and categorized in a way that is consistent with the five dimensions of this study: (1) Customer Satisfaction, (2) Organizational Culture, (3) Leadership Commitment, (4) Teamwork, and (5) Management of an IS Development Methodology. This data, along with other forms of documentation obtained during the study, either from my own

efforts or from the respondents, formed a basis for the presentation of cases in Chapter 4.

In analyzing this information I drew on my technical and managerial skills which had been developed and accumulated over the years working in the IS industry in the United States. Also the knowledge and expertise of my IS colleagues helped me draw conclusions and recommend feasible actions for further studies.

To interpret quantitative data obtained from surveys conducted in the first stage of the study, the coding and analysis of data were performed with SPSS (Norusis, 1987, 1999). Since the 7-response survey questions produce ordinal data, median and inter-quartile deviation were calculated to describe the location and distribution of respondents' behavior. The median is used as the measure of central tendency and provides some idea of what a typical response is; the greater the median, the more positive the behavior. The inter-quartile deviation is used as the measure of dispersion to measure the extent to which a distribution is dispersed or spread out from its median; the smaller the inter-quartile deviation, the more agreement among the respondents. However, for some tables, a measure of dispersion sometimes has not been calculated due to insufficient responses. Nevertheless, simple descriptive statistical tables of Survey Summaries were shared with the agencies so that the readers could make their own judgments about the precision of the findings.

Qualitative research is evaluated in terms of the concept of validity and reliability. It is a paradigm in which it is possible for qualitative research to pursue validity without neglecting reliability. In the test for validity and reliability, I attempt to record fully and accurately the events of the study. Validity is tested through the use of multiple sources of evidence (Kirk & Miller, 1986: 32; Manheim & Rich, 1986: 57; Bainbridge, 1989: 214). Reliability is insured by collecting the

same information in different ways and by comparing information of data collected with the information provided by the organizations involved (Kirk & Miller, 1986: 41; Manheim & Rich, 1986: 63; Bainbridge, 1989: 219). This approach is often known as triangulation (Yin, 1985). The triangulation will also help to assure the validity of data. A good way to look at the relationship between validity and reliability is from Kirk & Miller's perspective: "Reliability is the degree to which the finding is independent of accidental circumstances of the research, and validity is the degree to which the finding is interpreted in a correct way" (Kirk & Miller, 1986: 20).   In the same line of reasoning, validity and reliability are interrelated in a way that can be described by Manheim & Rich's viewpoint: "A measure may be quite reliable and yet invalid… but it cannot be valid without being reliable" (Manheim & Rich, 1986: 63).

The data were analyzed in the following sequence. First, a clear description of each case provides pertinent and detailed information indicating the important elements of TQM in the management of IS within larger organizations. Part of this step was the distribution of initial research papers during the study to the organizations involved. For example, individual site reports had been shown to the IS managers, IS developers, and the user community of organizations involved to clarify accuracy of interview results and obtain feedback. These summaries are presented in the next chapter. Then, pattern-matching (Miles & Huberman: 1984: 68; Yin, 1985: 103) across cases is the primary method of analysis to identify the relationships and themes of importance for this study. The empirical pattern found across cases is additionally compared in the context of the application of Deming's principles of management to IS development processes to discover what had been learned between then and today.

However, a number of limitations have been identified during the course of this study; most of

them deal with the number of interviewees and the number of end users versus the actual population of the organizations.

In the first stage of the research, both interview and survey techniques were conducted. Because we do not know how well the interview results and survey data represent the population of the IS department and the end users' departments in each agency, we cannot generalize beyond the actual sample that was made available. However, opinions gathered from interviews and surveys can be interpreted as valid views from managers, technical staff, and end users, and therefore can be used constructively to improve quality in the IS development processes. The same is true for the second stage of the research in which I was granted several face-to-face interviews with managers, technical staff, and end users in each agency.

In summary, the case study methodology provides a constructive mechanism for the purpose of this dissertation. This dissertation is a reflection of the current situation. Qualitative data collected from this second stage will be analyzed and compared with previous results of the first stage of the project. Empirical results found between then and today are open to new analysis, leading to new learning opportunities and discoveries beyond the initial research project.

CHAPTER 4 - PRESENTATION OF CASES

This chapter presents the three agencies of this study and what was found there. For each agency, a short description is provided. The chapter proceeds in the following sequence: Interview Summary, Customer Survey Results, and Employee Survey Results within the two stages of the research. Data analysis was not attempted to be discussed in this chapter although my own personal readings of the data were sometimes reported.

Agency 1

Agency 1 is a fast growing urbanized local government on the East Coast that was serving a community of roughly one million citizens at the time of the research. In the first stage of this study, the population was estimated at roughly 900,000 citizens. Today, the Information Technology (IT) Department is the official name of the system's organization although it was called Information Systems (IS) Department during the first stage of this study. For the purpose of this dissertation, the terms IS Department and the IT Department are used interchangeably to reflect the respective time frame. The presentation of Agency 1 is divided into two sections: the First Stage of the Research and the Second Stage of the Research.

Agency 1 in the First Stage of the Research

In the first stage of this study, the IS Department of Agency 1 was responsible for the

"maintenance and development of computer application systems, word processing services, statistical and demographic analysis, and special studies" (FY 1993 Adopted Budget, Volume 1, GGA, page 123). It was headed by a Director and an Assistant Director. There were five IS branches performing IS development activities and three other branches performing research and analysis, database and administrative support. Each IS branch was headed by a Manager; each of the three other branches was headed by a Senior Management Analyst. Of 103 people in the department, seven were managers; 96 were staff. Of 96 staff positions, 69 were IS professionals (FY 1993 Adopted Budget, Volume 1, GGA, page 121). Of seven managers, five were interviewed for this study. Of 69 IS professionals, eight were interviewed as a team; two of these team members were also interviewed individually.

Interview Summary – Management and Technical Staff

Respondents agreed that focusing on the internal customers was the most important factor in defining a quality information system: user requirements were met; zero defects were tolerated; error rates were low; and systems had met business requirements as effectively as possible at the time they came into operation. Almost all respondents agreed that everyone understood the meaning of quality, but guidelines for promoting a quality system remained somewhat informal. In spite of the lack of formal guidelines, customer requirements did exist and were defined in the user feasibility phase of the methodology document. Measurement criteria also existed by user sign-offs in all development phases through various means, such as change requests, problem logs, and change control processes.

Respondents also agreed that guidelines to determine "a job well done" were informal, if they existed at all. One manager thought that a good merit review may have perhaps fulfilled this role. According to all managers, a formal system of recognition existed at the organization level, but not at the department level or below.

There was a consistent theme among respondents about the system development methodology. The methodology had been fully documented since 1987 and consisted of several major phases of a system life cycle development process. However, all respondents agreed that the methodology document should have been updated to be consistent with the recent installation of a DB2 [Data Base 2] database structure.

According to management, James Martin's Information Engineering methodology was adopted as the official methodology of the department to fulfill the organization's increasing interest in the role of quality information systems in modern organizations (Martin and Palmer, 1991).

Another consistent theme was recognized regarding the content of the methodology document. All agreed that although there were no formal structured program walkthroughs, other checkpoint procedures had been indeed clearly defined. These procedures, such as project reviews, management reviews, and phase sign-offs, had often required heavy user involvement.

There was an inconsistent pattern of opinions, however, concerning the topic of project management. Among the management, three different viewpoints prevailed. The first stated that project management was well defined with heavy involvement of the users as project managers. The second saw that project management was defined depending on the scope of each project. Finally, the third recognized that project management was one weakness of the existing methodology and was therefore under review. The individual IS professionals who were not managers tended to agree with the third management opinion.

There seemed to be a problem concerning training. Although an annual training plan for all employees was prepared, actual delivery was limited by budget constraints. To fill this gap, some special training was provided on site by James Martin who was at the time under contract to install the Information Engineering methodology.

In terms of hardware needed at the time, all respondents agreed that more personal computers were needed. In terms of software needed, respondents disagreed. One manager thought that the

department already had the software they needed while others thought that perhaps some CASE [Computer Aided Software Engineering] tools would be needed later.

Almost all respondents agreed that the user community played an important role in the data collection process. However, sometimes the users provided only general instructions; the IS professionals had to guide them to the right sources in order to collect the required data. Once the data were collected, an edit process was established by the computer professionals to extract only desirable and usable data which were then validated by the user community. In addition to user participation early in the collection of data, this process also required a team effort, according to one manager who stressed the importance of the team concept.

Managers were encouraged by the department to empower the employees. To increase employee involvement, authority to act, and responsibility, managers specifically created an environment which promoted enthusiasm and cooperation, and fostered excellence among employees.

Consistent with management's theme of promoting a participatory culture, the individual IS professionals felt a spirit of teamwork and cooperation not only within the department but also within the entire organization. The IS professionals admitted, however, that they had sometimes encountered unexpected and uncooperative attitudes from some individuals, but not all, in the operations department regarding operations procedures.

The interviewed team of eight IS professionals worked directly with one user department, thus eliminating the problems that usually occurred in most computer shops regarding competing clients asking for work to be done at one given time. The IS individuals on the team were able to talk freely to each other to get information they needed in order to get the job done. They were able to talk freely with other team members outside their branch for help. In fact, they were encouraged to go to everyone including managers whenever they needed help.

The individual IS professionals were aware of the overall department's quality mission, and

considered that improving the quality of their work was part of their on-going responsibility. Overall, the IS professionals liked their job and were not able to think of anything that they did not like in their work assignment. They took pride in their work because they thought that the work they did was important to the success of the department. Although recognizing that the system development methodology document could have been used as a guideline to help them to better perform their work, this document should have been updated to include the DB2 standards.

Overall, the individual IS professionals were happy with their work environment which included equipment, materials, manuals, and documentation. However, the recent installation of the relational DB2 database structure has pointed out the need for more DB2 manuals.

Generally speaking, the individual IS professionals knew who their internal customers were, interacted with them on a daily basis, and maintained a good professional relationship with the user community.

Although budget constraints have minimized recent training, the individual IS professionals still expressed confidence that the management had always looked after them and tried to help them take advantage of opportunities to expand their knowledge of quality management. In addition, the IS staff sounded confident about their technical background which enabled them to perform on any assignments, present and future. In fact, although they liked the work they did, they were ready for any new assignment within the IS Department.

Budget constraints also played an important role in management training. Some managers had attended professional seminars such as Nolan, Norton and James Martin, to expand their knowledge of quality management and project management. Others, however, relied solely on technical books, journals, magazines, articles, and sometimes feedback from consultants.

In spite of the lack of formal training in quality management, managers were committed to a customer focus to achieve continuous improvement of the systems development process and to keep their internal customers happy. This was achieved by maintaining constant dialogue with the user

community, although in a somewhat informal manner. To ensure that the commitment to a quality information system was met, the users were asked to be involved in every phase of the systems development process. In fact, without user sign-offs, the process barely continued on to the next phase.

Managers expected their employees to be responsive to user needs, to be attentive to management instructions, and to try to do a good job. Managers considered their employees to be fundamentally hardworking, responsible human beings, and therefore should be encouraged and given full support.

When asked about their management philosophy regarding the roles of a leader or a manager in the quest for a quality information system, two opinions were generated. Four managers had thought of themselves as playing the role of both a leader and a manager; and one had thought of himself as a manager. However, these managers had all been consistent with each other on the concept and definition of a leader and a manager, in which they agreed that the leader created the vision of the department, and then motivated the department to transform into that vision. This mission required the inventory of existing department capabilities, and a set of actions that must be taken to move the department into the future. The manager, on the other hand, concentrated on the bottom line. He or she made sure that the actions that were taken to move the department into the future were done as correctly and effectively as possible. In other words, "the leader does the right things, and the manager does the things right" (Bennis & Nanus, 1986:21).

James Martin's Information Engineering has been adopted as the department's official quality management methodology. Activities at the time were underway to install the methodology according to the department's plan. Whether or not James Martin's methodology delivered what the IS Department (and the user community) had expected remains subject to empirical inquiry.

Customer Survey Results

A questionnaire was sent to ten respondents who were identified as customers of the IS Department of Agency 1. These respondents included representatives of other internal units, several IS Division/Section Chiefs, and deputies of the individual local offshoots of Agency 1. Eight out of ten copies of the survey which were distributed were returned.

Table 4.1 presents the results of the quantitative portion of this survey. In this presentation two issues are addressed: (1) perceptions of the user community toward the systems development process, including the relationships and overall quality of systems development; and (2) the perceived attention given to internal customers by the systems developers.

Five respondents replied to three open ended questions in which they were asked to freely express how the system development process can be improved to better meet their needs.

Generally, the user community of IS Department of Agency 1 agreed that they were satisfied with the quality of services provided. Most of these respondents further agreed that they were involved in some phases of the systems development process. Fewer agreed that they were involved in all phases. Most importantly, local IS division/section chiefs and their deputies understood the objectives, the requirements, and the benefits of project requests prior to beginning the systems development.

All respondents also said that they maintained a very good working relationship with the IS Department in either a formal or informal manner.

Respondents moderately agreed that customer satisfaction was measured before this survey was conducted. However, respondents were not sure whether customer feedback systems existed to keep track of customer complaints and statistics, although official and direct lines of communication

Table 4.1: Agency 1 - Initial Customer Satisfaction with the Systems Development Process

Part 1 - Perceptions of systems development process, relationships, and quality			
Question	Full Text of Question	Median	Interquartile Deviation
1	Generally speaking, my department is familiar with the concept of the system development process.	6.0	0.9
2	My department is involved in some phases of the system development process.	6.5	0.5
3	My department is involved in all phases of the system development process.	6.0	1.0
4	My department has a clear definition of the objectives of the project request prior to turning it over to the system developers.	6.0	0.0
5	My department has a clear definition of the requirements of the project request prior to turning it over to the system developers.	5.0	0.4
6	My department has a clear understanding of the benefits of the project request prior to turning it over to the system developers.	6.0	0.4
7	In general, my department is satisfied with the timeliness of work provided by the system developers.	5.0	1.6
8	In general, my department finds a minimum error rate in work provided by the system developers.	5.0	0.5
9	In general, my department finds that the work provided by the system developers is consistent with our requirements.	6.0	0.9
10	In general, my department is satisfied with the quantity of work provided by the system developers.	5.0	1.6
11	In general, my department is satisfied with the quality of work provided by the system developers.	6.0	0.9
12	My department seldom complains about the system developers.	5.5	1.3
13	My department talks with the system developers on a regular basis.	7.0	0.5
14	Generally speaking, my department maintains good working relationships with the system developers.	6.5	0.9

Part 2 - Description of attention paid by systems developers to internal customers			
15	The system developers conduct customer satisfaction surveys on a regular basis.	5.0	1.3
16	The system developers establish customer feedback systems to keep track of complaint statistics.	4.0	1.3
17	The system developers establish official and direct lines of communication with my department through interviews and office visits on a regular basis.	5.0	1.0
18	The system developers establish unofficial and indirect lines of communication with my department through informal contacts.	6.5	0.5

were established between the IS Departments and other internal units.

Several of the respondents had suggested how other internal units and the IS Department could help each other. Generally, local IS division/section chiefs had been very satisfied with the quality of services provided although they thought that sometimes it took too long for a response to a request. Respondents were willing to work with the IS Department to provide better analyses of problems as well as in-depth details regarding required projects early in the IS development process. One respondent had suggested increased staffing as a way to improve the IS development process to meet the user needs.

Employee Survey Results - **Management and Technical Staff**

A questionnaire was sent to two branch managers and 30 IS professionals in the IS Department of Agency 1. This sample of 32 accounted for 50 percent of the IS professionals in this department. These respondents were selected by the department's head. Two managers were selected because they were not interviewed previously. Of the 32 questionnaires distributed, 21 copies were returned including two from managers and 19 from IS professionals.

Table 4.2 - Technical Personnel, and Table 4.3 – Management, present the results of the quantitative portions of this survey. In this presentation three issues were addressed: (1) the perceptions of all computer professionals toward the systems development process, including the relationships, and overall quality of the systems development; (2) the perceptions of technical personnel toward work in the department; and (3) the perceptions of management toward leadership style in the department.

17 respondents replied to three open-ended questions in which they were also asked to freely express their suggestions for improvement of the system development process especially regarding:

Table 4.2: Agency 1 - Initial Technical Staff perceptions of the Systems Development Process

Question	Full Text of Question	Median	Interquartile Deviation
Part 1 - **Perceptions of Systems Development Process, Methodology, and Quality**			
1	There is a formal systems development methodology in my department.	5.0	1.0
2	The systems development methodology is clearly documented.	5.0	1.0
3	Checkpoint procedures (such as structured walkthrough, project review, management review, phase sign-off, etc.) are clearly defined in the systems development methodology.	4.0	1.5
4	The role of project management is clearly defined in the systems development methodology.	4.0	1.5
5	My department has a clear definition of quality systems.	4.0	1.5
6	There are formal guidelines for promoting quality systems in my department.	5.0	1.5
7	Customer requirements do exist within these guidelines.	5.0	1.0
8	Measurement criteria are clearly defined within these guidelines. These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects, etc.	3.0	1.0
9	There are formal guidelines to determine "a job well done" in my department.	3.0	1.5
10	There is a system of formal recognition in my organization.	3.0	1.5
11	There is a system of formal recognition in my department.	3.0	1.0
12	Generally speaking, in my department, project personnel have adequate training to achieve quality goals.	5.0	1.5
13	Generally speaking, I know the types of hardware which are currently installed in-house.	6.0	1.0
14	Generally speaking, I am aware of my department's plan to purchase new hardware to support the systems development methodology.	4.0	1.0
15	I need a more sophisticate personal computer to better perform my job.	3.0	2.5
16	Generally speaking, I know the types of software which are currently installed in-house.	6.0	1.5
17	Generally speaking, I am aware of my department's plan to purchase new software to support the systems development methodology.	5.0	2.0
18	I need a specific software to better perform my job.	4.0	1.5
19	The data collection process is clearly defined in the systems development methodology.	4.0	1.0
20	The reliability and consistency of the data collection process are clearly defined in the systems development methodology.	4.0	1.0

Table 4.2: Agency 1 - Initial Technical Staff perceptions of the Systems Development Process - continued

	Part 2 - Technical Staff Perceptions of Work in the Department		
Question	Full Text of Question	Median	Interquartile Deviation
21	I am fully aware of my department's overall quality mission.	5.0	1.5
22	I like my present work assignment.	6.0	0.5
23	I can't think of anything that I don't like regarding my present work assignment.	2.0	2.5
24	The work I do is important to the success of my department.	7.0	0.5
25	Improving my work is part of my on-going responsibility.	7.0	0.5
26	I rely heavily on the systems development methodology in my present work assignment.	4.0	2.0
27	I am ready for any new assignment within my department.	6.0	2.0
28	I have adequate training to perform well in my present work assignment as well as future assignments.	6.0	0.5
29	Generally speaking, I am happy with my work environment (including equipment, materials, manuals, documents, supplies, office space, hardware, etc.).	6.0	0.5
30	I know my customers and their functionality.	6.0	0.5
31	I talk to my customers on a regular basis.	7.0	0.5
32	Generally speaking, I maintain a good professional relationship with my customers.	7.0	0.5
33	I talk to my co-workers on a regular basis, whether professionally or privately.	7.0	0.5
34	My co-workers are always willing to help when I need them.	7.0	0.5
35	I talk to my manager or project leader on a regular basis.	7.0	0.5
36	I am not shy to talk to my manager or project leader when I need help.	6.0	0.5
37	My manager and project leader are always helpful and supportive.	5.0	2.5
38	My management often sends me to professional seminars, and/or technical courses to promote my technical knowledge of quality management.	5.0	2.0
39	My management often encourages me to participate in solving problems.	6.0	2.5
40	In my department, different groups cooperate to meet common department goals.	5.0	1.5
41	In my organization, different departments cooperate to meet common organizational goals.	4.0	1.0
42	Generally speaking, scheduling problems caused by competing clients are resolved to everyone's satisfaction.	5.0	1.0
43	I can feel a spirit of cooperation and teamwork that exists in my department as well as my organization.	3.0	2.0

Table 4.3: Agency 1 - Initial Management perceptions of the Systems Development Process

	Part 1 - **Perceptions of Systems Development Process, Methodology, and Quality**		
Question	Full Text of Question	Median	Interquartile Deviation
1	There is a formal systems development methodology in my department.	5.0	n/a
2	The systems development methodology is clearly documented.	4.0	n/a
3	Checkpoint procedures (such as structured walkthrough, project review, management review, phase sign-off, etc.) are clearly defined in the systems development methodology.	2.5	n/a
4	The role of project management is clearly defined in the systems development methodology.	4.0	n/a
5	My department has a clear definition of quality systems.	2.0	n/a
6	There are formal guidelines for promoting quality systems in my department.	2.5	n/a
7	Customer requirements do exist within these guidelines.	2.0	n/a
8	Measurement criteria are clearly defined within these guidelines. These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects, etc.	3.0	n/a
9	There are formal guidelines to determine "a job well done" in my department.	2.5	n/a
10	There is a system of formal recognition in my organization.	5.0	n/a
11	There is a system of formal recognition in my department.	2.0	n/a
12	Generally speaking, in my department, project personnel have adequate training to achieve quality goals.	4.0	n/a
13	Generally speaking, I know the types of hardware which are currently installed in-house.	5.5	n/a
14	Generally speaking, I am aware of my department's plan to purchase new hardware to support the systems development methodology.	2.0	n/a
15	I need a more sophisticate personal computer to better perform my job.	3.5	n/a
16	Generally speaking, I know the types of software which are currently installed in-house.	5.5	n/a
17	Generally speaking, I am aware of my department's plan to purchase new software to support the systems development methodology.	3.5	n/a
18	I need a specific software to better perform my job.	2.5	n/a
19	The data collection process is clearly defined in the systems development methodology.	2.0	n/a
20	The reliability and consistency of the data collection process are clearly defined in the systems development methodology.	2.0	n/a

Table 4.3: Agency 1 - Initial Management perceptions of the Systems Development Process – continued

	Part 3 - Management Perceptions of Leadership Style in the Department		
Question	Full Text of Question	Median	Interquartile Deviation
44	Management should give detailed instructions to employees rather than giving them general directions so employees can work out the details.	2.0	n/a
45	Management should create a work environment in which employees can achieve personal goals while working for common department's goals.	6.5	n/a
46	Management should motivate employees by using economic incentive (wage raises) more than intangible rewards (honor and respect).	5.5	n/a
47	Generally speaking, employees in this department are fundamentally hardworking and responsible and should be encouraged and given full support from management.	6.0	n/a
48	Employees in this department are encouraged to maintain constant dialogue with the customers in the systems development process.	4.5	n/a
49	Top management of this organization fully supports the empowerment of all employees in this department to do whatever necessary to improve their work.	2.5	n/a
50	In this department, teamwork is encouraged to increase employee involvement.	4.0	n/a
51	Generally speaking, quality means total customer satisfaction or whatever the customer expects.	5.0	n/a
52	Generally speaking, employees in this department are encouraged to take ownership of work.	5.5	n/a
53	This department is determined to provide appropriate training on quality management to all employees.	3.5	n/a
54	Management has a clear vision of the department's future direction in the quest for quality.	2.5	n/a
55	Management recognizes that commitment to quality is a way to achieve continuous improvement and keep customers happy.	3.5	n/a
56	In this department, managers often attend professional seminars on quality management.	2.0	n/a
57	In this department, managers learn about quality management mostly from reading articles, books, magazines, professional journals, etc.	6.0	n/a
58	Management recognizes the importance of training to enable employees to acquire skills needed to accomplish the department's quality goals.	5.5	n/a
59	Management recognizes that teamwork involves open communications in an environment in which fear is driven out.	4.5	n/a
60	Management often meets to review the progress of the department's goals on a regular basis.	2.0	n/a
61	Management attempts seriously to gathering employees' opinion about managers' performance.	2.5	n/a

(1) meeting the customers' requirements and expectations; and (2) increasing employees' satisfaction while working toward the common goals of the department.

Generally, all respondents agreed that there was a formal systems development methodology in the department although it was not an updated written document. Respondents also agreed that measurement criteria were informal. These criteria had included the amount of corrective maintenance once the system was delivered, the number of complaints about the systems, and the statistics of quality reviews of individual projects. Guidelines to determine "a job well done" also remained informal if they existed at all. Overall, respondents knew the resources (hardware and software) that were available in-house.

Respondents did not agree on other items. Technical personnel had thought that customer requirements were usually defined in an informal manner while managers had not thought so. Technical personnel had thought that the data collection process, its reliability and its consistency were somewhat defined informally while managers had not thought so. Managers acknowledged that there was a formal system of recognition at the organizational level while technical personnel had not thought so.

In general, technical personnel were aware of the overall department quality mission, and considered that improving the quality of their work was part of their on-going responsibility. Technical personnel took pride in their work because they thought what they did was important to the success of the department. They spoke with the customers on a regular basis and maintained a very good working relationship with the user community. They were encouraged by managers to participate in problem solving. Technical personnel were not shy to talk to managers when they needed help and moderately agreed that managers were supportive. Technical personnel did talk with co-workers on a regular basis and strongly felt that co-workers were always helpful. They

moderately agreed that there was cooperation among different groups within the department. However, they did not know whether there was cooperation among different departments within the organization. Overall, they were not so sure about a spirit of teamwork in the organization.

Managers, on the other hand, thought that they should create a work environment in which employees could achieve personal goals while working for common department's goals. In general, managers thought that their employees were fundamentally hardworking and responsible and should be given full support. Managers thought of quality as total customer satisfaction or whatever the customer expected. To that end, managers had encouraged their employees to take ownership of work and to maintain a constant dialogue with the user community.

Managers agreed that they did not have formal training in quality management and had learned about quality management mostly from reading books, professional journals, and other relevant literature. Managers also recognized the importance of training to enable employees to acquire skills needed to accomplish the department's quality goals.

Managers did not believe that this department had a clear vision of the department's future direction. They also felt that the concept of empowerment was not fully supported by top management. Moreover, the management in this department did not attempt to seriously gather employees' opinions about the performance of the managers.

Ideas for professional improvement were shared by respondents. Several respondents had suggested ways to: (1) Improve the systems development process to meet customers' requirements and expectations; and (2) Help increase employees' satisfaction while working toward the common goals of the department. Managers and technical personnel agreed that the concept of teamwork and partnership should be further explored. Respondents suggested the following action items: (1) Listen to the users and treat the users as customers; (2) Obtain user commitment; (3) Keep in

constant touch with the users; (4) Fully test to ensure a quality product prior to delivery; and (5) Gather feedback from the users. By working side by side with the user community as a partnership, respondents believed that responsibilities, successes, and failures be shared. Furthermore, managers and technical personnel agreed that participative management was an area where improvements could be made. Specifically, respondents suggested that feedback from employees should have been sought, with focus areas centered on accomplishments, improvements without "finger pointing," and technical and managerial leadership for the entire department (not just for each branch separately).   Several respondents suggested the creation of a departmental system of recognition for employees in which good work should be recognized and rewarded accordingly (or at least an informal thank you note from management for a job well done).

Agency 1 in the Second Stage of the Research

In the second stage of this study, the official name of the systems organization of Agency 1 is the Information Technology (IT) Department. The IT Department of Agency 1 "provides leadership, process governance, architecture resources and expertise in deploying modern information technologies to improve government efficiency" (FY 2011 IT Plan, section 1, page 5). Its organizational structure is headed by a Director and Chief Technology Officer and a Deputy Director. There are specific branches performing IT systems development activities such as "web based systems, distributed architecture, and wireless hand-held devices, as well as platforms that support enterprise class solutions and software applications" (FY 2011 IT Plan, section 1, page 5). Each branch is headed by a Director.

Qualitative data was gathered via several in-person interview sessions on site at Agency 1 with

the IT Department and the End User Department. For the IT Department, two managers were interviewed individually. Manager 1 is an Executive who is in charge of information related areas including the IT Department. Manager 2 is a Branch Director of the "Software Solutions/Applications" area of the IT Department. Two IT developers were interviewed together in the same session. They are from the same branch and report to the same director of the "Software Solutions/Applications" area of the IT Department. For the End User Department, two IT End Users were interviewed together in the same session. They are from the same department. The IT systems that they currently use had been designed and developed by the IT Department of Agency 1. Two written reports: (1) *Interview Summary – Management and Technical Staff*, and (2) *Interview Summary – End Users*, had been shared with Agency 1's leadership to verify accuracy of the interviews and to obtain feedback. These reports are presented below.

Interview Summary – Management and Technical Staff

Respondents agree that the focus on the customers is the most important factor in defining a quality IT system: user requirements are met; comprehensive tests and re-tests are fully and formally documented; zero defects are tolerated; error rates are low; and systems meet business requirements as effectively as possible at the time they come into operation.

Respondents understand and agree on the meaning of quality, although they look at it through a different lens due to their specific role and responsibility. Manager 1 thinks that "quality is really defined by the customer being happy at the end." In other words, "not only does the system function well, but it can be used well by the end user." Manager 2 thinks that a quality IT system, depending on a specific application, must meet all or some "factors such as maintainability, interoperability, scalability, reusability, flexibility, and reliability." Sometimes there is a "give and

take on those aspects," so decisions must be made to decide which factors are most critical based on the "implications." Both IT developers agree that quality in IT systems means that "all users' requirements are met and all users' acceptance tests are completed."

All respondents agree that formal guidelines for promoting a quality system can be found in the "FY 2011 IT Plan." Manager 2 indicates that "best practices" are also "followed" in addition to that official document. From the IT developers' perspective, the official document may or may not cover "every single detail" that they do for "promotions" although there is definitely a "process that is in place that they have to go through to obtain approvals from different areas." For example, when they finish the development of a piece of software, they promote it from the "development test" to the "users' test period." The users will be testing on the different areas themselves, in different regions. Finally they will move it to the "production region." Since the "IT team performs the promotion from acceptance to production," there's a "weekly change management meeting" in which the IT team informs other branches of the IT Department of any changes. The goal of this meeting is to make sure that the "changes that the IT developers made must not affect other existing production applications."

Customer requirements do exist and are defined in the official "FY 2011 IT Plan" document. Manager 1 comments that "customer requirements are what start the entire process." Manager 2 describes "Use Cases," a "unique process" that is being used to "build an application from scratch and the piece of functionality around it." Both IT developers agree that the "basis for what they do is based on what exactly the customers want." They "interview the customers" to understand the "requirements" and "build the software" for them. The "guidelines" that they use to build the software are based on what the "customers anticipate to get at the end product."

There is a consistent theme among all respondents about the system development

methodology. A formal IT system development methodology does exist in the "FY 2011 IT Plan." It is often referred to as the "Systems Development Life Cycle Standards" or SDLCS and is clearly defined in the "Management Control and Processes" section of this formal and official document of Agency 1. As a general definition, the "SDLCS provides application developers a framework of the important procedures and universal requirements necessary to complete an application." Manager 1 explains and elaborates further that this comprehensive document "outlines the entire organizational management framework, strategic planning process, architectural planning process, system life cycle, and IT project management program."

Another consistent theme that can be recognized is in regard to the content of the SDLCS methodology document. All respondents agree that checkpoint procedures are indeed clearly defined. These procedures such as project reviews, management reviews, phase sign-offs, etc. often require heavy user involvement.

All respondents agree that the roles of project management are clearly defined in the SDLCS. According to Manager 1, "there's an entire project process that the organization goes through." The IT project manager, the business project manager, and the consulting group project manager normally work together as a team in this project process. Along the way, there are always "project meetings and steering committee meetings." In addition, the "organization trains both IT project managers and business project managers." They have to go through a "formal project management certification program" before they can work on projects.

Measurement criteria are employed in user sign-offs of all development phases through various means, such as, change requests, problem logs, and change control processes. These activities are fully documented at every step of the SDLCS. Manager 2 indicates that these criteria usually come up in the "User Acceptance Test" process because "nothing will be allowed to move into production

until it has followed formal acceptance process," and part of that acceptance process is for "reliability and certain aspects of quality." Manager 1 emphasizes the critical aspects of the "testing phases" at every step of the SDLCS. In other words, "in every phase of the system development, system delivery, and the life of the system, all errors must be formally documented, corrected, re-tested, and made sure they are corrected prior to delivering new code to the customer." On the other hand, from the IT developers' perspective, there is an "IT software tracking system to keep track of issues and/or problems that must be fixed immediately."

There are different viewpoints among the respondents regarding formal guidelines to determine "a job well done." Manager 1 relates this topic to "the number of errors that have occurred, documented, and fixed." Based on the number of errors, perhaps something different should be done the next time. Basically, after the "usability testing" with the client, the system is delivered. After the "system is delivered," efforts should be made to see "how happy the client is" and if there is "anything that needs to be changed." This process must be "documented" so that the "next time we develop, we learn from those issues." Manager 2 is not certain if there are formal guidelines. She indicates that "certain evaluations such as code reviews are done by other departments prior to moving the system into production." Within certain intervals, after the system has gone into production, "we go back and have a review." However, whether or not that process is "formalized" is to be determined. IT developer 1 does not know if there are formal guidelines. For example, "Every time a user does a good job, you will say 'thank you very much' and you pat them on the back. So, it's an oral kind of thing, and I am not sure if it's written anywhere." IT developer 2 agrees that it is still an informal process when the user will tell the developer, "You did a good job."

There are different viewpoints among managers and developers regarding a formal system of recognition. The managers agree that one exists at every level of the organization. Manager 1

indicates that "there's a team level, there's a department level, and there's an organization level of awards." For example, "the IT group has an awards ceremony where awards are given to people who have done exceptional jobs on multiple projects; the organization also has an awards recognition program where largest projects are eligible for team awards." Manager 2 indicates that there's "performance evaluation" at the individual level. On the other hand, the IT developers do not think that there is a system of formal recognition.

All respondents are positive about the topic of training at the organization. Manager 1 explains that training is something that is being built into the projects. In other words, "for each of the projects that are found in the IT Plan, there's a component for training, for both the technical side as well as the business side, and then for the end users also." Manager 2 specifically explains that training is typically "part of the application process" and that "it's a continuous evolution." Technical skills of each of the IT developers are kept in a "profile" so managers can make informed decisions about future assignments for them. Examples of prerequisites for such future assignments include "retooling" them for a specific project that requires specific skills; putting together a "training plan" for them; sending them to "formalized classes;" "partnering" them with IT developers on the floor who already have the experience; and "gradually allowing them to perform their own assignments" on that specific project until the IT developers can get to the "level of proficiency where the training wheels can be taken off." Both IT developers agree that their project manager normally does a good job in this area. Generally, IT developers are trained in-house where they "basically teach each other." Sometimes they would be sent to "formal training" for specific skills. Then they would be assigned to "small projects" prior to gradually being assigned to more "complex projects."   In the IT environment, this process is normally referred to as OJT or on-the–job training.

