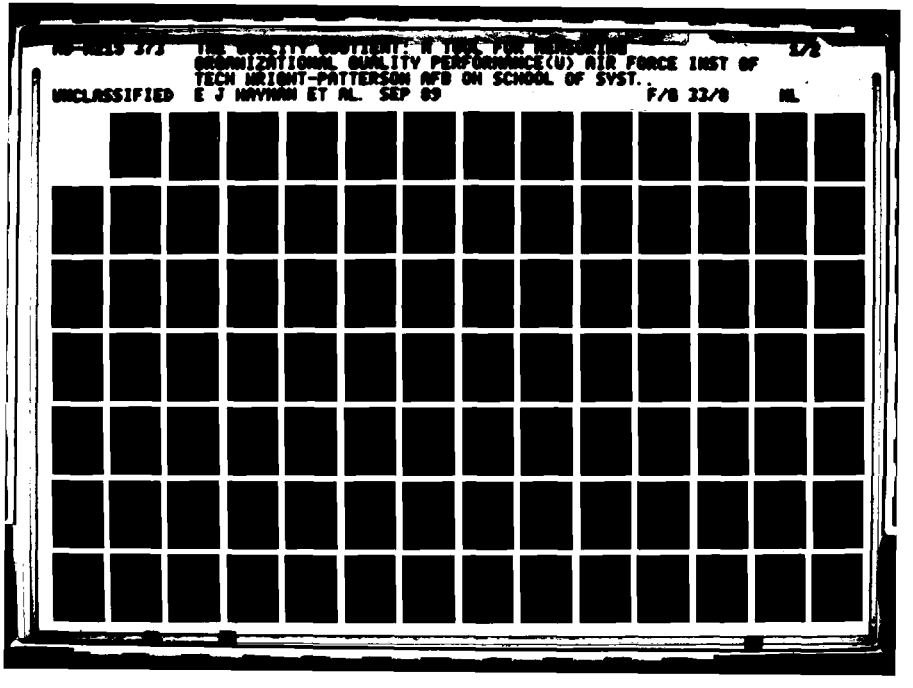

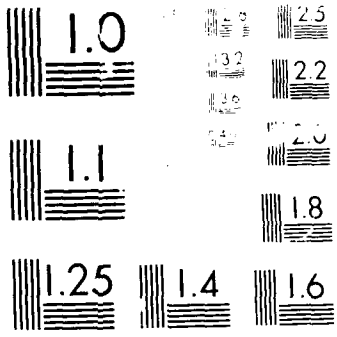
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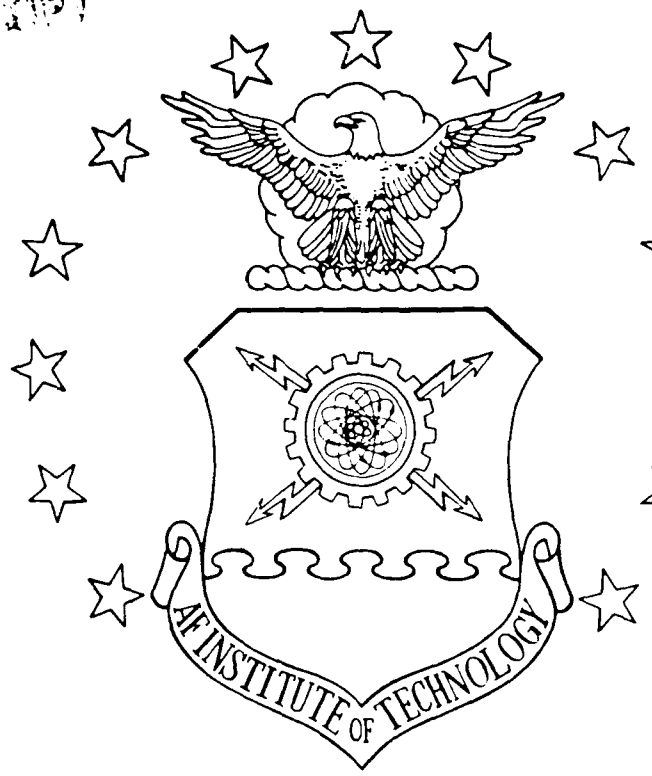

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THE QUALITY QUOTIENT: A TOOL FOR MEASURING ORGANIZATIONAL QUALITY PERFORMANCE

THESIS

Edward J. Hayman
Captain, USAF

Ruth E. Schneider
Civilian, USAF

AFIT/GLM/LSR/89S-31

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY

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THESIS

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Logistics Management

Edward J. Hayman, B.A.
Captain, USAF

Ruth E. Schneider, B.A.
Civilian, USAF

September 1989

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Preface

The purpose of this study was to develop a measurement tool for assessing organizational progress toward institutionalizing the changes required for quality performance. As in any study conducted in a "real world" laboratory, the process was sometimes unwieldy.

Many people were instrumental in helping to keep things moving in the right direction. Rodney House and Francis Marthiljoni at SA-ALC volunteered to serve as technical advisors throughout the process; the study could not have been accomplished without their help. Col Darrell Grapes and his entire staff also participated actively in the coordination of the project and in comments which added to its value. Col Hoch, Col Lindsey, Col Winn, Charles Carver, Charles Drake, Dan Prosser, Randy Galbreath, John Brossard, Mike Foran, Connie Turpin, Paul Keller, Bob Glovka, Belinda Carpentier, Connie Bedeck, Georgia Newton, Joe Gertch, and many others gave us the kind of quality support this paper is about.

Acknowledgment of the support of our thesis advisor, Major Ken Jennings - who really gave us a free rein goes without saying. But mostly, to the partner in this effort, often coming from different angles - but somehow meeting, in the end, on common ground, a great deal of thanks and respect are due.

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Abstract

This research studied the relationship between hypothesized predictors of quality performance and a readily available performance indicator, the Oregon Productivity Matrix Score. The authors attempted to develop a formula for predicting quality performance, the Quality Quotient, as well as testing the discriminability of the predictors.

To gather information, a survey developed specifically for this research was sent to each of the five Air Force Air Logistics Centers. The data were analyzed primarily using multiple regression analysis and discriminant analysis. The results of these analyses highlighted the ability of specific predictors for both prediction and discrimination using the Oregon Productivity score (standardized as a Z-score) as a dependent variable.

In addition to providing strong predictive ability, two of the regression formula beta coefficients surprised the researchers by having a negative effect on the dependent variable (although stated to have a positive effect by quality experts). Survey participants who were members of the top performing organizations believed that their organizations' data collection systems were more complicated than necesssary, and that statistical techniques should only be used by experts in the Quality field.

THE QUALITY QUOTIENT:

A TOOL FOR MEASURING ORGANIZATIONAL QUALITY PERFORMANCE

I. INTRODUCTION

Overview

Quality is now touted as the decisive element of business strategy--the key to regaining American competitive advantage (Deming,1986:ix-xi; Feigenbaum, 1983:xxi; Harrington, 1987:viii; House Republican Research Committee, 1988:1; Pfau, 1989:17-21; Render & Ralston, 1984:24-33). Both corporate and government agencies are implementing Total Quality Management (TQM) programs in an attempt to improve productivity and ensure survival in a new economic age of global competition (Scherkenbach, 1988:16-17; Kearns, 1988,17-18). These TQM programs are derived from a new philosophy which require a revolution in American management techniques (Render & Ralston, 1984:24-33; Feigenbaum, 1983:828). This paper is an attempt to identify the major characteristics of this "revolution" (what changes must take place, according to the experts); to determine which of these characteristics are present in organizations with varying levels of quality performance; and to develop a

measurement model, the Quality Quotient, for determining the progress an organization is making toward implementing the new philosophy.

Chapter One will provide a general background on the emerging quality revolution in the United States and will outline some of the steps the Department of Defense and the Air Force Logistics Command have taken toward adopting the new quality philosophy. It will also discuss some of the reasons a measurement model is needed and define the general categories which will be used in the Quality Quotient.

Background

The old management techniques will no longer work; management philosophy must change to reflect the new demands of a new economic age (Scherkenbach, 1988:16-17).

The Need for a Revolution. The past successes of managers in this country were largely the result of productivity gains brought about during the previous revolution--the industrial revolution. When resources are generally scarce, as in the post World War II era, Kendrick reports, interest in productivity peaks. Productivity generally refers to an increase in the "ratio of outputs to any or all inputs" (Kendrick, 1961:6) or producing more (quantity) with fewer resources. During the post World War II years, supplies of finished goods were scarce and productivity advances were regarded as a way of "mitigating the inflationary tendencies arising from the generally

buoyant demand situation" (Kendrick, 1961:5). If proportionately more products could be produced using proportionately fewer resources, the increased demand could be met without increases in price. In fact, the entire industrial revolution was based on achieving these improved input/output ratios--through economies of scale (Eullman, 1980).

In *The Improvement of Productivity - Myth and Realities*, Eullman claims managers are still depending on economies of scale to increase productivity because it worked so well in the past. He attributes the decline in productivity improvement in the United States (and many other industrial economies) to the fact that economies of scale have, for the most part, already been achieved. Further economies will provide improvement only at a decreasing rate. Radical productivity improvement, he concludes, can now only come from an innovation philosophy rather than an efficiency philosophy.

Managers and workers have also been conditioned to believe, through what Ouchi refers to as "superstitious learning", that the efficiency techniques used so successfully during the industrial revolution will always work. Recognizing the need for change is difficult under these conditions (Ouchi, 1984:4). At the Ford Motor Company, pioneer in mass production, Scherkenbach emphasizes that TQM must be thought of as the next revolution not

another "return to basics" approach. The new economic age of global competition requires a new set of management techniques--a revolution in the way managers think about their responsibilities and their organizations. The institutionalization of innovation and continuous improvement, rather than efficient use of mass production, will form the basis for success in the future. The new economic age centers around the realization that "Higher quality costs less, not more" (Scherkenbach, 1988:17).

Convincing managers that quality can actually decrease costs is complicated by both the short-term focus of the old business philosophies and by the cost accounting systems which support them. "The short term focus is now, with considerable justice, considered a major weakness of American policy makers, both in government and in business." The difference between short and long term thinking, Drucker explains, can be seen in the manager's view of planning. The purpose of planning is not to decide "what to do tomorrow" (a short-term manager is proud of these plans) but instead to decide "what should be done today to have a tomorrow" (Drucker, 1983:171,68-90).

Both Drucker and Deming agree that accounting systems focus on the wrong things. Rather than measuring the cost of inputs and the cost of the transformation process, Deming advocates a focus on the waste--waste caused by poor incoming material, late deliveries, poorly trained workers,

inadequately controlled processes, poor customer service, poor product design, etc. and on improvements that increase results in these areas (Deming, 1986:121-123). Drucker purports a focus on the ratio between efforts and results. "No matter how cheap or efficient an effort, it is waste, rather than cost, if it is devoid of results" (Drucker, 1983:69). Accounting systems which are set up t monitor short-term profits, but not to identify the waste which is consuming higher profits, are indicative of the fact that managers do not understand the relationship between quality and profit (Deming, 1986:121-123). The quality revolution requires that managers gain an understanding of factors the accounting systems have not tried to measure. "Quality is, in essence, a (new) way of managing" (Feigenbaum, 1983:829).

Several experts have written extensively on the new quality management concept. The views of two major, and opposing, contributors are covered below to give the reader some insight into the similarities and differences of opinion on the nature of the changes required.

Deming. The successful rise of Japanese industries following World War II is often attributed to Dr. W. Edwards Deming. His work with the Japanese prompted them to name their National quality award after him. Dr. Deming has devoted his life study to identifying the elements required to achieve quality, productivity and competitive position. A brief description of his 14 points for effective

management have been extracted from *Out of the Crisis* and are outlined below.

1. Create Constancy of Purpose for Improvement of product and service. The aim (is) to become competitive and to stay in business and to provide jobs. Establishment of constancy of purpose means acceptance of obligations like the following:
   a. Innovate.
   b. Put resources into:
      Research
      Education
   c. Constantly improve design of product and service.

2. Adopt the New Philosophy. We are in a new economic age, created by Japan. Deadly diseases afflict the style of American management. We can no longer tolerate commonly accepted levels of mistakes, defects, material not suited for the job, people on the job that do not know what the job is and are afraid to ask, handling damages, antiquated methods of training on the job, inadequate and ineffective supervision, management not rooted in the company, job hopping in management...

3. Cease Dependence on Mass Inspection. Quality comes not from inspection, but from improvement of the production process. Inspection, scrap, downgrading, and rework are not corrective action on the process.

4. End the Practice of Awarding Business on the Basis of Price Tag Alone. Without adequate measures of quality, business drifts to the lowest bidder, low quality and high cost being the inevitable result. A long-term relationship between purchaser and supplier is necessary for best economy.

5. Improve Constantly and Forever the System of Production and Service. With continual improvement, the distributions of the chief quality characteristics of parts, materials, and service become so narrow that specifications are lost beyond the horizon.

6. Institute Training. Training must be totally reconstructed. Management needs training to learn about the company, all the way from incoming material to customer. A central problem is need for the appreciation of variation. A big problem in training and in leadership in the United States arises from a flexible standard of what is acceptable work and what is not. The standard is

too often dependent on whether the foreman is in difficulty to meet his daily quota in terms of numbers.

7. Adopt and Institute Leadership. The job of management is not supervision, but leadership. Management must work on sources of improvement, the intent of quality of product and of service, and on the translation of the intent into design and actual product. Some suggestions follow:

a. Remove barriers that make it impossible for the hourly worker to do his job with pride of workmanship.

b. Leaders must know the work they supervise.