In terms of hardware, Manager 1 exhibits a detailed knowledge of the inventory of hardware of the organization. Basically, the organizational structure consists of a "technical architecture" which would address and review these technical aspects. Generally, the organizational IT platform consists of "IBM mainframe, Sequel Servers, Dell Servers, MS [Microsoft]/Intel environment, and Unix/Oracle environment" and a mix of technology such as a "storage area network, fiber optic network, Unix-based, and Windows-based" networks. The organization also has "Citrix implementation and a huge teleworking program so people can telework from home where they can get access to their desktops through Citrix." So basically, the organization has "everything," he said. Manager 2 and the IT developers indicate that they do not involve hardware in their work because this is the area that belongs to the infrastructure group. The IT developers identify the current hardware that they are using at their workstation as "desktops, laptops," including PCs [Personal Computers] such as "Dell, Pentium, and Intel Core i7 with 4GB [Gigabytes] of RAM [Random Access Memory]."

Manager 1 explains that "there's always a plan to purchase new hardware depending on business needs." Manager 2 and the IT developers indicate that they are not involved in hardware purchase decisions at all. They do, however, "work in partnership with the infrastructure group when putting together systems requirements." There's always a representative from the infrastructure group working with them. However, according to Manager 2, they are moving to a "virtual environment." They are "no longer working with boxes for an application." It is being "virtualized." To be specific, they are "at the point where they do not have the physical space to have dedicated servers for every application. So the industry is moving more to a virtual service to reduce the overall footprint." In other words, they are trying to "reduce energy to be greener."

In terms of software that is currently used, the IT developers identify the following: "Visual

Studio, which encompasses C++, VB [Visual Basic], VSP [Visual Snapshot Provider] Web development, Sequel Server, COBOL [Common Business-Oriented Language], DB2, CICS [Customer Information Control System], VSAM [Virtual Storage Access Method]," etc. Manager 1 explains that the organization currently has an enormous e-government program which includes social media such as Facebook, Youtube, Twitter, etc. Although the current IT platform still has a small group of mainframe systems utilizing COBOL, DB2, etc., such older technology is "projected to be phased out completely in the next few years." In the future, "everything will be Unix-based or Intel-based."

Manager 1 indicates that there is always a plan to purchase new software depending on business needs. There is an architecture review board that looks at the new infrastructure including hardware and software, the current platform, and makes decisions about future platforms. Basically, "there will be a great deal of Web-based systems." Manager 2 is aware of the plan to purchase new software by the "folks in infrastructure" because it's an "on-going evolution." The IT developers are also aware of plans to purchase new software for their group. They do not pay attention to plans for other groups.

All respondents agree that the user community plays an important role in the data collection process. Generally, once the data are collected, an edit process is established by the IT developers to extract only desirable and usable data which will then be validated by the user community. Technically, based on users' requirements, the IT developers "collected data via interviews or emails." Subsequently a "database plan" is drawn and a "prototype" is created for the user community, then the developer confirms with the user: "This is what you asked us to do. Is this what you want?" Once the user community is satisfied with the prototype, only then the system is built by the IT developers. In the same context but from a high level perspective, Manager 1

describes the process as follows: "collect general requirements, document the functionality that is needed by the user community, and determine if it is going to be built in-house or is it better to buy from the market." In either case, the system must satisfy the needs of the user community. Manager 2 stresses further that the data are actually "owned" by the user community. Specifically, in a data conversion project, the IT team works with the user community in "putting together their scripts, making sure that the data are clean, and discussing about the mechanism of how to move them when putting the system in place." In this scenario, data clearly "belong" to the user community. In addition, the data must be complete, accurate, and timely. In other words, data must be at the right place in a timely manner for the users' transaction.

In addition to user participation early in the collection of data, this process also requires a team effort, according to Manager 1 who stresses the importance of the team concept. There's a team of people in project management who must interact with different groups. "These are the people who are trained to gathering requirements, collecting the information, going through review processes, meeting with the user community and the technical people, documenting the plan, and moving forward with the system design process. The project managers make sure that information is collected and that is exactly what people want."

Managers are encouraged by the department to empower the employees. To increase employee involvement, authority to act, and responsibility, managers specifically create an environment which promotes enthusiasm and cooperation to foster excellence among employees.

Consistent with the management's theme of promoting a participatory culture, the IT developers feel a spirit of teamwork and cooperation not only within the department but also within the entire organization. They believe that "everyone is a team player."

The IT developers do not have to deal directly with the problems that most other IT shops

outside the organization typically experience regarding competing clients asking for work to be done at one given time. The developers always refer any scheduling issues to their project manager or team lead, and it has proven to work very well to every party's satisfaction.

The IT developers can always talk freely to each other to get the information they need in order to get the job done. They could talk freely with other team members outside their branch for help. In fact, they are encouraged to go to everyone in the IT Department including managers whenever they need help.

The IT developers are aware of the overall department quality mission, and consider that improving the quality of their work is part of their on-going responsibility. In general, they like their job and could not think of anything that they do not like in their present work assignment. They take pride in their work because they think that the work they do is important to the success of the department. Overall, the IT developers are happy with their work environment such as, but this is not limited to, equipment, materials, manuals, and documentation.

The IT developers know who their internal customers are. They interact with them on a regular basis, and maintain a good professional relationship with the user community.

The IT developers express confidence that the management always looks after them and tries to help them take advantage of opportunities to expand their knowledge of quality management. In addition, they sound confident about their technical background which enables them to perform on any assignments, present and future. In fact, although they like the work they do now, they are ready for any new assignment within the IT Department.

Generally, managers learn about quality management through training. Basically, for new IT project managers, they have to go through project management certification. The organization has its own program based on PMP [Project Management Professional]. In addition, managers also go

to conferences or professional seminars such as Gartner, or Idol. They also rely on technical books, journals, magazines, articles, and sometimes feedback from consultants to expand their knowledge of quality management and project management. "It's an on-going evolution," as Manager 2 says.

Managers are committed to their customers and to achieving continuous improvement of the systems development process and keep their customers happy. This is done by maintaining constant dialogue with the user community, although in a somewhat informal manner. To ensure that the commitment to quality IT systems is met, the users are asked to be involved in every phase of the systems development process. In fact, without the user sign-off, the process barely continues to the next phase.

Managers expect their employees to be responsive to user needs, to pay attention to management instructions, and to try to do a good job. Managers consider their employees to be fundamentally hardworking, responsible human beings, and therefore should be encouraged and given full support.

When asked about their management philosophy regarding the roles of a leader or a manager, two opinions were generated. Manager 2 thinks of herself as a manager; and Manager 1 thinks of himself as a leader. Both managers seem to be consistent with each other on the concept and definition of a leader and a manager. The leader creates the vision of the organization, and then motivates the organization to transform into that vision. This mission requires the inventory of existing organizational capabilities, and a set of actions that must be taken, to move the organization into the future. The manager, on the other hand, concentrates on the bottom line. The manager makes sure that the actions that are taken to move the organization into the future are done as correctly and effectively as possible. In summary, both managers seem to agree with Bennis & Nanus's definition (1986: 21): "Managers are people who do things right and leaders are people who

do the right things."

When asked for additional comments, Manager 1 stresses the critical aspects of the "IT Plan" which could be considered as a Bible for all IT activities of the organization. It was basically something that was started in the 1990s and it is continually redefined over time. It consists of the organization's strategic plans, tactical plans, and IT implementation plans. It embraces the concept of business users and IT workers working together to develop and deploy the best systems they possibly can for the user community. Specifically, its architectural emphasis is to make sure that everything fits together, that the technical platform is the best that can be afforded, maintained, and stable. This means that there is no stress to the infrastructure, and that is basically the goal of the organization. He then concluded, "I think we have done that."

Interview Summary – End Users

Overall, respondents agree that they are most of the time satisfied with the quantity, quality, and timeliness of work and services provided by the IT Developers of the IT Department of Agency 1.

Respondents agree that the work provided by the IT Developers is always consistent with their requirements. The error rate, if there is any, would be at a minimum level. They seldom complain. "When we are testing and we see something that needs to be changed, they are very quick to work on making that. The turnaround I believe is very good."

Respondents further agree that they are involved in some phases of the systems development process such as Requirements and Testing, although they are not familiar with the concept of the SDLCS. They do not agree that they are involved in all phases of the SDLCS.

Most importantly, they understand the objectives, the requirements, and the benefits of project requests prior to beginning the systems development.

Respondents also agree that they maintain a very good working relationship with the IT Developers in either a formal or informal manner. They usually communicate with the IT

Developers on a regular basis. They acknowledged, "For our group, we speak to them probably regularly."

Respondents moderately agree that customer satisfaction was measured verbally and informally. "The IT Developer calls to make sure something's been done and we're working on it. We're using it and are happy with it. It's functioning the way we need it to. I'm going to say it's a survey in more of a verbal sense."

Respondents are not sure of whether customer feedback systems exist from the IT Department to keep track of customer complaints and statistics. One end user stated, "I'm not going to say it's a complaint. I'm going to say they have a system tracking for when we have an issue with something that we need them to address or they have a way of keeping track of it, because they end up reminding us."

Respondents acknowledge that they maintain unofficial and indirect lines of communication with the IT Developers on a regular basis: "When they have something here, they always seem to stop by and ask how everything is going on our end."

When asked about an area where the IT Developers could increase overall satisfaction of the quality of services provided, respondents agree that "without a doubt," the IT Developers are "extremely responsive" to their needs, issues, or concerns. So, it is practically fair to say that there is not anything to be improved in this area.

When asked about an area where they can help the IT Developers deliver the quality of services that had been requested, respondents suggested that perhaps they could also be responsive in providing the IT Developers what they need in a timely fashion so they can get their tasks completed on time: "So, just be as responsive with them when they need something, as they are with us if we need something." When asked for additional comments, respondents expressed the appreciation for the attention that the IT Developers had been paying to them, and that they hold the IT Developers in high regard: "They had always been very receptive to walking me through a problem and making sure I get an answer. So I am completely satisfied with the folks in IT and how they treat me and help me do my job better."

Finally, respondents conclude the interview session with additional positive comments about the spirit of teamwork and their relationships with the IT developers: "It's a work in progress always, so you can always think of ways to improve on something. All things considered, I think the IT folks have done well. They are always consistent and accurate. Good teamwork, that's the way to put it."

Agency 2

This agency is a major department of Agency 1. Today, Information Technology (IT) Section is the official name of the systems organization although it was called Information Systems (IS) Section during the first stage of this study. For the purpose of this dissertation, IS Section and IT Section are used interchangeably to reflect the respective time frame. The presentation of Agency 2 is divided into two sections: the First Stage of the Research and the Second Stage of the Research.

Agency 2 in the First Stage of the Research

In the first stage of this study, the IS Section of Agency 2 was responsible for the maintenance and development of computer application systems. In the past, all IS development activities were provided, supported, and maintained by the centralized IS Department of the Parent Agency. During that time frame, the Parent Agency was reassessing its IS development policies to distribute the centralized IS development activities to the individual local offshoots. With a total headcount of five, the IS Section of Agency 2 was headed by a Systems Officer. Of the five people in this section, two were management; three were staff, and all were IS professionals. Both managers were interviewed individually for this study. In addition, four IS professionals were interviewed as a team; three of them were also interviewed individually.

Interview Summary – Management and Technical Staff

Respondents in this computer applications section agreed that accuracy, currency, consistency, and integrity of the systems were the primary and most important factors in defining a quality information system. The secondary factor in defining a quality information system was customer satisfaction. Almost all respondents agreed that everyone understood the meaning of quality (as specifically defined), but guidelines for promoting a quality system remained somewhat informal. A Data Committee had been established to formalize a data dictionary for the organization, consisting of representatives of several user groups in the organization. They participated in making complete the formal documentation and standards for the entire organization.

Due to the lack of formal guidelines, internal customer requirements remained informal. Sometimes a memorandum was sent by the user community to formally initiate a request for work to be done. Only informal criteria existed for such matters as the amount of corrective maintenance required once the system was delivered. Complaints about the system were informally handled. Due to the lack of staff the team was under pressure to "get it done" without written, formal rules.

Respondents agreed that there were no formal guidelines to determine "a job well done." One manager had thought that his employees were doing a good job if there were not any complaints about them. All managers said some system of recognition for all employees existed at the Parent Agency level, but not at the local agency level.

Respondents in this agency agreed that a system development methodology was not in place at the time. For mainframe computer application systems which had been developed and maintained by the Parent Agency, there may have been a written methodology. At this agency, however, all systems development activities were written using PC-based software and at the time remained "informal, unstructured, and often depend on the tasks at hand." There had not been any written guidelines for the PC software.

Systems management thus presented a problem for some in this agency. One manager stated that project management seems defined for major projects, but not for small projects. He also thought that the systems management process at this agency was "fragmented, uncoordinated,

sometimes unclear, and in some cases performed by persons without knowledge of the organizational operations, procedures, and needs." This manager thought that computer applications developed by non-computer professionals resulted in different standards and a lack of proper systems maintenance. He hoped the IS Section's Data Committee would become the first step toward standardization of all systems management activities within this agency. Members of the team further stated that the entire concept of project management was under study at the time through the formation of the Data Committee and often depended on the scope of each project. Due to the lack of a formal methodology document, checkpoint procedures such as structured walkthroughs, project reviews, management reviews, phase sign-offs, etc. had all remained informal.

Training was also an issue. Due to budget constraints, training had been limited. To fill this gap, some informal training was provided on site by the IS Section to its employees. Managers felt that one possibility (dependent upon budget availability) for reduced training needs would be to hire new computer professionals with all possible technical qualifications.

The agency had about 130 personal computers (PC) connected via local area network (LAN). About 100 of these PCs were connected to the central mainframe of the Parent Agency. Eventually all PCs would be connected to the central mainframe. More PCs and more PC software packages would be needed as the systems development activities grew over time. Specific PC software called "Database Compiler" was needed to enable the computer professionals to develop software on the PC-LAN platform.

Almost all respondents agreed that the user community played a somewhat visible and important role in the data collection process. However, sometimes the users provided only general instructions; the computer professionals had to guide them to the right sources in order to collect the required data. Once the data were collected, an edit process was established by the computer professionals to extract only desirable and usable data. At the time, there was not a validation process by the user community. However, everyone agreed that with the establishment of the Data Committee at the time, the user groups would have had an opportunity to validate data after the edit

process.

Employees had been encouraged to participate in solving problems by the team concept. In turn, managers had been encouraged to empower the employees. To increase employee involvement, managers had specifically created an environment which promoted delegation, enthusiasm and cooperation, which fostered excellence among employees.

Consistent with management's theme of promoting a participatory culture, the individual computer professionals felt a spirit of teamwork and cooperation within the group. The computer professionals admitted, however, that they sometimes had not felt the same way with other sections in the organization, perhaps due to the lack of communication among them. According to the interviewed team, each section in this organization had different goals although all of them understood the common mission. However, whether different sections across organizational boundaries had cooperated to meet common organization goals awaits an empirical inquiry.

The interviewed team of four IS professionals also encountered the common problems of competing clients simultaneously asking for work to be done. As a result, the team had to prioritize the user requests. The status of the user groups and the urgency of the requests played an important role in setting up schedules for work to be done.

The individuals in the team had been able to talk freely to each other to get the information they needed in order to complete the job. In fact, they were encouraged to seek the advice of others including managers whenever they needed help. Generally, the individual computer professionals were aware of the overall IS Section's definition of quality mission - accuracy, currency, consistency, and integrity - and they considered that in improving the quality of their work. The IS professionals liked their job although there were some aspects that they had liked more than others. They most liked the freedom to interact with each other, the freedom to work independently, acquaintanceship with new PC technology, and the opportunity to develop computer systems to help the user community. They least liked the bureaucratic aspects of organizational life and the absence of formal operating procedures. Staff took pride in their work because they thought that the work that they did was important to the success of the IS Section. Due to the lack of a system

development methodology document, however, the computer professionals had to use their best judgment to complete a job.

Overall, the individual computer professionals were happy with their work environment, such as the equipment, materials, manuals, and documentation. However, an observed increase in systems development using a PC platform points to the need for more PC manuals and more PC memory.

The individual computers professionals knew who their internal customers were, interacted with them on a daily basis, and maintained a fairly good professional relationship with the user community.

Also, the observed increase in systems development using a PC platform shows the need for more PC training. Individual IS professionals knew that budget constraints had minimized previous training, yet they still expressed confidence that their immediate management had always looked after them and tried to help them take advantage of opportunities to expand their technical knowledge. The IS professionals admitted, however, that their skills had not been optimized due to the lack of training. Often, the organization took it for granted that the IS professionals already had enough knowledge to do the work. The IS staff expressed confidence about their technical background. In fact, staff had felt that although they liked the work they did at the time, they were ready for any new assignment within the IS Section.

Managers at this agency had attended professional seminars to expand their knowledge of quality management and project management. Budget constraints also played an important role in training at this level too. Such training was limited at the time. Therefore, managers relied solely on literature such as technical books, journals, magazines, and articles. One manager had believed that her quality management training came from her family background and life experience, allowing her to become an effective and invaluable learner.

Managers did not agree on the agency's use of its quality focus to achieve continuous improvement and to keep customers happy. One manager felt that keeping customers happy meant maintaining constant dialogue with the user community, although in a somewhat informal manner.

The other manager felt that not all customers were going to be happy with the status quo. Due to the amount of increased workload and the lack of sufficient staff, the systems management had to prioritize user requests depending on the status of the customers and the urgency of the requests. As a result, only the most important customers were happy, but others were not; while only the most urgent requests were addressed immediately, others were delayed. Both managers felt that the Data Committee must address customer concerns.

At the time, not everyone in the organization was familiar with the concept and definition of the Data Committee. The Data Committee was not a stranger to the staff of IS Section. However, in the user community, only senior administrative staff understood the purpose of this committee, while support staff may or may not have known its purpose.

Managers expected their employees to be responsive to user needs (again, depending on the status of the customers and the urgency of the requests), to pay attention to management instructions, and to try to do a good job. Managers believed that their employees were fundamentally hardworking, responsible human beings, and therefore should be encouraged and given full support.

Managers somewhat disagreed about their management philosophy regarding the definition, concept, and roles of a leader and a manager. One manager felt that the role of a manager was different from that of a leader. The leader created the vision of the section, and then motivated the section to transform into that vision. This mission required the inventory of existing section capabilities followed by a set of actions that must be taken to move the section into the future. The manager, on the other hand, concentrated on the bottom line. He or she made sure that the actions taken to move the section into the future were done as correctly and effectively as possible. This manager thought of herself as a manager, not a leader. The second manager agreed in principle with this role definition, but for himself preferred to be considered a leader. However, due to staff shortages, increased workload, and responsibility for three areas at the same time, he was required to manage.

Customer Survey Results

The survey questionnaire was sent to ten division/section chiefs in Agency 2. These respondents were chosen due to their regular contact with the IS Section through various project requests for systems related activities in Agency 2. All ten copies of the survey which were distributed to ten division/section chiefs were returned.

Table 4.4 presents the results of the quantitative portions of this survey. In this presentation two issues were addressed: (1) the perceptions of divisions/sections toward the process, relationships, and quality of the systems development; and (2) the perceived attention to internal customers by the systems developers.

Four respondents replied to three open-ended questions in which they were asked to freely express how the systems development process can be improved to better meet their needs.

Generally, respondents agreed that they were somewhat satisfied with the quality of services provided. Respondents agreed that they were involved in some phases of the systems development process but not all of them. Most importantly, they understood the objectives and the benefits of project requests prior to beginning the systems development. Respondents also agreed that they maintain a good working relationship with the IS Section although in a somewhat informal manner.

Respondents stated that customer satisfaction was never measured before this survey was conducted. Customer feedback systems did not exist, and there were not any official and direct lines of communication established between the Information Systems Section and other internal units.

Several of the respondents had suggested how other internal units and the Information Systems Section could help each other. They were willing to work with the Information Systems Section and were willing to provide feedback and resources to them. Three of these respondents also expressed

Table 4.4: Agency 2 - Initial Customer Satisfaction with the Systems Development Process

	Part 1 - Perceptions of systems development process, relationships, and quality		
Question	Full Text of Question	Median	Interquartile Deviation
1	Generally speaking, my department is familiar with the concept of the system development process.	5.0	1.5
2	My department is involved in some phases of the system development process.	5.0	1.0
3	My department is involved in all phases of the system development process.	2.5	1.5
4	My department has a clear definition of the objectives of the project request prior to turning it over to the system developers.	5.0	1.2
5	My department has a clear definition of the requirements of the project request prior to turning it over to the system developers.	5.0	0.5
6	My department has a clear understanding of the benefits of the project request prior to turning it over to the system developers.	5.0	1.0
7	In general, my department is satisfied with the timeliness of work provided by the system developers.	5.0	1.1
8	In general, my department finds a minimum error rate in work provided by the system developers.	5.0	1.2
9	In general, my department finds that the work provided by the system developers is consistent with our requirements.	5.0	1.1
10	In general, my department is satisfied with the quantity of work provided by the system developers.	5.0	0.9
11	In general, my department is satisfied with the quality of work provided by the system developers.	5.0	0.4
12	My department seldom complains about the system developers.	4.5	2.0
13	My department talks with the system developers on a regular basis.	6.0	1.0
14	Generally speaking, my department maintains good working relationships with the system developers.	6.0	1.2

	Part 2 - Description of attention paid by systems developers to internal customers		
15	The system developers conduct customer satisfaction surveys on a regular basis.	2.0	0.6
16	The system developers establish customer feedback systems to keep track of complaint statistics.	4.0	0.6
17	The system developers establish official and direct lines of communication with my department through interviews and office visits on a regular basis.	3.0	1.5
18	The system developers establish unofficial and indirect lines of communication with my department through informal contacts.	5.0	1.1

that they would have liked to be more involved with the systems development process and more informed with the services available. They also felt that the IS Section should have been more proactive in suggesting useful data that could help the end users do a better job.

Agency 2 in the Second Stage of the Research

In the second stage of this study, the official name of the systems organization of Agency 2 is the Information Technology (IT) Section. The IT Section is headed by an IT Program Manager who "oversees a ten-person staff that maintains systems owned" by Agency 2 which include "desktop support, communication units in the fields, digital recording systems, management systems, and anything dealing with backend technology." In other words, its area of responsibility encompasses all IT related activities and services for Agency 2.

Qualitative data were gathered via several in-person interview sessions on site at Agency 2 with the IT Section and the End User Section. On the IT Section side, the head of the IT Section was the only manager who was interviewed for this research in one session. Two IT developers were interviewed together in another session. They work on the same projects and are backups for each other. They both report to the head of the IT Section. On the End User Section side, two IT End Users were interviewed together in the same session. Each interviewee has a different and distinct role as an End User of the IT Section of Agency 2. End User 1, the Quality Analyst, is responsible for "compiling statistics and reports on what is going on in the department in terms of how well we are doing [in] certain functions." End User 2, the Coordinator, has responsibility for "handling [different] requests for [different] reports for the department and actually dealing with the public including other departments." The IT systems that they currently use have been developed

and supported by the IT Section of Agency 2. Two written reports: (1) *Interview Summary –
Management and Technical Staff*, and (2) *Interview Summary – End Users* had been shared with
Agency 2's leadership to verify the accuracy of the interviews and to obtain feedback. These
reports are presented below.

Interview Summary – Management and Technical Staff

According to the manager, "the IT Section maintains systems owned" by Agency 2 which
include "desktop support, communication units in the fields, digital recording systems, management
systems, and anything dealing with backend technology." In other words, its area of responsibility
encompasses all IT related activities and services for Agency 2.

In general, all respondents agree that the focus on the customers is the most important factor in
defining a quality IT system: user requirements are met; comprehensive tests and re-tests are fully
and formally documented; zero defects are tolerated; error rates are low; and systems meet business
requirements as effectively as possible at the time they come into operation.

All respondents understand and agree on the meaning of quality, although they look at it in a
different way due to their specific role and responsibility. The manager thinks that quality is
"[when] the system is accurately capturing users' requirements, locking them down, and agreeing
that will be no changes." In other words, "When it meets the users' requirements, and is
sustainable, [then] that is a quality product." He then adds that it must also be "reliable and
consistent." IT Developer 2 thinks quality in IT systems means that to "basically meet the user's
needs… The IT system should be developed flexible enough to take in business development and
changes." IT Developer 1 suggests that "it needs to be efficient and quick… It doesn't behoove us
to have processes that, when they need to change now, to have a process that ends up taking 2-3

months down the road. So, I think timeliness is [the] key."

All respondents agree that formal guidelines for promoting a quality information system can be found in the "FY 2011 IT Plan." The manager stresses the critical aspect of the official document as follows, "Absolutely, you have it right here in that book. It is clearly documented and that's why in my agency when we do development for a system or go look at a cost product, we follow the guidelines because your chances of success are much higher by doing that - by going by the established procedures."

Respondents also agree that customer requirements do exist and are defined in the official "FY 2011 IT Plan" document. The manager elaborates further, "Yes, especially when you are doing an RFP (Request for Proposal) you clearly define what the customer requirements are. They do have to be captured and they do have to be documented."

In general, there is a consistent theme among respondents about the system development methodology. A formal IT system development methodology does exist in the "FY 2011 IT Plan" published by Agency 1, the Parent Agency. It is often referred to as the SDLCS and is clearly defined in the "Management Control and Processes" section. The "SDLCS provides application developers a framework of the important procedures and universal requirements necessary to complete an application" (FY 2011 IT Plan, Section 4, Page 9). The manager explained and elaborated further that "there are standards established by the DIT [of the Parent Agency]. That right there is a technology plan. There are also documents dealing with standards of how any environment you develop will be created… [such as the] testing environment, training environment, development environment… There are certain industry standards that have been embraced by the DIT [of the Parent Agency] that we go by… We only embrace what the DIT [of the Parent Agency] embraces." IT Developer 1 pointed to the "FY 2011 IT Plan" and said: "This is it." IT Developer 2 added, "This is the main guideline and we tailor it to the user needs and our style here… We take this as a guideline, and it's clear that we have to go down this path. There is of course flexibility for us to go further, so it gives us a clear idea."

Another consistent theme is regarding the content of the SDLCS methodology document. Respondents agree that checkpoint procedures are indeed clearly defined. These procedures such as project reviews, management reviews, phase sign-offs, etc. often require heavy user involvement. The manager is so optimistic about the procedure that he has to go through and suggests one example from the "procurement standpoint" as follows, "What I would do is get together all of my technical information and I'd go over to the DIT [of the Parent Agency] and meet with the Architectural Review Board (ARB). Their function is to go over what you're purchasing. They're going to ask questions… They're going to come back to you with common sense suggestions… So that is the best methodology to do that… the ARB program and we adhere to it strictly."

All respondents agree that the roles of project management are clearly defined in the SDLCS. The manager said, "Yes, absolutely." Both IT developers agreed, "Yes."

Measurement criteria also exist by user sign-offs of all development phases through various means, such as change requests, problem logs, and change control processes. The manager explains, "We have a tracking system. You've heard of ITIL [Information Technology Infrastructure Library]? That's partially embraced here by Agency 1, [the Parent Agency]. We are Agency 2, [the Child Agency] we tell our people that 'when you have a problem, you [can] call the IT Helpdesk and [they can help] you log a ticket'… We track that. Every time there is a problem it is documented in a system of the number of calls you have. Then we start watching the calls and say there is a reoccurring theme here with the problem, and we need to fix that… We also track the challenges of the system through the information systems through the DIT [of the Parent Agency]." These activities are fully documented at every step of the SDLCS. The manager continued, "Yes, you have to. There has to be a formal systems document in any issues or challenges that are encountered."

There are slightly different viewpoints among the respondents regarding formal guidelines to determine "a job well done." Both IT developers agree that formal guidelines do not exist but believe that informal guidelines do exist. IT Developer 1 said: "I don't know if there's anything formal for that. To say that a job is well done, you need to send an email, so I'd go with a 'no' on

that. Sure, there are informal guidelines, but not formal guidelines." IT Developer 2 added: "Sometimes they let the manager know, and he comes and gives us the good news." On the other hand, the manager does not believe that any guidelines exist for "a job well done." He said, "Maybe once in a while, but overall, no. The DIT [of the Parent Agency] does have a reward program, but internally [in this Child Agency], no. They do have an appreciation day." The manager then elaborated his perspective further, "You can have a system that works 98 percent of the time. The 2 percent of it being down is when you hear screaming. They don't realize that your system has been down 2 percent and up 98 percent, and that's pretty darn good. They don't understand that… People are very slow to recognize good work, but very quick to criticize."

There are different viewpoints among manager and developers regarding a formal system of recognition. Both IT developers agree that such a system exists. IT Developer 1 said, "Yes." IT Developer 2 added, "Yes, there is." On the other hand, the manager does not think so. He explained, "I'll come down and tell you [that] 'You've done a good job', but there really is no system in place in Agency 1 [the Parent Agency] to give a bonus to someone for a good job." Instead, he suggests that perhaps this is done through the regular performance appraisal, in that "they get annual reviews and pay raises based on performance." In this regard, the manager acknowledges that he always tries his best to look out for his staff. He said, "You can put them in for awards and outstanding performance rewards. They [can] get gift certificates… Except on a certain project, I can do an outstanding performance reward in [the Parent Agency]. You can do a letter and you send it over to [the Parent Agency] and they evaluate it."

Respondents are optimistic about the training at the organization. The manager, while being more cautious about the budget said, "We have budget issues in the organization just like the rest of the country does." The manager is also an advocate of training and employee development; he offers his perspective as follows, "Yes absolutely, I encourage training. The biggest compliment the leader of a section can have is, if I take you and I develop you, and I train you and you really [get] inspired and do really well. If you do a good job, I do a good job. When you do that you get a reputation from people that a good quality employee will come from you." Both IT developers

agree that their manager normally does a good job in this area. IT Developer 2 states, "There's money set aside for training." IT Developer 1 has not experienced training issues because the Parent Agency always sends staff to formal training. He elaborates further, "If a project comes up where you need to have more up-to-date training on a newer version of products, or you need to work on project [that] you've never worked on before, [and then] they'll send you to training, like Learning Tree." While acknowledging that his organization does not have the money nor the time to invest in the concept of OJT [on-the-job training], the manager expresses with confidence, "My job is to get the right person in the right position to do the job and I've been 100 percent successful so far."

In terms of hardware, the manager exhibits a detailed knowledge of the inventory of hardware of the organization. Generally, the organizational IT platform consists of "desktops, laptops, servers, video conferencing equipment, audio conferencing equipment… [And] of course the usual printers, scanners, peripherals and things like that."

In terms of future plans to purchase new hardware at the organization, respondents agree that they are not aware of any plans. However, they are aware that there is a refresh cycle that is formally established. IT Developer 1 said, "They have a formal plan set in place, where on a rotating basis, they purchase new desktops, laptops and printers." Regarding the approximate timeframe of the refresh cycle, the manager said, "Desktops are usually [refreshed every] 5 years."

In terms of software that is currently used, the IT developers identify the following: "Sequel Server, Visual Studio, Visual Source Save, Crystal Reports, Photoshop, Dreamweaver, Adobe Acrobat Suite, and the whole Microsoft Office Suite." The manager adds, "We have specialized software, Telestaff, [which] tracks people on leave, to make sure we have enough people working in the field… We have reporting systems… and a record management system… and on the intranet, we have about 70 applications that are agency specific - the ordering of materials, personal tracking, and things like that."

In terms of future plans to purchase new software at the organization, IT Developer 1 said, "We just did, so yes. At the end of the fiscal year, they go through a review of what we have and

what we need to have upgraded and updated, and anything new that we need. So we just did an upgrade to Sequel Server in 2008." IT Developer 2 added, "We got a new version of Photoshop." However, the manager believes that there's no plan to purchase new software due to the limited budget. He offered his perspective as follows, "We paid for maintenance and support. I don't consider that new software."

Respondents agree that the user community plays an important role in the data collection process. Generally, once the data are collected, an edit process is established by the IT developers to extract only desirable and usable data which will then be validated by the user community. Technically, based on users' requirements, the IT developers collected data via interviews. IT Developer 1 describes the process as follows, "We interview the users and we've keenly involved from the start to the end of the process of creating the applications that use the data. A lot of the times, when a user comes in and says, 'We need this information', we actually know more than they do on what they want. They'll consult with us, and we'll go through what they need, and we'll go through their requirements. We have a symbiotic relationship with them. So we're keenly aware of all the data that's collected."

To ensure the reliability and consistency of the data collected, the manager states that the data are actually defined by the user community. He said, "I think the accuracy of a report is solely dependent on the user. Data is data. I'm collecting all this data based on [the user's] needs… and what [they] want, I'll give it to [them]. I'm not going to define [their] needs." IT Developer 1, while acknowledging that "We're the keepers of the data," suggests a way to keep the data clean by making sure that only good data can be entered into the system "in the first place." He says, "One of the goals to avoid them from putting in bad data is right at the start. Standardize the databases, so that the information is something that can be used not only for a certain application but for other applications – widening the scope of what the data may be used for in the future. Being gatekeepers on what actually gets in." IT Developer 2 explains the concept of avoiding redundancy in the data collection process as follows, "We don't have a lot of redundancy, because our applications talk to each other. We don't have duplicate data, so the data is consistent because we refer to one source…

We try to refer to the same source so that the data is consistent."

Management is encouraged by the department to empower the employees. "Each person knows their responsibility as they take ownership of it. They call the ball on it… You make a decision based on the information you have at the time… If you make the wrong decision in IT, we won't do that again… I'm going to stand behind you." On the other hand, he is also a firm believer in holding people "accountable" for what they do. He elaborated, "Everyone here knows their responsibilities and I hold them accountable for their responsibilities. I give them expectations. I establish expectations."

To increase employee involvement, the authority to act, and responsibility, the management specifically creates an environment which promotes enthusiasm and cooperation to foster excellence among employees. He expresses his perspective on work and life of his staff as follows, "I'm a firm believer that my employees have a lot outside of this agency… They have families and they need to go enjoy that… Everybody has to have that balance in life… And everybody else in this agency knows that I take care of them."

Consistent with the management's theme of promoting a participatory culture, the IT developers feel a spirit of teamwork within their department. IT Developer 1 said, "From my standpoint, I think it's great." IT developer 2 agreed, "Yes, we have a good team of coworkers. There's no lock door policy where you can't talk to the manager."

The IT developers do not have to deal directly with the problems that most other IT departments outside the organization typically experience, such as competing clients asking for work to be done at one given time. The developers always refer any scheduling issues to their manager, and this step has proven to work very well to every party's satisfaction. IT Developer 1 said, "That's where the manager comes in. If there are scheduling issues, he's the one who will take care of it. He'll relay to us, 'Here is the most important thing you need to work on.' So the burden isn't put on us to try to make all these people happy at the same time. He considers that [it is] his job to worry about [and] prioritizing what our schedule needs to be." IT Developer 2 added, "The work gets done."

The IT developers can always talk freely to each other to get the information they need in order to get the job done. In fact, they are encouraged to go to everyone in the IT Section including the manager whenever they need help.

The IT developers are aware of the overall department quality mission, and consider that improving the quality of their work is part of their on-going responsibility. They like their job and could not think of anything that they do not like in their present work assignment. IT Developer 1 says he likes the "freedom and flexibility" and elaborates further, "I like the intimacy and the freedom of people being able to say, 'I need this', and [then I would respond], 'Go ahead and make the request online, [then] we'll have a meeting.' They get to throw out ideas, and I get to provide input too. So it's very flexible and enjoyable." IT Developer 2 comments, "I cannot think of anything I like [the] least; I think I like my job here."

Both IT developers take pride in their work because they think that the work they do is important to the success of the organization. IT Developer 1 adds his perspective as follows, "I think it reflects in the fact that different parts of the organization – when they see something [new] up, it's amazing with the number of people who say, 'Hey I want this, can you do this?' So I think that reflects the importance, that different groups come in and say, 'That's really great, I need this too. How about doing this, can you do this for me?' So, that shows there is an importance to it." Overall, the IT developers are happy with their work environment, but this attitude is not limited to equipment, materials, manuals, and documentation.

The IT developers know who their internal customers are. They interact with them on a regular basis, and maintain a good professional relationship with the user community. IT Developer 1 categorizes this formal relationship with it as follows, "We actually require them to put it in a formal request, so that it can be documented. We'll have a starting point and we'll go ahead and honor their request. We'll be able to have a whole life cycle of their request. [After it] has been requested, [after] we've met, [and after] we've handled their request; it is now closed. Yes, that's part of our philosophy too."

The IT developers express confidence that management always looks after them and tries to

help them take advantage of opportunities to expand their knowledge of quality management. In addition, they sound confident about their technical background which enables them to perform on any assignments, present and future. In fact, although they like the work they do now, they are ready for any new assignment within the IT organization. IT Developer 1 said, "That's one of the joys of being here – you're always getting new assignments."

Generally, the management learns about quality management through training. He said, "I'm actually ready to go to a class about interaction among the technologies in the business - identifying the users' needs, business needs, and translating it into technology." In addition, the manager also goes to conferences or professional seminars. He also relies on technical books, journals, magazines, articles about "TQM, QM [Quality Management], or whatever it's called."

Management too is committed to the customers, to achieving continuous improvement of the systems development process and to keep the customers happy. This is done by maintaining constant dialogue with the user community, although in a somewhat informal manner. The manager elaborated, "As long as they aren't complaining, then everything is good." On the other hand, he offered his perspective on the philosophy to get things done to make the customers happy as follows, "I'm very quality and client service oriented. If a person has a problem, fix it. If you can't fix it, find someone who can fix it. The customers had already told you what the problem is, so we hand it off to someone else and get it done. We follow up and make sure it's done." To ensure that the commitment to quality IT systems is met, the users are asked to be involved in every phase of the systems development process. In fact, without the user sign-off, the process does not really continue to the next phase.

Management expects employees to be responsive to user needs, to pay attention to management's instructions, and to try to do a good job. In fact, the manager states clearly that he does not hold them to a different standard than his: "I've always told my people that if you make a mistake, I'm not going to get mad. People make mistakes, [and] I make mistakes. I'm not going to hold you to a different standard than me." Management considers employees to be fundamentally hardworking, responsible human beings, and therefore should be encouraged and given full support.

The manager holds his employees in high regard with comments such as, "These people here are loyal… and devoted to this agency. I'd sell them and I would never work another day in my life and I'll be the richest man in the world."

When asked how management increased employee satisfaction while working towards the common goal of the organization, IT Developer 1 said, "I'm not sure if there's anything that could be done that we're not doing now. I'm very satisfied with the way we do things. We've got support from our manager; we've got a good working relationship with all of our clients." IT Developer 2 offered more specifics when explaining his personal perspective, "We have the freedom to work on the stuff already. We have our freedom, within the guidelines. And we get training and new equipment, so we're happy with the toys we get." From the managerial perspective, the manager said that from his experience, "I've been successful here, not because I'm a great guy, not because I'm brilliant, but because I know a little bit about hiring people and the right people [are] in place here, and subsequently, [when] I hire the right people, my life is made a lot easier."

When asked how they could help deliver the systems that the customers expect, IT Developer 1 suggested, from his own experience, that better documentation is a big plus. "One thing that I always struggle with is documentation. If I could do [a] better documentation [now], that would not only help the customers but it would help me later on." IT Developer 2 stresses the need for staying within the established guidelines, "I think what we're doing is great, and sometimes people have a hard time prioritizing. That's where you could anticipate the needs. It's up to them to give us the requirements… We have to stay within the guidelines. We're happy within what the guidelines are." From the managerial perspective, the manager expresses with confidence that his people are already doing the job and that nothing more can be done. He reiterates, "They already do it… I'm proud and privileged to work with these people."

When asked philosophically about the roles of a leader or a manager, the manager thinks of himself as both a leader and a manager. He explained, "Sometimes I have to assume both because we have limited staff here. A leader is only as good as the people he surrounds himself with." He further elaborated on the current situation at the organization and offered his perspective as follows,

121

"I wish we had more staff to accomplish more to deliver more services… But what I've done, I've identified these are my needs, projecting down the road, as we grow, and request for service increases and demands, so I need to have people in place to meet that. So I identified that into our workforce plan." Generally, he seems to be consistent with the concept and definition of a leader and a manager. The leader creates the vision of the organization, and then motivates the organization to transform into that vision. This mission requires the inventory of existing organizational capabilities, and a set of actions that must be taken, to move the organization into the future. The manager, on the other hand, concentrates on the bottom line. The manager makes sure that the actions that are taken to move the organization into the future are done as correctly and effectively as possible. In summary, he would also agree with Bennis & Nanus's notion (1986: 21): "Managers are people who do things right and leaders are people who do the right things."

Interview Summary – End Users

Respondents agree that they are satisfied most of the time with the quantity, quality, and timeliness of work and services provided by the IT Developers in the IT Section of Agency 2. End User 1 comments, "They are great; but a lot of the times, they are constrained by the vendors in which we purchase from. They do a great job of what they can; but if the third party isn't giving them what they need, then it causes a problem." End User 2 agrees, "They are great."

Respondents agree that the work provided by the IT Developers is always consistent with their requirements. The error rate, if there is any, would be at a minimum level. They seldom complain. End User 1 said, "They are very good." End User 2 added, "Very good people."

Respondents further agree that they are involved in some phases of the systems development process such as Requirements and Testing, although they are not familiar with the SDLCS as described in the "FY 2011 IT Plan." End User 1 comments, "To some degree, yes, because when we get a product, they need to say, 'What is it that you need.' I sit on a workgroup for our software, and we say, 'This is what we need our software to tell us.' So yes, some phases." Regarding the SDLCS, End User 2 comments, "I've personally never seen that book [FY 2011 IT Plan], so I don't

122

know." End User 1 adds, "This book, I have not seen; but familiar with the idea [of the SDLCS], theoretically, yes." These users do not agree that they are involved in all phases of the SDLCS.

Most importantly, they fully understand the objectives, the requirements, and the benefits of project requests prior to beginning the systems development.

Respondents also agree that they maintain a very good working relationship with the IT Developers in either a formal or informal manner. They usually communicate with the IT Developers on a regular basis.

Respondents moderately agree that customer satisfaction is measured verbally and informally. In fact, they never received a formal customer satisfaction survey. End User 1 said, "That, I've never received." However, in an informal sense, they acknowledged, "Informally yes, because we have good working relationships with them. If any issues come up, like, 'Hey, what do you think of this?' then it's more informal. I think it's because they value our opinion as we value theirs." End User 2 continued, "[There is] no system in writing, because when [the IT system] was first implemented, [the IT program manager] kept coming to me and asked me, 'How has it worked with my position.' So yes he did." End User 1 added, "We talk about it on a regular basis, and we have those certain meetings, but not a formal writing thing."

Respondents are not sure of whether customer feedback systems exist from the IT Section to keep track of customer complaints and statistics. They said, "We wouldn't know that." However, End User 2 acknowledged, "When you have a problem with anything that's going on, say for instance, if I got locked out of the system. There's a form, you fill out the request to the IT Help Desk, and then they will come and will respond to you. They will say, 'Hey I heard that [there is a problem]' and then they'll fix it for you." End User 1 elaborated, "I do think they have something for complaints that's different from an IT ticket. But I'm sure that's on the intranet." End User 2 said, "I've never seen it, or never had to use it."

Respondents acknowledge that they maintain official and direct lines of communication with the IT Developers on a regular basis. They said, "We have official meetings every Thursday."

Respondents also acknowledge that they maintain unofficial and indirect lines of

123

communication with the IT Developers on a regular basis. They said: "Yes, on a daily basis."

When asked about an area where the IT Developers could increase overall satisfaction of the quality of services provided, respondents suggest that "some sort of training or an introduction of the operational side of the department" would help. End User 1 elaborates further, "The IT people … usually come in because they're hired as IT people, and they know IT really well. They understand the program, but they don't understand the context behind it. They don't necessarily understand everything from the department world. They speak in computer language versus the context of which certain information needs to be gathered. You can have someone who is totally good with IT systems, but if they don't understand the clinical nature of what I'm talking about, they're not going to be able to pull the right information [for me]. We know the operational side [of the department]. They don't necessarily understand that." End User 2 agrees, "I guess that would be more on the operational side."

When asked about an area where they can help the IT Developers deliver the quality of services that had been requested, respondents suggested that perhaps they could also be more specific in providing the IT Developers what they need in a timely fashion so they can get their tasks completed on time. End User 1 explained, "The only thing I can think of is to be more specific as possible. And in my requests, the more specific you could be, the easier it is or becomes for them."

When asked for additional comments, respondents expressed the appreciation for the attention that the IT Developers had been paying to them, and that they hold the IT Developers in high regard. End User 1 offered exceptional remarks as follows, "They are very good. I think if they get constrained by anything, it's not anything that's their fault; it's the vendor that we have purchased. Because they have to work with whatever systems we have bought, and if we bought a bad system, then they're going to have to fix the problems, so they do a great job with that." End User 2 added, "We alert them when we have a problem because we use the software on a day-to-day basis. If there's a problem, most of them don't know [about it]. But we do work with [the software] on a day-to-day basis. They appreciate it because they don't know that there's a problem."

Finally, respondents conclude the interview session with optimistic comments about the spirit of teamwork and how their relationships with the IT developers could be improved. "They have lots of work to do; they're swamped because they have requests coming in from everyone, plus they keep us running. We wouldn't be able to function without them. These IT guys are great."

Agency 3

This agency is one of the major statistical agencies of the federal government with headquarters in the East Coast and field offices located across the country. It is a TQM committed organization with a clearly defined organizational vision, mission statement, quality policy, and several strategic goals. Today, Information Technology (IT) Department is the official name of the systems organization although it was called Information Systems (IS) Department during the first stage of this study. For the purpose of this dissertation, IS Department and IT Department would be used interchangeably to reflect the respective time frame. It should be noted, however, there are fundamental differences regarding the areas of responsibility between the previous IS Department and the current IT Department. Currently, the systems organization at Agency 3 had been decentralized to several systems development groups across the organization. On the other hand, it was a centralized organization during the first stage of the research. For that reason, the second stage of this research had been conducted with one IT system development group which belongs to a major department of Agency 3. Within that context, the presentation of Agency 3 is divided into two sections: the First Stage of the Research and the Second Stage of the Research.

Agency 3 in the First Stage of the Research

In the first stage of this study, the IS Department of Agency 3 "develops and monitors the execution of plans, policies, and procedures for the management, acquisition, telecommunications, and automated data processing" (ADP Plan, Section 1, Page 2). In the past, all computer systems development activities were provided, supported, and maintained by this department. At the time, except for the programming activities which had been decentralized, all other activities remained centralized and were managed by the IS Department. With a total headcount of roughly 300, the IS Department was headed by an Associate Director. Reporting to the Associate Director were six Division/Office Chiefs. Each Division/Office was responsible for some specific area such as: Systems Management, Software Support, Business Process Management, Technical Research, End-User Training, Hardware Management, Computer Operations, or Hot-Line Technical Support (ADP Plan, Attachment 1, page 18). The typical chain of command in this department is hierarchically structured: 1. Associate Directorate, 2. Divisions/Offices, 3. Branches, 4. Sections. Five managers were interviewed for this study including the Associate Director, two Division Chiefs, and two Branch Chiefs. Six IS professionals were interviewed individually; four of them were also interviewed as a team.

Interview Summary – Management and Technical Staff

Respondents in this department agreed that a focus on the internal customers was the most important factor in defining a quality IS: user requirements and expectations were met; measurement criteria were well defined; systems were well documented; systems were delivered on time and within budget; error rates were low; and systems were accurate and reliable. Almost respondents agreed that everyone understood the meaning of quality, but guidelines for promoting a quality system remained somewhat informal. As a substitute, a series of quality management activities has been designed by the IS Department to support the organizational strategic goals. These activities also supported the specific goals of several departments: Meet or Exceed Customer

Expectations, Improve Product Line to Meet Customer Needs, Enhance Employee Career Environment, Automate Effectively, and Improve Administrative Systems and Management.

The IS Department had developed a program to support the improvement of the organization's software quality and the process by which it was developed. As part of this effort, a Systems Development Life Cycle (SDLC) team was formed and consisted of several user groups in the organization. They participated in the completion of formal documentation and standards for the entire organization. Specifically, the team was tasked to develop a methodology for all phases of the systems development life cycle with emphasis on automation, communication, and team participation to enhance user satisfaction. The scope of this methodology included (but was not limited to) project management, change control, structured walkthroughs, cost-benefit analysis, process management, and CASE tools.

Due to the lack of formal guidelines, internal customer requirements remained informal. Measurement criteria such as the amount of corrective maintenance required once the system was delivered and the number of complaints about the system were also informal, if they existed at all. These issues were to be properly addressed by the SDLC team in producing the forthcoming reference documentation and standards.

Respondents agreed that there were no formal guidelines to determine "a job well done" or to determine if a system had achieved a certain level of quality. However, a performance review that had guidelines for determining how well an individual performed may perhaps have filled this role. According to respondents, a formal system of recognition existed at the organizational level, but not at the department level or below.

Respondents in this agency agreed that there was not any specifically defined system of development or methodology. At various individual departments where the programming activities had been decentralized, there may have been different written methodologies. One specific goal of the IS Department was to set standards and focus the direction of the entire organization through the formation of the SDLC team. Due to the lack of a formal methodology document, checkpoint procedures such as structured walkthroughs, project reviews, management reviews, phase sign-offs,

etc. all remained informal.

The team of four IS professionals stated that although there was usually a completion date for a specific project when the system was expected to be up and running, project management was also somewhat informal. Managers, however, stated that in order to effectively conduct project and resource management, the target system architecture of this department was the organization's structured strategy to be an "open system." In so doing, a processing environment across diverse software, hardware, and telecommunication systems would be secured to present "seamless access" for the user community.

Training was an area that was viewed favorably by respondents. The organization had provided TQM and additionally made other training resources available to management and employees. An actual training plan for employees had not been in existence, but a performance plan which included employee training was more formalized.

Managers attended professional seminars on quality management and project management. Some managers also attended courses on problem solving and team building. Quality gurus such as W. Edwards Deming and James Martin had been invited to teach on several occasions in this organization and they were not strangers to managers of the department. Employees were confident that they would have had no problem when requesting training to expand their technical knowledge.

In terms of hardware, most staff members had access to the mainframe computers, minicomputers, and a variety of microcomputers. The department had been planning to migrate to a state-of-the-art "open system." At that point, modernized hardware would then be needed, and the plan was under study at the time of the research. In terms of software, there was a wide range of software installed including compilers, debuggers, record/file handlers, graphic packages, word processors, and statistical packages. To accommodate the department's plan to migrate to an "open system," new software was also needed, and this plan was also under study at the time.

Almost respondents agreed that the user community played an important role in the data collection process. There were different forms of data collection, such as user interviews, specifications, outcomes of the JAD [Joint Applications Design] working sessions, and prototype

information from the users. The users also edited and validated the collected data to ensure reliability and consistency of the data collection process. According to the team of four IS professionals, users requested that the systems be made generic so the users could edit and validate the data. In addition to user participation early in this data collection process, users also participated in other team efforts, according to one manager who stressed the importance of the team concept. The critical aspects of the data collection process would also be properly addressed by the SDLC team.

Managers were encouraged by the department to empower the employees. To increase employee involvement, authority to act, and responsibility, managers had specifically created an environment which promoted enthusiasm and cooperation, and fostered excellence among employees.

Consistent with management's theme of promoting a participatory culture, the individual IS professionals felt a spirit of teamwork and cooperation within the group. The IS professionals admitted, however, that they sometimes did not feel the same way with other groups in the larger organization, perhaps due to the lack of communication among them. According to the IS professionals, each unit of the organization - whether department, division, branch, or section - had different goals although all of them understood the common organizational mission. However, whether different units across organizational boundaries had cooperated to meet common organizational goals remains to be studied.

The interviewed team of four IS professionals felt that they were lucky not to have had the problems that usually occurred in most IT departments regarding competing clients simultaneously asking for work to be done. For the most part, the IS professionals had been successful in making everyone happy, due to the fact that they always tried to plan and schedule tasks carefully in advance. The individuals in the team could talk freely to each other to get information they needed in order to get the job done. They were able to talk freely with other team members outside their branch for help. In fact, they had been encouraged to go to everyone including managers whenever they needed help.

The individual IS professionals were aware of the overall department quality mission. They considered that improving the quality of their work was part of their on-going responsibility. The IS professionals liked their job, although there were some aspects that they liked more than others. The most liked are the opportunity to develop computer systems to help the user community, become acquainted with modern computer technology, the freedom to interact with each other, and the freedom to work independently. They were also happy with the work environment such as equipment, materials, manuals, and documentation. For the most part, they believed that all these products had been gradually improving.

The least liked aspects are the bureaucratic features of organizational life and sometimes the lack of communication among units of the organization. The staff took pride in their work because they thought that the work they did was important to the success of the department. Due to the lack of a system development methodology document, however, the IS professionals had to use their best judgment to get the job done.

The individual IS professionals knew who their internal customers were, interacted with them on a regular basis, and maintained a good professional relationship with the user community.

The staff sounded confident about their technical background which enabled them to perform on any assignment, present or future. In fact, although they liked the work they did, they felt that they were ready for any new assignment within the IS Department. One of the professionals stated that he might have been ready to accept a new assignment depending on the nature of the assignment. Two others, however, expressed the desire for additional training in order to be well prepared for a new assignment.

In addition to attending professional seminars (such as those headed by Deming or Martin) to expand their knowledge of quality management, managers had often updated their knowledge through technical books, journals, and sometimes feedback from consultants. Managers were committed to a customer focus to achieve continuous improvement of the systems development process, and to keep their internal customers happy. This was done by maintaining a constant dialogue with the user community, in a formal manner. To ensure that the commitment to quality

information systems was met, feedback from the user community was always sought. One specific goal of this department had been to involve customers in developing policies and executing major initiatives. To support this specific goal, managers in this department had often practiced the quality management principles of the organization through frequent surveys, focus groups, and user meetings to learn about what customers wanted.

Managers had expected that their employees be responsive to user needs, pay attention to management instructions, and try to do a good job. Managers had considered their employees to be fundamentally hardworking, responsible human beings, and therefore should be encouraged and given full support.

When asked philosophically regarding the roles of a leader or a manager, three opinions were generated. Three managers thought of themselves as playing the role of both a leader and a manager; one thought of himself as a leader; and one as a manager. However, these managers had been consistent with each other on the concept and definition of a leader and a manager. The leader created the vision of the department, and then motivated the department to transform into that vision. This mission required the inventory of existing department capabilities, and a set of actions that must be taken to move the department into the future. The manager, on the other hand, concentrated on the bottom line. He or she made sure that the actions that were taken to move the department into the future were done as efficiently and effectively as possible. In summary, the managers at this agency would have agreed with do things right versus do the right thing distinction (Bennis & Nanus: 1986: 21).

Customer Survey Results

A questionnaire was sent to ten respondents who were identified as customers of the IS Department of Agency 3. These respondents included representatives of other internal units of Agency 3.   Seven out of ten copies of the survey which were distributed were returned.

Table 4.5 presents the results of the quantitative portions of this survey. In this presentation

Table 4.5: Agency 3 - Initial Customer Satisfaction with the Systems Development Process

	Part 1 - **Perceptions of systems development process, relationships, and quality**		
Question	Full Text of Question	Median	Interquartile Deviation
1	Generally speaking, my department is familiar with the concept of the system development process.	6.0	1.0
2	My department is involved in some phases of the system development process.	6.0	1.0
3	My department is involved in all phases of the system development process.	5.0	2.0
4	My department has a clear definition of the objectives of the project request prior to turning it over to the system developers.	5.0	1.5
5	My department has a clear definition of the requirements of the project request prior to turning it over to the system developers.	6.0	1.5
6	My department has a clear understanding of the benefits of the project request prior to turning it over to the system developers.	5.0	1.0
7	In general, my department is satisfied with the timeliness of work provided by the system developers.	6.0	0.5
8	In general, my department finds a minimum error rate in work provided by the system developers.	5.0	0.5
9	In general, my department finds that the work provided by the system developers is consistent with our requirements.	5.0	0.5
10	In general, my department is satisfied with the quantity of work provided by the system developers.	5.0	0.5
11	In general, my department is satisfied with the quality of work provided by the system developers.	5.0	0.5
12	My department seldom complains about the system developers.	6.0	1.5
13	My department talks with the system developers on a regular basis.	4.0	1.0
14	Generally speaking, my department maintains good working relationships with the system developers.	6.0	0.5

	Part 2 - **Description of attention paid by systems developers to internal customers**		
15	The system developers conduct customer satisfaction surveys on a regular basis.	3.0	0.5
16	The system developers establish customer feedback systems to keep track of complaint statistics.	4.0	0.0
17	The system developers establish official and direct lines of communication with my department through interviews and office visits on a regular basis.	3.0	1.0
18	The system developers establish unofficial and indirect lines of communication with my department through informal contacts.	5.0	1.0

two issues were addressed: (1) the perceptions of the user community toward the systems development process, including the relationships, and overall quality of systems development; and (2) the perceived attention to internal customers by the systems developers.

Five respondents replied to the three open-ended questions in which they were also asked to freely express how the system development process could be improved to better meet their needs.

The user community of IS Department of Agency 3 moderately agreed that they were somewhat satisfied with the quality of services provided. Almost all these respondents further agreed that they were involved in some phases of the systems development process. Fewer agreed that they were involved in all phases. Most importantly, respondents understood the objectives, the requirements, and the benefits of project requests prior to beginning the systems development.

Respondents also agreed that they maintained a good working relationship with the IS Department. Respondents moderately disagreed that customer satisfaction was measured on a regular basis prior to this survey. Furthermore, respondents were not sure whether customer feedback systems exist to keep track of customer complaints and statistics. No official and direct lines of communication were established between the IS Departments and other internal units.

Several of the respondents suggested how other internal units and the IS Department could help each other. Overall, respondents had been somewhat satisfied with the quality of services provided. Respondents were willing to work with the IS Department and to provide better analysis of problems as well as in-depth details regarding required projects early in the systems development process. This would have eliminated situations in which requests came with an "emergency" mode. Respondents also felt that the IS Department should have been more proactive instead of reactive to changes in technology as a way to improve the systems development process to meet the user needs.

Employee Survey Results – Management and Technical Staff

A questionnaire was sent to 20 IS professionals including managers in the IS Department of Agency 3. This sample of 20 included mostly IS professionals who actually performed computer application development activities in this department. These respondents were selected by the special advisor to the department's head. This public official was assigned by the department's head to work directly with me. Of the 20 questionnaires distributed, 10 copies were returned including two from managers and eight from computer professionals.

Table 4.6 - Technical Staff, and Table 4.7 – Management, present the results of the quantitative portions of this survey. In this presentation three issues were addressed: (1) the perceptions of all computer professionals toward the systems development process, including the relationships, and overall quality of the systems development; (2) the perceptions of technical personnel toward work in the department; and (3) the perceptions of management toward leadership style in the department.

Five respondents replied to the three open-ended questions in which they were also asked to freely express their suggestions for improvement of the system development process especially regarding: (1) meeting the customers' requirements and expectation; and (2) increasing employees' satisfaction while working toward the common goals of the department.

Respondents agreed that there were not any specifically defined systems development methodology in the department. Respondents also agreed that measurement criteria had been informal. These criteria could be measured by the amount of corrective maintenance once the system was delivered, the number of complaints about the systems, and the statistics of quality reviews of individual projects. Guidelines to determine "a job well done" had also remained informal if they existed at all. Respondents moderately agreed that they were aware of all resources

Table 4.6: Agency 3 - Initial Technical Staff perceptions of the Systems Development Process

Question	Full Text of Question	Median	Interquartile Deviation
	Part 1 - **Perceptions of Systems Development Process, Methodology, and Quality**		
1	There is a formal systems development methodology in my department.	4.0	0.4
2	The systems development methodology is clearly documented.	4.0	0.9
3	Checkpoint procedures (such as structured walkthrough, project review, management review, phase sign-off, etc.) are clearly defined in the systems development methodology.	4.0	0.9
4	The role of project management is clearly defined in the systems development methodology.	3.5	1.2
5	My department has a clear definition of quality systems.	4.0	0.9
6	There are formal guidelines for promoting quality systems in my department.	4.0	1.2
7	Customer requirements do exist within these guidelines.	4.0	0.4
8	Measurement criteria are clearly defined within these guidelines. These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects, etc.	4.0	1.5
9	There are formal guidelines to determine "a job well done" in my department.	4.0	2.2
10	There is a system of formal recognition in my organization.	5.0	0.5
11	There is a system of formal recognition in my department.	5.0	0.9
12	Generally speaking, in my department, project personnel have adequate training to achieve quality goals.	4.5	1.5
13	Generally speaking, I know the types of hardware which are currently installed in-house.	5.5	0.9
14	Generally speaking, I am aware of my department's plan to purchase new hardware to support the systems development methodology.	4.5	1.2
15	I need a more sophisticate personal computer to better perform my job.	1.5	1.8
16	Generally speaking, I know the types of software which are currently installed in-house.	5.0	1.1
17	Generally speaking, I am aware of my department's plan to purchase new software to support the systems development methodology.	3.5	0.9
18	I need a specific software to better perform my job.	2.5	2.5
19	The data collection process is clearly defined in the systems development methodology.	4.0	0.4
20	The reliability and consistency of the data collection process are clearly defined in the systems development methodology.	4.0	0.4

Question	Full Text of Question	Median	Interquartile Deviation
	Part 2 - Technical Staff Perceptions of Work in the Department		
21	I am fully aware of my department's overall quality mission.	5.0	1.9
22	I like my present work assignment.	5.0	1.2
23	I can't think of anything that I don't like regarding my present work assignment.	3.5	1.9
24	The work I do is important to the success of my department.	5.5	0.9
25	Improving my work is part of my on-going responsibility.	6.5	0.5
26	I rely heavily on the systems development methodology in my present work assignment.	2.0	1.4
27	I am ready for any new assignment within my department.	5.0	1.2
28	I have adequate training to perform well in my present work assignment as well as future assignments.	4.5	1.2
29	Generally speaking, I am happy with my work environment (including equipment, materials, manuals, documents, supplies, office space, hardware, etc.).	5.0	0.9
30	I know my customers and their functionality.	5.0	0.7
31	I talk to my customers on a regular basis.	5.0	1.2
32	Generally speaking, I maintain a good professional relationship with my customers.	6.0	0.0
33	I talk to my co-workers on a regular basis, whether professionally or privately.	6.5	0.5
34	My co-workers are always willing to help when I need them.	6.0	0.5
35	I talk to my manager or project leader on a regular basis.	6.0	1.0
36	I am not shy to talk to my manager or project leader when I need help.	6.0	2.0
37	My manager and project leader are always helpful and supportive.	6.0	1.0
38	My management often sends me to professional seminars, and/or technical courses to promote my technical knowledge of quality management.	3.0	2.5
39	My management often encourages me to participate in solving problems.	6.0	1.0
40	In my department, different groups cooperate to meet common department goals.	4.0	0.5
41	In my organization, different departments cooperate to meet common organizational goals.	4.0	1.0
42	Generally speaking, scheduling problems caused by competing clients are resolved to everyone's satisfaction.	4.0	0.5
43	I can feel a spirit of cooperation and teamwork that exists in my department as well as my organization.	4.0	1.0

Table 4.7: Agency 3 - Initial Management perceptions of the Systems Development Process

Question	Full Text of Question	Median	Interquartile Deviation
	Part 1 - Perceptions of Systems Development Process, Methodology, and Quality		
1	There is a formal systems development methodology in my department.	2.5	n/a
2	The systems development methodology is clearly documented.	2.5	n/a
3	Checkpoint procedures (such as structured walkthrough, project review, management review, phase sign-off, etc.) are clearly defined in the systems development methodology.	2.5	n/a
4	The role of project management is clearly defined in the systems development methodology.	2.5	n/a
5	My department has a clear definition of quality systems.	2.5	n/a
6	There are formal guidelines for promoting quality systems in my department.	2.0	n/a
7	Customer requirements do exist within these guidelines.	2.5	n/a
8	Measurement criteria are clearly defined within these guidelines. These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects, etc.	3.0	n/a
9	There are formal guidelines to determine "a job well done" in my department.	2.0	n/a
10	There is a system of formal recognition in my organization.	6.0	n/a
11	There is a system of formal recognition in my department.	5.0	n/a
12	Generally speaking, in my department, project personnel have adequate training to achieve quality goals.	5.0	n/a
13	Generally speaking, I know the types of hardware which are currently installed in-house.	5.5	n/a
14	Generally speaking, I am aware of my department's plan to purchase new hardware to support the systems development methodology.	4.0	n/a
15	I need a more sophisticate personal computer to better perform my job.	2.5	n/a
16	Generally speaking, I know the types of software which are currently installed in-house.	3.5	n/a
17	Generally speaking, I am aware of my department's plan to purchase new software to support the systems development methodology.	3.5	n/a
18	I need a specific software to better perform my job.	3.5	n/a
19	The data collection process is clearly defined in the systems development methodology.	3.0	n/a
20	The reliability and consistency of the data collection process are clearly defined in the systems development methodology.	3.0	n/a

Table 4.7: Agency 3 - Initial Management perceptions of the Systems Development Process – continued

Part 3 - Management Perceptions of Leadership Style in the Department			
Question	Full Text of Question	Median	Interquartile Deviation
44	Management should give detailed instructions to employees rather than giving them general directions so employees can work out the details.	3.0	n/a
45	Management should create a work environment in which employees can achieve personal goals while working for common department's goals.	6.0	n/a
46	Management should motivate employees by using economic incentive (wage raises) more than intangible rewards (honor and respect).	4.5	n/a
47	Generally speaking, employees in this department are fundamentally hardworking and responsible and should be encouraged and given full support from management.	5.5	n/a
48	Employees in this department are encouraged to maintain constant dialogue with the customers in the systems development process.	5.5	n/a
49	Top management of this organization fully supports the empowerment of all employees in this department to do whatever necessary to improve their work.	3.0	n/a
50	In this department, teamwork is encouraged to increase employee involvement.	5.0	n/a
51	Generally speaking, quality means total customer satisfaction or whatever the customer expects.	4.5	n/a
52	Generally speaking, employees in this department are encouraged to take ownership of work.	5.0	n/a
53	This department is determined to provide appropriate training on quality management to all employees.	5.5	n/a
54	Management has a clear vision of the department's future direction in the quest for quality.	3.5	n/a
55	Management recognizes that commitment to quality is a way to achieve continuous improvement and keep customers happy.	5.0	n/a
56	In this department, managers often attend professional seminars on quality management.	5.0	n/a
57	In this department, managers learn about quality management mostly from reading articles, books, magazines, professional journals, etc.	3.0	n/a
58	Management recognizes the importance of training to enable employees to acquire skills needed to accomplish the department's quality goals.	4.5	n/a
59	Management recognizes that teamwork involves open communications in an environment in which fear is driven out.	4.5	n/a
60	Management often meets to review the progress of the department's goals on a regular basis.	5.0	n/a
61	Management attempts seriously to gathering employees' opinion about managers' performance.	3.0	n/a

(hardware and software) that were available in-house.

Respondents did not agree on other items from the survey. Technical personnel thought that customer requirements were somewhat defined although in an informal manner while managers did not think so. Technical personnel thought that the data collection process and its reliability and consistency were somewhat defined informally while managers did not think so. Managers acknowledged that a formal system of recognition existed at the organizational level while technical personnel moderately thought so.

Technical personnel were aware of the overall department quality mission, and considered that improving the quality of their work was part of their on-going responsibility. Technical personnel took pride in their work because they thought that the work they did was important to the success of the department. They spoke with the customers on a regular basis and maintained a very good working relationship with the user community. They were encouraged by managers to participate in problem solving. Technical personnel were not shy to talk with managers when they needed help and moderately agreed that managers were supportive. Technical personnel did talk with co-workers on a regular basis and strongly felt that co-workers were always helpful. However, they did not know whether there was cooperation among different groups within the department, or among different departments within the organization. In general, they were not so sure about a spirit of teamwork in the organization.

Managers, on the other hand, thought that they did create a work environment in which employees could achieve personal goals while working for the department's common goals. Managers thought that their employees were fundamentally hardworking and responsible and should be given full support. Managers moderately thought of quality as total customer satisfaction or whatever the customer expected. To that end, managers had encouraged their employees to take

ownership of work and maintain a constant dialogue with the user community.

Managers agreed that they often attended professional seminars on quality management and learned more about quality management from reading literature such as books and professional journals. Managers had also recognized the importance of training to enable employees to acquire skills needed to accomplish the department's quality goals.

Managers did not believe that this department had a clear vision of the department's future direction. They also felt that the concept of empowerment was not fully supported by top management. Although management in this department had often met to review the progress of the department on a regular basis, managers in this department had not attempted to seriously gather employee opinions about the performance of managers.

Several respondents had suggested ways to: (1) improve the systems development process to meet customers' requirements and expectations; and (2) help increase employees' satisfaction while working toward the common goals of the department. Managers and technical personnel agreed that the concept of teamwork and partnership should be further explored. Respondents had suggested the following action items: (1) Let the customer play an important and visible role in the systems development process; (2) Obtain user commitment; (3) Keep a constant touch with the users; (4) Fully test to ensure a quality product prior to delivery; and (5) Gather feedback from the users. Managers and technical personnel agreed that participative management was an area where improvements could be made. Specifically, respondents had suggested that a more downward communication should be practiced, that employees be treated more fairly, that feedback from employees be sought, and that their focus should be centered on accomplishments and improvements. One respondent had suggested that project managers should also be experienced systems analysts.

Agency 3 in the Second Stage of the Research

Qualitative data was gathered via several in-person interview sessions on site at Agency 3 with this IT System Development Group and the End User Department. On the side of IT System Development Group, three managers were interviewed in two separate sessions. The first session includes an Assistant Division Chief and a Branch Chief who were interviewed together. The Senior Executive was interviewed in the second session. Both sessions were performed on site at Agency 3's headquarters. Each interviewee has a different and distinct role as Manager within Agency 3. Manager 1, the Senior Executive, "has full responsibilities for all budget, planning, program management, supporting relationships with other divisions within the organization, particularly outreach to the field and advertising." Manager 2, the Assistant Division Chief, "is the program manager whose role is basically to make sure that the Branch Chief has the necessary staffing to be successful in implementation to support the functional users." Manager 3, the Branch Chief, "is the project manager for the application and manages the technical staff that does the development of the application." Manager 2 and Manager 3 belong to the same division. In their role, they are also performing technical work. For the purpose of this research, they were also interviewed as IT developers. They would offer both a managerial perspective as well as technical staff's perspective to the specific questions when asked during the interview. On the End Users side, three IT End Users were interviewed in two separate sessions. The first session includes a Branch Chief and a Day-to-Day Manager who were interviewed together. An Administrative Coordinator, who is currently working in a regional center of the organization, was interviewed via telephone conference in the second session. Both sessions were performed on site at Agency 3's headquarters. The IT system, specifically 'System D', that they currently use had been designed and developed by this IT

Systems Development Group. Each interviewee has a different and distinct role as an End User of 'System D.' End User 1, the Branch Chief, "is responsible for the senior administrative processes." End User 2, the Day-to-Day Manager, "has responsibility for managing the 'D System' from the end user's perspective." End User 3, the Administrative Coordinator, "is currently the end user for the 'D program' and other programs that the organization has." Two written reports: (1) *Interview Summary – Management and Technical Staff*, and (2) *Interview Summary – End Users* had been shared with Agency 3's leadership to verify accuracy of the interviews and to obtain feedback. These reports are presented below.