8. Drive out Fear. No one can put in his best performance unless he feels secure. A common denominator of fear in any form,anywhere, is loss from impaired performance and padded figures.

9. Break Down the Barriers Between Staff Areas. Teams composed of people in design, engineering, production, and sales could contribute to design for the future, and could accomplish important improvements in product, service, and quality of today, if they could work without fear of taking risk. Teamwork is sorely needed throughout the company.

10. Eliminate Slogans, Exhortations, and Targets for the Work Force. The charts and posters take no account of the fact most of the trouble comes from the system. Exhortations and posters generate frustration and resentment. They advertise to the worker that management is unaware of the barriers to pride of workmanship.

11. Eliminate Numerical Quotas for the Work Force. The intent of application of a work standard is noble: predict costs; establish a ceiling on costs. The actual effect is to double the cost of the operation and to stifle pride of workmanship.

12. Remove Barriers that Rob People of Pride of Workmanship. People whether in management or on the factory floor have become, to management, a commodity.

13. Encourage Education and Self-improvement for Everyone. What an organization needs is not just good people; it needs people that are improving with education.

14. Take Action to Accomplish the Transformation.

Crosby. Philip Crosby, founder and president of the Crosby Institute's "Quality College", also developed 14

points to guide managers in implementing successful quality improvement programs. His version of the actions required were drawn from *Quality is Free*.

1. Management Commitment. Discuss the need for improvement with management people, with an emphasis on the need for defect prevention. Prepare a quality policy that states that each individual is expected to "perform exactly the requirement or cause the requirement to be changed". Agree that quality improvement is a practical way to profit improvement.

2. Quality Improvement Team. Bring together representatives of each department to form the quality improvement team. These should be people who can speak for their department in order to commit that operation to action. Explain their role--which is to cause the necessary actions to take place in their department and in the company.

3. Quality Measurement. It is necessary to determine the status of quality throughout the company. Quality status is recorded to show where improvement is possible, where corrective action is necessary, and to document actual improvement later on. Placing the results of measurement in highly visible charts establishes the foundation of the entire quality improvement program.

4. Cost of Quality Evaluation. All you really need is enough information to show your management that reducing the cost of quality is in fact an opportunity to increase profits without raising sales, buying new equipment, or hiring new people. The first step is to put together the fully loaded costs of (1) all efforts involved in doing work over, including clerical work; (2) all scrap; (3) warranty (including in-plant handling of returns); (4) after-service warranty; (5) complaint handling; (6) inspection and test; and (7) other costs of error, such as engineering change notices, purchasing change orders, etc. It is normal to obtain only one-third of the real costs the first time you try it. Having the comptroller establish the cost of quality removes any suspected bias from the calculation. More important, a measurement of quality management performance has been established in the company's system.

5. Quality Awareness. It is time now to share with employees the measurements of what nonquality is costing. This is done by training supervisors to orient employees, and by providing

visible evidence of the concern for quality improvement through communication material such as booklets, films, and posters.

6. Corrective Action. As people are encouraged to talk about their problems, opportunities for correction come to light. These problems must be brought to the supervisory meetings at each level. Individuals soon see that the problems brought to light are being faced and solved on a regular basis.

7. Establish an Ad Hoc Committee for the Zero Defects Program. Three or four members of the team are selected to investigate the Zero Defects concept. Zero Defects is not a motivational program. The purpose is to communicate to all employees the literal meaning of the words "zero defects" and the thought that everyone should do things right the first time. In particular, the ad hoc g_oup should seek out ways to match the program to the company's personality.

8. Supervisor Training. A formal orientation with all levels of management should be conducted prior to implementation of all the steps. All managers must understand each step well enough to explain it to their people.

9. Zero Defects Day. The establishment of ZD as the performance standard of the company should be done in one day. That way, everyone understands it the same way. Making a "day" of the ZD commitment provides an emphasis and a memory that will be long lasting.

10. Goal Setting. During meetings with employees each supervisor requests that they establish the goals they would like to strive for. Usually, there should be 30-, 60-, and 90-day goals. All should be specific and capable of being measured.

11. Error Cause Removal. Individuals are asked to describe any problem that keeps them from performing error free work on a simple, one page form. This is not a suggestion system. All they have to do is list the problem; the appropriate functional group will develop the answer.

12. Recognition. Genuine recognition of performance is something people really appreciate. The prizes or awards should not be financial. They will continue to support the program whether or not they, as individuals, participate in the awards.

13. Quality Councils. The quality professionals and the team chairpersons should be brought together regularly to communicate with each other and to determine actions necessary to

upgrade and improve the solid quality program being installed.

14. Do It Over Again. Repetition makes the program perpetual and, thus, "part of the woodwork."

These excerpts highlight the fact experts have not adapted a single version of the steps required for management transformation. Recognition of the need for management change in support of TQM, however, is universal.

The DOD Response. The Department of Defense, faced with a shrinking budget and a growing federal deficit, has also recognized the need to change its management techniques. DOD can no longer afford to pay for quality as an additive--after the product is purchased. As Vice Admiral Webber, Chief Engineer of the Navy, stated: "We want a good product up front because we can't afford, financially or operationally, to be involved with 'fix-it' or 'get-well' programs to correct problems that should have been avoided during construction - we've had too much of that in the past" (Webber, 1987:41). The desire to obtain quality products is not new, but the priority, direction, and top level emphasis are. A "sweeping new crusade" for quality began under Robert B. Costello, former Undersecretary of Defense for Acquisition (Morrison, 1987:31). His TQM program started a cultural change within the Department and began to press for a sweeping attitude change in its major industrial suppliers as well (Borklund, 1987:44). The DOD TQM program began to change the focus of quality from

matching the end product to specifications, to a total system of process control (Englund, 1988:11). This represents a drastic departure from the traditional DOD quality methods. The emphasis of the Department of Defense TQM program is now an overriding emphasis on quality, reliability, maintainability and producibility as opposed to the earlier focus on performance, program schedules, and cost (Hafner, 1987:45).

Under TQM the task of preventing defects throughout the manufacturing process becomes the responsibility of management; in the past, workers were often blamed for poor quality. DOD has now recognized the need for changes in management approach (Morrison, 1987:32).

The relationship between quality and cost reduction is also being recognized in the Department. There is an increased understanding that standards and specifications that are unduly restrictive and set forth unrealistic requirements can increase acquisition costs and make quality less feasible. Choosing the lowest bidder, because it reduces acquisition costs can result in procuring a system that fails more often and becomes more expensive to maintain. Therefor, it becomes increasingly important to not sacrifice quality in the name of cost savings or competition, as better quality can save money by preventing rework, component replacement, and repair costs (Webber, 1987:42).

The AFLC Approach. General Alfred G. Hansen, Commander of The Air Force Logistics Command (AFLC) has made quality a top priority for the Command. "I firmly believe the key to the future operation and success of AFLC is quality--quality of our people, our processes, our performance and our products" (Hansen, 1989). AFLC's TQM program is known as QP4--quality through people, process, products, and performance. The stated objective for QP4 is to "instill quality in our basic processes and work force to ensure responsive and productive logistics support" (SIP, 1989:1). The focus of QP4 is to develop attitudes and systems at all levels that promote and implement continuous improvement of procedures, processes, products and services (SIP, 1989:1).

AFLC employs more than 98,000 civilian and military personnel in a wide range of blue collar and white collar positions. AFLC is the organic industrial base of the Air Force, and therefore many of the skills and processes used parallel those found in the private sector. The AFLC quality improvement program has been patterned after the same gurus--Deming, Crosby, Juran, Taguchi--that corporate quality programs have been patterned after; AFLC is facing the same quality issues, described earlier, that face all American companies. Some AFLC organizations have been pursuing TQM initiatives since the early 1980s, others are just beginning to get involved.

Measuring Quality Performance

The management changes inherent in the quality revolution should be monitored to determine if they have been successfully implemented. "When an organizational innovation is implemented, there must be some test to reveal whether it had the expected effect or not" (Ouchi, 1981:95). The measurement tools currently employed on a national level, like those of our corporations, focus on short-term economic standing. The Bureau of Labor Statistics (BLS) publishes a myriad of single-factor efficiency ratios such as output per paid man day, direct to indirect labor, return of investment,etc. The TQM revolution requires re-focusing national attention from meeting short-term numerical efficiency goals to the more complex management competencies required for continuous improvement. Current measurement tools do not ask the right questions; a new methodology for measuring corporate success is needed (Deming, 1986:20,21,99). Crosby attempted to measure the maturity of quality programs through his Quality Management Grid (Crosby, 1979: 25-40). Although this tool may be useful "to project a view of the company that all involved can accept and a source of direction concerning what needs to be done next" (Crosby, 1979:40), it does not measure whether the management vision is being effectively transferred to the work force. The Quality Quotient is an attempt to provide one such method for managers to use in assessing their own

success at instituting the new philosophy throughout the organization.

The word "quality" itself means different things to different people. To implement "Quality" on a national level first requires a common understanding of the factors to be pursued (Deming, 1986:x). Public Law 100-107, known as the Malcolm Baldrige National Quality Improvement Act of 1987, created a national quality award for the United States. The United States Department of Commerce was charged with developing the evaluation criteria (measurement factors) to be used for judging corporation's quality achievements. The four framework elements and seven examination criteria they developed "are an important adjunct of the award examinations. They not only are the basis of assessing award applications, but also represent an extension of the examination value system. The criteria are particularly important in projecting the meaning of 'total' in total quality management" (Reimann, 1989:35-39). Because this national award has become the standard by which public and private sector organizations judge their quality performance, the authors used the categories outlined in it as the basic framework for the Quality Quotient.

The award criteria are divided into four framework elements: the driver for change, the systems for implementing change, the goal of the change, and the measurement of progress. Each of the seven measurement

categories corresponds to one of these framework elements. Driver: Leadership; Systems: Information and Analysis, Planning, Human Resource Management, and Quality Assurance; Goal: Customer Service; and Progress: Quality Results (Reimann, 1989:35-39). Each of the measurement categories are defined in Chapter II.

Scope

This study focused on measurement of Quality Performance in AFLC organizations manifesting various levels of quality performance. In all, 21 AFLC work units were included in the study. Units included procurement, material management, distribution, and maintenance functions. AFLC was used as the subject for this research because their TQM program parallels the national TQM imperative, the work force parallels the national work force, and the individual work groups are in various stages of implementing a consistent TQM program. "Comparative empirical studies can be made of the performance characteristics of a set of organizations assumed to share the same ultimate criteria but clearly differing in their overall success as judged by competent observers. Using factor analysis methods and actual performance data to identify the sets of lower-order performance criteria, and using trend and correlational analysis to detect the relationships among these sets of criteria over time, one can, in principle, draw conclusions about the penultimate components of performance that bear

upon organizational survival or failure in that particular line of business" (Seashore, 1986:234).

The organizations used in this study are thought by the authors to represent various levels of quality performance and to fulfill the requirements for the type of analysis suggested by Seashore. AFLC activities included in this study are located at six major Centers throughout the country: Oklahoma City, Oklahoma; Ogden, Utah; San Antonio, Texas; Sacramento, California, Warner Robins, Georgia; and Newark, Ohio.

Results of comparisons between attitudes and the various quality performance indicators will be used to build a predictive model of relationships among employee attitudes about the elements of quality performance and the indicators of organizational performance. The resultant model will be *The Quality Quotient*.

Problem Statement

The implementation of quality programs is not easy, nor is it one dimensional; it requires a cultural change--change in the way people and processes are managed. The effectiveness of change cannot be known unless it can first be measured. A tool is needed to identify the characteristics of successful quality performance, to measure the success of management changes, and to identify areas requiring management attention to ensure continued growth.

Specific Research Objectives

This research will attempt to answer the following four questions:

1. What elements contribute to organizational quality development?

2. How can these elements be measured in a quantitative manner?

3. Can attitudinal differences be found in organizations with differing quality performance levels?

4. Can these differences be used to predict quality performance or to differentiate between organizations of differing quality performance levels?

Thesis Overview

This chapter discussed the need to identify and predict factors which affect quality performance. Chapter II will describe the approach and steps followed in this study. Chapter III will review the literature of both quality and organizational performance for identification of possible quality performance predictors. Chapter IV will discuss the data analysis performed, and Chapter V will present the conclusions and recommendations for further research.

II. Methodology

Chapter Overview

This chapter identifies the methods used to solve the research problem. Specifically, it describes the literature review and the survey questionnaire used to collect data; defines the population and samples; and discusses the statistical techniques used to analyze the data.

Literature Review

The literature review (Chapter III) was a key component of this research's methodology, as it defined the content of the survey questionnaire. The literature review was conducted to answer the investigative question: What factors do experts believe affect quality performance?

Through answering the above question, the literature review defined the specific measurement areas to be used in survey development and also provided source material for the actual survey items.

The measurement areas listed as examination categories in the 1989 Application Guidelines for the Malcolm Baldrige National Quality Award (Department of Commerce, 1989:18) were used as guidelines for conducting the literature review. The measurement categories are listed and defined in this chapter as subheadings under the main heading of Survey Instrument.

Search of literature written by quality experts sought the following information for each measurement category:

1. Quality expert consensus that a particular variable (predictor) is a necessary ingredient in an effective quality program.
2. Expert definition of the predictor and its use in promoting quality performance.
3. Attitudes or behaviors indicative of the presence and strength of the predictor.

Survey Instrument

A survey instrument was used to collect the data needed to answer the remaining investigative questions. The survey (Appendix A) was developed specifically for this research and uses a seven point Likert scale.

Section I of the survey obtained demographic data; section II obtained data about the presence and strength of the predictors (attitudes and behaviors).