Interview Summary – Management and Technical Staff

Respondents agree that the focus on the customers is the most important factor in defining a quality IT system: user requirements are met; comprehensive tests and re-tests are fully and formally documented; zero defects are tolerated; error rates are low; and systems meet business requirements as effectively as possible at the time they come into operation.

Respondents understand and agree on the meaning of quality, although they look at it through a different lens due to their specific role and responsibility. Manager 1 defines "quality by the degree to which requirements are fulfilled; and system robustness and resiliency in reliability." In order to apply this quality concept in the "complicated operation" of his specific organization in which "we can't be down for more than a few minutes during peak processing," Manager 1 offers an additional perspective for a quality system as follows, "A system has to, number one, be resilient and reliable. And secondly, we have to be able to have systems that can be flexible." Manager 3 thinks of quality as a "lack of defects. If the users aren't complaining, I feel that we're producing a quality product for the end users." Manager 2 offers the same perspective as Manager 3 with additional explanations. "We want to put a product out there where the users feel comfortable using our product with no complaints. That's why in our software development cycle and configuration management, we have different phases for reviews. We want to make sure that we're reviewing the

test scenarios and whatever we put out there is going to work. We need to make sure we don't fail. The quality is there." From the IT developers' perspective, they both agree that comprehensive testing effort that meets users' requirements is a critical aspect of a quality product. "We have the requirements, but at the same time, we have the unit tests, then the beta tests, prior to the production" implementation.

There is a consistent theme among all respondents about the specific nature of the system development methodology at the organization. They agree that the methodology is always documented. However, they have more than one document. In fact, they have so many of them, at various levels, due to the fact that "there are a lot of IT resources in different business areas" of this organization. Manager 2 said, "We do have a formal methodology at the division level, but at the same time, within the group, within the 'D System' area, we have our own development life cycle we have used for this implementation for the past 10 years." Manager 1 agreed, "This group, which is in our administrative area, does have a life cycle development methodology. There are several throughout the organization… We don't have just one, or, we don't have a standard. So while this group has one, I have a large group and they have one also, and it might be the same one that this group has." Manager 1 explained further about the specific nature of this development methodology at the organization, "We don't have one centralized development methodology. We have programming groups all over the organization; they aren't trained the same way; they don't all start in the same place; they don't have the same particular set of skills. So it is much more decentralized."

The Software Development Plan, or the SDP for the 'D System', describes its high level strategy to system development as follows. "The SDP provides the insight into the processes to be followed for software development, the methods to be used, the approach to be followed for each activity, and the project schedules, organization, and resources. The SDP was created during the project planning phase and updated throughout the life of the project as needed" (SDP, section 2, page 7).

The Software Life Cycle Model (SLCM) has been described in depth in Section 6, pages 21-

25. As a general definition, the "SLCM is an Enterprise Resource Planning (ERP) approach to software implementation that leverages practices based on experience as well as to develop sophisticated e-business capabilities as quickly and effectively as possible" (SDP, section 6.1, page 21). Manager 2 further explained, "This is a document that we updated back in 2006 that shows a high level system plan, but it shows the requirement development process, some of the background, some of our QA [Quality Assurance] processes."

Another consistent theme is regarding the content of the SDP or SLCM methodology document. All respondents agree that checkpoint procedures are indeed clearly defined. These procedures such as project reviews, management reviews, phase sign-offs, etc., often require heavy user involvement. Manager 2 said, "We call it PQR (Project Quality Review) because in the end of every phase, we have a review… [on] what are some of the issues, budget, implementation, schedules, and quality" (SDP, section 6.3.5, page 30). Manager 1 elaborated further, "I would say yes, definitely yes, because we have change control boards, [and] we have configuration management boards. We did all that to get our IT systems managed properly."

Respondents agree that the roles of project management are clearly defined. Manager 1 said: "We went through some rigorous PMO [Project Management Office] to get our major systems developed. So right now I have four active project management offices, and each one conducts their formal walkthroughs, testing, reviews, [and] change controls with written CRs." Manager 2 indicated, "We may probably have another document, but we define here, the organizational structure and the roles" (SDP, section 3.1, pages 9-11).

Respondents agree that formal guidelines exist for promoting a quality IT system. Manager 2 said, "The answer is yes, we have our SQA plan, the Software Quality Assurance plan" (SDP, section 7.2, page 33). Manager 1 added, "All of our systems were tested. We have testing metrics that all of our systems have to pass. We have a testing officer who is in charge of making sure we have rigorous tests of all of our systems." From the IT developers' perspective, "We don't have much turn around or turnover in our group; and our group has been steady. The people who have been trained have that quality inside; they are already used to the process."

Respondents agree that customer requirements do exist. There are rules and procedures to follow whenever requirements are received from customers. Manager 2 explains, "When we get the requirements, we go through the review, and if we feel that the requirements are not clear we go immediately back to the functional person who wrote the requirements, get the clarification, and make them re-write the requirements."

Measurement criteria also exist by user sign-offs of all development phases of the SDP and the SLCM (SDP, section 6.1, pages 21-25) through various means as pointed out by Manager 2: Projects Communication (SDP, section 6.2, pages 26-28), Reviews (SDP, section 6.3, page 29-30), and Project Metrics (SDP, section 6.4, page 31-32). Manager 1 added, "We have sets of metrics on system performance, very strict detailed guidelines that are applied at unit testing levels, integration testing, full system testing; and each system, each application in a system, has to meet those metrics before it is released into production." On the other hand, from the IT developers' perspective, "We can generate a query and see how many defects we know. Sometimes they are not defects. Sometimes it could be new reports, even though we have clear requirements from the customer after receiving the report. They will say, 'You know what, we need to add this additional field', as they might be showing it as a defect, but it's really not a defect."

There are slightly different viewpoints among the respondents regarding formal guidelines to determine "a job well done." Manager 1 stated: "The guidelines to determine a job well done has to do with the actual business processes that are being supported. So we have budget, quality and time criteria for all of our projects. So yes, very strict. People get recognized in different ways. We have formal recognitions, performance evaluation systems, and we have special awards for people who excel." On the other hand, Manager 2 is not certain if there are formal guidelines: "We don't have one." However, he acknowledges that the employee performance reviews are formal and documented, "but we recognize our employees. And the way we recognize those employees are that we have three reviews during the year. We have the quarterly review and the final performance review. And that's documented because that's part of the organization." At the team level, when a system goes to production successfully, Manager 2 said, "To make it more formal, we have done a

write up and submitted it for a review. And that's how the team got a bronze medal, so that's the guideline for that. We did it that way. In 2004, we were recognized by a bronze medal." From the IT developer's perspective, "That's an informal thing… the user community sent an email informally to say, 'Hey great job, thank you, you have done an awesome job and thank you for supporting us.' They have done that."

Respondents agree that there is a formal system of recognition that exists at every level of the organization. Manager 1 said, "We have a very strict detailed evaluation system, with strict scoring criteria for levels a, b, and c. When you have a certain number of points, you can qualify for a raise or bonus for a certain level. All of that has to be documented." Manager 3 explained further about the critical aspects of HR guidelines: "There's a formal process for recognizing people at the organization level, and it filters down the division, to the application level. I cannot go … being working for the government… we cannot go out and do something that is different than what the HR organization says… So all I can do is to do exactly the same thing that is required through the organization." Manager 2 agreed, "We cannot deviate from those guidelines." In addition to the formal evaluation system, there are also special awards for specific circumstances, as Manager 1 indicated, "We give special awards. I gave some special awards to people who work particularly hard… For people who stayed all night, and worked over the weekends, I gave them special awards. But they also get formal recognition and awards… at all levels."

Respondents think optimistically about the topic of training at the organization. From the IT developer's perspective, there's an "Individual Training Plan (IDP) and we have to do it on a yearly basis. I have to submit mine to my boss for review, and he will suggest certain classes to focus more on this or that. That is on all levels." In terms of technical training for IT developers, Manager 1 explained further, "Yes, they have personal development plans for employees. And of course, depending on what technologies have been selected. For instance, we use more and more Java now, so people will get Java training if they decide to use Java. We use a product called SAS in some of our areas, so we send some of our people for training in SAS. We do a lot of Oracle, so we trained a lot of people in the last 10 years or so in Oracle."

In terms of hardware, Manager 3 exhibits a detailed knowledge of the inventory of hardware of the organization. Basically, "We have Dell R9000s setup for our servers…" he said, "We have a database cluster of Dell R9000s, cluster of web servers per environment… We have a mixture of Dell desktops [and] monitors." Manager 3 added, "We also have an F5 Big IP load balancer. That load balances all the incoming traffic from one URL [Uniform Resource Locator] across the web servers." Manager 1 is aware that, "We have a number of Blade computers now, IBM Blades. And we have several different kinds of storage devices. We do storage area networking now. We do virtualization with the Blades. And we're beginning to do Cloud computing, but the CIO [department] is pretty much running that." The IT developers have "laptops for remote support… They don't do any development on the laptops… It is there to provide after-hours support. All of our work is done on a desktop."

In terms of future plans to purchase new hardware at the organization, Manager 2 states that "there's a formal plan for that, but not at my level. That's the CIO [department]. They review it on an annual basis with all our customers." Manager 1 agrees that the CIO department is responsible for all hardware purchase decisions. Manager 3 explains, "We go through a life cycle [to] refresh technology. After the R9000s get so old, they will be refreshed with newer technology. I think the refresh cycle is every three years. So every three years, the servers get refreshed… All the laptops and desktops [are on the] same refresh cycle. That's more along a five year life cycle."

In terms of software that is currently used, Manager 1 said, "We use a lot of software products. A lot of Java development environment products. Lots of Oracle, Microsoft-based, and SharePoint, stuff like that is beginning to be used." Specifically, Manager 3 added, "We are strictly an Oracle shop here. We use Oracle database, we use People tools, which include best of breed technology, so the parts of People tool we are using is web logic, tuxedo, and [the] application engine. No C++, no VSB." Manager 2 explained, "People tools is the development platform for the People Soft application, so it's an object oriented tool, using C, but it is basically embedded in their own application, so it's more object oriented."

Manager 1 indicates, "We're always buying software." Specifically, Manager 2 explains that,

147

"The formal plan [to purchase new software], in terms of OS [Operating Systems] and Database, is more of the CIO [department]. At our level, the formal plan is to make sure [we have] the software we need to be successful for the deployment of the application. There's a formal process where if you want a specific product. We submit this request and someone has to approve it. Then we can proceed to buy that software [and] continue to buy the maintenance. [For example], we have 25 licenses of TOAD [Tool for Oracle Application Developers], another group has 40 licenses, and another group has 20 licenses. So, the CIO [department] says: 'Time out, hold on. Instead of spending money that way, let's buy an enterprise license and let the enterprise use this product.' This is being formalized. So they have formalized in certain areas, like TOAD. They just formalized that with an enterprise license." From the IT developer's perspective, the process can be described as follows: "We propose and say we need this and here is the justification. Then they say, OK, if it is at the server level or windows level, it needs to get approved, so it gets to send to the acquisition group. The acquisition group decides how they want to go out and purchase the product. At this point, we are out of the picture until they provide the software to us."

Respondents agree that the user community plays an important role in the data collection process. Once the data are collected, an edit process is established by the IT developers to extract only desirable and usable data which will then be validated by the user community via testing efforts. Manager 1 said, "We do end to end testing, we have test cases, we use modeling, [and] we have a user acceptance test." Manager 2 stressed the critical aspects of the data collection process in terms of lessons learned, by saying, "Here are the activities, here are the issues or something we have learned, [and] this is what we like to see improved for the next release."

To ensure the reliability and consistency of the data collected, Manager 1 said, "We run all kinds of offline tests. We have modeling techniques to simulate volumes. So we simulate peak volumes, we simulate work flows. We simulate handoff and interfaces on all of our systems." Manager 2 continued, "If the data is not reliable or not there, then we have failed." Manager 3 explained, "We can also measure our success based off the number of 'Remedy' tickets that come in. We have a process - there's a software product called 'Remedy.' When there is a problem with

any systems, people enter in Remedy. If there is an issue, they create a 'Remedy' ticket and it gets routed to the application work group… We are the last stop along the train to resolve issues [related to our application] that come out. So we can clearly measure our success or failure related to how many 'Remedy' tickets we get."

Managers are encouraged by the department to empower the employees. Manager 2 offers his approach as follows, "From my management perspective, I gave them leeway and [say], 'Go ahead to make [the] decision, right or wrong. The decision you make, I will support you.' We all make mistakes. We are not perfect, but I let them make the decision. If I'm not here, they don't need to wait for me for an answer." Manager 3 continues with his way of doing things, because "as a manager, I promote independent thinking. I asked my developers constantly to think outside the box and come up with unique solutions to existing problems that are repeating over and over again. I asked them for their vision because I gave them my vision, but I cannot envision everything… Each team, I ask them to give me what their vision is to fix problems or where they want to go in the future."

To increase employee involvement, authority to act, and responsibility, managers specifically create an environment which promotes enthusiasm and cooperation to foster excellence among employees. Manager 1 outlines his managerial approach as follows, "Authority to act is directly related to performance. If people have performed then they will be allowed the authority to act. A lot of people don't have the authority to act because they need someone to watch them pretty close. So it depends on how well someone is performing or proven how well they can handle that authority."

Consistent with the management's theme of promoting a participatory culture, from the IT developers' perspective, there's a spirit of teamwork and cooperation within their department. However, it is not necessarily that it can also be felt the same way in other departments, as Manager 3 indicates, "Within my staff, we clearly have established cooperation and teamwork. Everyone here works well together and we resolve any conflicts along the way. When it gets out of my team and gets into a different organization, a lot of times there isn't teamwork… During the [critical

149

period], there are other competing priorities… So whoever that is carrying the biggest stick at the time, what job gets to be done." Manager 2 agrees and adds that, "There are some organizations that we work very well and there are some other organizations where teamwork doesn't exist. And that's normal in [the] private sector and government sector."

Scheduling is an area where there are problems that most other IT shops outside the organization typically experience regarding competing clients asking for work to be done at one given time. To deal with this situation, Manager 3 said, "Every day we would have to re-assess where we are, what was the most important to get done that day or that week and identify priorities to the staff, accordingly." From the IT developer's perspective, "The customer was involved in this. [The manager] would talk to the functional person: 'OK, you give me five requirements here and you want all this next week. Well, I can't do all five at the same time. Which one is your top priority? To have that agreement, you guys tell me [where] we want to go from here.' It has proven to work very well to every party's satisfaction because the 'ultimate users' were involved."

The IT developers can always talk freely to each other to get the information they need in order to get the job done. In fact, they are encouraged to go to everyone including managers whenever they need help. Manager 3 said, "I have an open door policy. They can walk into my door all the time."

The IT developers are aware of the overall department quality mission, and consider that improving the quality of their work is part of their ongoing responsibility. They like their job and could not think of anything that they do not like in their present work assignment. They take pride in their work because they think that the work they do is important to the success of the department. Overall, the IT developers are happy with their work environment as such, but this is not limited to, equipment, materials, manuals, and documentation.

The IT developers know who their internal customers are. "Our direct customers are in another department - the functional team." They interact with the user community on an indirect basis via the functional team. Manager 3 describes the nature of this relationship as follows: "[The functional team] gets feedback from the field people and here at the headquarters. They get feedback from

them and consolidate the information and provide it to us, i.e., when software needs changes or if things aren't working properly. We get all of our information from that organization." They believe that this professional relationship with the user community has been good. He continues, "At the end of the operations, they have a meeting, the functional side with their offices to collect feedback [such as], what worked, what didn't work, what improvement [do] we need to make. So for the next phase, [for] anything we can improve, we will. That's always the collection of data method on how to make the application better."

From the IT developers' perspective, management always looks after them and tries to help them take advantage of opportunities to expand their knowledge of quality management. In addition, they sound confident about their technical background which enables them to perform on any assignments, present and future. In fact, although they like the work they do now, they are ready for any new assignment within the organization.

Managers learn about quality management through training. Manager 1 said, "We send our staff to formal training, and a number of our staff have project manager and IT management certificates from GWU [George Washington University]. We run classes in-house also. We send our managers and our technical staff to training on technical management, quality management, and programming skills. Then, we have classes when our people move up the ladder to a management level, they have to take a whole set of classes in managing people, relationships, negotiation, and all that kind of stuff. So people get a lot of training." In addition, managers also go to conferences or professional seminars such as TQM. Manager 2 indicated that at the organization, they attend various "brown bag" sessions. They also rely on technical books, journals, magazines, and articles to expand their knowledge of quality management and project management. Manager 3 acknowledged that he has attended "formal and informal classes for quality management." He agreed with Manager 1 that "through GWU, the organization provides project management and IT project management. That was part of the formal process. Another formal process is the organization quality management [training]."

Managers are committed to their customers, to achieving continuous improvement of the

systems development process, and to keep their customers happy. This is done by maintaining constant dialogue with the user community, although in a somewhat informal manner, via the functional team. To ensure that the commitment to quality IT systems is met, the users are asked to be involved in every phase of the systems development process. In fact, without the user sign-off, the process barely continues to the next phase.

Managers expect their employees to be responsive to user needs, to pay attention to management instructions, and to try to do a good job. Managers consider their employees to be fundamentally hardworking, responsible human beings, and therefore should be encouraged and given full support. Manager 1 said, "I give people a lot of personal support and a lot of personal congratulations… To the best I can, try to match people up to the right kind of opportunities."

When asked about a way in which management can do to increase employee satisfaction while working towards the common goal of the organization, from the IT developer's perspective, the answer was, "I am always looking for someone to identify my priorities and give me goals and objectives. Provide me with a vision where I need to go… I want to see that I am moving in the right direction. I am looking for that vision. So I'm looking for a manager with that vision and can easily direct me in that direction." From the managerial perspective, Manager 2 said, "What I have been trying to do, first of all, is to make sure my [manager] and his staff are happy with their day to day activities. Then, I would try to absorb as many issues or concerns so they can dedicate their time to do their day to day operations." Manager 1 offered his advice to technical staffs as follows, "Expose to more operations… We kind of get so caught up with the deadlines that the technical staffs sometimes don't get to raise their heads up to see what's going on in the operation… So if they can rotate around every now and then and get to spend a little more time in some other organizations… I would like to see some of the technical staffs go outside of the organization and maybe have internships in other organizations. Just to get some exposure to something else besides these four walls."

When asked about a way in which they could do to help deliver the systems that the customers expect, from the IT developer's perspective, the answer was, "I gave them the vision of the load

balancing through the F5 and talking to the web servers, having a consolidated database for all 12 regions and headquarters… [I] provided reports to upper management… I gave them the performance that they needed to have 9000 current users signed on the current system and perform jobs at the same time." From the managerial perspective to the IT developers, Manager 2 stated, "Budget related, personnel issues, or whatever, let me see if I can handle that so you won't have to worry about that, so you can focus on the customer and the application… I will do that and obtain what I need to obtain for the success of the program; because in the end, if we fail, that's all of us that we fail." Manager 1 offered his advice as follows: "The main thing I think they could do is to develop some personal vision of where they want to go with their careers. And a lot of what happens in the government is people get comfortable and settle. So sometimes they see something they want to do and they are unprepared themselves because they didn't think about it ahead of time. So I think if they were a little bit broader in thinking where they can apply their skills. For instance, you might be able to from being technical to being a project manager and back. And you might become a program manager."

When asked about their management philosophy regarding the roles of a leader or a manager, all three managers think of themselves as both a leader and a manager. They seem to be consistent with each other on the concept and definition of a leader and a manager. The leader creates the vision of the organization, and then motivates the organization to transform into that vision. This mission requires the inventory of existing organizational capabilities, and a set of actions that must be taken, to move the organization into the future. The manager, on the other hand, concentrates on the bottom line. The manager makes sure that the appropriate actions that are taken to move the organization into the future are done as correctly and effectively as possible. In summary, all three managers would agree with the Bennis-Nanus notion (1986: 21): "Managers are people who do things right and leaders are people who do the right things."

Interview Summary – End Users

Respondents agree that they are most of the time satisfied with the quantity, quality, and

timeliness of work and services provided by the IT Developers of the IT Systems Development Group of Agency 3. End User 2 comments, "When we had crunch time sometimes we had to prioritize," but generally "I was happy." End User 3 adds: "Yes, we're getting good quality."

Respondents agree that the work provided by the IT Developers is always consistent with their requirements. The error rate, if there is any, would be at a minimum level. They seldom complain. End User 3 said, "I don't complain at all."   End User 2 added, "Well nothing is ever perfect. I mean, sometimes we write requirements and they might perceive something differently. But that's what the testing is for. So generally, we try to iron it out. Usually when we send some requirements and they don't understand it, they'll communicate it with us. We'll try to explain it to them. Like I said, if there is a problem where we typed up a requirement, and they sort of program it differently, most of the time we'll catch it before we even release it and pass it, we'll get back to them and they'll fix it for us. So they are very good that way."

Respondents further agree that they are involved in some phases of the systems development process such as Requirements and Testing. End User 2 explained further about this process, "When we write the requirements, one of the program managers will have to go in and approve it first of all at our level. Then when we send it back down there, they'll program it. Then we'll test it and either we'll give it a Yes or No. Then once it is OK with us, they'll test it, and will send it out into production."

Respondents are also familiar with the concept of the SDP and the SLCM (SDP, section 6, pages 21-25).   However, they do not agree that they are involved in all phases of the SDP and the SLCM.

Most importantly, they understand the objectives, the requirements, and the benefits of project requests prior to beginning the systems development. End User 1 elaborated further: "In order to implement a system here at this organization, you have to write a business case. That business case has to state what your objectives are, what your purpose is for using the project; and what the risks are with it; and also can it be done in other way. So before you can even get it off the ground, you have to spell out what the benefits and the risks are. So you are not even allowed to go that far,

unless you clearly state it and have it approved by management and have the funding approved."

Respondents also agree that they maintain a very good working relationship with the IT Developers in either a formal or informal manner. They usually communicate with the IT Developers on a regular basis. End User 2 acknowledged, "We communicate with them daily. We have meetings with them. We have different teams. We discuss what's coming up or something, or maybe a new request or new requirement. So we get together a lot." End User 1 explained their relationship as, "a very unique system … they are dedicated programmers, so we are not competing with other people for their time and attention. They are dedicated to us, and we are dedicated to them. And that makes a difference. That's why we work side by side. I mean we pick up the phone, we call, and we get immediate action. So our system is not typical of what you normally find."

Respondents moderately agree that customer satisfaction was measured verbally and informally. End User 3 said, "I haven't had a formal customer satisfaction survey." However, in a verbal sense, End User 3 acknowledged, "I'd say yes, we've had informal surveys like that." End User 2 agrees with the nature of this informal verbal feedback in lieu of an actual customer satisfaction survey.

On the other hand, End User 1 explains that this survey could be informal as well as formal. "We ask our end users, the real end users of the system. We ask them, do they, how they feel about it. And they give us feedback. So we kind of serve as the middle man to do their customer satisfaction survey, and they come to our debriefings with us. So they get to hear what the real end users need, what they want, and the things they need us to change. So we do it; we've done it; I guess we do it once a year." To explain the formal sense of this survey, End User 1 adds, "We ask how they feel about us, and how they feel about the programmers. And we give them feedback. So they are on hand because we actually meet to go over it. So they're present when the end users talking to us. So they hear and they get it in writing."

Respondents agree that a customer feedback system exists from the IT Systems Development Group to keep track of customer complaints and statistics. End User 3 stated, "Yes, they have a 'Remedy' system. So if we have an issue, we put in a ticket that says, 'We have this problem,' and

then they work on it." End User 1 added, "Remedy is the organization-wide system. It's a whole help desk thing when they call in, where end users call in and say 'I have this problem' and they create tickets. And then we're required to respond to tickets and resolve them. So it's an automated system that we use here at the organization."

Respondents acknowledge that they maintain official and direct lines of communication with the IT Developers on a regular basis. End User 2 stated, "We have different team meetings that meet with them on a weekly basis. We'll have a daily, if there's an issue with something, they'll call us directly and we'll meet with them." End User 1 added, "The formal lines are communicated through notes. There are notes for every meeting that happens. They have a person who writes all the notes and what the outcome was and the follow up items. So that's the official side of it."

Respondents also acknowledge that they do maintain unofficial and indirect lines of communication with the IT Developers on a regular basis. End User 3 stated, "Not here when I am out in the field, but at headquarters, yes. Like if they're working on a requirement or something and if there's a question, they just ask, 'OK, how about this' or 'What did you mean about this', so yes, very informal. They make sure they're on the right page."

When asked about an area where the IT Developers could increase overall satisfaction of the quality of services provided, respondents agree that "because we're already dedicated to each other, I don't know if we can improve anything." Respondents agree that they "get instant satisfaction from the 'D System' programmers." In other words, the IT Developers are extremely responsive to their needs, issues, or concerns. So, it is practically fair to say that there is nothing to be improved in this area. End User 3 concluded, "There's not a whole lot. I think they do a really good job for us." End User 1 continued, "I don't know how they can improve anything."

When asked about an area where they can help the IT Developers deliver the quality of services that had been requested, respondents suggested that perhaps they could just continue to operate like they do currently by working together as a team and providing detailed requirements as clear as possible in a timely fashion so the IT Developers can get their tasks completed on time. End User 3 explained, "We can provide detailed requirements, making sure we've thought the

whole thing out, seeing the big picture, making sure that it's going to work the way that we're thinking about. We need to be very detailed and explicit in what it is that we want." End User 1 stressed the critical aspects of teamwork by mentioning, "If I know something, I tell them. If they know something, they tell us. We operate as a team."

When asked for additional comments, respondents expressed the appreciation for the attention that the IT Developers had been paying to them, and that they hold the IT Developers in high regard. End User 1 offered exceptional remarks as follows, "Our programmers handle everything, from start, cradle, to burial. And they do it instantaneously for us. We set up a great communication chain and the way it flows to us. And I have no complaints. I don't know how we'd do it in any other way." End User 2 agreed, "There is this level of support throughout, and it is great. You know, it is nice to call someone and have it done right then and there. It's very unique that we have this group that does it for us."

Finally, respondents conclude the interview session with additional comments about the spirit of teamwork and how their relationships with the IT developers could be improved, by mentioning that, "We all know each other's number by heart. We operate like that. [The IT developers can] just continue [to meet the needs]. So we can't do anything else but have that close relationship."

CHAPTER 5 - COMPARATIVE ANALYSIS

The focus of this chapter is to tie together the theoretical findings gathered in Chapter 2 and the field research findings in Chapter 4. Establishing the relationship between the theoretical grounding of the study and the practical aspects of the operational world in the three agencies enables the interpretation of results in this chapter to provide insights on the lessons learned between the empirical state of TQM in these three agencies in the first stage and the second stage of the study. Specifically, the interpretation of results reveals the lessons that were learned from these organizations, correctly or incorrectly, between the then situation and the today situations at these organizations.

In this chapter, attempts were also made to search for the common ground among the case sites as well as the differences between them. Within that comparative context, this chapter involves the discussion of the following sections: (1) Summary of Sample Size; (2) Interpretation of Results; and (3) Summary and Analysis.

Summary of Sample Size

In the First Stage of the Research

Table 5.1 represented the sample size of IS human resources committed by each agency to support the first stage of this dissertation project in terms of face-to-face interviews on site and mail surveys to their employees. Agency 1 committed 100 percent of its management staff and 42 percent of its technical staff. Overall, Agency 1 committed 47 percent of its technical resources. Agency 2 committed 100 percent of its technical resources. Agency 3 committed 23 percent of its management staff and 11 percent of its technical staff. Overall, Agency 3

committed 13 percent of its technical resources. It was reasonable for Agency 1 and Agency 2 to be able to commit 100 percent of its management staff due to the fact that these two organizations were much smaller than Agency 3 in terms of size. Agency 3 had a total headcount of 300 while Agency 1 and Agency 2 only had a total headcount of 103 and 5, respectively.

Table 5.1: Summary of Sample Size

Agency	Staff	Headcount	Interview	Factor (%)	Survey Sent	Survey Returned (%)	Return Rate	Interviews & Surveys	Headcount Factor (%)
1	Management	7	5	71	2	2	100	7	100
	Technical	69	10	14	28	19	68	29	42
	Management & Technical	76	15	20	30	21	70	36	47
	Administration	27	0	0	0	0	0	0	0
	Total	103	15	15	30	21	70	36	35
2	Management	2	2	100	0	0	0	2	100
	Technical	3	3	100	0	0	0	3	100
	Management & Technical	5	5	100	0	0	0	5	100
	Administration	0	0	0	0	0	0	0	0
	Total	5	5	100	0	0	0	5	100
3	Management	31	5	16	2	2	100	7	23
	Technical	169	10	6	18	8	44	18	11
	Management & Technical	200	15	8	20	10	50	25	13
	Administration	100	0	0	0	0	0	0	0
	Total	300	15	5	30	10	50	25	8
NOTE	This Sample Size reflects the First Stage of the Research								

Since 100 percent of IS management staff and technical staff in Agency 2 were interviewed, individually and as a group, the Employee Survey Questionnaire was not distributed to them, and therefore, survey data for employees in Agency 2 were not available.

As indicated in Table 5.1, a 70 percent rate of return had been obtained from employees of Agency 1 and 50 percent from employees of Agency 3.

Table 5.2 presented the Rate of Return of Customer Survey Questionnaire. Mail surveys were sent to the Heads of the Internal Customer Departments of the respective IS Department in each agency. An 80 percent rate of return had been obtained from internal customers of Agency 1, 100 percent from internal customers of Agency 2, and 70 percent from internal customers of Agency 3.

Table 5.2:   Customer Survey Sample Size

Agency	Survey Sent	Survey Returned	Return Rate (%)
1	10	8	80
2	10	10	100
3	10	7	70
NOTE	This Sample Size reflects the First Stage of the Research Surveys Sent to Head of Internal Customer Organizations		

In the Second Stage of the Research

Several elite interviews were conducted in all three agencies to help retain the cross-agency and cross-time comparative analysis that was a strong feature of the dissertation design. Qualitative data captured from these elite interviews seek to derive conclusions about the *today* stage and the lessons that could be learned from comparing it with the *then* stage. The comparison is not only between then and today, but also among the three empirical cases themselves.

In Agency 1, four elite interview sessions with six people were conducted on site with the IT organization and the End User organization. For the IT organization, two managers were interviewed individually in two separate sessions and two IT developers were interviewed together

in another session. For the End User organization, two IT End Users were interviewed together in the same session.

In Agency 2, three elite interview sessions with five people were conducted on site with the IT organization and the End User organization. For the IT organization, one manager was interviewed individually in one session and two IT developers were interviewed together in another session. For the End User organization, two IT End Users were interviewed together in the same session.

In Agency 3, four elite interview sessions with six people were conducted on site with the IT organization and the End User organization. For the IT organization, three managers were interviewed; one was interviewed separately in one session, and two were interviewed together in another session. For the End User organization, three IT End Users were interviewed; one was interviewed separately in one session, and two were interviewed together in another session.

Interpretation of Results

To interpret the results and develop lessons learned which will be the basis for Chapter 6, attempts are made in this chapter to link some expectations that the literature should highlight about the empirical findings in the operational world based on the investigation in the field during the two stages of the research.

Table 5.3 presents this linkage. This linkage is expressed in terms of five TQM dimensions as presented and discussed in Chapter 2. Each TQM dimension is linked to a set of standards, measures, or indicators, of what constitute certain levels of success or failure in doing TQM. Within this linkage, the Interpretation of Results is divided into two categories: (1) In the First Stage of the Research, and (2) In the Second Stage of the Research. They are presented as follows.

Table 5.3: Measurement Indicators of TQM Dimensions

	TQM Dimension	Indicator
1	Customer Satisfaction	Involvement
		Clarity
		Timeliness
		Accuracy
		Consistency
		Dependability/Reliability
		Quality/Productivity
		Overall Satisfaction
2	Organizational Culture	Culture
		Goal Settings
		Work Settings
		Training Program
		Motivation
		Customer Awareness
		Promotion Opportunity
		Teamwork
3	Leadership Commitment	Style
		Vision
		Empowerment
		Strategy
		Responsibility
		Financial Rewards
		Leadership
4	Teamwork	Communication
		Interdependence
		Trust
		Integration
		Coordination
		Technical Capabilities
		Overall Satisfaction
5	Management of an IS Development Methodology	Methodology
		Documentation
		Project Management
		Hardware/Software
		Customer Focus
		Recognition System
		Availability/Flexibility
		Maintainability

In the First Stage of the Research

Each TQM dimension was analyzed using qualitative data gathered from several interviews and quantitative data captured from two surveys in each agency. As presented in Chapter 3, there were three different sets of questions which were prepared and used during in-person interviews on site at each agency: Interview Guide for Management (IGM-1) as presented in Appendix B, Interview Guide for Technical Staff (IGS-1) as presented in Appendix C, and Interview Guide for Project Team (IGT-1) as presented in Appendix D. Similarly, there were two different sets of Survey Questionnaires which were prepared and sent to internal customers of the agencies: Employee Survey Questionnaire (ESQ-1) as presented in Appendix E and Customer Survey Questionnaire (CSQ-1) as presented in Appendix F.

- **Customer Satisfaction**

Customer Satisfaction was the first TQM dimension of this study. To measure customer satisfaction, the following indicators were identified: Involvement, Clarity, Timeliness, Accuracy, Consistency, Dependability and Reliability, Quality and Productivity, and Overall Customer Satisfaction (Crosby, 1979, 1992; Deming, 1982, 1986; Juran, 1989; Mauch, 2010; Micklewright, 2010).

Table 5.4 presented the quantitative portion of this dimension. The first indicator was Involvement, "Generally speaking, we are familiar with the concept of the systems development process, and stay involved either in some or all phases" (CSQ-1, questions 1, 2, 3). While internal customers of Agency 1 and Agency 3 agreed with this statement, internal customers of Agency 2 moderately agreed.