For survey development, existing surveys were screened, and specific questions selected and reworded as necessary to direct the questions at soliciting information about quality performance. In addition to selecting items from existing surveys, new survey items were created to ensure the measurement categories were sufficient in scope to cover the many broad areas found in both the Malcolm Baldrige criteria and during the literature review.

Appendix B lists the variables used in survey development, and the appropriate survey item number(s).

Section II of the survey was divided into the same subsections as found in the Malcolm Baldrige Award Application Guidelines. Each section is described below (Chamber of Commerce, 1989:19-29).

Leadership. This section tests for a clear and visible quality value system along with a supporting management system put in place by the senior executives to guide all employees. It tests for senior executive support of quality developments within the organization.

Information and Analysis. This section tests the scope, validity, use, and management of data required to enact a total quality system. Also, the adequacy of the data and information to support a prevention based approach to quality is examined.

Strategic Quality Planning. This category examines the inclusion of quality improvement planning into overall business planning, primary emphasis is place on goal setting.

Human Resource Utilization. This category examines the efforts to develop and utilize the work force potential for quality and to maintain an environment conducive to full participation, continuous improvement, and personal and organizational growth.

Quality Assurance of Products and Services. This section examines the approaches used for total quality control of goods and services based primarily upon process design and control. Also examined is the integration of quality control with continuous quality improvement.

Quality Results. This section examines quality and quality improvement levels as compared to expectations and competing groups or organizations.

Customer Satisfaction. This category examines respondents knowledge of the customer, the customer service system and responsiveness.

After initial construction, the survey instrument was critiqued by quality and survey experts at the Air Force Institute of Technology and HQ Air Force Logistics Command. This revised survey was then sent to 25 personnel at San Antonio Air Logistics Center (SA-ALC) for field testing.

SA-ALC personnel were selected for the field test as a representative sample of the target population. In addition to answering the survey items, respondents were asked to provide information on item clarity, and were given the opportunity to critique the survey. Revisions were made to both form and content of the survey as a result of the field test.

A package containing surveys, a cover letter guaranteeing respondents' anonymity, and answer sheets were

mailed to the office of the Director of Quality Programs (QP) at each Air Force Air Logistics Center. Surveys were administered and returned by QP personnel at each center.

Population

The population to be surveyed included all Air Force Air Logistics Centers, as each have ongoing quality programs, and each actively use the Oregon Productivity Matrix as a measure of organizational performance (use of the Oregon Productivity Matrix in this research is addressed later in this methodology chapter, as well as in Chapter III).

Samples

Data was collected from 28 sample groups selected from the Air Logistics Centers. Each Air Logistics Center received six groups of surveys, each group containing 30 surveys (with the exception of the Aerospace Guidance and Metrology Center which only received two groups of surveys). The number of sample groups selected was intentional in order to ensure the sampling distribution was indicative of the overall population (Ott, 1988:109-113). Groups selected to participate were selected by their Air Logistics Center.

Thirty individuals were selected randomly from each of the Air Logistics Center's groups to participate in taking the survey.

Data Processing

Responses to all questions were read by an optical scanner into a computer data file. Prior to reading into the computer, answer sheets were grouped according to work center (all answer sheets contained numerically sequenced identification numbers for this purpose).

Measurement

A seven point Likert scale was used to provide ordinal data with origin as described in Business Research Methods (Emory, 1985:88-89). Although there is some disagreement among the research community on use of parametric statistical tests with ordinal data (Emory, 1985:89-90), the data was *treated* as interval data and analyzed using parametric statistics.

Statistical Analysis

Data analysis was performed using programs developed for the Statistical Package for the Social Sciences (SPSS). SPSS procedures were used to obtain descriptive statistics, perform reliability analysis, factor analysis, multiple regression analyses, discriminant analyses, one way analyses of variance, and T-tests.

Descriptive Statistics. The mean score for each survey item was calculated for each sample group. The sum of the mean scores for all items in each measurement category are the values of the independent variables

(predictors) used in performing factor analysis, the oneway analyses of variance, regression analysis, and discriminant analysis.

Factor Analysis. A separate factor analysis was performed for each section of the questionnaire to group questionnaire items into their underlying principal components. Principal axis factoring, the default SPSS method (SPSS Inc., 1983:650), was used. For each initial factor analysis the lowest communality accepted was .40. All items not meeting the minimum communality value were treated as individual factors and removed from the factor analysis. Remaining questionnaire items were again analyzed in the factor analysis. The highest factor loading for an item was used to include it into a given factor.

Reliability Analysis. Reliability analysis (SPSS, Inc., 1981:256) was performed on each grouping of variables found in the factor analysis. The minimum reliability accepted was .60 (Cronbach's alpha). If a group of questions (factor) did not meet the minimum acceptable reliability criteria, each item within the factor was treated as a separate item (the group no longer existed).

Multiple Regression Analysis. Multiple regression analysis was performed for two reasons. First, to determine the contribution of each independent variable to quality performance (dependent variable). Second, to build

a predictive model for quality performance based upon the contributions of each of the quality measures.

A readily available performance measure, each group's Oregon Productivity Matrix Score, was used as the dependent variable. Because the criteria used for the Productivity Matrix Score varies from division to division, available scores were standardized as Z-scores within each division. This made scores comparable from one division to another.

In performing the regression analysis, the significance of the β (beta) coefficients were tested using a two tailed F-test with a 90% confidence level (α=.10). A hierarchical forward regression (SPSS Inc., 1981:120) procedure was used to arrive at the predictive model (independent variables did not enter the equation unless their β's associated F statistic were significant at the value of α=.10).

Discriminant Analysis. First, discriminant analysis was performed to produce a model for determining which of two categories a surveyed group would fall into - either the top half or bottom half, using the standardized Oregon Matrix Score as the dependent variable. Discriminant analysis was then performed to produce a model for determining which of two categories a group would fall into - either the top 25% or the bottom 25%, again using the standardized Oregon Matrix Score as the dependent variable.

All discriminant analysis was performed using the direct variable entry procedure. This discriminant procedure enters all predictor variables at the same time (SPSS Inc., 1983: 627), as opposed to a forward or stepwise procedure.

Oneway Analysis of Variance. Analyses of variance were performed to determine if there were or were not differences between the mean scores for each sample group. This procedure was performed for each predictor. The F-statistic was used to determine if at least one group mean was different from any of the other group means, at a 95% confidence level (α=.05). If the F-statistic was significant, then a multiple T-test was performed (Least Squared Difference) to determine which groups were different for that measurement. The purpose of this procedure was to test ability of survey items to discriminate between groups.

Summary

This chapter summarized the methods used to formulate a survey questionnaire, obtain and statistically analyze data gathered to answer the research questions stated in Chapter I. The analysis of data and conclusions drawn from that analysis will follow in Chapters IV and V.

III. A REVIEW OF THE LITERATURE

Chapter Overview

The literature review served as the basis for the development of the survey instrument. From the theories of how to successfully implement quality improvement and from the experiences of many companies involved in the transformation process, possible factors contributing to quality performance were accumulated. This chapter will discuss the potential predictors (independent variables) gleaned during this study. The sources included are not intended to represent an exhaustive review of the literature written in each area--each of the factors would require a literature review longer than this paper--but rather to represent a cross section of the factors often cited in the literature as having a potential relationship to performance.

The factors are organized, first, by the seven examination criteria of the Malcolm Baldrige National Quality Award (MBNQA)--to facilitate application to the National standard; and second, by the groupings identified through the factor analysis process--to improve the correlation between this chapter and later chapters covering the data analysis and results. Each of the factors has been given a name to further aid discussion.

Following the discussion of the independent variables, the Oregon Objectives Matrix, used in this research as a

gauge of quality performance (dependent variable), will be introduced.

The Independent Variables

Leadership. In ongoing research of companies struggling to revitalize themselves, leadership is the "single most important factor in successful change" (Beer, 1988:35). Cound, chairman of the Board of Directors for the American Society of Quality Control (ASQC) agrees. He outlines three prerequisites to the kind of leadership the quality transformation requires: a "brutally realistic understanding of the inevitable consequences if the status quo is tolerated, a compelling vision of the change that must be brought about, and the personal courage to act" (Cound, 1988:20). Beer describes changing corporate culture as an important aspect of the action required to transform an organization. He explains "elements of the new culture--employee participation, teamwork, commitment, problem solving, tolerance for new ideas, sharing information--amount to a paradigm shift in our conception of organizing and managing people" (Beer, 1988:33). The following factors were developed to measure elements of the new leadership paradigm.

Corporate Culture. Harvey and Brown define corporate culture as "a system of shared values and beliefs which interact with an organization's people, structure, and systems to produce behavioral norms." These norms "influence

how managers and employees approach problems, serve customers, react to competitors, and carry out their activities" (Harvey and Brown, 1988:64). All these behavioral aspects are important elements of a quality culture. The 1988 Gallup survey performed for the American Society of Quality Control found 43% of American executives now believe corporate culture must change to successfully meet quality objectives. Kearns, CEO of Xerox Corporation, calls this recognition "fundamental" (Kearns, 1988:28). The following categories of survey items were developed to measure various aspects of the new corporate culture required to support quality performance.

Participative Decision Making. Juran writes that quality control should ideally be delegated to the work force to the maximum extent possible. The shorter feedback loops will result in earlier response to quality problems and a greater sense of ownership and participation by the work force (Juran, 1989:264). Jennings found participation in decision making to have positive effects on many role, goal and involvement variables (Jennings, 1986:94). Survey items 21-27 and 29 were drawn from an existing survey (Jennings, 1986) to measure this construct.

Support for Creativity. Support for creativity is a major distinguishing factor between

innovative and traditional organizations (Siegel and Kaemmerer, 1970:553-562). Survey items 16-20 were based on a scale drawn from an existing survey (Jennings, 1986).

Anticipative Management. Successful corporations will have to use more anticipative management to keep pace with the increasing rate of change (Harvey and Brown, 1988:64). Naisbitt and Aburdene call this type of change "re-inventing the corporation." The re-invention begins with a "powerful vision--a whole new sense of where a company is going and how to get it there" (Naisbitt and Aburdene, 1985:24). This vision must be "clear and compelling" (Peters and Austin, 1985:284-287), and it must anticipate the future. Chandler, chairman and CEO of the Eastman Kodak Company, believes anticipative management will give Kodak back its competitive edge. Anticipating a market demand and being able to fill it faster and better than anyone else is now an integral part of the Kodak quality strategy (Chandler, 1988:18). Survey items 28 and 30 were developed by the authors to determine perceptions of the clarity and purposefulness of the leadership's vision for the future.

Work Group Commitment to Quality. TQM is "Building quality in from the beginning and making it everyone's concern and responsibility" (Pfau, 1989:17). Stempel, president and CEO of General Motors Corporation, compares quality to a team sport--where individual efforts

are effectively combined and there is a joint commitment to excellence by everyone (Stempel, 1988:13). Crosby says zero defects must be the goal of each and every person in the corporation (Crosby, 1979:). Survey items 36 and 38-42 were developed by the authors to measure the intensity of the demand for perfection and the commitment of the work group to achieving quality.

Supervisory Communication. The Lord Corporation identifies communication problems as the biggest obstacle to implementing quality improvement. They report that every communication on quality must demonstrate management commitment and prove to the work force that quality is not just another temporary program. To do this, the materials have to be sincere, believable and communicated honestly (Hagle and Whitehair, 1988:29). Honesty is one of the most important values to foster in pursuing quality (Groocock, 1986:17-19). Communication must go both directions. Corporations usually do a good job of communicating materials to the workers but managers must allow workers to communicate their ideas to management, as well (Juran, 1989:314). Survey items 9-15 were drawn from an existing survey set (Jennings, 1986) for measurement of this construct.

Alignment. A successful corporate vision "links a person's job with his or her life purpose and generates

alignment--that unparalleled spirit and enthusiasm that energizes people" (Naisbitt and Aburdene, 1985:32). Survey item 31 was developed by the authors to measure this construct.

Frustration. Deming discusses the frustration people report where the management is not really ready to take action. Barriers to pride of workmanship frustrate people who want to do a job right (Deming, 1986:78-82). Survey item 34 was developed by the authors to measure this construct.

Knowledge of the Need for Change. The "Rolls Royce mentality still exists in our country, and that is the idea that quality is expensive" (Kearns, 1988:28). Derrick, Desai, and O'Brien found that perceptions of quality differed among various organizational levels. Survey item 35 was taken from their survey (Derrick, Desai, and O'Brien, 1989:22-27) to measure the individual's perception of the relationship between quality and productivity.

Self-Expectation. Managers often believe quality problems exist because of poor worker motivation--people do not really care about whether or not they do the job (Dumas, 1989:4i). Survey item 37 was developed by the authors to determine if respondents expected themselves to do perfect work.

Personal Commitment to Quality. A key quality strategy is convincing each individual in the organization

that he/she is personally accountable for quality. Quality must be perceived as more than just the job of the quality department to be truly effective (Harrington, 1987:183-186). Survey item 43 was developed by the authors to measure this construct.

Continuous Improvement. Active pursuit of improvements at every level of the organization is a characteristic of organizations involved in TQM. They view change as a natural, continuous part of their activities (Pfau, 1989:17). Improvements must be made continually; to not improve is tantamount to falling behind. "Quality improvement is a never ending journey. Each day, each product or service is getting relatively better or relatively worse, but it never stands still" (Peters, 1987:98). Kearns reminds that improvement must also be a continuous process because of competition. "As we get better, so does our competition. We are in a race in which there is no finish line" (Quality Progress, 1989:30). Survey items 32 and 33 were developed by the authors to measure perceptions about the need for continuous improvement.