Table 5.4: Measurement of the First TQM Dimention
Customer Satisfaction

Indicator	Agency 1		Agency 2		Agency 3	
	Median	Interquartile Deviation	Median	Interquartile Deviation	Median	Interquartile Deviation
Involvement	6.4	0.7	4.6	1.2	5.2	1.2
Clarity	5.7	0.3	5.0	0.9	5.3	1.3
Timeliness	5.0	1.6	5.0	1.1	6.0	1.5
Accuracy	5.0	0.5	5.0	1.2	6.0	0.5
Consistency	5.0	0.9	5.0	1.1	5.0	0.5
Dependability	5.0	1.6	5.0	0.9	5.0	0.5
Reliability	5.5	1.2	4.5	2.0	6.0	1.5
Quality	6.0	0.9	5.0	0.4	5.0	0.5
Productivity	6.5	0.9	6.0	1.2	6.0	0.5
Overall Satisfaction	5.8	0.8	4.0	1.3	4.0	1.0
NOTE	Results Reflect the First Stage of the Research					
	Results Measured from Customer Survey Sent to Three Agencies					

The next indicator was Clarity, "Generally speaking, we have a clear definition of the objectives, requirements, and benefits of the project request prior to turning it over to the developers" (CSQ-1, questions 4, 5, 6). While internal customers of Agency 1 and Agency 3 agreed with this statement, internal customers of Agency 2 moderately agreed.

Timeliness was the third indicator, "In general, we are satisfied with the timeliness of work provided by the developers" (CSQ-1, question 7). While internal customers of Agency 3 agreed with this statement, internal customers of Agency 1 and Agency 2 moderately agreed.

The fourth indicator of importance was Accuracy, "In general, we find a minimum error rate in work provided by the developers" (CSQ-1, question 8). While internal customers of Agency 3 agreed with this statement, internal customers of Agency 1 and Agency 2 moderately agreed.

Consistency meant correctness, "In general, we find that the work performed by the developers is consistent with our requirements" (CSQ-1, question 9). While internal customers

of Agency 1 agreed with this statement, internal customers of Agency 2 and Agency 3 moderately agreed.

Dependability/Reliability were the key words of today's technological world, "Generally speaking, we maintain good working relationship with the developers and we seldom complain" (CSQ-1, questions 12, 14). While internal customers of Agency 3 agreed with this statement, internal customers of Agency 1 and Agency 2 moderately agreed.

The subject of many articles in the past two decades was Quality/Productivity. "Generally speaking, we are satisfied with the quality and quantity of work provided by the developers" (CSQ-1, questions 10, 11). While internal customers of Agency 1 agreed with this statement, internal customers of Agency 2 and Agency 3 moderately agreed.

Finally we are able to reasonably observe the Overall Customer Satisfaction indicator as follows, "Generally speaking, the developers try their best to establish good rapport with us via formal or informal contacts" (CSQ-1, questions 17, 18). While internal customers of Agency 1 moderately agreed with this statement, internal customers of Agency 2 and Agency 3 were undecided on whether to agree or disagree.

- **Organizational Culture**

Organizational Culture was the second TQM dimension of this study. To measure organizational culture, the following indicators were identified: Culture, Goal Settings, Work Settings, Training Program, Motivation, and Customer Awareness, Promotion Opportunity, and Teamwork (Robbins, 1986; Rother, 2010; Selznick, 1948, 1984; Simon, 1997; Summerill et al, 2010).

Table 5.5 presented the quantitative portions of this dimension. Culture was the most critical factor in an organization. The issue was whether or not "employees in this department are encouraged to maintain constant dialogue with the customers in the systems development processes" (ESQ-1, question 48). Survey results indicated that managers from Agency 1 and Agency 3 agreed with this statement. Interview results (IGM-1, questions 25, 26) indicated that managers from all three agencies agreed with this statement.

Table 5.5: Measurement of the Second TQM Dimention
Organizational Culture

Audience	Indicator	Agency 1		Agency 2		Agency 3	
		Median	Interquartile Deviation	Median	Interquartile Deviation	Median	Interquartile Deviation
Management	Culture	4.3	*	n/a	n/a	5.0	*
	Goal Settings	5.0	*	n/a	n/a	4.5	*
	Work Settings	6.5	*	n/a	n/a	6.0	*
	Training Program	4.2	*	n/a	n/a	4.5	*
Technical Staff	Motivation	7.0	0.5	n/a	n/a	6.0	0.7
	Customer Awareness Promotion	6.7	0.5	n/a	n/a	5.3	0.6
	Opportunity	6.0	2.0	n/a	n/a	5.0	1.2
	Teamwork	7.0	0.5	n/a	n/a	6.2	0.5
NOTE		Results Reflect the First Stage of the Research					
		Results Measured from Employee Survey					
		* not obtainable due to insufficien responses					
		n/a survey not sent to Agency 2 due to all staff were interviewed					

Goal Settings involved the perception of trying to best serve the needs of the customers. "Generally speaking, quality means total customer satisfaction or whatever the customer expects" (ESQ-1, question 51). Survey results indicated that managers from Agency 1 and Agency 3 moderately agreed with this statement. Interview results (IGM-1, questions 6, 27) indicate that managers from Agency 1 and Agency 3 strongly agreed while managers from

Agency 2 offered a different perspective. They, however, thought that quality meant accuracy, consistency, currency, and integrity, whereas customer satisfaction was in fact the secondary factor of importance.

Work Settings did influence quality and productivity (Robbins, 1986). Therefore, "management should create a work environment in which employees can achieve personal goals while working for common department's goals" (ESQ-1, question 45). Survey results indicated that managers from Agency 1 and Agency 3 strongly agreed with this statement. Interview results (IGM-1, question 29) indicated that managers from all three agencies agreed with this statement.

A Training Program provided the necessary skills and knowledge to employees to accomplish specific actions (Saylor, 1992). This meant "the organization is determined to provide appropriate training on quality management to all employees" (ESQ-1, question 53). Survey results indicated that managers from Agency 1 and Agency 3 moderately agreed with this statement. Interview results (IGM-1, question 12) indicated that managers from Agency 1 and Agency 2 did recognize that there seemed to be a problem concerning training due to budget constraints. However, training was an area that was viewed favorably by almost all respondents from Agency 3. This organization did provide TQM training and made other training resources available to managers and employees.

People worked to satisfy needs and to accomplish individual objectives and ambitions. In other words, people were motivated in one way or another. In this sense, Motivation was described simply as "improving my work is part of my on-going responsibility because the work I do is important to the success of my department" (ESQ-1, questions 24, 25). Survey results indicated that technical staffs from Agency 1 and Agency 3 strongly agreed with this statement.

Interview results (IGS-1, questions 22, 24) indicated that technical staffs from all three agencies agreed with this statement.

Customer Awareness was in fact the profound knowledge that was critical to the success of the individual in organizational life. "I know my internal customers and their functionality; I talk to them on a regular basis; and generally speaking, I maintain a good professional relationship with them" (ESQ-1, questions 30, 31, 32). Survey results indicated that technical staffs from Agency 1 and Agency 3 strongly agreed with this statement. Interview results (IGS-1, questions 28, 29, 30) indicated that technical staffs from all three agencies agreed with this statement.

Promotion Opportunity was a factor that could also influence or change the individual behavior to accomplish personal goals. The fact that an employee could say, "I am ready for any new assignment within my department" (ESQ-1, question 27) meant that there were ample opportunities for qualified employees in that department. Survey results indicated that technical staffs from Agency 1 and Agency 3 agreed with this statement. Interview results (IGS-1, question 25) indicated that technical staffs from all three agencies agreed with this statement.

Another aspect of organizational environments that affected employee behavior was the spirit of Teamwork. An example is the statement: "I talk to my co-workers on a regular basis, whether professionally or privately; and they are always willing to help when I need them" (ESQ-1, questions 33, 34). Survey results indicated that technical staffs from Agency 1 and Agency 3 strongly agreed with this statement. Interview results (IGS-1, questions 31, 32) indicated that technical staffs from all three agencies agreed with this statement.

- **Leadership Commitment**

Leadership Commitment was the third TQM dimension of this study. To measure

leadership commitment, the following indicators were identified: Style, Vision, Empowerment, Strategy, Responsibility, Financial Rewards, and Leadership (Bennis, 1989; Blake & Mouton, 1972; Burda, 2010; Likert, 1967; Schein, 2010).

Table 5.6 presented the quantitative portions of this dimension. Style was described in two ways. First, "managers consider their employees to be fundamentally hardworking, responsible human beings, and therefore should be encouraged and given full support" (ESQ-1, questions 47). Survey results indicated that managers from Agency 1 agreed while managers from Agency 3 moderately agreed. Interview results (IGM-1, question 29) indicated that managers from all three agencies agreed with this statement. Second, "managers expect their employees to be responsive to user needs, pay attention to management instructions, and try to do a good job" (ESQ-1, question 44, 52). Survey results indicated that managers from Agency 1 agreed while managers from Agency 3 moderately agreed. Interview results (IGM-1, questions 20, 21) indicated that managers from Agency 1 and Agency 3 agreed with this statement. Managers from Agency 2 also agreed except for the term 'responsive to user needs'; they said that their employees would try to be responsive to user needs depending on the urgency of the requests and the visibility status of the customers.

Vision was developed by management to indicate where the organization wanted to go and leadership was essential in making vision a reality (Saylor, 1992). Specifically, the question was, "does management have a clear vision of the department's future" (ESQ-1, question 54). Surveys results indicated that managers from Agency 1 disagreed while managers from Agency 3 moderately disagreed. Interview results (IGM-1, question 24) indicated that managers from all three agencies agreed with this statement.

Audience	Indicator	Agency 1		Agency 2		Agency 3	
		Median	Interquartile Deviation	Median	Interquartile Deviation	Median	Interquartile Deviation
	Style	6.0	*	n/a	n/a	5.2	*
	Vision	2.5	*	n/a	n/a	3.5	*
	Empowerment	4.0	*	n/a	n/a	4.0	*
	Strategy	3.5	*	n/a	n/a	5.0	*
	Responsibility	2.2	*	n/a	n/a	4.0	*
Management	Financial Rewards	5.5	*	n/a	n/a	4.5	*
Technical Staff	Leadership	5.7	1.1	n/a	n/a	5.2	1.5
NOTE		Results Reflect the First Stage of the Research					
		Results Measured from Employee Survey					
		* not obtainable due to insufficien responses					
		n/a survey not sent to Agency 2 due to all staff were interviewed					

Empowerment was another issue to be addressed to understand if "top management in this organization fully supports the empowerment of all employees in this department to take appropriate measures necessary to improve their work" (ESQ-1, question 49). Surveys results indicated that managers from Agency 1 and Agency 3 moderately agreed with this statement. Interview results (IGM-1, questions 19, 20, 21) indicated that managers from all three agencies agreed with this statement.

Strategy could be thought of an essential element of leadership to reflect the viewpoint in which "management recognizes that commitment to quality is a way to achieve continuous improvement and keep customers happy" (ESQ-1, question 55). Survey results indicated that managers from Agency 1 moderately disagreed while managers from Agency 3 moderately agreed. Interview results (IGM-1, question 27) indicated that managers from Agency 1 and Agency 3 agreed with this statement while managers from Agency 2 offered a different viewpoint. They felt that not all customers were going to be happy with the ways things were in

their agency regardless of how seriously they were in committing to quality focus due to the lack of sufficient staff to handle all user requests at one given time.

Responsibility deserved special attention. "Management attempts seriously to gathering employees opinion about managers performance" (ESQ-1, questions 60, 61). Survey results indicated that managers from Agency 1 and Agency 3 consistently agreed that this was the area where improvement was actually needed. Interview results (IGM-1, question 29) indicated that managers from all three agencies agreed with this assessment.

Financial Rewards were given for the performance of some successful and specific action (Saylor, 1992). "Management should motivate employees by using economic incentive (wage raises) more than intangible rewards (honor and respect)" (ESQ-1, question 46). Survey results indicated that managers from Agency 1 agreed while managers from Agency 3 moderately agreed. Interview results (IGM-1, question 19) indicated that managers from all three agencies agreed with this statement.

One important factor that affected organizational environments was the employee's perceptions of his or her Leadership's direction that would significantly contribute to the employee professional goals. In fact, "a manager who often sends his or her subordinates to professional seminars and/or technical courses to promote their technical knowledge of quality management" (ESQ-1, question 58) was exhibiting good leadership practices. The issue was whether or not managers paid enough attention to employees training. Survey results indicated that technical staffs from Agency 1 and Agency 3 agreed with this statement. Interview results (IGS-1, question 12) indicated that, due to budget constraints, training was very limited to technical staffs in Agency 1 and Agency 2. However, they sounded confident that management always looked after them and tried to help them take advantage of opportunities to expand their

knowledge of quality management. Technical staffs in Agency 3 offered a different viewpoint. They agreed that individual training was a favorite subject.

- **Teamwork**

   Teamwork was the fourth TQM dimension of this study. To measure teamwork, the following indicators were identified: Communication, Interdependency, Trust, Integration, Coordination, Technical Capabilities, and Overall Satisfaction (Barnard, 1968; Follett, 1940; Peotter, 2009; Porter et al, 2010; Scholtes, 1991).

   Table 5.7 presented the quantitative portions of this dimension. Communication could be thought of as a process or flow. The information passed between a sender and a receiver, and we cannot communicate what we do not know (Robbins, 1986). Survey results indicated that technical staffs from Agency 1 and Agency 3 consistently agreed with the following statement: "My management often encourages me to participate in solving problems" (ESQ-1, question 39). Interview results (IGS-1, question 33) indicated that technical staffs from all three agencies agreed.

   Interdependence meant "different groups cooperate to meet the common department goals" (ESQ, question 40) from a simplistic perspective**.** Survey results indicated that technical staffs from Agency 1 and Agency 3 moderately agreed with this statement. Interview results (IGS-1, question 35) indicated that technical staffs from all three agencies moderately agreed that the cooperation between different groups within the department remained an empirical inquiry. From a broader perspective, interdependence also meant **"**different departments cooperate to meet the common organizational goals" (ESQ-1, question 41). Survey results indicated that technical staffs from Agency 1 and Agency 3 moderately agreed with this statement. Interview

results (IGS-1, question 35) indicated that technical staffs from all three agencies moderately agreed that the cooperation between different departments within the organization remained an empirical inquiry.

Table 5.7: Measurement of the Fourth TQM Dimention
Teamwork

Audience	Indicator	Agency 1		Agency 2		Agency 3	
		Median	Interquartile Deviation	Median	Interquartile Deviation	Median	Interquartile Deviation
	Communication	6.0	2.5	n/a	n/a	6.0	1.0
	Interdependence	5.0	1.5	n/a	n/a	4.0	0.5
	Trust	4.0	1.0	n/a	n/a	4.0	1.0
	Integration	5.0	1.0	n/a	n/a	4.0	0.5
	Coordination	3.0	2.0	n/a	n/a	4.0	1.0
	Technical Capabilities	5.0	1.2	n/a	n/a	3.2	1.3
Technical Staff	Overall Satisfaction	4.7	1.2	n/a	n/a	4.5	1.5
NOTE		Results Reflect the First Stage of the Research					
		Results Measured from Employee Survey					
		* not obtainable due to insufficien responses					
		n/a survey not sent to Agency 2 due to all staff were interviewed					

Trust and Interdependence were closely related. Without trust, there was not a useful purpose for interdependency. Therefore, trust also involved the assumption that "different departments must cooperate to meet the common organizational goals" (ESQ-1, question 41). Survey results indicated that technical staffs from Agency 1 and Agency 3 moderately agreed with this statement. Interview results (IGS-1, question 35) indicated that technical staffs from all agencies moderately agreed that the cooperation and trust between different departments of the organization remained an empirical inquiry.

Integration was the situation in which "a person can feel a spirit of cooperation and teamwork that existed in his or her department as well as his or her organization as a whole" (ESQ-1, question 43). Survey results indicated that technical staffs from Agency 1 and Agency 3 moderately agreed with this statement. Interview results (IGS-1, questions 31, 32) indicated that technical staff from all three agencies agreed with this statement in terms of "in his or her department," and moderately disagreed in terms of "as well as his or her organization as a whole."

Coordination was another issue that could be addressed by the following statement: "Generally speaking, scheduling problems caused by competing clients are resolved to everyone's satisfaction" (ESQ-1, question 42). Survey results indicated that technical staffs from Agency 1 and Agency 3 moderately disagreed with this statement. Interview results (IGS-1, question 34) indicated that technical staffs from Agency 1 and Agency 3 moderately disagreed while technical staffs from Agency 2 stated clearly that in realistic situations, not everyone was going to be happy with scheduling problems.

Technical Capability was an area where everyone in the team would be affected. To be consistent with the organizational standards and guidelines, a set of principles and rules must be followed. "I rely heavily on the systems development methodology in my present work assignment" (ESQ-1, questions 26, 28). Survey results indicated that technical staffs from Agency 1 moderately agreed while technical staffs from Agency 3 moderately disagreed with this statement. Interview results (IGS-1, question 23) indicated that technical staffs from Agency 1 agreed while technical staffs from Agency 2 and Agency 3 disagreed.

Finally, Overall Individual Satisfaction could be summarized as follows. "I am fully aware of my department's overall quality mission; I like my present work assignment; and generally

speaking, I am happy with my work environment" (ESQ-1, questions 21, 22, 23, 29). Survey results indicated that technical staffs from Agency 1 and Agency 3 moderately agreed with this statement. Interview results (IGS-1, questions 19, 20) indicated that technical staffs from all tree agencies agreed with this statement.

- **Management of an IS Development Methodology**

Management of Systems Life Cycle was the fifth and last TQM dimension of this study. To measure the management of the systems life cycle, the following indicators were identified: Methodology, Documentation, Project Management, Hardware/Software, Customer Focus, Recognition System, Availability/Flexibility, and Maintainability (Beniger, 1986; Huber, 1990; Lin, 2010; Lord, 1982; Shea & Garson, 2010).

Table 5.8 presented the quantitative portions of this dimension. Methodology and Documentation were proven to be the two most important technical factors in any system development effort. "There is a formal systems development methodology in my department; and it is clearly documented" (ESQ-1, questions 1, 2, 3). Survey results indicated that technical staffs from Agency 1 moderately disagreed while technical staffs from Agency 3 disagreed with this statement. Interview results (IGM-1, questions 2, 3; IGS-1, questions 2, 3) indicated that managers and technical staff from Agency 1 agreed while managers and technical staffs at Agency 2 and Agency 3 disagreed with this statement.

Managers and technical staffs from Agency 2 indicated that there may have been a written methodology at Agency 1 (the Parent Agency). However, systems activities at Agency 2 remained "informal and unstructured and often depend on the tasks at hand." At various individual departments of Agency 3 where the programming activities have been decentralized, perhaps there may have been different written methodologies. Managers and technical staffs

from Agency 3 were fully aware that the IS Department was in the process to set standards for

the entire organization through the formation of the SDLC team.

Table 5.8: Measurement of the Fifth TQM Dimention
Management of an IS Development Methodology

Audience	Indicator	Agency 1		Agency 2		Agency 3	
		Median	Interquartile Deviation	Median	Interquartile Deviation	Median	Interquartile Deviation
Management	Methodology	3.8	*	n/a	n/a	2.5	*
	Documentation	4.0	*	n/a	n/a	2.5	*
	Project Management	4.0	*	n/a	n/a	5.0	*
	Hardware	3.7	*	n/a	n/a	4.0	*
	Software	3.8	*	n/a	n/a	3.5	*
	Customer Focus	2.2	*	n/a	n/a	2.3	*
	Recognition System	3.2	*	n/a	n/a	4.3	*
	Availability and Flexibility	2.0	*	n/a	n/a	3.0	*
	Maintainability	3.0	*	n/a	n/a	3.0	*
Technical Staff	Methodology	4.3	1.3	n/a	n/a	3.8	0.8
	Documentation	5.0	1.0	n/a	n/a	4.0	0.9
	Project Management	5.0	1.5	n/a	n/a	4.5	1.5
	Hardware	4.3	1.5	n/a	n/a	3.8	1.3
	Software	5.0	1.7			3.7	1.5
	Customer Focus	4.7	1.3	n/a	n/a	4.0	0.8
	Recognition System	3.0	1.3	n/a	n/a	4.7	1.2
	Availability and Flexibility	4.0	1.0	n/a	n/a	4.0	0.4
	Maintainability	3.0	1.0	n/a	n/a	4.0	1.5
NOTE		Results Reflects the First Stage of the Research					
		Results Measured from Employee Survey					
		* not obtainable due to insufficien responses					
		n/a survey not sent to Agency 2 due to all staff were interviewed					

In terms of Project Management, "the role of project management was clearly defined"

(ESQ-1, question 4), survey results indicated that technical staffs from Agency 1 was not sure

while technical staffs from Agency 3 moderately agreed. Interview results (IGM-1, question 5;

IGS-1, question 5) indicated that managers and technical staffs from all three agencies disagreed with this statement.

In terms of Hardware/Software, let us consider the following statement. "Generally speaking, I know the types of hardware/software which are currently installed in-house" (ESQ-1, question 13, 16). Survey results indicated that technical staffs from Agency 1 moderately agreed while technical staffs from Agency 3 moderately disagreed with this statement. Interview results (IGM-1, questions 13, 15; IGS-1, questions 13, 15) indicated that technical staffs from all three agencies moderately agreed with this statement.

Having a Customer Focus offered different viewpoints between managers and employees. "My department has a clear definition of quality systems" (ESQ-1, questions 5, 6, 7). Survey results indicated that technical staffs from Agency 1 agreed while technical staffs from Agency 3 moderately agreed with this statement. Interview results (IGM-1, question 6; IGS-1, question 6) indicated that technical staffs from all three agencies moderately agreed with this statement.

A Recognition System could be described as simple as, "There is a system of formal recognition in my department and my organization" (ESQ-1, questions 9, 10, 11). Survey results indicated that managers and technical staffs from Agency 1 disagreed while managers and technical staffs from Agency 3 moderately agreed. Interview results (IGM-1, question 11; IGS-1, question 11) indicated that all respondents from all three agencies moderately disagreed with this statement in terms of 'department' and moderately agreed in terms of 'organization.'

In a system life cycle, Availability/Flexibility played a noticeable and critical role. "The availability, reliability, consistency, and flexibility of the data collection process are clearly defined in the systems development processes" (ESQ-1, question 20). Survey results indicated that technical staffs from Agency 1 and Agency 3 were undecided whether to agree or disagree

while and managers moderately disagreed.   Interview results (IGM-1, questions 17, 18; IGS-1, questions 17, 18) indicated that all respondents from all three agencies moderately disagreed with this statement.

Once the system was implemented, it must be able to be maintained easily. That was what the terminology "Maintainability" denoted. "Measurement criteria are clearly defined within the guidelines for promoting quality information systems. These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects" (ESQ-1, question 8). Survey results indicated that technical staffs from Agency 1 and Agency 3 were undecided whether to agree or disagree while managers moderately disagreed.   Interview results (IGM-1, question 9; IGS-1, question 9) indicated that all respondents from all three agencies moderately disagreed with this statement.

In the Second Stage of the Research

Each TQM dimension is analyzed using qualitative data gathered from elite interviews in each agency. As presented in Chapter 3, there are three different sets of questions which are prepared and used in these interviews on site at each agency: Interview Guide for Management (IGM-2) as presented in Appendix H, Interview Guide for Technical Staff (IGS-2) as presented in Appendix I, and Interview Guide for End User (IGC-2) as presented in Appendix J.

Again, Table 5.3 (Measurement Indicators of TQM Dimensions) is used as a baseline to interpret the linkage between the expectations that the literature should highlight the empirical findings in the operational world based on field investigation during the second stage of the research.

- **Customer Satisfaction**

Involvement, "Generally speaking, we are familiar with the concept of the systems development process, and stay involved either in some or all phases" (IGC-2, questions 1, 2, 3). While end users from Agency 3 strongly agree with this statement, end users from Agency 1 and Agency 2 moderately agree.

Clarity, "Generally speaking, we have a clear definition of the objectives, requirements, and benefits of the project request prior to turning it over to the developers" (IGC-2, questions 4, 5, 6). End users from all three agencies strongly agree with this statement.

Timeliness, "In general, we are satisfied with the timeliness of work provided by the developers" (IGC-2, question 7). End users from all three agencies agree with this statement.

Accuracy, "In general, we find a minimum error rate in work provided by the developers" (IGC-2, question 8). End users from all three agencies strongly agree with this statement.

Consistency means correctness. "In general, we find that the work performed by the developers is consistent with our requirements" (IGC-2, question 9). End users from all three agencies strongly agree with this statement.

Dependability/Reliability are still the key words of today's technological world, "Generally speaking, we maintain good working relationship with the developers and we seldom complain" (IGC-2, questions 12, 14). End users from all three agencies strongly agree with this statement.

The subject of many articles in the past two decades was Quality/Productivity. Let's look at the following statement, "Generally speaking, we are satisfied with the quality and quantity of work provided by the developers" (IGC-2, questions 10, 11). End users from all three agencies agree with this statement.

Finally we can be able to reasonably observe the Overall Customer Satisfaction indicator as follows, "Generally speaking, the developers try their best to establish good rapport with us via formal or informal contacts" (IGC-2, questions 17, 18)**.** End users from all three agencies strongly agree with this statement.

- **Organizational Culture**

Culture is the most critical factor in an organization. The issue is whether or not "employees in this department are encouraged to maintain constant dialogue with the customers in the systems development processes" (IGM-2, questions 25, 26). Managers from all three agencies agree with this statement.

Goal Settings involve the perception of trying to do the best in everything we do to serve the needs of the customers, "Generally speaking, quality means total customer satisfaction or whatever the customer expects" (IGM-2, questions 6, 27). Managers from all three agencies agree with this statement.

Work Settings influence quality and productivity (Robbins, 1986), therefore, "management should create a work environment in which employees can achieve personal goals while working for common department's goals" (IGM-2, question 29). Managers from all three agencies agree with this statement.

Training Program provides the necessary skills and knowledge to employees to accomplish specific actions (Saylor, 1992). This means "the organization is determined to provide appropriate training on quality management to all employees" (IGM-2, question 12). Managers from all three agencies agree with this statement.

People work to satisfy needs and to accomplish individual objectives and ambitions. In other words, people are somehow motivated one way or another. In this sense, Motivation is described as simple as "improving my work is part of my on-going responsibility because the work I do is important to the success of my department" (IGS-2, questions 22, 24). Technical staffs from all three agencies agree with this statement.

Customer Awareness is in fact the profound knowledge that is critical to the success of the individual in organizational life. "I know my internal customers and their functionality; I talk to them on a regular basis; and generally speaking, I maintain a good professional relationship with them" (IGS-2, questions 28, 29, 30). Technical staffs from all three agencies agree with this statement.

Promotion Opportunity is a factor that could also influence or change the individual behavior to accomplish personal goals. The fact that an employee can say that, "I am ready for any new assignment within my department" (IGS-2, question 25) means that there are ample opportunities for qualified employees in that department. Technical staffs from all three agencies agree with this statement.

Another aspect of organizational environments that affect employee behavior is the spirit of Teamwork. For example, let's consider the following statement. "I talk to my co-workers on a regular basis, whether professionally or privately; and they are always willing to help when I need them" (IGS-2, questions 31, 32). Technical staffs from all three agencies strongly agree with this statement.

- **Leadership Commitment**

Style is described in two ways. First, "managers consider their employees to be

fundamentally hardworking, responsible human beings, and therefore should be encouraged and given full support" (IGM-2, question 29), and second, "managers expect their employees to be responsive to user needs, pay attention to management's instructions, and try to do a good job" (IGM-2, questions 20, 21). Managers from all three agencies agree with this statement.

Vision is developed by management to indicate where the organization wants to go and leadership is essential in making vision a reality (Saylor, 1992). Specifically, the question is, "does management have a clear vision of the department's future" (IGM-2, question 24). Managers from all three agencies agree with this statement.

Empowerment is another issue to be addressed to understand if "top management in this organization fully supports the empowerment of all employees in this department to take appropriate measures necessary to improve their work" (IGM-2, questions 19, 20, 21). Managers from all three agencies agree with this statement.

Strategy can be thought of an essential element of leadership to reflect the viewpoint in which "management recognizes that commitment to quality is a way to achieve continuous improvement and keep customers happy" (IGM-2, question 27). Managers from all three agencies agree with this statement.

Responsibility deserves special attention, "Management attempts seriously to gathering employees opinion about managers performance" (IGM-2, question 29). Managers from all three agencies agree with this statement.

Financial Rewards are given for the performance of some successful and specific action (Saylor, 1992). "Management should motivate employees by using economic incentive (wage raises) more than intangible rewards (honor and respect)" (IGM-2, question 19). Managers from all three agencies agree with this statement.

One important factor that affects organizational environments is the employee's perceptions of his or her Leadership's direction that would significantly contribute to the employee personal goals. In fact, "a manager who often sends his or her subordinates to professional seminars and/or technical courses to promote their technical knowledge of quality management" (IGS-2, question 12) is exhibiting good leadership practices. The issue is whether or not managers pay enough attention to employees training. Technical staffs from all three agencies agree with this statement.

- **Teamwork**

Communication can be thought of as a process or flow. The information passes between a sender and a receiver, and we cannot communicate what we do not know (Robbins, 1986). Qualitative data gathered from interviews indicate that technical staffs from all three agencies consistently agree with the following statement: "My management often encourages me to participate in solving problem" (IGS-2, question 33).

Interdependence means "different groups cooperate to meet the common department goals" (IGS-2, question 34) from a simplistic perspective**.** From a broader perspective, interdependence also means **"**different departments cooperate to meet the common organizational goals" (IGS-2, question 35). Technical staffs from all three agencies agree with this statement.

Trust and Interdependence are closely related. Without trust, there is no useful purpose for interdependency. Therefore, trust also involves the assumption that "different departments must cooperate to meet the common organizational goals" (IGS-2, question 35). Technical staffs from all three agencies agree with this statement.

Integration is the situation in which "a person can feel a spirit of cooperation and teamwork that exists in his or her department as well as his or her organization as a whole" (IGS-2, questions 31, 32). Technical staffs from all three agencies strongly agree with this statement.

Coordination is another issue that can be addressed by the following statement: "Generally speaking, scheduling problems caused by competing clients are resolved to everyone's satisfaction" (IGS-2, question 34). Technical staffs from all three agencies agree with this statement.

Technical Capability is an area where everyone in the team will be affected. To be consistent with the organizational standards and guidelines, a set of principles and rules must be followed, "I rely heavily on the systems development methodology in my present work assignment" (IGS-2, question 23). Technical staffs from all three agencies strongly agree with this statement.

Finally, Overall Individual Satisfaction can be summarized as follows. "I am fully aware of my department's overall quality mission; I like my present work assignment; and generally speaking, I am happy with my work environment" (IGS-2, questions 19, 20). Technical staffs from all three agencies strongly agree with this statement.

- **Management of an IS Development Methodology**

Methodology and Documentation are the two most important technical factors in any system development effort. "There is a formal systems development methodology in my department; and it is clearly documented" (IGM-2, questions 2, 3; IGS-2, questions 2, 3). Managers and technical staffs from all three agencies agree with this statement.

The next indicator is Project Management, "The role of project management is clearly defined" (IGM-2, question 5; IGS-2, question 5). Managers and technical staffs from all three agencies agree with this statement.

In terms of Hardware/Software, let's consider the following statement, "Generally speaking, I know the types of hardware/software which are currently installed in-house" (IGM-2, questions 13, 15; IGS-2, questions 13, 15). Managers and technical staffs from all three agencies agree with this statement.

Customer Focus offers different viewpoints between managers and employees, "My department has a clear definition of quality systems" (IGM-2, question 6; IGS-2, question 6). Managers and technical staffs from all three agencies agree with this statement.

Recognition System can be described as simple as, "There is a system of formal recognition in my department and organization" (IGM-2, question 11; IGS-2, question 11). Managers and technical staffs from all three agencies agree with this statement.

In a system life cycle, Availability/Flexibility plays a noticeable and critical role, "The availability, reliability, consistency, and flexibility of the data collection process are clearly defined in the systems development processes" (IGM-2, question 17, 18; IGS-2, question 17, 18). Managers and technical staffs from all three agencies agree with this statement.

Once the system is implemented, it must be able to be maintained easily. That's what the terminology "Maintainability" denotes. "Measurement criteria are clearly defined within the guidelines for promoting quality information systems. These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects" (IGM-2, question 9; IGS-2, question 9). Managers and technical staffs from all three agencies agree with this statement.

Summary and Analysis

After the interpretation of results of the three case studies early in this chapter, we can now develop lessons learned from this empirical investigation over time and put them in a perspective that will help provide insights on the lessons learned between the empirical state of TQM in these three public agencies in the first stage and the second stage of the study. The five TQM Dimensions will again be used in this section as a baseline to analyze the three agencies within the shifting paradigm of the research findings to discover either the constancy, or change, or both, between the *then* and the *today* stages of research. In other words, the summary and analysis of data in this section will provide a fundamental ground for finding and providing appropriate answers to the third question of the research design of this dissertation: What lessons were learned between then and today?

Customer Satisfaction

- **Agency 1**

In the first stage of the research, survey results indicated a satisfactory score in terms of Overall Satisfaction indicator (Median = 5.8 and Inter-quartile Deviation = 0.8) as Table 5.4 has indicated. Productivity indicator had the highest Median value of 6.5 followed by Involvement, Quality, Clarity, and Reliability, respectively with Median values of 6.4, 6.0, 5.7, and 5.5, respectively. The lowest Median value of 5 was measured for the remaining indicators: Timeliness, Accuracy, Consistency, and Dependability. Overall, this picture indicated a positive relationship between the user community and the IS organization as expressed in the following comments, "I have been very satisfied with the quality of service provided by the staff of the IS Department. They are responsive to our requests and very helpful in directing our inquiries."

However, there would certainly be room for improvement as expressed by the following comments, "Generally speaking, our department is satisfied with the quality of work. Timeliness is the problem. It takes too long for requests to be responded to. The problem is too much work, far few programmers."

In the second stage of the research, interview results indicate a positive feeling from the user community towards the IS organization, the systems developers, and the systems development processes that have been developed, adopted, and refined over time. In fact, Agency 1 has become a sophisticated organization with top leadership commitment and involvement in critical and strategic business decisions, and a strong focus on and a dedication to its customers. The user community has a solid relationship with the systems developers and the IS organization overall. In addition, end users often express gratitude for the attention that is given to them by the systems developers. They hold the IS organization and the systems developers in high regard with favorable compliments such as, "It's a work in progress always, so you can always think of ways to improve on something. All things considered, I think the IT folks have done well. They are always consistent and accurate. Good teamwork, that's the way to put it."

- **Agency 2**

In the first stage of the research, survey results indicated a somewhat satisfactory score in terms of Overall Satisfaction indicator (Median = 4.0 and Inter-quartile Deviation = 1.3) as Table 5.4 has indicated. Productivity was the only indicator that had the highest Median value of 6.0 followed by a Median value of 5 for most of other indicators. The other Median values were 4.5 and 4.6, for the indicators of Reliability and Involvement, respectively. Overall, this picture indicated that although the work has been satisfactory, the relationship between the user community and the IS organization has been generally surviving. Reliability was an area that

needed to be improved as expressed by the following comments, "Although the personnel try to be responsive, the system does not always capture information in a way that is useable … Would like to see regular input from end users so the system can be modified as needed to provide useful information."   Another area of improvement was Involvement which was expressed by the following comment, "Be proactive, [and] suggest data that could be provided to managers to help them to do a better job."