Information and Analysis. "If you cannot measure quality and define its impact on your operation, you might as well forget it" (Berry, 1989). According to Berry, companies have been measuring the wrong things for years--activity versus contribution, the past instead of the future. The type of data analysis a company employs

determines whether that company will know what to do to stay in business (Berry, 1989). The following elements were developed to measure various aspects of information and analysis.

Data Availability. To be useful, data must be available at the appropriate levels. Mann quotes Lord Kelvin in her book The Keys to Excellence: "When you can measure what you are speaking about and express it in numbers, you know something about it" (Mann, 1989:59). Garvin reports a major difference between Japanese and American air conditioning firms is the availability of the data to the work force. The highest performing organizations consistently pushed data down to the work force to educate them. When the workers have data, they can understand the process. If they understand the process, they can begin to improve it (Garvin,1988:207-211). Survey items 46-48 and 50-51 were developed by the authors to determine if accurate data is available to the work center.

Data Use. Ishikawa and Lu emphasize the importance of everyone in the organization becoming involved in the quality control process. This involves, by their definition, the understanding and use of various types of statistical data (Ishikawa and Lu, 1985:44-49). Survey items 49 and 52-53 were developed by the authors to determine involvement with data analysis.

Data Validity. Mann relays several views on data validity. Among them: Deming: much of the voluminous amount of data received by a plant manager in the form of printouts is rightfully discarded; Conway: people cannot deal with effective resolutions if their data deals only with generalities (Mann, 1989:60-62). Survey items 44 and 45 were developed by the authors to determine if data was either too complicated or of little use.

Problem Analysis. Garvin concludes that American industries view the workers as having little to do with work processes. They therefore provide them with very little feedback on the results and give them even less input into diagnosis. The result is workers who do not worry about the cause of problems because they don't even know the problems (Garvin, 1988:207). Many managers do not understand the problems either. "Mobility from one company to another creates prima donnas for quick results" American industry is replete with problem solvers--even if problems must be created or magnified so they can be miraculously fixed (Deming, 1989:121). Item 54 was developed by the authors to determine the extent of problem analysis.

Analysis Time. When production is valued over quality the time spent solving or analyzing problems is seen as counterproductive. Grant et al found that customer service clerks did not waste time on customer problems because doing so caused them to handle fewer calls (Grant et

al, 1988:39-45). Item 55 was developed by the authors to gauge opinions on whether the time spent problem solving was a loss.

Strategic Planning. In the last several years, strategic quality planning has become a common part of corporate strategic planning (Ernst & Whinney, 1987:27). Juran has written extensively on this topic. He identifies four long range quality planning steps: knowing the current environment, trying to assess the future, analyzing the threats and opportunities, and formulating broad directions and goals to be reached by the company (Juran, 1974:6-15). "Quality improvement can take care of existing alligators, one by one. However, to stop the production of new alligators requires shutting down that malignant hatchery" and developing a new benign one with the development of new, useful quality plans (Juran, 1989:82-83). With the emphasis on strategic quality planning as an integral part of overall business strategy, quality experts are now spelling out specific steps for formalized quality planning.

Job Clarity. Planning helps translate the abstract vision into concrete actions that are meaningful to individuals (Jennings, 1989). Harrington describes the importance of tactics--the annually updated, task oriented goals that spell out the specific activities required to get closer to the longer range objectives. He says these tactics allow the individual worker to receive a clear and

specified backing from management (Harrington, 1987:183-1189). And Deming reminds that chaos is the result of everyone doing his best but not knowing what to do (Deming, 1989:19). Survey items 56-59 were drawn from an existing survey set (Jennings, 1986) for this construct.

Mission Linkage. Strategic quality planning must be tied into mission objectives. If there is no linkage, the quality program will continue to explain the past instead of helping to create the future (Garvin, 1988:27). Harrington also emphasizes the importance of linking quality performance to the company. A culture must be established to direct the organization through a clear mission statement, directed at specific customer needs (Harrington, 1987:183-189). Survey items 60-63 and 66-67 were developed by the authors to measure this construct.

Goal Realism. Some of the research on expectancy theory has found evidence that goals must be perceived as realistic before people will try to meet them. Situations can cause people to give up if they know the means to achieve the goals will not be provided (Pinder, 1984). Juran agrees that many people will believe the new quality goals are not attainable and that unless management makes some "sharp breaks" with tradition, they will be right (Juran, 1989:351). Raising expectations and setting difficult goals, can, however, boost motivation and performance if the situation is deemed realistic (Eden,

1988). Survey items 64, 69, and 70 were developed by the authors to measure the perceived difficulty and realism of organization goals.

Human Resource Utilization. Brock, current Secretary of Labor, has stated: "Quality to me doesn't mean a changed product. It means a changed human equation" (Brock, 1988:39). The new equation involves such areas as knowledge of job design, organizational structure, organizationai communication and control, group dynamics, motivation, performance evaluation, and conflict resolution techniques (Daft and Steers, 1986:567). For quality performance the following elements were identified.

Participation. Changes in management structure are necessary. Participative structures must replace the traditional, hierarchical, and scientifically managed organizations. A more open environment of "trust, communication, creativity, and security" with changed roles for both labor unions and managers will result (Rubinstein, 1988:25). "Work-force participation can add significantly to companies' quality performance" (Juran, 1989:295). Item 93 was taken from an existing survey set (Jennings, 1986); items 81, 84, 91, and 106-111 were developed by the authors to measure the perceived level of participation.

Supervisory Relationship. Development of good relationships between management and labor has been key to

the success of NUMMI, the joint venture between Toyota and General Motors. Quality has been a major focus of the plant since the beginning; the organizational structures and work practices reflect a new era of management enlightenment (Rublinstein, 1988:25). Items 88-90, 92, and 101 were developed by the authors to asses the climate of supervisory relationships.

Trust. Trust emerged from the literature consistently (Juran, 1989:114; Persico, 1989:34;). One of Deming's main points is "Drive out fear". Organizations can never reach the highest levels of quality if the employees are afraid to tell managers how the system can be improved. Random error is too often treated as an employee error and too often used to punish people rather than to identify system weaknesses (Deming, 1986:109-115). It is the responsibility of leadership to determine the cause of problems. This can only be done where the worker is not afraid to identify problems and where everyone receives honest feedback on their products and their performance (Deming, 1986:115, 249). Survey items 83, 94-97, and 100 were developed by the authors to measure the extent of trust perceived in the work environment.

Training Adequacy. Workers can not be expected to make continuing improvements in processes without the skills needed to do so (Persico, 1989:34). Employee involvement and motivation are not enough. "The people who do the work

know it best, but they must be trained and given all the information that senior executives have if they are to be effective in helping us run our business (Kearns, 1988:30). The Japanese are known for "overtraining" their workers. Their training involves a broad range of tasks and is continued over time. The level and extent of training results in workers who believe they have more than enough skill to do their jobs well (Garvin, 1988:202-203). Survey items 73-75 were developed by the authors to measure the attitudes toward the adequacy of training received.

Performance Obstacles. The work environment itself may create obstacles to quality performance. Besides providing the proper training, management must provide the necessary resources, and an environment conducive to doing the job right every time (Harrington, 1987:118-119). Survey items 113-116 were drawn from an existing survey set (Jennings, 1986) to measure the types of obstacles to performance perceived by the respondents.

Personal Responsibility. Alexander write about "quality's third dimension"--a human dimension. He proposes that jobs can become more meaningful to people under the new quality philosophy and managers need to recognize this strength of the concept. To be responsible for a meaningful product or service adds meaning to the worker's life and allows him to fulfil more of his higher level needs within the organizational setting (Alesander, 1988:22). Items 77

were 78 taken from the MCAQ; items 85 and 86 were developed by the authors to measure the extent of responsibility expressed by the respondents.

Role Clarity. One important responsibility in the management of human resources is clearly identifying the work results expected. Too often managers will base their decision of acceptable quality on whether or not the production quota has been met (Deming, 1989:). Survey items 97-99 were developed by the authors to measure whether a clear understanding of the requirements of the work are generally understood before the work is done.

Initiative. The first try at implementing quality almost invariable is aimed at trying to motivate the work force (Dumas, 1989:41-44). Items 104 and 105 were developed by the authors to determine whether the respondents felt that most people did lack the initiative to do a quality job.

Personal Utilization. "It has long been known that under the Taylor system the experience and creativity of the work force were major underemployed assets of the companies" (Juran, 1989:293). Everyone doing his best is not enough but, everyone doing his best is essential (Deming, 1989). Survey item 76 was drawn from an existing survey set (Jennings, 1986) to determine whether individuals believed they are being utilized.

Involvement. Good performance has been shown to increase worker involvement; increased involvement leads to greater commitment to future, more complex goals, thus creating a cycle of performance reinforcement (Hall and Foster, 1977:282). Survey item 79 was developed by the authors to determine the extent of involvement.

Active Involvement in Improvement. Quality requires an environment where people will "use their ingenuity to break down obstacles and barriers that face them daily" (Gunneson, 1987:84-88). Item 80 was developed by the authors to measure how actively the respondents were involved in suggesting improvements in the work processes.

Control. (survey item 82) Allowing people to collect data on their jobs and measure their own performance, puts them "in charge of their own destiny" (Denton and Kowalski, 1988:39). If people do not believe they can control the outcome of their work, there is no need to try to improve the process. Before the quality program was implemented in a midwestern paper mill, problems with paper strength variances were dismissed as uncontrollable: "everyone familiar with paper knew that its strength depended on the strength of the wood fibers, and only God makes trees." After studying the process, they discovered they could indeed control the strength (Shainin and Shainin,

1987:48-52). Survey item 82 was developed by the authors to measure the amount of control respondents believe they have over their work center activities.

Expectancy. Quality requires hard work but people will not act unless there is an expectation that hard work will actually provide returns each and every time (Duff, 1989:18-20). Item 87 was developed by the authors to determine whether hard work was perceived to provide results.

Negative Feedback. Negative feedback is an important error detection and compensation device (Bannister, 1986:203). Juran advocates shortening the feedback loop and building feedback into the system to allow early response by the work force (Juran, 1989:146-150). Item 102 was developed by the authors to determine whether negative feedback was received.

Job Constraints. Quality requires that people understand their jobs, be trained to do them properly and have the necessary tools (Crosby, 1989:24). Management cannot expect quality to happen if they don't provide the "necessary infrastructure and resources" (Juran, 1987:25-28). The authors developed item 112 to determine the extent the job itself imposed constraints on quality.

Quality Assurance of Products and Services. Approaches used for quality assurance of products and services fall

into three basic categories depending on who is given the information and the type of analysis performed: inspection, process control, and quality functional deployment (Fortuna, 1988:23). The following elements were developed to measure systems for contributing to the quality of products and services.

Accountability. Improving responsibility and accountability can help boost quality. In the personnel office of Solid State Circuits the work was reorganized so that each person was responsible for an identifiable portion. The increased accountability dramatically improved quality (Denton and Kowalski, 1988:38). Items 120 and 121 were developed by the authors to determine whether people believed they were accountable for their work results.

Inspection. Inspection systems attempt to ensure quality by sorting good products from bad products before they reach the hands of the customer. This represents the earliest stage of product quality measurement. At Hewlett-Packard's Fort Collins Systems Division, for example, the quality department initially owned all of the information about quality because they were responsible for testing and inspection. The big quality transition that has now become obvious is the movement from inspection to process control (Kohoutek, 1988:17). "Inspection to improve

quality is too late, ineffective, costly. But, it is still commonplace" (Deming, 1986:28). Item 117 was developed by the authors to determine the attitude toward inspection.

Resource Availability. Managers must provide the key resources to supplement the energy, motivation, and communication of quality improvement teams (Persico, 1989:33). Survey item 118 was developed by the authors to determine if the respondents believed they have been provided with the key resources need to perform the work.

Blame. "No one should be blamed or penalized for performance that he can not govern" (Deming, 1989:249). Item 119 was developed by the authors to determine if respondents believed they were blamed for quality problems.

Attitude Toward Problem Solving. Some administrative departments at Solid State Circuits were overwhelmed with the new quality program; they didn't know where to begin to isolate anything workable. Leary, Director of Administration, encouraged them to keep trying. Once they found something they could have success with, the interest in solving other problems was automatic (Denton and Kowalski, 1988:39). Survey item 122 was developed by the authors to determine whether people were overwhelmed by their organization's quality problems.

Inspection Use. (survey item 123) If people are afraid the results of inspection will be used to punish

"bad" organizations, the data accuracy will be compromised (Deming, 1989:266). Item 123 was developed by the authors to determine whether respondents believed the results of inspections would be used to blame organizations.

Statistical Technique Practicality. Hunter reports that statistical literacy will become essential to success. Statistical techniques have not been applied as readily as other technology; the failure to understand their application to business has resulted in tremendous lost opportunities (Hunter, 1987:94-97). Survey item 124 was developed by the authors to determine whether statistics was seen as a valuable business tool.

Program Objective. Monitoring the results or quality and meeting specifications are no longer viable strategies at The Eastman Kodak Company. They are now looking beyond the control of processes to the streamlining of processes. Not just the production processes, but all of the other processes involved in anticipating market demands (Chandler, 1988:18). Item 125 was developed by the authors to determine whether respondents believed that just meeting the specifications was good enough.

Statistical Techniques Use. The biggest difference between inspection and process control is the placement of data in the hands of the people who actually own the process. Because they now have real-time, meaningful data (feedback), they "own" the quality of their

own processes, products, and services; they monitor their own quality, and the ownership makes them more apt to improve their processes (Kohoutek, 1988:18). Survey item 126 was developed by the authors to determine who the respondents believed should receive and understand data.

Results from Quality Assurance of Products or Services. The intent of this category of the MBNQA is to measure the actual quality of the goods or services produced. Because this survey measures attitudes, rather than actual quality, this section was directed at the perceived results.

Knowledge of Results. "It is essential to provide knowledge of performance results in a regular and timely manner in order to increase and sustain high levels of motivation" (Harris and Chaney, 1969:209). Feedback is an integral part of the systems theory of management and authors such as Juran, Deming, and Crosby all identify it as important. Survey items 127-131 were developed by the authors to measure the perceived amount of feedback from the customer and outside sources.

Perceived Quality Level. One common obstacle to quality improvement is Groocock's "Toledo Syndrome". The essence is the belief that any and all improvement efforts suggested would be impossible, for one reason or another, to successfully implement (Groocock, 1986:340-341). Survey items 132 and 133 were developed by the authors to determine whether the respondents felt that change was realistic.

Customer Satisfaction. (survey items 134-153) The difference between excellent companies and others is the vigor with which true customer feedback is actually sought. Peters and Austin say that excellent companies have "the smell of the customers". They don't wait for complaints, they actively listen to what the customer wants--now and for the future (Peters and Austin, 1985:284-287).

Knowledge of Customers. To satisfy a customer, an organization must first know who the customer is and what they really want. One of the major impacts of the industrial revolution was to remove this critical link between the worker and the customer (Deming, 1989:179). Items 150 and 151 were developed by the authors to determine the amount of knowledge of the customer respondents believed they have.

Customer Responsiveness. Responsiveness is one of the key factors in successful organizations (Lovitt, 1989:50-51). "Those organizations that will succeed and prosper are well aware of the present customer revolution and are prepared to meet the challenge with the highest standards of service quality, timeliness, and delivery" (Desatnick, 1989:24). Just producing quality products is not enough, successful companies also create "total customer responsiveness" (Peters, 1987:132). Items 136, and 140 to 145 were developed by the authors to determine the extent of customer responsiveness.

Attitude toward Customer. "Callousness or indifference in the delivery of an inherently helpful service destroys much of its benefit" (Peters, 1989:107). Item 134 was developed by the authors to determine the attitude toward customer complaints.

Customer Access. Shuffling customers from one office to another has a tremendous cost--customers do not like it (Gunneson, 1987:84-88). Survey item 135 was developed by the authors to measure how easy respondents believe it is for customers to get access to the right person.

Complaint Knowledge. Many companies still believe that customer complaints can be cured with education; if the customer understood, he would not complain. "Each of us carries around a crippling disadvantage--we know and probably cherish our product. After all, we live with it day in and day out. But that blinds us to why the customer may hate it" (Peters, 1987:188-189). Survey item 137 was developed by the authors to determine whether customer complaints are viewed as a sign that the customer needs "education."

Customer Emphasis. Companies have gone through so many management programs that it is sometimes difficult to convince employees that quality is not just

another "flavor of the month" (Houghton, 1988:17). Survey item 138 was developed by the authors to determine if customer service is perceived as another management fad.

Authority. Excellent companies get everyone involved with service to the customer. Promises are always kept, no matter what it takes to do so. Every action of every person is centered on providing the customer with service (Peters and Austin, 1985:107-109). Survey item 139 was developed by the authors to determine if people believe they have the authority to take action to satisfy the customer.

Customer Feedback Importance. Nonconformance to customer requirements, measured and reported as a gauge of performance, will prompt people to take pro-active steps with customers (Denton and Kowalski, 1988:36-39). Survey item 146 was developed by the authors to measure if customer feedback is used to gauge performance.

Customer Feedback Use (Positive or Negative). Today's quality organization must know the customer so well that it can understand the future needs of those customers as well as any problems related to the use of the product (Scholtes and Hacquebord, 1988:28). Two-way communication between the customer and the supplier can help improve quality (Woodruff and Phillips, 1987:18-19). Survey item 147 was developed by the authors to determine if both positive and negative feedback from customers was routine.

Customer Feedback Use (Negative Only). Too often, the only time real customer feedback is received is when a problem arises. Two-way communication between the customer and the supplier can help improve quality (Woodruff and Phillips, 1987:18-19). Survey item 148 was developed by the authors to determine whether customer feedback was restricted to negative inputs.

Change Based on Customer. Customer feedback is often dismissed as "dream lists" rather than acted on as opportunities (Peters, 1987:185). Item 149 was developed by the authors to determine whether respondents believe changes are made as a result of customer feedback.

Work Consistency. "Apparent differences between people arise almost entirely from action of the system that they work in, not from the people themselves" (Deming, 1989:110). Item 152 was developed by the authors to determine how much of the variance in work output was thought by the respondents to be attributable to the differences between people.

Self Reported Quality Measure. Item 153 was developed by the authors to determine the respondents' overall perception of the quality of their work.

The Dependent Variable

To validate the survey instrument and the resulting predictive model, a current measure of each work center's

quality performance was needed. The Oregon Objectives Matrix (OMX) is currently used in AFLC to monitor performance improvement and was used as the dependent variable (Felix and Riggs, 1983:387-393).

The OMX Theory. The Oregon Objectives Matrix (OMX) was developed by Felix and Riggs as a total-factor productivity improvement measurement tool. As discussed in Chapter One, the measurement systems currently used in many corporations are single-factor indicators. As such, they do not consider the interaction effects of the various decision trade-offs managers must make. Single-factor measurement systems contribute to what Juran calls "the urge to suboptimize" management action and as such do not indicate the benefits of a more balanced management strategy (Juran, 1989:112-113).

The OMX is a system which establishes a common numerical scoring system for management selected performance criteria, and combines the scores of all the measured criteria into a single, overall productivity (performance) index. When developing the OMX, management weights the relative importance of each performance objective so the index will provide an accurate assessment of how well managements mission objectives are being met. Some sample measurement areas are Late Orders/Total Orders and Defective Units/Total Units.

The OMX was used as the dependent variable in this study for two reasons. First, AFLC is currently using the OMX to track productivity improvements. Second, the matrix, although aimed at measuring productivity, is a direct indicator of quality performance. The authors of OMX explain the productivity and quality relationship as follows:

> It is extremely important to recognize the relationship between productivity and quality before going further.
>
> $$\text{PRODUCTIVITY} = \frac{\text{Goods + Services}}{\text{Resources}}$$
>
> To improve productivity, organizations increase goods and/or decrease resources. However, goods and services can be increased by both their amount and by their value. That is, we can produce the same number of bookshelves, but if they are of higher quality (say a hand rubbed finish), their value rises and, therefore, so does productivity. Likewise, if we are quality conscious when making the shelves, and don't waste lumber, nails, lacquer, energy, and time, the amount of resources necessary to produce each bookshelf is less, and productivity rises even further. (Felix and Riggs, 1983:387)

The quality literature also supports the tie between quality and productivity, stating that defect prevention is perhaps the most effective way to improve productivity (Groocock, 1986:72) and that quality and productivity share many of the same roots and are positively correlated (Garvin, 1988:84-89). The emphasis on improvement over time is also consistent with the continuous improvement philosophy of TQM.

The OMX Application at AFLC. The use of the OMX in AFLC began in the Depot Maintenance (MA) organization in

1983. Robert Darling, the senior civilian executive during this time, was a catalyst for revitalization of the organic repair industrial base. PACER IMPACT (nickname for a 10-year plan for improving productivity) translated his vision for AFLC MA organizations. He emphasized improvements in five basic areas: Methods and processes, material and asset management, work force motivation and development, environmental impacts, and technology insertion. Frustrated by his inability to reinforce these ideals with existing, short-term, single-factor measurement systems, he chartered a group to find a way to track long-term progress in balance with short-term measures. OMX was the team's recommendation.

The MA version of the OMX was developed to measure progress on the following questions.

1. Are we doing what needs to be done to meet customer requirements for repair?
2. Are we repairing things on time?
3. Are we finding ways to repair things faster?
4. Are we constantly improving the quality of everything we do?
5. Are we improving the management of our people, money, facilities and equipment so we can continue to do the first four things?

February 25, 1986, Executive order 12552 required federal agencies to improve productivity 20% from 1985 to

1992. The OMX was then adopted by other organizations in AFLC to document their improvement and baselines were set to the 1985 performance data. The scores used in this study reflect improvement from 1985 to the end of the second quarter of FY89.

Summary

Elements identified in the review of the quality and organizational performance literature were used as the basis of the items in the survey instrument. The data analysis will evaluate the elements for ability to predict quality performance. The resultant model will become The Quality Quotient.

IV. Analysis and Findings

Chapter Overview

This study was performed to determine what measurable attitudes and behaviors (measurable through a survey) can be used to predict or differentiate between groups with differing quality performance levels. Chapter III, the literature review, was conducted to develop survey items through search of quality and related literature. This chapter presents results of the analysis defined in Chapter II, based on the data collected as a result of administering the survey developed from the findings in Chapter III.

Survey Analysis

Response Rate. The initial intention was to obtain at least 30 sample groups, with 30 individual respondents in each group. Due to both lack of time and printing errors (several survey booklets contained missing pages), only twenty eight groups of surveys were available for analysis. Groups surveyed and office symbols are not identified since a condition for their participation was anonymity. Any of the survey groups wishing to receive results specific to their group can obtain them directly from one of the authors.

Variable Definition. Factor analysis was used to group together those survey items that measured the same

psychological phenomena or component. Each section of the survey was analyzed separately using the SPSS default factor analysis procedure, principal components analysis (SPSS Inc. 1983:650). Results of the factor analysis are summarized in Appendix B.

Each factor (group of survey items) defined from the factor analysis was treated as a single variable for all the remaining statistical procedures. This allowed the reduction of variables from the original 153 (number of survey items) to 57.

Reliability analysis was performed to ensure the survey items identified as composing a factor were consistently interpreted by survey respondents as a whole. For the purposes of this research, reliability coefficients higher than .60 (Cronbach's α) were considered adequate reliability coefficients. Results of the reliability analysis are displayed in Appendix C.

Predicting Performance. Regression analysis was performed on 21 groups, those groups whose Oregon Productivity Matrix Scores were available. A listing of the groups' raw and standardized Matrix scores are at Appendix D (again, the groups are not identified due to the guarantee of anonymity).

Prior to performing the regression analysis, correlation coefficients were examined for evidence of high

correlation between predictors. To avoid multicollinearity problems, several variables were removed from the analysis. The listing of variables removed, due to a correlation of .70 or greater with another variable is at Appendix E.

Table 1

Regression Analysis Results for Predicting Standardized Oregon Productivity Matrix Scores

Multiple R	.88
R Square	.77
Adjusted R Square	.71
Standard Error	.51

Analysis of Variance:

	DF	Sum of Squares	Mean Square	F	Sig F
Regression	4	13.79	3.45	13.07	.0001
Residual	16	4.24	.26		

----------Variables In the Equation----------

Variable	B	SE B	Beta	F	Sig F
Data Validity	-2.11	.37	-.72	33.17	.0000
Stat Technique Use	-1.29	.34	-.49	12.34	.0017
Customer Feedback Use (Neg Only)	.83	.28	.38	8.68	.0095
Analysis Time	.89	.30	.36	8.41	.0104
(Constant)	7.54	2.46		9.38	.0075

Regression analysis resulted in the entry of twenty variables into a predictive equation. However, only the first four variables entered contributed enough to the change in adjusted R square and lowering of the standard error to be included in the predictive equation. The results of the regression analysis after entry of the fourth variable are shown at Table 1.

The probabilities associated with the overall F-statistic (.0001) and the individual probabilities associated with the Beta coefficients (under Sig F at Table 1) are all statistically significant. That is, there is evidence the Beta coefficients are not equal to zero and therefore produce a meaningful linear regression equation (Ott 1988: 369, 378).

Multiple R of .88 displays a strong correlation between the predictors and the dependent variable (Hedderson 1987: 105). In addition, the proportion of variance explained in the dependent variable associated with the variance in the four predictors is also high at .71 (Adjusted R Square).

The Beta column in Table 1 indicates the value of the standardized regression coefficients. Beta represents the effect that a standard deviation change in the predictor would have on the dependent variable. Based on the Beta coefficients, Data Validity has the strongest impact on the dependent variable, with Statistical Technique Use second, Negative Feedback Use third, and Analysis Time fourth.

The unstandardized beta coefficients appear in the column under the heading B in Table 1. The regression equation resulting from this forward regression procedure is *"The Quality Quotient": Predicted Standardized Oregon Productivity Score = -2.11(Data Validity) + -1.29(Statistical Technique Use) + .84(Customer Feedback Use - Negative Only) + .89(Analysis Time) + 7.54.* The standard

error in prediction is .51. Since the predicted score is a standardized score (a Z-score, ranging form -3 to +3), a standard error of .51 is somewhat high, although not unacceptable.

Also of importance in the equation are the effects of each of the predictors on the dependent variable. Both Data Validity and Statistical Technique Use have a negative effect on the dependent variable. Negative Feedback Use and Analysis Time both have a positive effect on performance (the dependent variable). Each variable is discussed below:

Data Validity. The data validity variable is composed of two survey items, 44 and 45. Survey item 44 asks respondents, on a seven point scale from "Strongly Agree" (coded 7) to Strongly Disagree (coded 1)if "Your organizations data system is more complicated than it needs to be." Survey item 45 asks (on the same scale) if "Your organization's data system does not seem to collect the right kind of data." The negative beta weight points out that the better performers have the data systems that are more complicated and do not seem to collect the right kind of data.