In the second stage of the research, interview results indicate a positive feeling from the user community towards the IS organization and the systems developers.   Over time, the IS group has grown from a staff of 5 to a staff of 10 with increasing responsibilities.   It is committed to meet and exceed the expectations of the internal customers.   The user community and the developers maintain a positive relationship. In addition, end users often appreciate the attention that has been given to them by the systems developers and hold the IS group and the systems developers in high regard with compliments such as, "They have lots of work to do; they're swamped because they have requests coming in from everyone, plus they keep us running. We wouldn't be able to function without them. These IT guys are great."

- **Agency 3**

In the first stage of the research, survey results indicated a somewhat satisfactory score in terms of Overall Satisfaction indicator (Median = 4.0 and Inter-quartile Deviation = 1.0) as Table 5.4 has indicated. Timeliness, Accuracy, Reliability, and Productivity indicators had the highest Median value of 6.0 followed Clarity and Involvement, respectively with Median values 5.3 and 5.2, respectively.   A Median value of 5 was measured for the remaining indicators: Consistency, Dependability, and Quality. This picture indicated that although the work has been more than satisfactory, the relationship between the user community and the IS organization has been

generally good. Consistency was an area for improvement as expressed in the following comments, "The help we get is satisfactory. We would be grateful if perhaps samples of project implementation methods for characteristic projects in our company were given to us." Another area of improvement was Dependability which was expressed as follows, "They've been very slow to react to changes in technology and to fulfill the needs for a production environment. Involve customers instead of dictating. Be proactive instead of reactive. Keep us informed of planned and proposed changes in technology." Quality was also another area of concerns from the user community as expressed by the following comments, "They could be more knowledgeable about the products they support. Agree precisely on a final product. They should prepare more software package to install for any other systems (except PC). I don't want to wait more than a month to install SAS into my PC."

In the second stage of the research, interview results indicate that the user community feels positive towards the IS organization and the systems developers. In fact, Agency 3 has become a more sophisticated organization with a clearly stated quality policy at the organizational level. The systems development activities had been decentralized and each department has several IS development groups. The user community has a solid relationship with the IS development group and the systems developers that were dedicated to them. In fact, in this empirical study at Agency 3, the user community and the IS development groups are dedicated to each other. End users express gratitude for the attention that was given to them by the systems developers. They hold the IS development group and the systems developers in high regard with compliments, such as, "Our programmers handle everything, from start, cradle, to burial. And they do it instantaneously for us. We set up a great communication chain and the way it flows to us. And I have no complaints. I don't know how we'd do it in any other way."

- **Summary**

The user community's perceptions towards the IS organization and systems developers have improved significantly between the then situation and the today situation for all three agencies with respect to this TQM dimension. The end users are satisfied with the work provided by the systems developers and the attention they receive from the IS organization. They maintain constant dialogue and keep each other in touch, formally or informally, to avoid the negative aspects of the relationship for the better of the organization. Along the way, they have learned to accommodate each other in a positive way. To have that solid and meaningful relationship today, they have learned to incorporate each other's spoken, unspoken, present, and future needs and expectations into the systems development processes. In the same perspective, Seadle (1994: 14, 41) sums up the customer satisfaction perspective for TQM applications in this way, "TQM is a philosophy, not a specific set of procedures. It is the belief that everyone in an organization can cooperate to build a defect-free product if mental and physical barriers to that result can be recognized and removed… A thoughtful implementation of TQM, however, can help overcome barriers within IS department and between programmers and users." Siddiqui & Rahman (2007: 76) continue with the same line, "TQM and IS can be quite fruitful in improving the quality of products and services offered to the end customer." This is consistent with Deming's philosophy and approach to quality (Deming, 1965: 5) as stated, "The consumer is the most important part of the production line. Quality should be aimed at the needs of the consumer, present and future." The final picture here shows that the user community and the systems developers are satisfied, professionally and personally, with respect to this TQM dimension.

In sum, the lessons learned approach has indicated that this area is a visible gain in which everyone is a winner. All three agencies perform well in this regard. Deming's full description of

his second point (Deming, 1986: 23) stresses this customer's mission focus, "Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change."

Organizational Culture

- **Agency 1**

In the first stage of the research, survey results indicated that technical staffs viewed this TQM dimension highly satisfactory while managers did not. Table 5.5 indicated that both Motivation and Teamwork indicators had the highest Median value of 7.0 followed by Customer Awareness and Promotion Opportunity, respectively with Median values of 6.7 and 6.0, respectively. This picture showed that technical staffs were fully satisfied with the organizational culture around them. Consistently, interview results indicated that technical staffs took pride in their work because they thought the work they did was important to the success of the organization. On the other hand, managers had a highest Median value of 6.5 for the Work Settings indicator followed by a series of lower Median values of 5.0, 4.3, and 4.2, respectively for Goal Settings, Culture, and Training Program indicators, respectively. This picture showed a somewhat unfavorable view from the managers regarding the organizational environment and culture around them, as expressed in these comments, "Get a direction that is 'people' oriented. Communicate with all levels of staff. Get appropriate standards and guidelines. Be less political and more for the 'right way.' Support staff. Involve staff." Also, interview data indicated that budget constraints played an important role in training. Although an annual training plan for all employees was prepared, actual delivery was limited.

In the second stage of the research, interview results indicate a different picture. Managers and technical staff agree that things are getting better as the years go by. Technical staffs feel a spirit of teamwork and cooperation not only within the department but also within the entire organization. They believe that "everyone is a team player." This is very consistent with the management's theme of promoting a participatory culture in organization. The management feels positive about the topic of training at their respective organizations. Training is something that is being built into the projects. In other words, "for each of the projects that are found in the IT Plan, there's a component for training, for both the technical side as well as the business side, and then for the end users also." Within that context, training is "part of the application process." In other words, "It's a continuous evolution." On top of that, everyone feels an organizational atmosphere in which they spend a third of their daily life is very pleasant, structured, and coordinated. Specifically, its architectural emphasis is to make sure that everything fits together, that the technical platform is the best that can be afforded, maintained, and stable. "This means that there is no stress to the infrastructure, and that is basically the goal of the organization."

- **Agency 2**

In the first stage of the research, interview results indicated technical staffs took pride in their work because they thought that the work they did was important to the success of the organization.   Due to the lack of a system development methodology document, however, they had to use their best judgment to get their job done. Budget constraints also played an important role in training for employees and therefore such training was very limited. Therefore, managers and technical staffs relied solely on technical books, journals, magazines, and articles. Managers felt that not all customers were going to be happy with the ways things were. Due to the amount

of increased workload and the lack of sufficient staff, the IS group must prioritize user requests depending on the status of the customers and the urgency of the requests. As a result, only the most important customers were happy, others were not; only the most urgent requests were addressed immediately, others were not. Furthermore, all systems development activities were written using PC-based software and remained "informal, unstructured, and often depend on the tasks at hand."

In the second stage of the research, interview results indicate a different picture. Manager and technical staffs think about their work and feel the atmosphere around them in a positive way, especially about the topic of training. While acknowledging that, "We have budget issues in the organization just like the rest of the country does," they see no problems with training because the Parent Agency always sends staff to formal training, "If a project comes up where you need to have more up to date training on a newer version of products, or you need to work on project [that] you've never worked on before, [and then] they'll send you to training, like Learning Tree." They agree that the focus on the customers is the most important factor in defining a quality system, "When it meets the users' requirements, and is sustainable, [then] that is a quality product." Another factor that affects the organizational culture around them is that they now have a centralized, standardized, structured, and documented approach to systems development that can be found in the "FY 2011 IT Plan" which has been published by the Parent Agency. This formalized process makes a significant difference in their daily life in the organization.

- **Agency 3**

In the first stage of the research, survey results indicated that technical staffs viewed this TQM dimension satisfactorily while managers did so moderately. Table 5.5 indicated that

Motivation and Teamwork indicators had the highest Median value of 6.2 and 6.0 followed by Customer Awareness and Promotion Opportunity with Median values of 5.3 and 5.0. This picture showed that technical staffs were satisfied with the organizational environment and culture around them. Consistently, interview results indicated that technical staffs took pride in their work because they thought the work they did was important to the success of the organization. Due to the lack of a system development methodology document, however, they had to use their best judgment to get their job done. On the other hand, managers had a highest Median value of 6.0 for the Work Settings indicator followed by a series of lower Median values of 5.0, 4.5, and 4.5, respectively for the Culture, Goal Settings, and Training Program indicators, respectively. This picture showed, except for the Work Settings indicator, a somewhat less than favorable view from the managers regarding Culture, Goal Settings, and Training indicators of the organizational culture around them. However, interview data indicated that Training was an area that was indeed viewed favorably. The organization did provide TQM training and additionally made other training resources available to management and technical staffs. Managers attended professional seminars and courses on quality management, project management, problem solving, and team building. Quality gurus such as W. Edwards Deming and James Martin have been invited to teach on site on several occasions and they were not strangers to this organization.

In the second stage of the research, interview data were gathered from three managers. Two of them belong to the same group and are also performing technical work as well as dealing with the user community in addition to their managerial tasks. For the purpose of this research, they would offer both a managerial perspective as well as technical staff's perspective. This interview data reveal another aspect of this TQM dimension. Managers aim to create a work environment in

which employees can achieve personal goals while working for the common goals of the organization. To this end, managers specifically created an environment which promoted enthusiasm and cooperation to foster excellence among employees. Consistent with the management's theme of promoting a participatory culture, from the technical staff's perspective, there is indeed a spirit of teamwork and cooperation within their department. However, it is not felt the same way in other departments, "There are some organizations that we work very well with and there are some other organizations where teamwork doesn't exist. And that's normal in [the] private sector and government sector." Another aspect of this TQM dimension is Training. Everyone views this topic favorably. From the technical staff's perspective, there's an "Individual Training Plan (IDP) and we have to do it on a yearly basis. I have to submit mine to my boss for review, and he will suggest certain classes to focus more on this or that." From the management staff's perspective, "Yes, they have personal development plans for employees. And of course, depending on what technologies have been selected."

- **Summary**

Initially I had a concern with this analysis for Agency 3 due to the fact that technical staffs were not made available for a separate interview session as specifically requested. Instead, the two managers were also interviewed as technical staff. This situation offers a somewhat confusing scenario for me, but that was the way it was offered. It offers a unique opportunity for me to search for and identify a validation technique to ensure the validity and reliability of the technical staff's perspective. To avoid biased opinions or opinions appearing to be biased, technical staff's perspective gathered from management staff was validated against the end user's interview data. The logic behind this technique is that the user community works directly with technical staff on a daily basis and only deals with management staff occasionally whenever the need arises at the

managerial level. If the technical staff's perspective is found to be consistent with the user community's perspective, then it is considered valid and therefore can be considered reliable for the purpose of this research. In the end, this validation technique (Manheim & Rich, 1986: 63) has indicated that my original concern was found to be a minor matter.

Management staff's perceptions and technical staff's perceptions have improved significantly between the then and the today situations for all three agencies with respect to this TQM dimension. They feel positive about every aspect of organizational environment and culture. In this respect, we can rarely find their differences in this area today. They agree on almost every indicator, from Culture, Work Settings, Goal Settings, Training, to Motivation, Customer Awareness, Promotion Opportunity, and Teamwork. The organizational environment and culture in which they work allow them the chances to make their differences of the past disappear and look forward to the future of the organization. In this environment, they learn together that TQM is an ongoing process that fundamentally changes the old fashioned way of doing business to make organizations more responsive to customer demands for quality service. Ravichandran (2000: 718) focuses on this change in environment and culture in IS organizations as follows, "The role of IS department in organizations continues to evolve as IS units attempt to better orient their structures, processes, and personnel to meet the demands placed on them." In addition, Lin (2010: 345) expresses the organizational factor in IS and IT as follows, "IT implementation involves more than just technology deployment and requires organizational support."

In sum, this area is another aspect of the continuous improvement process as the lessons learned approach has presented in these organizations. All three agencies seem to do well in this regard. It is consistent with Deming's description of his sixth point, "Institute training on the job;" his tenth point, "Eliminate slogans, exhortations, and targets for the work force;" and his thirteenth

point, "Institute a vigorous program of education and self-improvement" (Deming, 1986: 23, 24).

Leadership Commitment

- **Agency 1**

In the first stage of the research, survey results indicated that managers did not view this TQM dimension favorably while technical staffs did so moderately. From the technical staff's perspective, Table 5.6 indicated a Median value of 5.7 for the Leadership indicator. This measurement indicated that they viewed favorably about the leadership of the organization. However, when asked to express their opinions on the open-ended question, technical staffs offered inconsistent viewpoints, for instance, "Provide a stronger leadership; share with all the current status and goals (instead of separate groups being told different things and passing on negative comments). Emphasize quality and quantity of work and not personalities, false suppositions, vague concepts, and non-productive issues." On the other hand, Style and Financial Rewards indicators were viewed favorably by managers with Median values of 6.0 and 5.5. The lowest Median values were 2.2, 2.5, and 3.5 for Responsibility, Vision, and Strategy indicators. Managers were undecided about Empowerment indicator as indicated by Median value of 4.0. This unfavorable view from managers has been expressed as follows, "First, let employees know that their opinion is important. Encourage creative ideas, not just one-way direction from management/branch chief to employee. Encourage 'cross' teams within the department so that employees are not 'owned' as much as they are now. Allow exposure to other technical opportunities." On the other hand, interview results indicated a different perspective from management staff. Managers indicated that they had a clear vision, strategy, and responsibility with a commitment to a customer focus in order to achieve continuous

improvement of the systems development process and to keep their internal customers happy. This was done by maintaining constant dialogue with the user community, although in a somewhat informal manner. To ensure that the commitment to quality information systems was met, the end users were asked to be involved in every phase of the systems development process. In fact, without the user sign-off, the process barely continued to the next phase.

In the second stage of the research, interview results are consistent with the results from the first stage's interviews and therefore inconsistent with the results from the survey. Like the first stage interview data, everyone is committed to the constancy of purpose of the organizational vision that focuses on the customers. Unlike the negative comments from the survey, today technical staffs think of management staff in a positive way. In turn, managers consider their employees to be fundamentally hardworking, responsible human beings, and should be given full support. In fact, they are encouraged by the organization to empower the employees. In addition, managers agree that there is a formal system of recognition that exists at every level of the organization. This is somewhat consistent with the survey results.

- **Agency 2**

In the first stage of the research, interview results indicated that managers and technical staff thought of customer satisfaction as the secondary factor in defining a quality information system. To them, accuracy, currency, consistency, and integrity of the systems were the primary and most important factors in defining a quality information system. Another viewpoint was that, due to the lack of staff, the team was under pressure to "get it done" without any written and formalized processes. Technical staffs thought that each section in this organization had different goals although all of them understood the common mission. However, whether different sections across organizational boundaries cooperate to meet common organization goals

remained an empirical inquiry. Managers expected that their employees would be responsive to user needs, depending on the status of the customers and the urgency of the requests, would pay attention to management instructions, and would try to do a good job. Managers believed that their employees were fundamentally hardworking, responsible human beings, and therefore should be encouraged and given full support.

In the second stage of the research, interview data indicate a different picture. Management staff and technical staffs sound positive and express a different outlook. They now agree that the focus on the customers is the most important factor in defining a quality IT system. Additionally, a manager offers his perspective on work and life of his people as follows, "I'm a firm believer that my employees have a lot outside of this agency… They have families and they need to go enjoy that… Everybody has to have that balance in life… And everybody else in this agency knows that I take care of them." In turn, technical staffs sound positive about management staff and his leadership skills with such compliments as, "I'm very satisfied with the way we do things. We've got support from our manager; we've got a good working relationship with all of our clients." In a reciprocal way, management staff holds his employees in high regards with comments such as, "These people here are loyal… and devoted to this agency. I'd sell them and I would never work another day in my life and I'll be the richest man in the world."

- **Agency 3**

In the first stage of the research, survey results indicated that managers did not view this TQM dimension favorably while technical staffs did so moderately. From the technical staff's perspective, Table 5.6 indicated a Median value of 5.2 for the Leadership indicator. This measurement indicated that they maintained moderate views of the leadership of the

organization. On the other hand, Style, Strategy, and Financial Rewards indicators were viewed moderately favorable by managers with Median values of 5.2, 5.0, and 4.5. The lowest Median value was 3.5 for Vision indicator. Managers were undecided about Empowerment and Responsibility as indicated by a Median value of 4.0 for both. This unfavorable view from managers has been expressed as follows, "Management should attempt to rid themselves of any and all negative emotions toward other managers and other departments. Almost all problems, whether technical or with morale, originate from past political and/or personal conflicts." Interview results indicated a different picture. First and foremost, Agency 3 was a TQM committed organization with a clearly defined organizational vision, mission statement, quality policy, and several strategic goals. The IS Department "develops and monitors the execution of plans, policies, and procedures for the management, acquisition, telecommunications, and automated data processing" within Agency 3. Managers were committed to a customer focus to achieve continuous improvement of the systems development process, and to keep their internal customers happy. This was done by maintaining a constant dialogue with the user community, in a formal manner. To ensure that the commitment to quality information systems was met, feedback from the user community was always sought. One specific goal of this department was to involve customers in developing policies and executing major initiatives. To support this specific goal, managers in this department often practiced the quality management principles of the organization through frequent surveys, focus groups, and user meetings to hear what the customers want. Managers considered their employees to be fundamentally hardworking, responsible human beings, and therefore should be encouraged and given full support.

In the second stage of the research, interview results are somewhat consistent with the results from the first stage's interviews and therefore inconsistent with the results from the

survey. Like the first stage interview data, everyone is committed to the constancy of purpose of the organizational vision that focuses on the customers. Technical staffs think of management staff in a positive way. In turn, managers consider their employees to be fundamentally hardworking, responsible human beings, and should be given full support. In fact, they are encouraged by the organization to empower the employees. In fact that is what they always do on a daily basis, "As a manager, I promote independent thinking. I asked my developers constantly to think outside the box and come up with unique solutions to existing problems that are repeating over and over again. I asked them for their vision because I gave them my vision, but I cannot envision everything… Each team, I ask them to give me what their vision is to fix problems or where they want to go in the future." In addition, managers agree that there is a formal system of recognition that exists at every level of the organization.

- **Summary**

    Generally, perceptions from both management and technical staffs have improved significantly between the then and the today situations for all three agencies with respect to this TQM dimension. They are optimistic about every aspect of leadership commitment in organization. In this respect, we can rarely find their differences in this area today. They agree on almost every indicator, from Style, Vision, Empowerment, Strategy, Responsibility, and Financial Rewards indicators to the Leadership indicator. Technical staffs think highly about management's leadership skills and believe that they have always been taken care of by management staff. In addition, they think that managers always look after them and try to help them take advantage of opportunities to expand their knowledge of quality management. Managers are consistent and committed to the concept and definition of a leader and a manager.

The leader creates the vision of the organization, and then motivates the organization to transform into that vision. This mission requires the inventory of existing organizational capabilities, and a set of actions that must be taken, to move the organization into the future. The manager, on the other hand, concentrates on the bottom line. The manager makes sure that the actions that are taken to move the organization into the future are done as correctly and effectively as possible. In fact, they sound consistent with the following definition, "Managers are people who do things right and leaders are people who do the right things" (Bennis & Nanus, 1986: 21).

In sum, leadership commitment is another aspect of the continuous improvement process as the lessons learned approach has presented in these organizations. All three agencies seem to do well in this regard. Saylor (1992: 26) offers his perspective as follows with respect to leadership, "They must convey the importance of the individual in the organization and the role of each contributor in making the vision a reality. This type of leadership is required throughout all levels of the organization." Symonds (2009: 7) suggests that effective leadership is related to the critical aspects of human nature, "People want to do a good job and contribute to a winning team. Leaders need to set up employees for success through training and insert employees seamlessly into a process that's well understood." It is consistent with Deming's descriptions, such as his first point, "Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs;" his seventh point, "Adopt and institute leadership;" his eighth point, "Drive out fear;" his eleventh point, "Eliminate numerical quotas for the work force and numerical goals for people in management;" and his twelfth point, "Remove barriers that rob people of pride of workmanship" (Deming, 1986: 23, 24).

Teamwork

- **Agency 1**

In the first stage of the research, survey results indicated a satisfactory score in terms of Overall Satisfaction indicator (Median = 4.7 and Inter-quartile Deviation = 1.2) as Table 5.7 has indicated. Communication indicator had the highest Median value of 6.0 followed by Interdependence, Integration, and Technical Capabilities with Median value of 5.0 for them. The lowest Median value was 3.0 for Coordination indicator. Technical staffs were undecided about the Trust indicator as indicated by a Median value of 4.0. Overall, this picture indicated a somewhat favorable view from technical staff with respect to this TQM dimension, as expressed in the following comments, "Team spirit must be encouraged throughout the organization… Work with our staff to test everything before we deliver the product. We also need user commitment which is very much lacking…We should be in constant touch with our users. Since users are not technical give them advice and guidance." Coordination was an area of needed improvement with comments such as, "I felt that, from the top on down, the department is not managed at all. I have been fortunate to be able to work on projects that I've found challenging, and to work on them in ways I've found to be successful." Another area that needed attention was Trust which technical staffs expressed as follows, "Management must learn how to deal with people and treat them equally. They should stop counting their own achievements all the time and appreciate their employees also. Give them credit where it is due. They should also learn to control their mood swings and not take it out on their staffs." Interview results indicated a better picture of the participative atmosphere at the organization. Technical staffs felt a spirit of teamwork and cooperation not only within the department but also within the entire organization. They admitted, however, that they sometimes encounter unexpected and uncooperative attitudes from some, but not

all, individuals in the operations department regarding operations procedures. They could talk freely to each other to get information they needed in order to get the job done. They could talk freely with other team members outside their branch for help. In fact, they were encouraged to go to everyone including managers whenever they need help.

In the second stage of the research, interview results are somewhat consistent with the results from the first stage's interviews and therefore inconsistent with the results from the survey. Like the first stage interview data, consistent with the management's theme of promoting a participatory culture, technical staffs feel a spirit of teamwork and cooperation not only within the department but also within the entire organization. They believe that "everyone is a team player." With respect to the user community, the Trust and Coordination indicators are clearly visible. Technical staffs know who their internal customers are, interact with them on a regular basis, and maintain a good professional relationship with the user community. In addition to user participation early in the system development project, this process also requires a team effort. There is a team of people in project management who must interact with different groups. "These are the people who are trained in gathering requirements, collecting the information, going through review processes, meeting with the user community and the technical people, documenting the plan, and moving forward with the system design process. The project managers make sure that information is collected and that are exactly what people want." Like the first stage interview results, technical staffs can always talk freely to each other to get information they need in order to get the job done. They could talk freely with other team members outside their branch for help. Actually, they are encouraged to go to everyone including managers whenever they need help. In addition, they sound confident about their technical background which enables them to perform on any assignments, present and future. In fact, although they like the work they do now, they are ready for any new

assignment within the organization.

- **Agency 2**

In the first stage of the research, interview results indicated that technical staffs were encouraged to participate in solving problems by the team concept. They felt a spirit of teamwork and cooperation within the group. They admitted, however, that they sometimes did not feel the same way with other sections in the entire organization, perhaps due to the lack of communication among them. With respect to the Coordination indicator, they often encountered the common problems of competing clients simultaneously asking for work to be done. As a result, they had to prioritize the user requests. The status of the user groups and the urgency of the requests played an important role in setting up schedules for work to be done. Therefore some groups were happy while others were not. Technical staffs liked their job although there were some aspects that they liked more than others. They most liked the freedom to interact with each other, the freedom to work independently, the acquaintance with new technology, and the opportunity to develop computer systems to help the user community. They did not like the bureaucratic aspects of organizational life and the absence of formal operating procedures. Even so, they expressed confidence about their technical background. In fact, they felt that although they liked the work they did, they were ready for any new assignment.

In the second stage of the research, interview data indicate a different yet positive picture. Technical staffs feel a spirit of teamwork within their organization, "From my standpoint, I think it's great… We have a good team of coworkers. There's no lock door policy where you can't talk to the manager." Another aspect of the Coordination indicator is that they do not have to deal directly with the problems in which competing clients ask for work to be done at one given time. They tend to refer any scheduling issues to their manager, and it has proven to work well

to every party's satisfaction, "He is the one who will take care of it. He'll relay to us, 'Here is the most important thing you need to work on.' So the burden isn't put on us to try to make all these people happy at the same time. He considers that his job to worry about." They can always talk freely to each other to get the information they need in order to get the job done. In fact, they are encouraged to go to everyone including the manager whenever they need help. In sum, technical staffs like their job, their "freedom and flexibility," and could not think of anything that they do not like in their present work assignment.

- **Agency 3**

In the first stage of the research, survey results indicated a somewhat satisfactory score in terms of Overall Satisfaction indicator (Median = 4.5 and Inter-quartile Deviation = 1.5) as Table 5.7 has indicated. Communication was the only indicator that had the highest Median value of 6.0. The lowest Median value was 3.2 for the Technical Capabilities indicator. Technical staffs were undecided about Interdependence, Trust, Integration, and Coordination indicator as indicated by a Median value of 4.0. Overall, this picture indicated a somewhat favorable to neutral viewpoint from technical staff with respect to this TQM dimension, as expressed in the following comments, "More downward communication. Provide more information/reasons for requesting specific tasks or assigning projects. More open communication to top management on regards to how tasks and projects are doing. Do not base performance on what is accomplished. Include what can't be accomplished or tried, as positive efforts." The Technical Capabilities indicator was an area of needed improvement with suggestive comments such as, "In my department, some project managers lack experience needed for their assignment… Ideally, the person managing development of an information system would be familiar with the customer's needs and know how to implement an appropriate system. A system meeting all

requirements could be developed very quickly because there would be minimal need for discussion. This situation is unlikely. However, project managers for data processing systems can and should be experienced programmers/analysts. This person already has the knowledge to implement a system. While working directly with the customers to understand the system specifications, a manager with data processing experience can simultaneously be formulating the system design. Additionally, important information relayed by the customer is not lost as often happens during the information systems development process; and development time is reduced by eliminating lengthy discussions relaying information to the system designer." Interview results indicated a different picture and in a direction of the participative atmosphere at the organization. Technical staffs thought that each unit of the organization, whether department, division, branch, or section had different goals although all of them understood the common organizational mission. However, whether different units across organizational boundaries cooperated to meet common organizational goals remained an empirical inquiry. For the most part, they have been successful in making everyone happy, due to the fact that they always tried to plan and schedule carefully in advance.

In the second stage of the research, interview data indicate a different and overall positive picture. Technical staffs feel a spirit of teamwork and cooperation within their department. However, it is not felt the same way in other departments, "There are some organizations that we work very well and there are some other organizations where teamwork doesn't exist. And that's normal in [the] private sector and government sector." Scheduling is an area where there are problems regarding competing clients asking for work to be done at one given time. Technical staff offers the following perspective, "The customer was involved in this. [The manager] would talk to the functional person: 'OK, you give me five requirements here and you want all this next

week. Well, I can't do all five at the same time. Which one is your top priority? To have that agreement, you guys tell me [where] we want to go from here.' It has proven to work very well to every party's satisfaction because the 'ultimate users' were involved." Technical staffs can always talk freely to each other to get the information they need in order to get the job done. In fact, they are encouraged to go to everyone including managers whenever they need help.

- **Summary**

Technical staff's perceptions have improved somewhat between the then situation and the today situation for all three agencies with respect to this TQM dimension. Technical staffs from Agency 1 believe in about every aspect of teamwork in the entire organization because "everyone is a team player." On the other hand, technical staffs from Agency 3, while agreeing that teamwork does exist within their respective departments, are not so convinced that it also exists across the boundaries within the entire organization. "Within my staff, we clearly have established cooperation and teamwork. Everyone here works well together and we resolve any conflicts along the way. When it gets out of my team and gets into a different organization, a lot of times there isn't teamwork." Technical staffs from Agency 2 seem to agree with the latter. Technical staffs from all three agencies also sound confident about their technical background which enables them to perform on any assignments, present and future. In fact, although they like the work they do now, they are ready for any new assignment offered to them.

In sum, this area exemplifies the continuous improvement process as the lessons learned approach has presented in these organizations. All three agencies seem to do well in this regard. Seadle (1994: 41) notes that teamwork has always been the goal of IS organizations. He clarifies the team concept in IS organizations as follows, "TQM seeks to make the whole organization work together; this is a goal that IS has long supported." Svetec (1995: 23) offers a viewpoint

that suggests that while it is often difficult to obtain consensus among a group of people, but "involving everyone in the process of continual improvement through the team concept has instilled an understanding of the program and emphasized the importance of the participation by all employees." It is consistent with Deming's description of his ninth point, "Break down barriers between departments;" and his fourteenth point (Deming, 1986: 24), "Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job."

Management of an IS Development Methodology

- **Agency 1**

In the first stage of the research, survey results indicated that technical staffs viewed this TQM dimension somewhat satisfactory while managers did not. Managers and technical staffs offered different viewpoints regarding systems development processes, relationships, and quality as shown previously in Table 5.8. Managers and technical staffs offered a contradictory perspective with respect to Documentation, Project Management, Software, Customer Focus, Hardware, and Methodology indicators. Technical staffs obtained an above average score with Median values of 5.0, 5.0, 5.0, 4.7, 4.3, and 4.3, respectively while managers obtained a below average score with Median values of 4.0, 4.0, 3.8, 2.2, 3.7, and 3.8, respectively. This picture showed that technical staffs were more satisfied than managers with respect to these indicators. Customer Focus was clearly an area where improvement was needed, as expressed in comments by technical staff, "Listen to the users and their concerns. Don't force users to accept systems just to ease the programming or 'because that's how other systems work.' Remember that if the customers (users) didn't need systems, we would not have jobs;" and comments from managers, "Work as a team with the user. Share responsibility, success and/or failures. Encourage mutual

respect for each person on the team can contribute to the project." They both viewed Availability/Flexibility, Maintainability, and Recognition Systems indicators unfavorably. Technical staffs obtained a below average score with Median values of 4.0, 3.0, and 3.0, respectively and managers obtained somewhat similar results with Median values of 2.0, 3.0, and 3.2, respectively. This picture showed that technical staffs and managers shared the same view with respect to these indicators. Recognition Systems was an area that needed improvement, per suggestions from managers as follows, "Employees need support from management and organizational procedures for all to follow. Bad work needs to be rejected; good work needs to be rewarded;" and per suggestions from technical staffs as follows, "Recognition of a good job being performed by an employee. Promotional advancement based on job performance excellence. Fair and promotional opportunities for all employees. Branch manager's biased opinion or prejudices to be removed when awarding an employee."

Interview results indicated a different perspective in a favorable way. With respect to Customer Focus indicator, managers and technical staff agreed that focus on the internal customers was the most important factor in defining a quality information system. With respect to the Recognition Systems indicator, managers and technical staff agreed that guidelines to determine "a job well done" were informal, if they existed at all. In addition, managers thought that a formal system of recognition existed at the organization level, but not at the department level or below. Managers and technical staffs sounded a consistent theme about the system development methodology. The methodology has been fully documented since 1987 and consisted of several major phases of a system life cycle development process. However, they all agreed that the methodology document should be updated to be consistent with the recent installation of a new database structure. James Martin's Information Engineering methodology (Martin & Palmer, 1991)

was being adopted as the official methodology of the department to fulfill the organization's increasing interest in the role of quality information systems in modern organizations. Managers offered three opinions with respect to Project Management indicator. The first stated that project management was well defined with heavy involvement of the users as project managers. The second saw that project management was defined depending on the scope of each project. Finally, the third recognized that project management was one weakness of the existing methodology and therefore was currently under review. Technical staffs agreed with the third opinion.

In the second stage of the research, interview results indicate a different and overall positive picture. Changes have been made to accommodate the challenges of the new millennium. Managers and technical staffs are consistent with respect to almost every indicator of this TQM dimension. They all agree that a formal system development methodology does exist in the formal "FY 2011 IT Plan." It is often referred to as the SDLCS and is clearly defined. The "SDLCS provides application developers a framework of the important procedures and universal requirements necessary to complete an application." This comprehensive document "outlines the organizational entire management framework, strategic planning process, architectural planning process, system life cycle, and IT project management program." Perhaps the only area where managers and technical staffs are inconsistent is the Recognition System indicator. Managers indicate that there is indeed a formal system of recognition that exists at every level of the organization. "There's a team level, there's a department level, and there's an organization level of awards," for instance, "the IT group has an awards ceremony where awards are given to people who have done exceptional jobs on multiple projects; the organization also has an awards recognition program where largest projects are eligible for team awards." However, technical staffs do not share the same view. Nevertheless, they are all committed to their customers and to

achieving continuous improvement of the systems development process and to keep their customers happy. This is done by maintaining constant dialogue with the user community. "Customer requirements are what start the entire process." The users are often asked to be involved in every phase of the systems development process. In fact, without the user sign-off, the process barely continues to the next phase.

- **Agency 2**

In the first stage of the research, interview results indicated managers and technical staffs agreed that there was not a system development methodology. For mainframe computer application systems which had been developed and maintained by the Parent Agency, there may have been a written methodology. At this agency, however, all systems development activities were written using PC-based software and at this time remained "informal, unstructured, and often depend on the tasks at hand." There were not any written guidelines for the PC software. A Data Committee had been established to formalize a data dictionary for the organization. This committee consisted of representatives of several user groups in the organization. They were participating to finalize formal documentation and standards for the entire organization. Systems management also presented a problem. Managers stated that project management seemed defined for major projects, but not for small projects and thought that the systems management process at this agency was "fragmented, uncoordinated, sometimes unclear, and in some cases performed by persons without knowledge of the organizational operations, procedures, and needs."

In the second stage of the research, interview data indicate a different yet positive picture. Managers and technical staffs agree that formal guidelines for promoting a quality information system can be found in the "FY 2011 IT Plan" published by the Parent Agency, "It is clearly documented and that's why in my agency, when we do development for a system or go look at a

cost product, we follow the guidelines because your chances of success are much higher by doing that - by going by the established procedures." They also have a tracking system to document the reoccurring issues and to fix them in a timely manner. "Every time there is a problem it is documented in a system of the number of calls you have. Then we start watching the calls and say there is a reoccurring theme here with the problem, and we need to fix that." These activities are fully documented at every step of the SDLCS, "There has to be a formal systems document in any issues or challenges that are encountered." With respect to the Customer Focus indicator, managers and technical staff agree that the focus on the customers is the most important factor in defining a quality IT system: user requirements are met; comprehensive tests and re-tests are fully and formally documented; zero defects are tolerated; error rates are low; and systems meet business requirements as effectively as possible at the time they come into operation.