Interpretation of this finding is difficult. First, because it is counter intuitive, and does not agree with the findings of the literature review. One would hypothesize that top performers would have an easy to use, useful data system. Several guesses can be made as to why

this finding occurs. One hypothesis would be that the data system currently in use is in fact too complicated and does not collect the right kind of data - and that the top performers realize this and deal with it in an appropriate manner. Another would be that the survey respondents interpreted the questions differently than they were intended, however, the reliability of the variable was .65, so in any case the respondents viewed the items in a fairly consistent manner.

Statistical Technique Use. This variable consists of one survey item, 126. Also on the same scale from "Strongly Agree" to "Strongly Disagree", this item asks if respondents believe "Statistical quality control should only be used and understood by Quality control/Quality Assurance personnel (experts in the Quality Division)." The negative beta weight for this item also contradicts quality expert opinion as found in the literature review. This finding points out that the more respondents believe statistical quality control is only for quality experts, the better is their performance.

Again, one can only hypothesize why this finding occurs. One likely reason is that if quality experts are right and all levels of personnel should learn appropriate statistical control techniques), the top performers have

been insufficiently trained, or have seen little demonstrated use of statistical process control in their work setting.

Another reason for this finding could be that the top performers are right in believing that statistical quality control is better left in the hands of experts. Whatever the reason, the top performers in the surveyed groups believe that statistical process control is better left in the hands of quality control experts.

Customer Feedback Use (Negative Only). This variable consists of one survey item, 148. The survey item asks if "The only time you hear about a customer is if something bad has just happened." The beta weight for this item is as expected: those who answered in a more positive manner, responding toward the "Strongly Disagree" end of the scale, were the better performers.

Analysis Time. This variable also consists of only one survey item, 55. The survey item asks if the respondents believe "Time lost trying to resolve the cause of a problem is easily regained." The positive beta weight for this survey item is also as expected. Those respondents believing that time lost trying to resolve problems is easily regained were the better performers.

Discriminating Performance Levels. Discriminant analysis was used to determine which variables allow

prediction of differing levels of quality performance. The dependent variable was again (as in the regression analysis) the standardized (Z-score) Oregon Productivity Matrix Score (Appendix E). Results of two separate discriminant analyses are discussed below. These results are based upon analysis of data available from the 21 groups with Oregon Productivity Scores. The same variables excluded from the regression analysis (Appendix F) to avoid multicollinearity problems, were excluded from the discriminant analyses.

Table 2

Results of Discriminant Analysis #1
(Top 50% to Bottom 50%)

Standardized Canonical Discriminant Functions:

Variable	Function
Goal Realism	-1.80
Data Use	-1.77
Trust	1.68
Performance Obstacles	1.67
Data Validity	1.26
Training Adequacy	.98

The first discriminant analysis focused on discriminating between the top 50 per cent performers (those with standardized Oregon Productivity Scores greater than or equal to 0) and the bottom 50 per cent (those with standardized scores less than 0). Table 2 summarizes the

results of this discriminant analysis. Variables are listed in order of their relative importance to the group separation based on the absolute size of the standardized canonical discriminant function.

One discriminant function was calculated with a Chi Square of 13.03, significance of .04. SPSS procedures perform an internal check of prediction ability, cross checking predicted group membership versus actual group membership. Prediction accuracy was 86%, with 20 out of 21 groups accurately classified.

A second discriminant analysis was performed to separate out those variables that would predict the top 25% performers or the bottom 25% performers. Again, the standardized Oregon Productivity Matrix Score was used as the dependent variable. Results of discriminant analysis number two are at table 3. Variables are listed in order of their relative importance to the group separation based on the absolute size of the standardized canonical discriminant function. Unlike the beta weight in regression analysis, the sign of the standardized canonical discriminant function does not portray the direction of influence by a predictor on the dependent variable (Hedderson 1987: 133).

For the second analysis one discriminant function was also calculated with a Chi square of 14.202, significance of .00. Three predictor variables resulted in a prediction accuracy of 100%. Removal of another variable (Data

Validity, with the smallest standard canonical discriminant function) from the equation resulted in an insignificant Chi square (significance of .21), casting doubt on the ability of just two variables to accurately discriminate.

Table 3

Results of Discriminant Analysis #2
(Top 25% to Bottom 25%)

Standardized Canonical Discriminant Functions:

Variable	Function
Job Specificity	-2.02
Goal Clarity	1.86
Data Validity	1.26

Differences Between Groups. Oneway analysis of variance was performed for each of the 57 variables to determine if the 26 groups differed in their mean responses. If there was a statistically signiticant difference for at least one group (using the F-statistic at α=.05) a T-test (Fisher's Least Squared Difference) was performed to determine which group's means were significantly different. A summary of the analysis of variance procedure for each variable are at Appendix F.

The hypothesis test used for each variable was identical and is as follows:

Ho: All group means are equal.

Ha: At least one group mean is different.

Test Statistic: F-statistic

Rejection Region: Probability of F < .05

Using the above criteria, the only variables where group means did not significantly differ are listed in Table 4.

Table 4

Variables Where Group Means Were Not Significantly Different

Variable	Mean	S.D.
Continuous Improvement	5.25	.35
Self Expectation	6.10	.27
Personal Commitment	5.91	.20
Problem Analysis	3.34	.30
Analysis Time	4.17	.38
Goal Realism	4.33	.28
Stake In Goals	5.57	.27
Training Adequacy	4.84	.29
Performance Obstacles	4.18	.22
Control	3.21	.38
Expectancy	5.61	.25
Negative Feedback Immediacy	5.58	.31
Statistics Technique Practicality	4.50	.31
Program Objective	3.23	.25
Statistical Technique Use	4.94	.36
Actual Quality Level	3.86	.34
Customer Emphasis	4.93	.32
Change Based On Customer	4.42	.25
Work Consistency	2.80	.33
Self Reported Quality Measure	6.14	.18

Included in Table 4 are the mean scores and standard deviation (across all) groups for each of the variables. All variable scores were converted to a seven point scale for ease of comparison with other variables.

For all other variables the F-statistic was significant. Analysis of variance results for all variables, and the individual group means and results of the T-test (Least Squared Difference) procedures for variables with significant F-statistics are at Appendix F.

It is important to note that all survey items were coded to reflect a positive slant for all statistical procedures. So, when interpreting mean scores for any one variable, the higher the score, the more favorable is the response (in terms of its hypothesized effect on quality).

The analyses of variance were performed to help determine if the survey questions were written in such a manner as to differentiate between responses of different groups. For 44 variables, there is statistically significant evidence that groups do differ in their responses. There is insufficient evidence to support the differentiating ability of questions in only 20 of 64 variables (as shown in table 4). However this could mean that groups in fact do not differ in their responses, not that the survey items are incapable of discriminating.

Summary

Data analysis resulted in a predictive equation for quality performance (Quality Quotient) through regression analysis. Although the regression analysis findings did not totally agree with quality expert consensus on the direction of influence on several variables, the strength of influence was confirmed by the strong association of the predictors with the dependent variable evidenced by the high multiple R and R Squared statistics.

In addition, several other variables were pointed out as strong discriminators between differing levels of quality performance through discriminant analysis.

V. Results

Chapter Overview

This chapter provides a summary of the results as they relate to the research questions and makes recommendations for further research.

Research Question 1: What Elements Contribute to Organizational Quality Development?

The literature review identified a multitude of factors which are reported to affect quality performance. There are common elements in many of the references used, but it is clear there is no universally recognized model. From the literature reviewed for this research, and the factor analysis performed, 153 separate survey items were developed. These survey items were grouped together into 57 variables through the use of factor analysis.

The original 153 survey items were too many to be of complete use for the researchers. It was also too many for SPSS statistical procedures to handle efficiently (SPSS can only handle 75 items at one time for factor analysis). In addition, there is evidence that many of the factors being highly correlated to each other could be combined for future studies. In fact, fourteen factors (possible predictors) were eliminated from the regression and discriminant analyses because of high correlation with another predictor.

The authors recommend that future research take a more focused, narrow approach. Rather than identify as many possible predictors as can be found, research should be conducted into the relationship between specific predictors and quality performance.

Research Question 2: How can these Elements Be Measured in a Quantitative Manner?

Each of the elements identified appeared to have attitudinal and/or behavioral aspects associated with it. A survey instrument was therefore developed to collect data on each of the elements for each group.

Many respondents reported the survey was too long. Future studies should consider administering only portions of the instrument to measure specific aspects of performance.

Research Question 3: Can Attitudinal Differences be Found in Organizations with Differing Quality Performance Levels?

The survey was generally useful in quantifying differences among groups. A few factors did not differentiate well, but it is difficult to determine whether this is due to the irrelevance of the factor, to the possibility that there was no actual difference in group attitudes or behaviors for those factors, or to ambiguity in the questions.

Because some of the items did not demonstrate the ability to differentiate among the surveyed groups, it may be possible to shorten the instrument. Further research in other organizations should be conducted to determine if there are factors in the current instrument which do not differentiate among groups; these items should eventually be removed from the survey.

Research Question 4: Can These Differences be Used to Predict Quality Performance or Differentiate Between Organizations of Differing Performance Levels?

The Predictive Model. A four factor model was derived from the regression analysis to predict quality performance: Data Validity, Statistical Technique Use, Customer Feedback (Negative Only), and Analysis Time.

Both the Customer Feedback Use (Negative Only) and Analysis Time were positively related to the performance indicator. This reflects the expected customer orientation of the work group (the only time they hear about customers is not when something bad has just happened) and the expected attitude toward spending time to solve problems (time lost trying to solve problems is easily regained).

The first two factors (Data Validity and Statistical Technique Use), however, were negatively correlated with performance; these results are contrary to the opinions of experts in the field. Data Validity was intended to measure the complexity and accuracy of the data system. The higher

performing organizations reported that their data systems were more complicated than they needed to be and that these complicated data systems did not seem to collect the right kind of data. Perhaps another series of questions should be asked to fully understand these findings.

1. Do the organizations even use these systems, or do they use other (manual, or even personal computer) systems? Is there a need for "a second set of books" in an organization plagued with an antiquated automated system which is not responsive to quality requirements?

2. Or, is quality really very simple with only a few pieces of data required to effectively perform?

3. Or, are the best organizations in this study still in an infant stage of quality performance where the emotional high of early success has taken place but the hard reality of continuous improvement has not yet been discovered?

Further research is indicated to determine the reason for the findings.

The Discriminate Model. Six variables were found to discriminate between the upper 50% and the lower 50% of the groups in the study: Goal Realism, Data Use, Trust, Performance Obstacles, Data Validity, and Training Adequacy. The ability of these predictors to discriminate suggests that higher performing organizations have created an

environment of trust, have set realistic goals for performance, have identified and removed barriers that inhibit performance, have provided adequate training on how to do the job properly and have established a system which allows employees to monitor and collect meaningful data on their work and problems.

Further research is indicated to test these hypotheses since discriminate analysis does not reflect the direction of the relationship of each variable.

A second analysis was performed to discriminate between the top 25% and the bottom 25% of the work groups. Three variables were significant in this approach: Job Specificity, Goal Clarity, and Data Validity. This would tend to suggest that work groups where people know exactly what is expected of them, understand how their work relates to the organizations mission, and have valid data to determine the results of the work are the highest performers.

Again, further research is indicated to test the direction and strength of these variables.

Summary

This chapter summarized the findings of this study and made several recommendations for further research. Although the authors did develop a predictive formula for quality performance (The Quality Quotient), the direction of influence of two predictors (Data Validity and Statistical

Technique Use) were not as hypothesized by quality experts. Further research was recommended to find out the reason why the influence of the predictors was not as hypothesized.

APPENDIX A: Survey Instrument

INSTRUCTIONS

This questionnaire contains 153 items (individual "questions"). All items must be answered by filling in the appropriate spaces on the machine-scored answer sheets provided. If for any item you do not find an answer that fits your situation exactly, use the one that is closest to the way you feel. There are no right or wrong answers.

Please use a "soft-lead" (No. 2) pencil, and observe the following:

1. Make heavy black marks that fill in the space or the answer you select.

2. Erase cleanly any answers you wish to change.

3. Make no stray markings of any kind on the answer sheet.

4. Do not staple, fold, or tear the answer sheet.

Do NOT fill in your name on any sheet. This way your answers will be anonymous.

Each answer block has 10 spaces (numbered 1 through 10) or a 1-10 scale. The questionnaire items normally require an answer from 1-7 only, therefore, you will rarely need to fill in a space numbered 8, 9, or 10. Questionnaire items are answered by marking the appropriate space on the answer sheet as in the following example:

SCALE:

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

Sample Item 1:

Your supervisor trusts you.

(If you "moderately agree" with sample item 1, you would "blacken in" the corresponding number of that statement (moderately agree = 6) on the answer sheet for the item numbered "sample item 1.")

Sample answer: 1 2 3 4 5 6 7 8 9 10

Take your time in answering the following questions. If you have any questions, please feel free to talk with the person administering the questionnaire.

SURVEY QUESTIONS

This section of the survey obtains information about your background. The information requested is to ensure that the groups you belong to are accurately represented, not to identify you as an individual. Please use the separate response sheet and darken the oval that corresponds to your response to each question.

1. Total months in present job position.

1. Less than one.
2. One to five.
3. Six to eleven.
4. Twelve to seventeen.
5. Eighteen to twenty three
6. Twenty four to thirty six.
7. Thirty seven or more.

2. Your highest education level.

1. Non-high school graduate.
2. High school graduate or equivalent.
3. Less than two years college.
4. Associate Degree or equivalent.
5. Bachelors Degree.
6. Masters Degree.
7. Doctoral Degree.