- **Agency 3**

   In the first stage of the research, survey results indicated that managers and technical staffs somewhat shared the same view with respect to this TQM dimension, although they offered different and mixed viewpoints regarding systems development processes, relationships, and quality. Table 5.8 indicated that managers viewed Project Management indicator with a Median value of 5.0 while technical staffs viewed it with a Median value of 4.5. Comments from managers indicated this viewpoint, "Employees should understand, recognize, and respect management's position and decisions on budget allocations and corporate goals of a specific project. When this is not present, the sense of ownership is more difficult for the employee." For remaining indicators, managers obtained a lower score than technical staffs. For instance, technical staffs obtained a Median value of 4.7 for the Recognition System while managers obtained a Median

value of 4.3. They offered mixed results for the rest of the indicators. Technical staffs obtained the lowest Median values of 3.8, 3.8., and 3.7, respectively for Methodology, Hardware, and Software indicators, respectively. For the same indicators, managers obtained 2.5, 4.0, and 3.5, respectively. Technical staffs were undecided with a Median value of 4.0 for Documentation, Customer Focus, Availability/Flexibility, and Maintainability. For the same indicators, managers obtained Median values of 2.5, 2.3, 3.0, and 3.0. Comments from technical staffs indicated this difference with respect to the Customer Focus indicator, "Talk with the real customers, the people who will use the system, to understand what they need to do, what information they need (typically deterrent to creating a good system is talking with supervisors rather than people who will use the system), establish a good working rapport with the customers, emphasize that each person's ideas are important for this project, open lines of communication for more information, ideas…Work hard to develop a quality product. Let the customer play an important and visible role in the development of the product. As much as possible give the customers what they want." This picture showed that technical staffs, although undecided, still treated this area more seriously than managers.

Interview data indicated that managers and technical staffs agreed that there was not a specifically defined system development methodology. At various individual departments where the programming activities have been decentralized, perhaps there may have been different written methodologies. The IS Department was developing a program to support the improvement of the organization's software quality and the process by which it was developed. One specific goal of the IS Department was to set standards and focus the direction of the entire organization. As part of this effort, a SDLC team was formed to finalize formal documentation and standards for the entire organization. Specifically, the team was tasked to develop a

methodology for all phases of the systems development life cycle with emphasis on automation, communication, and team participation to enhance user satisfaction. With respect to the Customer Focus indicator, managers and technical staffs agreed that the focus on the customers was the most important factor in defining a quality information system. Technical staffs knew who their internal customers were, interacted with them on a regular basis, and maintained a good professional relationship with the user community.

In the second stage of the research, interview data indicate a mixed picture. Managers and technical staffs agree that the system development methodology is always documented. However, they have more than one document. In fact, they have so many of them, at various levels, due to the fact that, "There are a lot of IT resources in different business areas" of this organization, and "We do have a formal methodology at the division level, but at the same time, within the group, we have our own development life cycle we have used for this implementation for the past 10 years." In other words, the specific nature of this development methodology at the organization is further explained as follows, "We don't have just one, or, we don't have a standard… We don't have one centralized development methodology. We have programming groups all over the organization; they aren't trained the same way; they don't all start in the same place; they don't have the same particular set of skills. So it is much more decentralized." With respect to the Customer Focus indicator, managers and technical staffs agree that the focus on the customers is the most important factor in defining a quality IT system, as explained, "At the end of the operation, they have a meeting, the functional side with their offices to collect feedback [such as], what worked, what didn't work, what improvement [do] we need to make. So for the next phase, [for] anything we can improve, we will. That's always the collection of data method on how to make the application better."

- **Summary**

Perceptions from management and technical staff have improved between the then situation and the today situation for all three agencies with respect to this TQM dimension. Agency 1 has shown improvements in this area. In the past, all IS development activities were provided, supported, and maintained by the centralized IS organization. Although the systems development methodology has been fully documented since 1987, it has not been updated for a long time. During the first stage of this study, Agency 1 was reassessing its IS application development policies to distribute the centralized systems development activities to the individual local offshoots. During the second stage of this study, it established a fully documented, standardized, and centralized systems development methodology which is called SDLCS. It is part of the organization's "IT Plan" and serves as a guideline for all systems development activities for the entire organization including the individual local offshoots.

Agency 2 has also shown improvement in this area. During the first stage of this study, the IS organization consisted of a staff of five and an increasing amount of workload due to the fact that it anticipated the decentralized systems development activities from the Parent Agency.   In addition, it did not have a system development methodology. Systems management processes at this agency were sometimes developed by non-IS professionals and IS applications resulted in different standards which in turn resulted in the lack of proper systems maintenance. During the second stage of this study, there is a different picture. The IS organization now consists of a staff of ten which makes a difference. In addition, it now can rely on the centralized and standardized systems development methodology, SDLCS, developed by the Parent Agency, for its systems development activities. By following the established guidelines, it now feels less stressed than before. And that was exactly the purpose of the "IT Plan."

Agency 3 reveals a different picture. During the first stage of this study, the IS organization did not have a defined system development methodology. However, at various individual departments where the programming activities had been decentralized, there may have been different written methodologies. In an effort to set standards and focus direction of the entire organization, the IS organization formed a SDLC team to finalize formal documentation and standards for the entire organization. During the second stage of this study, the centralized and standardized SDLC methodology which was mentioned previously did not exist at the organization level. Instead, there were several SDLC methodologies at various levels of the organization, from divisions, to branches, to projects. In fact, Agency 3 did not have only one methodology. In other words, it did not have a centralized and standardized development methodology as previously anticipated. At this time, the systems development activities were decentralized due to the fact that different programming groups all over the organization have their own SDLC methodologies.

In sum, this area is another aspect of the continuous improvement process as the lessons learned approach has presented in these organizations. All three agencies seem to do well in this regard although there was more than one documented system development methodology as in the case of Agency 3. Conti (2010: 366) offers a high level perspective that reflects the reality that we often overlook with respect to IS, IT, and society as follows, "Technology moves rapidly, strongly impacting on society's evolution. We are bound to build management models that fit the evolution of the technology and society." This TQM dimension represents the technical aspect of this study. The technical aspect of Deming's principles is a combination of three of his three points: his third point, "Cease dependence on inspection to achieve quality;" his fourth point, "End the practice of awarding business on the basis of price tag;" and his fifth

point, "Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs" (Deming, 1986: 23). Within this comparative context, the technical aspect of this TQM dimension is consistent with that of Deming's principles.

Recap

Table 5.9 represents a recap of this comparative analysis. It is a summary of the three case studies that lists the key elements of TQM used in the surveys and interviews. It is also a brief presentation of how these key elements of TQM show up in each of the three case studies between then and today. These key elements are briefly described as follows.

With respect to Customer Satisfaction, survey resulted indicated that during the *then* stage, systems developers from Agency 1 and Agency 3 have managed to maintain a satisfactory relationship with the user community while systems developers from Agency 2 have tried just to survive this relationship due to a number of reasons (lack of staff, increased workload, and an unstructured systems development among others). However, these situations have been improved over time. During the *today* stage, interview results reveal a positive relationship between the user community and the systems developers in all three agencies. The focus on the customer is now considered the most important factor in designing and building a quality system. Systems developers in all three agencies agree that TQM is a management philosophy that directs the identity of an organization toward working for and achieving customer satisfaction in the systems development processes. They also agree that striving for improvement in the customer relationship is constant. Both sides appreciate each other for this improvement.

Table 5.9 – Recap – Summary of the Three Case Studies

TQM Dimension	Agency	Then	Today
Customer Satisfaction	1	Survey results indicated that systems developers maintained a generally satisfactory relationship with the user community.	Interview results indicate that relationships between the systems developers and the user community have been improved.
	2	Survey results indicated that systems developers maintained a generally surviving relationship with the user community.	Interview results indicate that relationships between the systems developers and the user community have been improved.
	3	Survey results indicated that systems developers maintained a generally satisfactory relationship with the user community.	Interview results indicate that relationships between the systems developers and the user community have been improved.
Organizational Culture	1	Both survey and interview results indicated that technical staffs were satisfied with the work environment while managers were not.	Interview results indicate that managers and technical staff are satisfied that the work environment has been getting better over time.
	2	Interview results indicated that managers and technical staff were not satisfied with the work environment due to limited budget, training, lack of staff and increased workload. Customer satisfaction was not the primary importance factor in their daily work.	Interview results indicate that managers and technical staff are satisfied that the work environment has been getting better over time especially about the topic of training. Customer satisfaction is the most important factor in their daily work.
	3	Both survey and interview results indicated that technical staffs were satisfied with the work environment. Survey results indicated that managers were somehow satisfied. Interview results indicated that managers were satisfied.	Interview results indicate that managers and technical staff are satisfied that the work environment has been getting better over time.

Table 5.9 – Recap – Summary of the Three Case Studies – continued

TQM Dimension	Agency	Then	Today
Leadership Commitment	1	Survey results indicated that managers viewed this factor less favorable than technical staff. Interview results indicated that managers viewed it favorably.	Interview results indicate that managers view leadership factor favorably and technical staffs think of management staff in a positive way.
	2	Interview results indicated that managers and technical staff viewed leadership factor favorably.	Interview results indicate that managers view this factor favorably and technical staffs think of management staff in a positive way.
	3	Survey results indicated that managers viewed this factor less favorable than technical staff. Interview results indicated that managers viewed it favorably.	Interview results indicate that managers view leadership factor favorably and technical staffs think of management staff in a positive way.
Teamwork	1	Survey results indicated that technical staff viewed teamwork somewhat favorably. Interview results indicated that managers encouraged teamwork and technical staff felt a spirit of cooperation in the organization.	Interview results indicate that managers encourage teamwork and technical staffs believe that "everyone is a team player" in the entire organization.
	2	Interview results indicated that managers encouraged cooperation and technical staffs felt a spirit of teamwork within the group but did not feel the same way about other groups.	Interview results indicate that managers encourage teamwork and technical staffs feel a spirit of teamwork and cooperation in the entire organization.
	3	Survey results indicated that technical staff maintained a neutral viewpoint with respect to teamwork. Interview results indicated that managers encouraged cooperation and technical staff viewed teamwork moderately favorably.	Interview results indicate that managers encourage teamwork and technical staffs feel a spirit of teamwork and cooperation within their department although sometimes they may not feel the same way when dealing with other departments.

Table 5.9 – Summary of the Three Case Studies – continued

TQM Dimension	Agency	Then	Today
Management of an IS Development Methodology	1	Survey results indicated that technical staff viewed this dimension somewhat more satisfactory than managers. Interview results indicated that managers and technical staff agreed that the methodology should be updated to reflect accuracy. Interview results also indicated that managers did not agree with each other with respect to Project Management.	Interview results indicate that managers and technical staff agree that the system development methodology does exist in the "IT Plan" and the System Development Life Cycle (SDLC) has been clearly defined. Managers agree that Project Management has been clearly defined in the "IT Plan."
	2	Interview results indicated that managers and technical staff agreed that there was no system development methodology. They further agreed that all systems development activities remained "informal and unstructured depending on the tasks at hand."	Interview results indicate that managers and technical staff agree that the system development methodology does exist in the "IT Plan" of the Parent Agency and the System Development Life Cycle (SDLC) has been clearly defined. They further agree that the "IT Plan" has been used as a guideline in their daily work.
	3	Survey results indicated that managers and technical staff agreed that there was no system development methodology. Except for programming activities which had been decentralized, all other systems activities were centralized and managed by the IS organization. Interview results indicated that a SDLC team was formed to finalize formal documentation and standards for the entire organization.	Interview results indicate that the systems development methodology is always documented. However, there are several SDLC methodology documents at various levels - from divisions, to branches, to projects - of the organization. At this time, the systems development activities are decentralized. Therefore, there is no centralized systems development methodology document for the organization.

With respect to Organizational Culture, survey and interview resulted indicated that during the *then* stage, technical staffs from Agency 1 and Agency 3 were satisfied with the work environment in which values, beliefs, attitudes, assumptions, and expectations were shared, technical staffs from Agency 2 were not satisfied, managers from Agency 1 and Agency 2 were not satisfied. Managers from Agency 3 offered different answers. Interview results indicated that they were satisfied. However, survey results indicated that they were somewhat satisfied. During the *today* stage, interview results reveal that managers and technical staffs from all three agencies are fully satisfied with the organizational culture.

With respect to Leadership Commitment, survey resulted indicated that during the *then* stage, technical staffs from Agency 1 and Agency 3 viewed leadership factor more favorably than managers. Interview results indicated that technical staffs from Agency 2 and managers from all three agencies viewed it favorably. During the *today* stage, interview results reveal that managers from all three agencies think favorably about leadership and technical staffs think of management staff in a positive way. This picture shows the impact of a leader's ability to face forward and inspire others to build a better organization.

With respect to Teamwork, survey resulted indicated that during the *then* stage, technical staffs from Agency 1 viewed teamwork somewhat favorably and technical staffs from Agency 3 were undecided. Interview results indicated that managers from all three agencies and technical staffs from Agency 1 agreed that the spirit of teamwork and cooperation was encouraged and felt throughout the organization, technical staffs from Agency 2 agreed that they did feel that spirit within their group but did not feel it with other groups, technical staffs from Agency 3 agreed that while each unit had different goals and understood the common organizational goals, however, whether they came together to meet the common organizational goals were unclear.

During the *today* stage, interview results reveal that managers from all three agencies think favorably about this dimension and technical staffs from Agency 1 and Agency 2 think of it in a positive way. "Everyone is a team's player." Technical staffs from Agency 3 agree that teamwork and cooperation exist within their department but are not sure about others.

With respect to Management of an IS Development Methodology, survey resulted indicated that during the *then* stage, technical staffs from Agency 1 viewed SDLC more favorably than managers, technical staffs from Agency 3 agreed that a formal SDLC did not exist. Interview results indicated that managers and technical staffs from Agency 1 agreed that the SDLC was documented and must be updated to reflect current situation, managers and technical staffs from Agency 2 agreed that a formal SDLC did not exist, managers and technical staffs from Agency 3 indicated that a SDLC team was formed to finalize formal methodology for the entire organization. During the *today* stage, interview results reveal that managers and technical staffs from all three agencies agreed that they do have a formal SDLC to be used as standards and guidelines in their daily work although there are SDLC documents at various levels – divisions, branches, projects – due to the fact that systems activities are decentralized in Agency 3 at this time. Therefore, there is no centralized SDLC document for the entire organization in Agency 3 today as previously anticipated.

CHAPTER 6 – CONCLUSIONS AND RECOMMENDATIONS

The empirical findings in the operational world based on this investigation had been linked with the expectations that the literature highlighted. This chapter will reflect on these findings, present conclusions, and recommend feasible action items for future research.

Conclusions

Although not an officially committed TQM organization at the time of the first stage of the research, Agency 1 had been investing in quality IS development processes by employing James Martin's Rapid Application Development (RAD)'s concepts and techniques to maximize IS potential in an attempt to serve and satisfy its internal customers (Martin, 1990: 52). During this period, Agency 1 was reassessing its IS application development policies to distribute the centralized systems development activities to the individual local offshoots. Managers and technical staffs were committed to a customer focus using a participative approach in order to achieve an outstanding level of customer satisfaction in IS development processes. As a result, Agency 1 has maintained a generally good relationship with the user community.

In the second stage of the research, Agency 1 has undergone many organizational and structural changes to become a sophisticated public agency in which IS organization played a major role. It has adopted a new strategy and policy with regard to information related areas. During this time, it has established a fully documented, standardized, and centralized systems development methodology which is called SDLCS. It is part of an organization's "IT Plan" and serves as a guideline for all IT related development activities for the entire organization including the individual local offshoots. It was basically a plan that was started in the 1990s and it is continually

redefined over time. It consists of the organization's strategic plans, tactical plans, and IT implementation plans. It embraces the concept of business users and IT workers working together to develop and deploy the best systems they possibly can for the user community. Specifically, its architectural emphasis is to make sure that everything fits together, that the technical platform is the best that can be afforded, maintained, and remain stable. In this sense, Agency 1 has become a committed TQM organization. Interview results clearly reflect the positive effects of this centralized policy. The internal customers are extremely satisfied with the attention they received from and the services that were provided by the IS organization. As a result, the relationship between Agency 1 and the user community has improved over time. It is a significant upgrade from being "generally good" during the first stage of the research. On top of that, in addition to an official CIO (Chief Information Officer) who sets the strategy and direction for the IS organization, all information related areas and activities including the IS organization are direct responsibilities of a Senior Executive of this public organization. This is clearly a commitment and support from the top leadership of the organization in this regard. In fact, Deming's principles suggest that this was the right thing to do (Deming, 1986: 23). In this organization, managers create an environment which promotes enthusiasm and cooperation and foster excellence among employees. In turn, technical staffs in this organization feel a spirit of teamwork and cooperation not only within the department but also within the entire organization. In a broader sense, Agency 1, in an attempt to explore successful models and effective continuous quality improvement practices, has dedicated itself to the concept that quality is fundamental to its future technological capability and the quality of life of its citizens overall.

Agency 2, as a local offshoot of Agency 1, also was not an officially committed TQM organization during the first stage of the research. It was a small group of five IS professionals

including two managers. Although they did not have a formal systems development methodology to be used as a guideline, managers and technical staffs were committed to meet internal customers' requirements. However, due to limited human resources, they often had to prioritize user requests. In addition, customer satisfaction was considered secondary importance. The primary importance was the technical aspects of IS such as accuracy, currency, consistency, and integrity. This IS group consisted of a dedicated team of management and technical staff. They worked well together as a team or individually. However, under those specific circumstances of a limited staff, increasing workload, and the absence of a formal systems development methodology - although it was not its fault, Agency 2 has maintained a generally surviving relationship with the user community.

In the second stage of the research, as the Parent Agency has gone through a major reorganization, Agency 2 has also undergone significant changes. Over time, its staff increased from five to ten. It adopted the formal SDLCS developed by the Parent Agency as a guideline in its systems development processes. Management staff is people oriented and quality oriented. Technical staffs are dedicated and competent. Customer satisfaction is considered the most important factor in defining quality systems. In this sense, Agency 2 has become a committed TQM organization. Interview results clearly reflect this new direction. The internal customers are extremely satisfied with the attention they received from and the services that were provided by the IS group. As a result, the relationship between Agency 2 and the user community has improved. It is a significant upgrade from being "generally surviving" during the first stage of the research. In a broader sense, Agency 2 has learned to align its goals and objectives with a customer focus brought about by leadership and teamwork.

Agency 3 has always been a TQM committed organization with a clearly defined organizational vision, mission statement, quality policy, and several strategic goals. In the first

stage of the research, managers in the IS organization realized that continuous quality improvement requires more than good intentions; it requires knowledge; it requires employee empowerment; it requires a participatory culture; and it requires a formal IS development methodology. Managers and technical staffs agreed that systems are responsible for outcomes. To that end, managers were committed to employee training and development. Additionally, the IS organization formed a SDLC team to develop a centralized standard for the improvement of the organization's software quality and the process by which it has been developed to better serve its customers. As a result, Agency 3 has maintained a generally good relationship with the user community.

In the second stage of the research, as Agency 3 has become a more sophisticated federal agency, the original anticipated centralized SDLC methodology has a new emphasis. This SDLC methodology has become decentralized in the sense that different organizational levels – division, branch, and project – have their own SDLC methodology to go by. In other words, Agency 3 does not have at this time just one centralized standard SDLC for the entire organization. IS development groups and end user groups are dedicated to each other in IS development processes. Managers and technical staffs of IS development groups are dedicated and competent. Customer satisfaction is considered the most important factor in defining quality systems. Interview results clearly reflect this improved relationship. The internal customers are extremely satisfied with the attention they received and the services that were provided by the IS development groups. As a result, the relationship between IS development groups and the user community has improved. It is a significant upgrade from being "generally good" during the first stage of the research. As an example, the strategy to decentralize the SDLC methodology may have worked at this time. However, I cannot generalize beyond this specific scenario in which a specific IS development group and a specific end user group are dedicated to each other. The question is whether or not this

scenario can also be applied equally to other IS development groups and other end user groups at various levels – division, branch, and project – of Agency 3. The nature of this inquiry is beyond the reach of this sample size provided by Agency 3. However, I can say that the existence of a SDLC methodology here does make a difference in customer satisfaction in this sample size, given the fact that other factors – organization culture, leadership commitment, and teamwork - remain the same between the first stage and the second stage of the research as indicated by interview results.

In summary, as the results in these findings indicated, the lesson that was learned is that TQM which is based on the principle that continuous quality improvement would also result in increased customer satisfaction in public organizations. This study indicates that TQM application in IS development processes can work in the federal government and local government as well. At the federal government level, most agencies including IS organizations are huge in size and complex in processes. Local government agencies are not comparable to the federal agencies in this context. They do have one thing in common, however. Political appointees come and go, leaving behind legacies rather than processes. It makes sense that their leadership in creating a vision of the organization has and will always be at the forefront, in one way or another. With that understanding, it is probably possible for career employees to convince transitory leaders that processes can also help achieve political and policy goals at the same time if they serve and satisfy the needs of the customers. Quality processes require uncompromising passion and commitment from everyone - executives, managers, and staff. In this sense, TQM is a process which can be instilled in public service organizations with a customer-driven orientation. From an IS perspective, technological changes in the new information age continue to provide public organizations with greater challenges, choices and flexibility, as end users' comfort levels with technology grow. Therefore, striving for continuous improvement in that customer relationship is constant. In short,

the TQM approach in IS development processes starts with an understanding of the needs and perceptions of the end users, who have a stake in the outcomes. And the processes do not end there; instead, they continue to evolve, as Deming's fifth point indicates, "Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs" (Deming, 1986: 23).

Table 6.1 presents a recap of these conclusions. It organizes my presentation by summarizing comparison of the two stages across the examined TQM elements. In other words, it is a summary of the findings for the three case studies combined by the key elements of TQM between the *then* stage and the *today* stage. These findings are briefly described as follows.

With respect to Customer Satisfaction, the *then* stage has shown that systems developers from Agency 1 and Agency 3 considered Customer Satisfaction the primary factor of importance while systems developers from Agency 2 considered it as the secondary factor of importance in building a quality system. The today stage shows that all three agencies now agree that the focus on the customer has proved strength in improving user relationship. Systems developers and the user community are satisfied with each other.

With respect to Organizational Culture, the *then* stage has shown that systems developers from Agency 1 and Agency 2 believed that their Organizational Culture (shared vision, values, beliefs, attitudes, assumptions, and expectations) was not well defined while systems developer from Agency 3 believed that their Organizational Culture was well defined. The today stage shows that all three agencies agree that the improvement in the organizational environment and culture has provided more strength in work settings. Systems developers now feel less stressed.

With respect to Leadership Commitment, the *then* stage has shown that systems developers from Agency 1 and Agency 2 believed that their Leadership Commitment was not well defined

Table 6.1 – Summary of the Findings for the Three Case Studies

TQM Dimension	Agency	Then	Today
Customer Satisfaction	1	*Customer Satisfaction was the primary importance* - Customer Satisfaction was the most important factor in defining a quality system.	*Customer Focus proves strength* - Continuous improvement is seen in user's relationship. Internal customers are satisfied.
	2	*Customer Satisfaction was not the primary importance* - Customer Satisfaction was considered secondary importance in defining a quality system. The primary and most important factors were accuracy, currency, consistency, and integrity of the systems.	*Customer Focus proves strength* - Customer Satisfaction is the most important factor in defining a quality system. Continuous improvement is seen in user's relationship. Internal customers are satisfied.
	3	*Customer Satisfaction was the primary importance* - Customer Satisfaction was the most important factor in defining a quality system.	*Customer Focus proves strength* - Continuous improvement is seen in user's relationship. Internal customers are satisfied.
Organizational Culture	1	*Organization Culture was not well defined* - Organizational environment and culture were affected by limited organizational support due to budget constraints.	*Organizational Culture provides strength* - The official "IT Plan" of the organization establishes the architecture, defines the infrastructure for all systems related activities, and serves as a guideline for the entire organization. "This means that there is no stress to the infrastructure, and that is basically the goal of the organization."
	2	*Organizational Culture was not well defined* - Organizational environment and culture were affected by limited organizational support due to budget constraints.	*Organizational Culture provides strength* - This Child Agency embraces the standards established by the official "IT Plan" published by the Parent Agency. "We only embrace what the DIT of the Parent Agency embraces. That is the best methodology and we adhere to it strictly." Therefore, stress is minimized in this setting.
	3	*Organizational Culture was well defined* - Organizational support was defined by the organizational vision, mission statement, quality policy, and strategic goals.	*Organizational Culture provides strength* - In addition to established procedures, a user group and a development group are dedicated to each other in this study, therefore stress in this organizational environment is minimized.

Table 6.1 – Summary of the Findings for the Three Case Studies – continued

TQM Dimension	Agency	Then	Today
Leadership Commitment	1	*Leadership Commitment was not well defined* - Budget constraints affected the organizational strategy, policy, goals, and activities.	*Leadership Commitment provides strength* - The "IT Plan" dictates that all information related activities are direct responsibilities of a Senior Executive of the organization. Constancy of purpose is maintained.
	2	*Leadership Commitment was not well defined* - Budget constraints affected the organizational strategy, policy, goals, and activities.	*Leadership Commitment provides strength* - The "IT Plan" of the Parent Agency dictates that all information related activities are direct responsibilities of a Senior Executive of the organization including this Child Agency. Constancy of purpose toward continuous improvement is maintained.
	3	*Leaderships Commitment was well defined* - Leadership Commitment was defined by the organizational vision, mission statement, quality policy, and strategic goals.	*Leadership Commitment provides strength* - Constancy of purpose toward continuous improvement is maintained.
Teamwork	1	T*eamwork was well defined* - Teamwork and cooperation in a participatory atmosphere were promoted, encouraged, and felt not only within the IS department but also within the entire organization.	*Teamwork provides strength* - The whole organization is working together to achieve both the unit goal and the common organizational goals. "Everyone is a team's player."
	2	T*eamwork was not well defined* - Teamwork and cooperation in a participatory atmosphere were promoted, encouraged, and felt within the IS section, but not with other sections of the organization.	*Teamwork provides strength* - The whole organization is working together to achieve both the unit goal and the common organizational goals. "The transformation is everybody's job" (Deming, 1986: 24).
	3	T*eamwork was not well defined* - Each unit of the organization has different goals. However, whether different units across organizational boundaries cooperated to meet common organizational goals remained an empirical inquiry.	T*eamwork provides strength* - Although it is not always felt across organizational boundaries in this agency at this time, it is always promoted and encouraged. "It is a goal that IS has long supported" (Seadle, 1994: 41).

Table 6.1 – Summary of the Findings for the Three Case Studies – continued

TQM Dimension	Agency	Then	Today
Management of an IS Development Methodology	1	*Official Methodology was defined -* System Development Methodology was documented but not updated. James Martin's Information Engineering Methodology was adopted as the official methodology for the department in the quest for quality.	*Official Methodology provides strength -* The System Development Life Cycle Standards (SDLCS) are well defined in the official "IT Plan" of the organization. This is a standardized document for the entire organization including all local offshoots to be used as guidelines for all systems related development activities. The "IT Plan" is continuously refined over time in an effort to "improve constantly and forever the system of production and service, improve quality and productivity, and thus constantly decrease costs" (Deming, 1986: 23).
	2	*Official Methodology was not defined -* System Development Methodology did not exist. Systems development activities remained "informal and unstructured."	*Official Methodology provides strength -* The System Development Life Cycle Standards (SDLCS) are well defined in the official "IT Plan" published by the Parent Agency. This is a standardized document for the entire organization including this Child Agency to be used as guidelines for all systems related development activities. The "IT Plan" is continuously refined over time in an effort to "improve constantly and forever the system of production and service, improve quality and productivity, and thus constantly decrease costs" (Deming, 1986: 23).
	3	*Official Methodology was not defined -* System Development Methodology did not exist. Except for the programming activities which had been decentralized, all other activities remained centralized and managed by the IS organization. A SDLC (System Development Life Cycle) team was gathered to finalize formal standards for the entire organization.	*Official Methodology provides strength -* At this time, a System Development Life Cycle (SDLC) is defined, documented, and applied in each unit - from divisions, to branches, to projects - due to the decentralized nature of the systems development activities in this organization. Therefore, the system development methodology is not a centralized documentation for the entire organization.

while systems developers from Agency 3 believed that their Leadership Commitment was well defined. The *today* stage shows that all three agencies now agree that the commitment and support from top leadership have provided strength in maintaining and preserving the constancy of purpose toward continuous improvement.

With respect to Teamwork, the *then* stage has shown that systems developers from Agency 1 believed that Teamwork and Cooperation were well defined while systems developers from Agency 2 and Agency 3 believed that Teamwork and Cooperation were not well defined. The *today* stage shows that all three agencies agree that "everyone is a team player," and teamwork has provided strength in the organizational participatory atmosphere.

With respect to Management of an IS Development Methodology, the *then* stage has shown that systems developers from Agency 1 agreed that a formal SDLC was documented but not updated while systems developers from Agency 2 and Agency 3 stated that the formal SDLC was not defined. The *today* stage shows that all three agencies agree that they do have formal standards to go by in their daily work, and the official and documented SDLC has provided strength in guiding systems developers in developing quality systems. Agency 1 and Agency 2 adopt a centralized SDLC document while Agency 3 adopts several SDLC documents due to the decentralized nature of systems activities.

Table 6.2 presents the key lessons learned. It is a summary of the lessons learned by the key TQM elements. These lessons learned are related to the relevant literature which had been presented and discussed in Chapter 2 and are briefly described as follows.

With respect to Customer Satisfaction, end users and systems developers learned that TQM is not a short-term fix because, as Seadle (1994: 14) has observed: "TQM is a philosophy, not a specific set of procedures. It is the belief that everyone in an organization can cooperate to build

Table 6.2 - Summary of the Lessons Learned

TQM Dimension	Lessons Learned
Customer Satisfaction	• End users and systems developers learned that "TQM is a philosophy, not a specific set of procedures. It is the belief that everyone in an organization can cooperate to build a defect-free product if mental and physical barriers to that result can be recognized and removed" (Seadle, 1994: 14). • They also learned to maintain constant dialog, formally and informally. They learned to accommodate each other and incorporate each other's spoken, unspoken, present, and future needs and expectations into the systems development process. • They learned together that the focus on the customer is the primary and most important factor in defining and building a quality system, as Deming has advised: "The consumer is the most important part of the production line. Quality should be aimed at the needs of the consumer, present and future" (Deming, 1986: 5).
Organizational Culture	• Managers and technical staff learned to build together an environment in which they work to make the differences of the past disappear and look forward to the future of the organization. • In this environment, they learned together that TQM is an ongoing process that fundamentally changes the old fashioned way of doing business to make organizations more responsive to customer demands for quality service. • They also learned that "IT implementation involves more than just technology deployment and requires organizational support" (Lin, 2010: 345) as Deming has advised in his thirteenth point, "Institute a vigorous program of education and self-improvement" (Deming, 1986: 23, 24).
Leadership Commitment	• Managers learned that "they must convey the importance of the individual in the organization and the role of each contributor in making the vision a reality" (Saylor, 1992: 26). • They also learned that "people want to do a good job and contribute to a winning team. Leaders need to set up employees for success through training and insert employees seamlessly into a process that's well understood" (Symonds, 2009: 7). • Finally, they learned to incorporate Deming's first point into the strategy, vision, and goals of the organization, "Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs" (Deming, 1986: 23, 24).

Table 6.2 – Summary of the Lessons Learned – continued

TQM Dimension	Lessons Learned
Teamwork	• Managers and technical staff learned that "TQM seeks to make the whole organization work together; this was a goal that IS has long supported" (Seadle, 1994: 41). • They realized that while it was often difficult to obtain consensus among a group of people in organizations, but they also learned that "involving everyone in the process of continual improvement through the team concept has instilled an understanding of the program and emphasized the importance of the participation by all employees" (Svetec, 1995: 23). • And they learned to apply Deming's ninth point into the organizational life, "Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job" (Deming, 1986: 24).
Management of an IS Development Methodology	• Managers and technical staff learned that a standardized SDLC (System Development Life Cycle) development methodology was vital in their quest for quality. • They learned that the SDLC provided a formal modeling process that served as a baseline for them in developing the best systems they could create for their clients. • They learned that "technology moves rapidly, strongly impacting on society's evolution" and therefore they were "bound to build management models that fit the evolution of the technology and society" (Conti, 2010: 366). • They also learned together to apply Deming's fifth point into the process of continuous improvement, "Improve constantly and forever the system of production and service, to improve quality and productivity, and thus decrease costs" (Deming, 1986: 23).

a defect-free product if mental and physical barriers to that result can be recognized and removed." They learned together that striving for improvement in the customer relationship is constant and the improvement process must be continuous. Second, they learned to maintain constant dialogue, accommodate each other, and incorporate each other's spoken and unspoken, formal and informal, needs and expectations. Third, they learned that focus on the customer is the primary and most important factor in defining and building a quality system. In other words, they learned from Deming that "the consumer is the most important part of the production line" and "quality should be aimed at the needs of the consumer, present and future" (Deming, 1986: 5).

With respect to Organizational Culture, managers and technical staffs learned to build together an environment in which organizational vision, belief, values, attitudes, assumptions, and expectations were shared among them. Second, they learned together that TQM is an ongoing and continuous process that fundamentally changes the way in which organizations operate to make them more responsive to customer demands and expectations. Third, they learned that "IT implementation involves more than just technology deployment and requires organizational support" (Lin, 2010: 345) as Deming has advised in his thirteenth point, "Institute a vigorous program of education and self-improvement" (Deming, 1986: 23, 24).

With respect to Leadership Commitment, managers learned that "they must convey the importance of the individual in the organization and the role of each contributor in making the vision a reality" (Saylor, 1992: 26). Second, they learned that "people want to do a good job and contribute to a winning team" and "leaders need to set up employees for success though training and insert employees seamlessly into a process that's well understood" (Symonds, 2009: 7). Third, they learned that real change means an organizational shift in outlook. To adopt a long-

term view of the future of organizations, they learned to incorporate Deming's first point into the strategy, vision, and goals of the organization into the improvement process: "Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs" (Deming, 1986: 23, 24).

With respect to Teamwork, managers and technical staffs learned that "TQM seeks to make the whole organization work together [because] this was a goal that IS has long supported" (Seadle, 1994: 41). Second, they realized that while it was often difficult to obtain consensus among a group of different people in organizations, but they also learned that "involving everyone in the process of continual improvement through the team concept has instilled an understanding of the program and emphasized the importance of the participation by all employees" (Svetec, 1995: 23). Third, they learned to apply Deming's ninth point into organizational life (Deming, 1986: 24): "Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job."

With respect to Management of an IS Development Methodology, managers and technical staffs learned that a formal and standardized SDLC methodology was critical in the IS development processes. Second, they learned that the SDLC would streamline the improvement process in designing and building a quality system that meets or exceeds customer demands and expectations. The SDLC provided a formal modeling process that served as a baseline for them in developing the best systems they could create for their clients. Third, they learned that "technology move rapidly, strongly impacting on society's evolution" and therefore they are "bound to build management models that fit the evolution of the technology and society" (Conti, 2010: 366). Fourth, they learned together to apply Deming's fifth point into the process of

continuous improvement: "Improve constantly and forever the system of production and service, to improve quality and productivity, and thus decrease costs" (Deming, 1986: 23).

Recommendations

This research examines TQM applications to IS development processes in public organizations considering internal customers as the primary focus. It attempts to address the applicability of TQM to sub-units of organizations such as IS departments, sections, groups. It intends to show that the research findings as presented in the three case studies can be applied beyond these sub-units to other public organizations. In summary, TQM means all members of an organization participate in improving processes, products, services, and the culture they work in. The result of TQM is dramatic improvement in customer satisfaction, as the findings of this study presented. At this point, based on the findings of this research which may be considered as a basis for further research, the following recommendations and possibilities are presented.