3. How many people do you directly supervise?

1. None.
2. One.
3. Two.
4. Three
5. Four or five.
6. Six to Eight
7. Nine or more.

4. What is your age?

1. Under 21
2. 21 to 30
3. 31 to 40
4. 41 to 50
5. 51 to 60
6. 61 or over

5. What is your pay scale?

1. WG
2. WL
3. WS
4. GS
5. GM
6. Officer
7. Enlisted

6. What is your pay grade (civilian or military)?

1. 1 or 2
2. 3 or 4
3. 5 or 6
4. 7 or 8
5. 9 or 10
6. 11 or 12
7. 13 or Higher

7. Choose the answer which best describes your involvement in group problem solving teams.

1. I am currently a member of a Process Action Team (PAT), a Corrective Action Team (CAT), a Quality Circle (QC), or other group problem solving team.

2. I have been a member in the past and I would eagerly participate again.

3. I have been a member in the past and I hope I am never asked to participate again.

4. I have never participated on a group problem solving team.

8. Current total years of government service.

1. Less than one.
2. One to five.
3. Six to eleven.
4. Twelve to seventeen.
5. Eighteen to twenty three.
6. Twenty four to thirty six.
7. Thirty seven or more.

I. LEADERSHIP

This section will ask for information about the leaders in your organization. Primary intention is to determine if leadership emphasizes quality as part of the company's value system, through both personal action and through demands on employees. Use the separate response sheet and darken the answer that corresponds to your response using the scale provided below.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

9. Your supervisor makes you feel free to talk to him/her.

10. Your supervisor is frank and candid with you.

11. Your supervisor encourages you to let him/her know when things go wrong on the job.

12. The communication between you and your supervisor is good.

13. Your supervisor is open and honest with you.

14. You are free to tell your supervisor that you disagree with him/her.

15. Your supervisor is willing to tolerate arguments and give a fair hearing to all points of view.

16. You are receiving information from the sources (for example from senior supervisors, coworkers, senior management, newsletters) that you prefer.

17 You receive a lot of support from people in your organization.

18. You are receiving information at the same time you need it.

19. Your opinions make a difference in the day to day decisions that affect your job.

20. You can expect that suggestions you make will be heard and seriously considered.

21. This organization is always moving toward the development of new answers.

22. In your organization, people are allowed to try to solve the same problem in different ways.

23. Creativity is encouraged in your organization.

24. People in your organization are always searching for fresh, new ways of looking at problems.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

25. People in your organization are always trying out new ideas.

26. Your organization is open and responsive to change.

27. In your organization, people try new approaches to tasks, as well as tried and true ones.

28. Managers in your organization are always thinking about the future.

29. Managers in your organization are more interested in their own success than in the success of the organization.

30. Managers in your organization seem to have a clear understanding of their responsibilities.

31. What happens in your organization is really important to you.

32. Continually improving work results is an unrealistic goal.

33. Your boss should be satisfied with the output of your work center, that is, continually looking for improvements to work methods is a waste of time.

34. In this organization, you don't seem to have time to do things right.

35. For an increase in quality, there is a decrease in productivity.

36. Your supervisor expects perfection in your work.

37. You expect perfection in your work.

38. Your organization expects perfection from all its employees.

1 = Non-existent
2 = Extremely Weak
3 = Weak
4 = Average
5 = Good
6 = Excellent
7 = Outstanding

Using the scale above, please rate the following:

39. Your organization's overall commitment to producing quality work.

40. Top leadership's commitment to quality.

41. Your supervisor's commitment to quality.

42. Your co-workers' commitment to quality.

1 = Non-existent
2 = Extremely Weak
3 = Weak
4 = Average
5 = Good
6 = Excellent
7 = Outstanding

43. Your commitment to quality.

II. INFORMATION AND ANALYSIS

This section will test the scope, validity, use, and management of data required to enact a total quality system. Also, the adequacy of the data and information to support a prevention based approach to quality is examined. Use the separate response sheet and darken the answer that corresponds to your response using the scale provided below.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

44. Your organization's data system is more complicated than it needs to be.

45. Your organization's data system does not seem to collect the right kind of data.

46. Data is collected on all important aspects of your work center.

47. Your organization can usually get the data you need to determine the cause of problems.

48. The data used to evaluate your work center is accurate.

49. You understand what type of data is collected on your work center and can explain what it is used for.

50. When you need information you can rely on getting it promptly.

51. When a problem occurs, the data is readily available to determine the cause.

52. You always collect data and keep records on your work.

53. When you identify a problem you can get the data you need to prove your point.

54. If a problem occurs in your work center you don't waste a lot of time worrying about why it happened, you just fix it and get back to work.

55. Time lost trying to resolve the cause of a problem is easily regained.

III. STRATEGIC QUALITY PLANNING

This category examines the inclusion of quality improvement planning into overall business planning, to include the area of goal setting. Use the separate response sheet and darken the answer that corresponds to your response using the scale provided below.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

56. You know exactly what is expected of you in performing your job.

57. You understand clearly what your supervisor expects you to accomplish on the job.

58. What you are expected to do at work is clear.

59. You understand the priorities associated with what you are expected to accomplish on the job.

60. Top management clearly communicates how it plans to achieve center goals and objectives.

61. You know exactly how attainment of work center goals contributes to the attainment of mission objectives.

62. Your supervisor clearly identifies those work processes that need improvement.

63. You understand exactly how your work impacts the attainment of work center goals.

64. Your organization's goals are often unrealistic.

65. It takes a high degree of skill to attain the results expected in your organization.

66. Your supervisor almost always supports your personal work goals.

67. Your organization's goals make a lot of sense.

68. You have a personal stake in your organization's effectiveness.

69. Goals and objectives are necessary, but do not have much to do with everyday operation of your work center.

70. It is a waste of time to review goals and objectives periodically, as precise plans are never really laid out to ensure their accomplishment.

71. It is much easier to work alone, or with people you don't know well.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

72. Your peers are more committed to work center goals than your supervisor.

IV. HUMAN RESOURCE MANAGEMENT

This category examines the companies efforts to develop and utilize the work force potential for quality and to maintain an environment conducive to full participation, continuous improvement, and personal and organizational growth. Use the separate response sheet and darken the answer that corresponds to your response using the scale provided below.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

73. You have all the skills you need in order to do your job.

74. You have more than enough training and skills to do your job well.

75. You do not have enough training to do your job well.

76. Your special skills and talents are not used in your present job.

77. You feel personally responsible for the work you do on your job.

78. You deserve credit or blame for how well your work gets done.

79. Worker involvement in planning, implementing and evaluating work center activities is a necessary ingredient in attaining excellence.

80. You often make suggestions for improving work conditions and processes.

81. Management encourages, and often discusses with the work force new ideas for improving how jobs are done.

82. You have little control over work center activities.

83. Rules and regulations of your organization often hinder your performance.

84. Your ideas for improving work conditions and processes are often implemented.

85. Your personal effort is key to your work center's performance.

86. Efforts of your work center are key to the success of your organization's Quality Program.

87. Hard work results in better performance.

88. In your organization, those who contribute the most get the best rewards.

89. Your supervisor consistently rewards top performers.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

90. Your supervisor trusts you.

91. Members of your work center are encouraged to assess each other's efforts with an aim at improving your work center's performance.

92. You trust your supervisor completely.

93. When management says something you can really believe it is true.

94. People in your organization will do things behind your back.

95. Your organization cares more about money, machines and politics than people.

96. Your organization will take advantage of you if you give it a chance.

97. You know exactly what is expected prior to undertaking any specific task.

98. When working with others, you know exactly what is expected of them prior to undertaking a task.

99. You know who makes the decisions in your organization and how the decisions are reached.

100. Your most frequent feedback is criticism.

101. Your supervisor provides immediate feedback when work results are good.

102. Your supervisor provides immediate feedback when results are bad.

103. When you do something wrong, you can tell. Nobody needs to point it out.

104. Most people do not have the initiative to do that "little bit extra needed to really do the job right.

105. Most people must be forced to do more than just what is required.

106. People in your organization are always searching for fresh, new ways of looking at problems.

107. In your work center there is a great deal of opportunity to be involved in resolving problems that affect your work center.

108. Informational cross feed between work centers and departments is encouraged and is often used for problem solving.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

109. Honest, open communication exists between all levels of your organization.

110. Management is deeply involved in group problem solving with the work force.

111. Management promotes and often requires meetings with your coworkers to discuss job related issues/problems.

Use the rating scale below to indicate how often each performance obstacle or constraint poses a problem for you.

1 = Always
2 = Very often
3 = Often
4 = Sometimes
5 = Rarely
6 = Very rarely
7 = Never

112. Job induced constraints (factors in the actual makeup of the job itself such as machine breakdown, inadequate tools and supplies, etc.).

113. Communication obstacles (restrictions in communication with others important to getting your job done).

114. Administrative or policy constraints (rules, regulations and requirements that make it harder to do a good job).

115. Work group constraints (actions or attitudes of your immediate work group that make it harder to do a good job).

116. Supervisor constraints (actions or attitudes of your immediate supervisor that make it harder to do a good job).

V. QUALITY ASSURANCE OF PRODUCTS AND SERVICES

This section examines the approaches used for total quality control of goods and services based primarily upon process design and control, to include control of procured materials, parts and services. Also examined is the integration of quality control with continuous quality improvement. Use the separate response sheet and darken the answer that corresponds to your response using the scale provided below.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

117. Your organization needs more inspectors.

118. You have no problem obtaining the tools, equipment and supplies necessary to do your job.

119. Usually, when there is a problem in your work center, it is blamed on the workers.

120. If you make a mistake another worker is usually asked to correct it.

121. You are held accountable for your mistakes and are required to take action to prevent their recurrence.

122. Your organization has so many problems it will never be able to solve them all.

123. The results of audits and inspections are used to punish bad organizations.

124. Statistical quality control techniques are only theoretical and not useful in practice.

125. The objective of your organization's quality control program are met when product specifications are met (when your work is within acceptable standards).

126. Statistical quality control should only be used and understood by Quality Control/Quality Assurance personnel (experts in the Quality Division).

VI. QUALITY RESULTS

This section examines quality and quality improvement levels as compared to expectations and competing groups or organizations. Use the separate response sheet and darken the answer that corresponds to your response using the scale provided below.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

127. Complaints are rarely ever received about the work of your organization.

128. The results of work in your organization meet your customers standards.

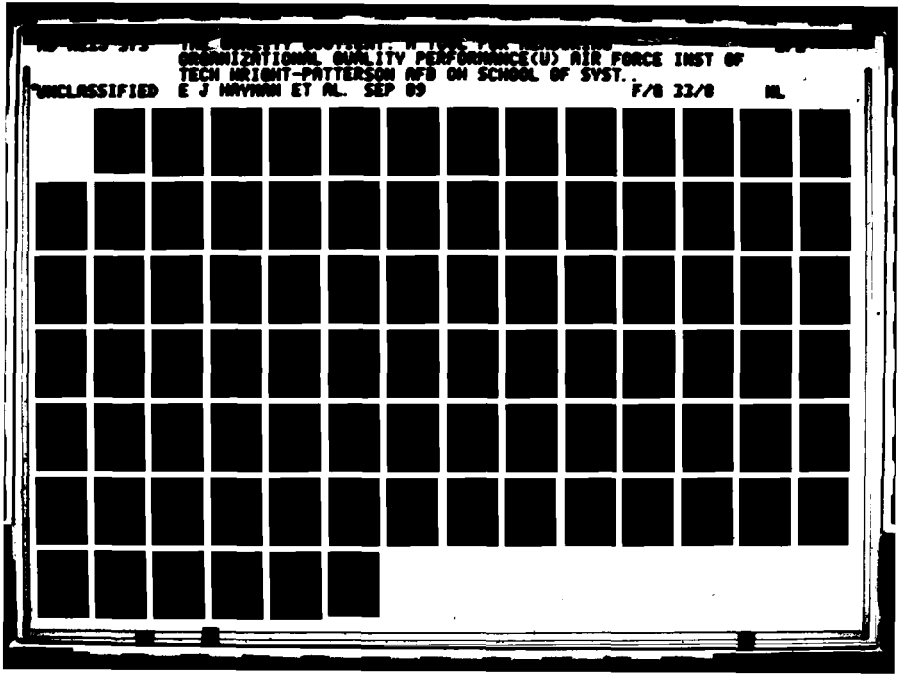
129. Outside groups often wonder how you are able to perform so well.