First, this study presented a successful example of TQM approach to IS development processes in which one specific IS development group and one specific user group are dedicated to each other and cannot be generalized beyond this example. The question is whether we can establish this relationship across the entire organization. It is likely that this special relationship would produce the same results as presented in this study. On the other hand, it is likely that it will require extensive human resources to be allocated to accommodate this special relationship to ensure successful TQM implementation in IS development processes. From a budget's standpoint, this model seems to be costly. One visible aspect of this model is that the organization will grow significantly in terms of staffing and budget to accommodate this situation. Is that a feasible

approach in a public setting? Such a study in the future could address this human resource issue and the cost associated with it because one of the goals of TQM is to decrease costs while continuously improving the process to achieve customer satisfaction (Deming, 1986: 23).

Second, this study shows that customer satisfaction is the most important factor in TQM approach to IS development processes. In this sense, it looks like that the internal customers are from an "outside-looking-in" position.   The question is whether the internal customers ever consider themselves to be part of the system, or just a separate component of the organization to check on the IS groups. I suggest that future research focusing on TQM application in IS development processes should strive to give the user community a sense of ownership by not only involving the end users of the IS development processes in every step of the way but also actually owning them. Such a study in the future could provide invaluable insights into Deming's system of profound knowledge where all components are interrelated and cannot be separated.

Third, this study briefly addresses the confusion of organizations with respect to the definition of quality. Quality means different things to different people as Garvin (1988: 216) refers to it as "both a problem and an opportunity for American companies." To date, there is no consensus on this definition (Wicks, 2009). This study may be used as a basis for additional testing of the differences in perception about the real meaning of quality across organizational levels. Testing could be done via questionnaires or field research. Empirical testing of such future studies may further help to illuminate the beneficial components of TQM derived from this research.

In public administration, we are often preoccupied with practical questions such as: How do theory and action relate? How do we apply what we learn to real life? My own account is that the connection between theory and practice can only occur through learning. Only as we reflect on our own experiences and generalize from them will we develop feasible and optimal theories of action.

Therefore, for an activity to be practicable, it must be attached to theory since theory helps us make sense out of the situation. From this perspective, Deming's system of profound knowledge and his 14-points provide a theoretical basis for the groundwork of this study. The continuous improvement of the process, not isolated elements of an organization to achieve total quality is, in fact, the connection between theory and practice. It coincides with the idea of dialogue in process theory, and brings citizens into the process through participative management, thus improving the long-term view of organizations.

I now end this dissertation with the following concluding remarks. Change is inevitable and in fact it is a natural part of life. Things can go right or wrong at some stages, but life still goes on. Over time, the customers will most likely offer some change at some point. They may change the way in which they usually view and do things. They may have a different perspective and consequently may want to change the entire process. So the one feasible aspect of life that can deal effectively with change, I think, is the continuous learning process. It makes sense to view continuous learning as a dynamic process of evolution. In this dynamic evolution, we must constantly learn new things to update our knowledge to ensure that we can meet the challenges of the customers' changes and satisfy their needs. From this point of view, there is no doubt in my mind that there is much to be learned from a TQM perspective and from a more sophisticated IS development processes in future technological aspects of this new information age in modern society that we live in today.

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Background and Purpose

Systems development groups seek to assure that the systems they develop are the best systems they can create for their clients. However, different groups go about this assurance in different ways. Are these differences significant? And if so, in what way?

This research will focus on quality improvement programs in a single department of a larger organization, specifically the Information Systems (IS) department. Each IS department may or may not operate under any "quality improvement" banner. Whether or not it does, a formal or informal system develops through which an IS is established, implemented, maintained, and replaced.

In this study, I am attempting to discover how different IS development methodologies control for quality applied through concepts and techniques in their IS development. I will not attempt to criticize or influence the way in which the IS department is currently operating. My sole purpose is to capture the various aspects of quality control and assurance in the development of a computer system within the organization and to make a presentation of the case study for my dissertation project. The IS department(s) involved and others may benefit from this empirical research depending on their specific objectives.

Methodology for the Case Study

The data for this case study will be collected from December 1992 through March 1993 and will cover the following basic steps:

- **Step 1 - Collecting useful documentation**

    I would like to collect the following variety of IS-related documents from the organizations:

    ➤ organizational charts;

    ➤ administrative documents: system life cycle development methodology, training policy,

quality policy, proposals, and progress reports;

> ➤ archival data: any data previously collected about the same subject, i.e., from an in-house survey;

> ➤ Agendas, announcements and minutes of meetings, other written reports of events, and memoranda.

- **Step 2 - Survey Questionnaire**

I would also like to conduct a survey with IS professionals within the IS department of an organization (for example: managers, supervisors, project leaders, team leaders, database administrators, systems analysts, programmer analysts, computer operators, etc.). The survey is designed to measure individual behavior; anonymity of respondents will be maintained. The purpose of the survey is to record information about the participants. A survey questionnaire will be prepared and presented to the IS department head for review.

- **Step 3 – Interviews**

I would like to meet in person with the IS department head, two or three IS managers, two or three IS project leaders, two or three IS programmer/systems analysts. The purpose of the interviews is to capture the participants' perception of their own experience in IS development. The interviews will be short, about one hour maximum. Interview guides will be prepared and presented to the IS department head for review. Overall, all interviews could be scheduled and completed in one working day. A summary of all interviews will be prepared and shared with the IS department head.

- **Step 4 - Direct Observation**

I would also like to participate in two or three IS team meetings, either a design meeting, a walkthrough meeting, or just a status meeting. If possible and if time permits, I would like to conduct a one-hour interview with each team. Again, questions will be prepared and presented to the IS department head for review. As before, a summary of all team interviews will be prepared and shared with the IS department head.

Researcher Identification

My name is Phu Van Ho; I am a U.S. citizen and a doctoral candidate at Virginia Polytechnic Institute and State University's Center for Public Administration and Policy. At this stage of the project, I am employed full-time as a Senior Staff Member of the Data Base Administration group at MCI Telecommunications, Arlington, Virginia. Before working at MCI in 1981, I worked for two years at Booz Allen and Hamilton as a Programmer/Systems Analyst with assignments at the U.S. Office of Personnel Management (OPM) and U.S. Department of Labor (DOL). Prior to arriving to the U.S. in 1975, I served seven years as a Navy Officer in the South Vietnam Navy. I am also a professional navigator with a Bachelor of Science degree in Merchant Marine Studies from Phu-Tho National Technical Center, Saigon, Vietnam. I received a Master of Science degree in Technology of Management from American University in 1979.

APPENDIX B – FIRST STAGE OF THE STUDY

INTERVIEW GUIDE - MANAGEMENT

1. Please briefly describe your functional responsibility.

2. Is there a formal IS development methodology in the organization?

3. Is there a formal documentation? If yes, may I have a copy?

4. Are checkpoint procedures clearly defined in the IS development methodology? These procedures can be walkthrough, project review, management review, etc.

5. Is the role of project management clearly defined in the IS development methodology?

6. How do you define quality in an information system?

7. Are there formal guidelines for promoting a quality system? If yes, may I have a copy?

8. Do customer requirements exist within these guidelines?

9. Are measurement criteria clearly defined within these guidelines? These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects, etc.

10. Are there formal guidelines to determine "a job well done"? If yes, may I have a copy?

11. Is there a system of formal recognition?

12. How do you ensure that project personnel have adequate training to achieve quality goals?

13. Please briefly describe the types of hardware which are currently installed in-house?

14. Are there plans to purchase new hardware to support the IS development methodology?

15. Please briefly describe the types of software which are currently installed in-house?

16. Are there plans to purchase new software to support the IS development methodology?

17. How are data collected and used in the IS development methodology?

18. How do you ensure the reliability and consistency of the data collection process?

19. What action does the organization take to increase employee involvement?

20. What actions does the organization take to increase employee responsibility?

21. What actions does the organization take to increase employee authority to act?

22. How do managers learn about quality management?

23. Do managers receive any specific training on quality management?

24. How does management use its quality focus to achieve continuous improvement and keep customer happy?

25. How does the organization ensure that these commitments address the concern of the customers?

26. How does the organization ensure that these commitments are understandable?

27. How do employees use the information about customer requirements and expectations?

28. In summary, please tell me what you think about the roles of a leader and manager in the quest for quality.

29. Do you have any additional comments?

APPENDIX C – FIRST STAGE OF THE STUDY
INTERVIEW GUIDE - TECHNICAL STAFF

1. Please briefly describe your personal and functional responsibility.

2. Is there a formal IS development methodology in the organization?

3. Is there a formal documentation?

4. Are checkpoint procedures clearly defined in the IS development methodology? These procedures can be walkthrough, project review, management review, etc.

5. Is the role of project management clearly defined in the IS development methodology?

6. How do you define quality in an information system?

7. Are there formal guidelines for promoting a quality system?

8. Do customer requirements exist within these guidelines?

9. Are measurement criteria clearly defined within these guidelines? These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects, etc.

10. Are there formal guidelines to determine "a job well done"?

11. Is there a system of formal recognition?

12. How do you ensure that project personnel have adequate training to achieve quality goals?

13. Please briefly describe the types of hardware which are currently installed in-house?

14. Are there plans to purchase new hardware to support the IS development methodology?

15. Please briefly describe the types of software which are currently installed in-house?

16. Are there plans to purchase new software to support the IS development methodology?

17. How are data collected and used in the IS development methodology?

18. How do you ensure the reliability and consistency of the data collection process?

19. Are you aware of the organization's overall quality mission?

20. Do you like your present work assignment?

21. What aspects do you like most/least?

22. Do you think that the work you do is important to the success of the organization?

23. Does the IS development methodology make sense to you? In other words, does it help you perform your work assignment better?

24. Do you think that improving the quality of your work is part of your on-going responsibility?

25. Are you ready for a new assignment within the IS department?

26. Do you feel that you have adequate training to perform well in your present position as well as future assignments?

27. What do you think about the equipment, materials, manuals, documents, supplies, office space, etc. that you need to perform your work?

28. Do you know who your customers are?

29. Please briefly describe who they are and what is their functionality?

30. Please briefly describe the relationship between you and your customers?

31. Please briefly describe the relationship between you and your co-workers?

32. Please briefly describe the relationship between you and your managers?

33. How does this organization promote your knowledge of quality management?

34. Do you have any additional comments?

APPENDIX D – FIRST STAGE OF THE STUDY
INTERVIEW GUIDE – PROJECT TEAM

1. Please briefly describe your team's functional responsibility.

2. Is there a formal IS development methodology in the organization?

3. Is there a formal documentation?

4. Are checkpoint procedures clearly defined in the IS development methodology?   These procedures can be walkthrough, project review, management review, etc.

5. Is the role of project management clearly defined in the IS development methodology?

6. How do you define quality in an information system?

7. Are there formal guidelines for promoting a quality system?

8. Do customer requirements exist within these guidelines?

9. Are measurement criteria clearly defined within these guidelines? These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects, etc.

10. Are there formal guidelines to determine "a job well done"?

11. Is there a system of formal recognition?

12. How do you ensure that project personnel have adequate training to achieve quality goals?

13. Please briefly describe the types of hardware which are currently installed in-house?

14. Are there plans to purchase new hardware to support the IS development methodology?

15. Please briefly describe the types of software which are currently installed in-house?

16. Are there plans to purchase new software to support the IS development methodology?

17. How are data collected and used in the IS development methodology?

18. How do you ensure the reliability and consistency of the data collection process?

19. How are employees encouraged to participate in solving problems?

20. How do different groups across organizational boundaries cooperate to meet common organization goals?

21. How would problems regarding scheduling requirements be resolved to everyone's

satisfaction?

22. How are the relationships between groups in this department?

23. How are the relationships between departments in this organization?

24. Do you feel a spirit of cooperation and teamwork that exists in this organization?

25. Do employees talk with one another to get information they need in order to get the job done?

26. Do employees talks with their supervisors to get information they need in order to get the job done?

This questionnaire is designed to capture the individual computer professionals' perceptions of the information systems development process.
- Part I asks all respondents about systems development methodology.
- Part II is for technical personnel. It asks about work in the department.
- Part III is for managers. It asks about leadership style.
- Part IV is for everyone. It asks for your suggestions for improvement.

Please consider the various aspects of quality control and assurance within your department when you answer the questions in this survey. Your answers will be kept confidential and will be used for statistical purposes only. For each question, please circle the appropriate number using the scale below:

1 (Strongly Disagree)
2 (Disagree)
3 (Moderately Disagree)
4 (Don't Know)
5 (Moderately Agree)
6 (Agree)
7 (Strongly Agree)

Please return your questionnaire in the enclosed self-addressed and stamped envelope. I appreciate your help and thank you in advance for completing this questionnaire.

PART I
Please describe to what extent you agree or disagree with the following statements about the information systems development process.

1. There is a formal systems development methodology in my department.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

2. The systems development methodology is clearly documented.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

3. Checkpoint procedures (such as structured walkthrough, project review, management review, phase sign-off, etc.) are clearly defined in the systems development methodology.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

4. The role of project management is clearly defined in the systems development methodology.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

5. My department has a clear definition of quality systems.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

6. There are formal guidelines for promoting quality systems in my department.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

7. Customer requirements do exist within these guidelines.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

8. Measurement criteria are clearly defined within these guidelines. These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects, etc.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

9. There are formal guidelines to determine "a job well done" in my department.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

10. There is a system of formal recognition in my organization.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

11. There is a system of formal recognition in my department.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

12. Generally speaking, in my department, project personnel have adequate training to achieve quality goals.

```
        Strongly          Don't        Strongly
        Disagree          Know          Agree
        -------------------------------------------
        1    2    3    4    5    6    7
```

13. Generally speaking, I know the types of hardware which are currently installed in-house.

```
        Strongly          Don't        Strongly
        Disagree          Know          Agree
        -------------------------------------------
        1    2    3    4    5    6    7
```

14. Generally speaking, I am aware of my department's plan to purchase new hardware to support the systems development methodology.

```
        Strongly          Don't        Strongly
        Disagree          Know          Agree
        -------------------------------------------
        1    2    3    4    5    6    7
```

15. I need a more sophisticate personal computer to better perform my job.

```
        Strongly          Don't        Strongly
        Disagree          Know          Agree
        -------------------------------------------
        1    2    3    4    5    6    7
```

16. Generally speaking, I know the types of software which are currently installed in-house.

```
        Strongly          Don't        Strongly
        Disagree          Know          Agree
        -------------------------------------------
        1    2    3    4    5    6    7
```

17. Generally speaking, I am aware of my department's plan to purchase new software to support the systems development methodology.

```
        Strongly          Don't        Strongly
        Disagree          Know          Agree
        -------------------------------------------
        1    2    3    4    5    6    7
```

18. I need specific software to better perform my job.

```
        Strongly          Don't        Strongly
        Disagree          Know          Agree
        -------------------------------------------
        1    2    3    4    5    6    7
```

19. The data collection process is clearly defined in the systems development methodology.

```
Strongly          Don't      Strongly
Disagree          Know        Agree
-------------------------------------------------
 1     2     3     4     5     6    7
```

20. The reliability and consistency of the data collection process are clearly defined in the systems development methodology.

```
Strongly          Don't      Strongly
Disagree          Know        Agree
-------------------------------------------------
 1     2     3     4     5     6    7
```

If you hold a technical position, then answer questions 21-33 below. If you hold a management position, then skip PART II and go on to PART III to continue with questions 44-61.

PART II

Please describe to what extent you agree or disagree with the following statements about your personal perception of the information systems development process.

21. I am fully aware of my department's overall quality mission.

```
Strongly          Don't      Strongly
Disagree          Know        Agree
-------------------------------------------------
 1     2     3     4     5     6    7
```

22. I like my present work assignment.

```
Strongly          Don't      Strongly
Disagree          Know        Agree
-------------------------------------------------
 1     2     3     4     5     6    7
```

23. I can't think of anything that I don't like regarding my present work assignment.

```
Strongly          Don't      Strongly
Disagree          Know        Agree
-------------------------------------------------
 1     2     3     4     5     6    7
```

24. The work I do is important to the success of my department.

```
Strongly          Don't      Strongly
Disagree          Know        Agree
-------------------------------------------------
 1     2     3     4     5     6    7
```

25. Improving my work is part of my on-going responsibility.
    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7
26. I rely heavily on the systems development methodology in my present work assignment.
    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7
27. I am ready for any new assignment within my department.
    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7
28. I have adequate training to perform well in my present work assignment as well as future
    assignments.
    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7
29. Generally speaking, I am happy with my work environment (including equipment, materials,
    manuals, documents, supplies, office space, hardware, etc.).

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7
30. I know my customers and their functionality.
    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7
31. I talk to my customers on a regular basis.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

32. Generally speaking, I maintain a good professional relationship with my customers.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

33. I talk to my co-workers on a regular basis, whether professionally or privately.

      Strongly   Don't   Strongly
      Disagree   Know   Agree
      ----
      1   2   3   4   5   6   7

34. My co-workers are always willing to help when I need them.

      Strongly   Don't   Strongly
      Disagree   Know   Agree
      ----
      1   2   3   4   5   6   7

35. I talk to my manager or project leader on a regular basis.

      Strongly   Don't   Strongly
      Disagree   Know   Agree
      ----
      1   2   3   4   5   6   7

36. I am not shy to talk to my manager or project leader when I need help.

      Strongly   Don't   Strongly
      Disagree   Know   Agree
      ----
      1   2   3   4   5   6   7

37. My manager and project leader are always helpful and supportive.

      Strongly   Don't   Strongly
      Disagree   Know   Agree
      ----
      1   2   3   4   5   6   7

38. My management often sends me to professional seminars, and/or technical courses to promote my technical knowledge of quality management.

      Strongly   Don't   Strongly
      Disagree   Know   Agree
      ----
      1   2   3   4   5   6   7

39. My management often encourages me to participate in solving problems.

      Strongly   Don't   Strongly
      Disagree   Know   Agree
      ----
      1   2   3   4   5   6   7

40. In my department, different groups cooperate to meet common department goals.

      Strongly   Don't   Strongly
      Disagree   Know   Agree
      ----
      1   2   3   4   5   6   7

41. In my organization, different departments cooperate to meet common organizational goals.

       Strongly   Don't   Strongly
       Disagree   Know   Agree
       ----
       1   2   3   4   5   6   7

42. Generally speaking, scheduling problems caused by competing clients are resolved to everyone's satisfaction.

       Strongly   Don't   Strongly
       Disagree   Know   Agree
       ----
       1   2   3   4   5   6   7

43. I can feel a spirit of cooperation and teamwork that exists in my department as well as my organization.

       Strongly   Don't   Strongly
       Disagree   Know   Agree
       ----
       1   2   3   4   5   6   7

If you hold a management position, then answer questions 44-61 below. If you hold a technical position, then skip PART III and go on PART IV to continue with questions 62-64.

PART III

Please describe to what extent you agree or disagree with the following statements about your personal perception of the effective management practices in the information systems development process.

44. Management should give detailed instructions to employees rather than giving them general directions so employees can work out the details.

       Strongly   Don't   Strongly
       Disagree   Know   Agree
       ----
       1   2   3   4   5   6   7

45. Management should create a work environment in which employees can achieve personal goals while working for common department's goals.

       Strongly   Don't   Strongly
       Disagree   Know   Agree
       ----
       1   2   3   4   5   6   7

46. Management should motivate employees by using economic incentive (wage raises) more than intangible rewards (honor and respect).

       Strongly   Don't   Strongly
       Disagree   Know   Agree
       ----
       1   2   3   4   5   6   7

272

47. Generally speaking, employees in this department are fundamentally hardworking and responsible and should be encouraged and given full support from management.

```
Strongly          Don't       Strongly
Disagree          Know         Agree
-------------------------------------------------
1     2     3     4     5     6   7
```

48. Employees in this department are encouraged to maintain constant dialogue with the customers in the systems development process.

```
Strongly          Don't       Strongly
Disagree          Know         Agree
-------------------------------------------------
1     2     3     4     5     6   7
```

49. Top management of this organization fully supports the empowerment of all employees in this department to do whatever necessary to improve their work.

```
Strongly          Don't       Strongly
Disagree          Know         Agree
-------------------------------------------------
1     2     3     4     5     6   7
```

50. In this department, teamwork is encouraged to increase employee involvement.

```
Strongly          Don't       Strongly
Disagree          Know         Agree
-------------------------------------------------
1     2     3     4     5     6   7
```

51. Generally speaking, quality means total customer satisfaction or whatever the customer expects.

```
Strongly          Don't       Strongly
Disagree          Know         Agree
-------------------------------------------------
1     2     3     4     5     6   7
```

52. Generally speaking, employees in this department are encouraged to take ownership of work.

```
Strongly          Don't       Strongly
Disagree          Know         Agree
-------------------------------------------------
1     2     3     4     5     6   7
```

53. This department is determined to provide appropriate training on quality management to all employees.

```
Strongly          Don't       Strongly
Disagree          Know         Agree
-------------------------------------------------
1     2     3     4     5     6   7
```

54. Management has a clear vision of the department's future direction in the quest for quality.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

55. Management recognizes that commitment to quality is a way to achieve continuous improvement and keep customers happy.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

56. In this department, managers often attend professional seminars on quality management.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

57. In this department, managers learn about quality management mostly from reading articles, books, magazines, professional journals, etc.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

58. Management recognizes the importance of training to enable employees to acquire skills needed to accomplish the department's quality goals.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

59. Management recognizes that teamwork involves open communications in an environment in which fear is driven out.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

60. Management often meets to review the progress of the department's goals on a regular basis.

    Strongly   Don't   Strongly
    Disagree   Know   Agree
    ----
    1   2   3   4   5   6   7

61. Management attempts seriously to gathering employees' opinion about managers' performance.

```
Strongly          Don't      Strongly
Disagree          Know         Agree
---------------------------------------------
1     2     3     4     5     6     7
```

Please continue with PART IV whether you are management or technical support.

PART IV

The following questions ask how the information systems development process can be improved to gain total customer confidence.

62. What if anything, could management do to help increase employees' satisfaction while working toward the common goals of the department? Please be specific.

63. What if anything, could employees do to help deliver a quality information system that meets the customers' requirements and expectations? Please be specific.

64. Additional Comments:

APPENDIX F – FIRST STAGE OF THE STUDY
CUSTOMER SURVEY QUESTIONNAIRE

The system development process consists of the following phases: Requirements Analysis, Logical Design, Physical Design, Equipment Selection and Acquisition, Programming and Testing, Implementation, Maintenance, and Follow-up Evaluation.

Please consider all of these phases when you answer the following questions. Your answers will be kept confidential and will be used for statistical purposes only. Circle the appropriate number using the scale below:

1 (Strongly Disagree)
2 (Disagree)
3 (Moderately Disagree)
4 (Don't Know)
5 (Moderately Agree)
6 (Agree)
7 (Strongly Agree)

Please return your questionnaire in the enclosed self-addressed and stamped envelope. I appreciate your help and thank you in advance for completing this questionnaire.

PART I
Please describe to what extent you agree or disagree with the following statements about the system developers and the development process.

1. Generally speaking, my department is familiar with the concept of the system development process.

   Strongly   Don't   Strongly
   Disagree   Know   Agree
   ----
     1   2   3   4   5   6   7

2. My department is involved in some phases of the system development process.

   Strongly   Don't   Strongly
   Disagree   Know   Agree
   ----
     1   2   3   4   5   6   7

3. My department is involved in all phases of the system development process.

   Strongly   Don't   Strongly
   Disagree   Know   Agree
   ----
     1   2   3   4   5   6   7

4. My department has a clear definition of the objectives of the project request prior to turning it over to the system developers.

   Strongly   Don't   Strongly
   Disagree   Know   Agree
   ----
     1   2   3   4   5   6   7

5. My department has a clear definition of the requirements of the project request prior to turning it over to the system developers.

```
     Strongly          Don't        Strongly
     Disagree          Know          Agree
     ------------------------------------------------
       1    2    3    4    5    6    7
```

6. My department has a clear understanding of the benefits of the project request prior to turning it over to the system developers.

```
     Strongly          Don't        Strongly
     Disagree          Know          Agree
     ------------------------------------------------
       1    2    3    4    5    6    7
```

7. In general, my department is satisfied with the timeliness of work provided by the system developers.

```
     Strongly          Don't        Strongly
     Disagree          Know          Agree
     ------------------------------------------------
       1    2    3    4    5    6    7
```

8. In general, my department finds a minimum error rate in work provided by the system developers.

```
     Strongly          Don't        Strongly
     Disagree          Know          Agree
     ------------------------------------------------
       1    2    3    4    5    6    7
```

9. In general, my department finds that the work provided by the system developers is consistent with our requirements.

```
     Strongly          Don't        Strongly
     Disagree          Know          Agree
     ------------------------------------------------
       1    2    3    4    5    6    7
```

10. In general, my department is satisfied with the quantity of work provided by the system developers.

```
     Strongly          Don't        Strongly
     Disagree          Know          Agree
     ------------------------------------------------
       1    2    3    4    5    6    7
```

11. In general, my department is satisfied with the quality of work provided by the system developers.

```
     Strongly          Don't        Strongly
     Disagree          Know          Agree
     ------------------------------------------------
       1    2    3    4    5    6    7
```

12. My department seldom complains about the system developers.

     Strongly   Don't   Strongly
     Disagree   Know   Agree
     ----
      1   2   3   4   5   6   7

13. My department talks with the system developers on a regular basis.

     Strongly   Don't   Strongly
     Disagree   Know   Agree
     ----
      1   2   3   4   5   6   7

14. Generally speaking, my department maintains good working relationships with the system developers.

     Strongly   Don't   Strongly
     Disagree   Know   Agree
     ----
      1   2   3   4   5   6   7

PART II

Please describe to what extent the system developers pay attention to you as a customer.

15. The system developers conduct customer satisfaction surveys on a regular basis.

     Strongly   Don't   Strongly
     Disagree   Know   Agree
     ----
      1   2   3   4   5   6   7

16. The system developers establish customer feedback systems to keep track of complaint statistics.

     Strongly   Don't   Strongly
     Disagree   Know   Agree
     ----
      1   2   3   4   5   6   7

17. The system developers establish official and direct lines of communication with my department through interviews and office visits on a regular basis.

     Strongly   Don't   Strongly
     Disagree   Know   Agree
     ----
      1   2   3   4   5   6   7

18. The system developers establish unofficial and indirect lines of communication with my department through informal contacts.

Strongly   Don't   Strongly
Disagree   Know   Agree

----

   1   2   3   4   5 6 7

PART III

Please describe how the system development process can be improved to better meet your needs.

19. What if anything, could the system developers do to increase your overall satisfaction with the quality of services provided? Please be specific.

20. What if anything, could your department do to help the system developers deliver the quality of services that you request? Please be specific.

21. Additional Comments:

APPENDIX G – SECOND STAGE OF THE STUDY
RESEARCH PLAN - THE QUEST FOR QUALITY

Background and Purpose

Systems development groups seek to assure that the systems they develop are the best systems they can create for their clients. However, different groups go about this assurance in different ways. Are these differences significant? And if so, in what way?

My research will focus on quality improvement programs in information technology (IT) systems development processes. Each IT systems development group may or may not operate under any "quality improvement" banner; however, a process develops through which an IT system is established, implemented, maintained, and replaced.

My focus will be on policy and processes impacting quality in software development. My purpose is not to critique or influence the way in which the IT systems development group is currently operating. The sole purpose of my research is to capture all aspects of the development of an IT system within the organization and to make a presentation of the case study for my dissertation project.

In this stage of the project, I will look at what happened in this area since my initial research to identify what can be learned, between "then" and "now." This is a way to get the project back in real time to discover what it means today than the days of the past.

Organizations will not be identified in the final dissertation product. A coded identifier such as Agency A, B, C, etc. will be used in the final dissertation product.

Methodology for the case study

In this stage of the project, I would like to meet in person with two IT managers including the head of an IT systems development group, two IT systems developers/programmers, and two IT

end-users. The purpose of the interviews is to capture the participants' perception of their own experience in IT systems development processes. The interviews will be short, about one hour maximum. Interview guides will be prepared and presented to the head of the IT systems development groups for review. Overall, all six interviews could be scheduled and completed in one working day.

During the interviews with the managers, I would like to collect some available IT systems development related documents. For example: administrative documents such as organizational charts, system life cycle development methodology, training policy, quality policy, proposals, and progress reports; archival data such as any data previously collected about the same subject, i.e., from an in-house survey; and miscellaneous documents such as agendas, announcements and minutes of meetings, other written reports of events, and memoranda.

A summary of all interviews will be prepared and shared with the head of the IT systems development groups. Follow-up interviews may be requested to confirm the accuracy of the interview summary and to fill any gaps in the data required.

Researcher Identification

My name is Phu Van Ho; I am a U.S. citizen and a doctoral candidate at Virginia Polytechnic Institute and State University's Center for Public Administration and Policy. I am currently retired after over 30 years in the IT systems development industry. Prior to my retirement, I have worked on various IT systems development assignments as programmer, system analyst, database administrator, team leader, project leader, and project manager for Booz Allen, MCI, Verizon, Sallie Mae, Accenture, and Bart. My previous assignments included working on site for several years with the federal government agencies such as U.S. Office of Personnel Management (OPM), U.S. Department of Labor (DOL), U.S. Department of Education (DOEd), and U.S. Customs and Border

Protection (CBP). Prior to arriving to the U.S. in 1975, I served seven years as a Navy Officer in the South Vietnam Navy. I am also a professional navigator with a Bachelor of Science degree in Merchant Marine Studies from Phu-Tho National Technical Center, Saigon, Vietnam. I received a Master of Science degree in Technology of Management from American University in 1979.

APPENDIX H – SECOND STAGE OF THE STUDY
INTERVIEW GUIDE - MANAGEMENT

1. Please briefly describe your functional responsibility.

2. Is there a formal IS development methodology in the organization?

3. Is there a formal documentation? If yes, may I have a copy?

4. Are checkpoint procedures clearly defined in the IS development methodology? These procedures can be walkthrough, project review, management review, etc.

5. Is the role of project management clearly defined in the IS development methodology?

6. How do you define quality in an information system?

7. Are there formal guidelines for promoting a quality system? If yes, may I have a copy?

8. Do customer requirements exist within these guidelines?

9. Are measurement criteria clearly defined within these guidelines? These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects, etc.

10. Are there formal guidelines to determine "a job well done"? If yes, may I have a copy?

11. Is there a system of formal recognition?

12. How do you ensure that project personnel have adequate training to achieve quality goals?

13. Please briefly describe the types of hardware which are currently installed in-house?

14. Are there plans to purchase new hardware to support the IS development methodology?

15. Please briefly describe the types of software which are currently installed in-house?

16. Are there plans to purchase new software to support the IS development methodology?

17. How are data collected and used in the IS development methodology?

18. How do you ensure the reliability and consistency of the data collection process?

19. What action does the organization take to increase employee involvement?

20. What actions does the organization take to increase employee responsibility?

21. What actions does the organization take to increase employee authority to act?

22. How do managers learn about quality management?

23. Do managers receive any specific training on quality management?

24. How does management use its quality focus to achieve continuous improvement and keep customer happy?

25. How does the organization ensure that these commitments address the concern of the customers?

26. How does the organization ensure that these commitments are understandable?

27. How do employees use the information about customer requirements and expectations?

28. In summary, please tell me what you think about the roles of a leader and manager in the quest for quality.

29. Do you have any additional comments?

APPENDIX I – SECOND STAGE OF THE STUDY
INTERVIEW GUIDE - TECHNICAL STAFF

1. Please briefly describe your personal and functional responsibility.

2. Is there a formal IS development methodology in the organization?

3. Is there a formal documentation?

4. Are checkpoint procedures clearly defined in the IS development methodology? These procedures can be walkthrough, project review, management review, etc.

5. Is the role of project management clearly defined in the IS development methodology?

6. How do you define quality in an information system?

7. Are there formal guidelines for promoting a quality system?

8. Do customer requirements exist within these guidelines?

9. Are measurement criteria clearly defined within these guidelines? These criteria can be the amount of corrective maintenance required once the system is delivered, the number of complaints about the system, the statistics of quality reviews of individual projects, etc.

10. Are there formal guidelines to determine "a job well done"?

11. Is there a system of formal recognition?

12. How do you ensure that project personnel have adequate training to achieve quality goals?

13. Please briefly describe the types of hardware which are currently installed in-house?

14. Are there plans to purchase new hardware to support the IS development methodology?

15. Please briefly describe the types of software which are currently installed in-house?

16. Are there plans to purchase new software to support the IS development methodology?

17. How are data collected and used in the IS development methodology?

18. How do you ensure the reliability and consistency of the data collection process?

19. Are you aware of the organization's overall quality mission?

20. Do you like your present work assignment?

21. What aspects do you like most/least?

22. Do you think that the work you do is important to the success of the organization?

23. Does the IS development methodology make sense to you? In other words, does it help you perform your work assignment better?

24. Do you think that improving the quality of your work is part of your on-going responsibility?

25. Are you ready for a new assignment within the IS department?

26. Do you feel that you have adequate training to perform well in your present position as well as future assignments?

27. What do you think about the equipment, materials, manuals, documents, supplies, office space, etc. that you need to perform your work?

28. Do you know who your customers are?

29. Please briefly describe who they are and what is their functionality?

30. Please briefly describe the relationship between you and your customers?

31. Please briefly describe the relationship between you and your co-workers?

32. Please briefly describe the relationship between you and your managers?

33. How does this organization promote your knowledge of quality management?

34. Do you have any additional comments?

APPENDIX J – SECOND STAGE OF THE STUDY
INTERVIEW GUIDE – END USER

1. Are you familiar with the concept of the system development process?

2. Are you involved in some phases of the system development process?

3. Are you involved in all phases of the system development process?

4. Do you generally have a clear definition of the objectives of the project request prior to turning it over to the system developers?

5. Do you generally have has a clear definition of the requirements of the project request prior to turning it over to the system developers?

6. Do you generally have a clear understanding of the benefits of the project request prior to turning it over to the system developers?

7. Are you generally satisfied with the timeliness of work as provided by the system developers?

8. Do you generally find a minimum error rate in work as provided by the system developers?

9. Do you generally find that the work provided by the system developers is consistent with your requirements?

10. In general, are you satisfied with the quantity of work provided by the system developers?

11. In general, are you satisfied with the quality of work provided by the system developers?

12. Do you seldom complain about the service provided by the system developers?

13. Do you communicate with the system developers on a regular basis?

14. Do you generally maintain a good working relationship with the system developers?

15. Do the system developers conduct customer satisfaction surveys on a regular basis?

16. Do the system developers establish customer feedback systems to keep track of statistics on users' complaints?

17. Do the system developers establish official and direct lines of communication with your department through interviews and office visits on a regular basis?

18. Do the system developers establish unofficial and indirect lines of communication with your department through informal contacts?

19. What if anything, could the system developers do to increase your overall satisfaction with the quality of services provided? Please be specific.

20. What if anything, could your department do to help the system developers deliver the quality of services that you request? Please be specific.

21. Do you have any additional comments?