130. Your organization is the best it has ever been.

131. In your organization everyone knows how important it is to do things right.

132. Your organization has changed so many things it is a wonder you do anything right.

133. In your organization there are so many things that can go wrong that there is no way to avoid all of them.


ORGANIZATIONAL QUALITY PERFORMANCE(U) AIR FORCE INST OF
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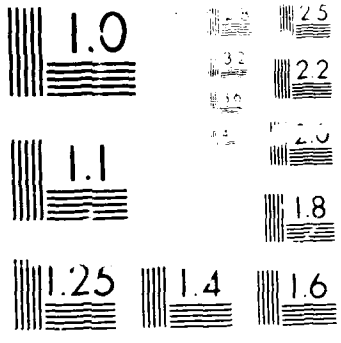
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VII. CUSTOMER SATISFACTION

This category examines respondents knowledge of the customer, customer service system and responsiveness, as well as current level and trends of customer service. Use the separate response sheet and darken the answer that corresponds to your response using the scale provided below.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

134. Most of the customer complaints you receive are frivolous.

135. Your customers have the right to call and talk to the person who did the work if they are unhappy about it.

136. If a customer complains about something, immediate action is taken to identify the problem.

137. Your customers do not understand the problems you have. If they did, they would only complain about the big things.

138. Customer satisfaction is just another set of "buzzwords" and for the most part receives only "lip service."

139. You are given the authority to do whatever is necessary to satisfy the customer.

140. Customers are given the fastest possible feedback to their questions.

141. Customers can count on getting the experts to answer their questions.

142. It is easy for the customer to get in contact with the experts.

143. Customers receive courteous treatment from your organization.

144. Customers know what your work center does for them.

145. Your work center has the reputation of being trustworthy, believable, and honest in dealings with others.

146. The most important measures of your performance are obtained through customer feedback.

147. You always receive information on customer reactions (good or bad) when it involves your work.

148. The only time you hear about a customer is if something bad has just happened.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

149. In this organization, you often make changes based on inputs from your customers.

150. You know exactly how many customer complaints your organization has received in the last month.

151. You know exactly what percentage of work done by your organization receives complaints.

152. The results of work performed by your work center depend greatly upon who performs the work.

FINAL QUESTION:

153. On a scale of 1 to 7 (one is the worst and seven the best) please rate the quality of your work.

APPENDIX B: Variable Listing/Results of Factor Analysis

Survey Section I/Items 9 to 43:

Variable	Items
Supervisory Communication	9 to 15
Corporate Culture	16 to 28, 30
Commitment	36, 38 to 42
Continuous Improvement	32, 33
Management Interest	29
Alignment	31
Frustration	34
Quality vs. Productivity	35
Self Expectation	37
Personal Commitment	43

Survey Section II/Items 44 to 55:

Variable	Items
Data Availability	46, 47, 48, 50, 51
Data Use	49, 52, 53
Data Validity	44, 45
Problem Analysis	54
Analysis Time	55

Survey Section III/Items 56 to 72:

Variable	Items
Job Specificity	56 to 59
Goal Clarity	60 to 63, 66, 67
Goal Realism	64, 69, 70
Goal Difficulty	65
Personal Work Goal Support	66
Stake in Goals	68
Goal Commonality	71
Goal Commitment	72

Survey Section IV/Items 73 to 116:

Variable	Items
Participation	81, 84, 91, 93, 106 to 111
Supervisory Relations	88 to 90, 92, 101
Trust	83, 94 to 97, 100
Training Adequacy	73 to 75
Performance Obstacles	113 to 116
Personal Responsibility	77, 78, 85, 86
Role Clarity	97 to 99
Initiative	104, 105
Skill Utilization	76
Involvement	79
Active Interest in Improvement	80
Control	82
Expectancy	87
Negative Feedback Immediacy	102
Resistance to Feedback	103
Job Constraints	112

Survey Section V/Items 117 to 126:

Variable	Items
Inspector Adequacy	117
Resource Availability	118
Blame	119
Accountability and Correction	120
Accountability and Prevention	121
Attitude Toward Problem Solving	122
Inspection Use	123
Statistics Technique Practicality	124
Program Objective	125
Statistical Technique Use	126

Survey Section VI/Items 127 to 133:

Variable	Items
Perceived Quality Level	127 to 131
Actual Quality Level	132, 133

Survey Section VII/Items 134 to 153:

Variable	Items
Customer System Responsiveness	136, 140 to 145
Knowledge of Customer System	150, 151
Attitude Toward Customer System	134
Customer Access	135
Complaint Knowledge	137
Customer Emphasis	138
Authority	139
Customer Feedback Importance	146
Customer Feedback Use (Pos or Neg)	147
Customer Feedback Use (Negative Only)	148
Change Based On Customer	149
Work Consistency	152
Self Reported Quality Measure	153

APPENDIX C: Results of Reliability Analysis

Survey Section I/Items 9 to 43:

Variable	Items	Reliability Alpha
Supervisory Communication	9 to 15	.95
Corporate Culture	16 to 28, 30	.95
Commitment	36, 38 to 42	.81
Continuous Improvement	32, 33	.64
Management Interest	29	N/A
Alignment	31	N/A
Frustration	34	N/A
Quality vs. Productivity	35	N/A
Self Expectation	37	N/A
Personal Commitment	43	N/A

Survey Section II/Items 44 to 55:

Variable	Items	Reliability Alpha
Data Availability	46, 47, 48, 50, 51	.86
Data Use	49, 52, 53	.68
Data Validity	44, 45	.65
Problem Analysis	54	N/A
Analysis Time	55	N/A

Survey Section III/Items 56 to 72:

Variable	Items	Reliability Alpha
Job Specificity	56 to 59	.91
Goal Clarity	60 to 63, 66, 67	.84
Goal Realism	64, 69, 70	.61
Goal Difficulty	65	N/A
Personal Work Goal Support	66	N/A
Stake in Goals	68	N/A
Goal Commonality	71	N/A
Goal Commitment	72	N/A

Survey Section IV/Items 73 to 116:

Variable	Items	Reliability Alpha
Participation	81, 84, 91, 93, 106 to 111	.90
Supervisory Relations	88 to 90, 92, 101	.83
Trust	83, 94 to 97, 100	.74
Training Adequacy	73 to 75	.82
Performance Obstacles	113 to 116	.74
Personal Responsibility	77, 78, 85, 86	.67
Role Clarity	97 to 99	.78
Initiative	104, 105	.80
Skill Utilization	76	N/A
Involvement	79	N/A
Active Interest in Improvement	80	N/A
Control	82	N/A
Expectancy	87	N/A
Negative Feedback Immediacy	102	N/A
Resistance to Feedback	103	N/A
Job Constraints	112	N/A

Survey Section V/Items 117 to 126:

Variable	Items	Reliability Alpha
Inspector Adequacy	117	N/A
Resource Availability	118	N/A
Blame	119	N/A
Accountability and Correction	120	N/A
Accountability and Prevention	121	N/A
Attitude Toward Problem Solving	122	N/A
Inspection Use	123	N/A
Statistics Technique Practicality	124	N/A
Program Objective	125	N/A
Statistical Technique Use	126	N/A

Survey Section VI/Items 127 to 133:

Variable	Items	Reliability Alpha
Perceived Quality Level	127 to 131	.69
Actual Quality Level	132, 133	.66

Survey Section VII/Items 134 to 153:

Variable	Items	Reliability Alpha
Customer System Responsiveness	136, 140 to 145	.85
Knowledge of Customer System	150, 151	.90
Attitude Toward Customer System	134	N/A
Customer Access	135	N/A
Complaint Knowledge	137	N/A
Customer Emphasis	138	N/A
Authority	139	N/A
Customer Feedback Importance	146	N/A
Customer Feedback Use (Pos or Neg)	147	N/A
Customer Feedback Use (Neg Only)	148	N/A
Change Based On Customer	149	N/A
Work Consistency	152	N/A
Self Reported Quality Measure	153	N/A

APPENDIX D: Groups with Available Oregon Productivity Matrix (OMX) Scores

Group ID	OMX Score	OMX Standardized
1	382	-1.17
2	440	- .81
3	497	- .45
4	616	1.20
5	817	.30
6	706	.85
7	760	1.19
8	543	-1.48
9	561	.21
10	300	-1.69
11	545	- .15
12	842	.46
13	950	1.16
14	491	1.04
15	675	.66
16	699	.81
17	493	-1.01
18	704	- .43
19	764	1.21
20	499	- .44
21	585	.64

APPENDIX E: Predictors Removed from Regression/Discriminant Analysis Due to Correlation of .70 or Greater with Another Predictor

Variable	Survey Item(s)
Commitment	36, 38 to 42
Data Availability	46, 47, 48, 50, 51
Role Clarity	97 to 99
Self Expectation	37
Personal Commitment	43
Personal Work Goal Support	66
Stake In Goals	68
Goal Commitment	72
Active Interest In Improvement	80
Control	82
Resistance to Feedback	103
Inspector Adequacy	117
Blame	119
Customer Feedback Use (Pos or Neg)	147

APPENDIX F: Results of Analysis of Variance and Least Squared Difference Tests

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Variable Supervisory Communication
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	5413.6545	200.5909	.6554	.9[illegible]
WITHIN GROUPS	824	99835.5838	[illegible].[illegible]		
TOTAL	851	105254.2383			

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Variable Corporate Culture
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	[illegible].5844	66[illegible].4454	[illegible].9734	.0045
WITHIN GROUPS	816	[illegible].8957	351.8[illegible]		
TOTAL	843	305336.4597			

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Variable Commitment
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	[illegible].[illegible]6	64.[illegible]92	[illegible].8499	.0006
WITHIN GROUPS	815	35159.36[illegible]8	43.[illegible]403		
TOTAL	842	37420.5353			

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Variable Continuous Improvement
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	407.587[illegible]	15.0955	1.4572	.0833
WITHIN GROUPS	809	8170.4093	10.3535		
TOTAL	836	8578.0064			

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Variable Management Interest
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	184.0570	6.8173	1.3004	.0940
WITHIN GROUPS	809	2837.3443	5.5872		
TOTAL	836	3[illegible]20.01[illegible]			

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Variable Alignment
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	84.1014	3.1141	1.6166	.0154
WITHIN GROUPS	809	1558.7[illegible]1	1.9269		
TOTAL	836	1[illegible]72.8383			

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Variable Frustration
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	287.2144	10.6375	1.7177	.0000
WITHIN GROUPS	317	1967.8456	6.2141		
TOTAL	344	2255.0600			

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Variable Quality as Productivity
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	216.4037	8.0150	1.9179	.0013
WITHIN GROUPS	317	1325.5956	4.1815		
TOTAL	344	1541.9993			

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Variable Def. Expectation
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	59.2990	2.1963	1.3394	.1113
WITHIN GROUPS	314	514.7119	1.6397		
TOTAL	341	574.0107			

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Variable Personal Commitment
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	27.9284	1.0344	1.1287	.2976
WITHIN GROUPS	815	746.3996	.9164		
TOTAL	842	774.8280			

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Variable Data Availability
By Variable GRPID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	2721.6851	100.8031	2.4593	.0001
WITHIN GROUPS	796	32629.5634	40.9920		
TOTAL	823	35351.5485			

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Variable Data Use
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB
BETWEEN GROUPS	27	955.8043	35.4001	2.6473	.0000
WITHIN GROUPS	307	4103.3741	3.3637		
TOTAL	334	5059.1784			

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Variable Data Validity
By Variable GRPID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	435.2483	16.1203	1.9825	.0021
WITHIN GROUPS	811	6561.3405	8.0904		
TOTAL	838	6996.5888			

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Variable Problem Analysis
By Variable Group Id

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	80.9073	2.9966	.7921	.7655
WITHIN GROUPS	814	3079.2364	3.7823		
TOTAL	841	3160.1437			

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Variable Analysis Time
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	144.0523	5.3356	1.3997	.0663
WITHIN GROUPS	816	3110.5595	3.8 13		
TOTAL	843	3254.6209			

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Variable Job Specificity
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	1599.2198	59.2304	1.8523	.0055
WITHIN GROUPS	824	26348.2767	31.9761		
TOTAL	851	27947.4965			

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Variable Goal Clarity
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	3143.4949	116.4257	2.0071	.0019
WITHIN GROUPS	805	46696.3107	58.0078		
TOTAL	832	49839.8055			

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Variable Goal Realism
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	523.5413	19.3904	1.0910	.3429
WITHIN GROUPS	806	14324.5402	17.7724		
TOTAL	833	14848.0815			

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Variable Goal Difficulty
By Variable Group Id

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	203.0070	7.5188	2.7353	.0000
WITHIN GROUPS	813	2233.5114	2.7478		
TOTAL	840	2436.5184			

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Variable Personal Work Goal Support
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	148.3783	5.4955	1.9435	.0010
WITHIN GROUPS	813	2227.3906	2.7396		
TOTAL	840	2385.7689			

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Variable Stake In Goals
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	70.3553	2.6058	1.1415	.2839
WITHIN GROUPS	914	1858.2752	2.2829		
TOTAL	941	1928.6413			

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Variable Goal Commonality
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	190.8977	7.0703	2.0728	.0012
WITHIN GROUPS	819	2793.5392	3.4109		
TOTAL	846	2984.4368			

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Variable Goal Commitment
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	157.5865	5.8365	1.6951	.0155
WITHIN GROUPS	818	2816.5610	3.4432		
TOTAL	845	2974.1478			

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Variable Participation
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	9166.1496	339.4870	2.1330	.0005
WITHIN GROUPS	788	122542.6727	155.5110		
TOTAL	815	131708.8223			

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Variable Supervisory Relations
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	3736.8455	138.4017	2.6639	.0000
WITHIN GROUPS	809	42031.2644	51.9545		
TOTAL	836	45768.1099			

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Variable Trust
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	3222.5889	119.3551	2.3083	.0032
WITHIN GROUPS	791	40899.8287	51.7065		
TOTAL	818	44122.4176			

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Variable Training Adequacy
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	729.4398	26.9793	1.0845	.3509
WITHIN GROUPS	821	20423.4424	24.8763		
TOTAL	848	21151.8822			

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Variable Performance Obstacles
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	799.8189	29.6230	1.4950	.0512
WITHIN GROUPS	822	16287.8225	19.8149		
TOTAL	849	17087.6414			

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Variable Personal Responsibility
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	1200.0775	44.4473	2.6599	.0000
WITHIN GROUPS	822	13735.9225	16.7104		
TOTAL	849	14936.0000			

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Variable Role Clarity
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	1194.9578	44.2577	2.3755	.0001
WITHIN GROUPS	820	15517.0976	18.6305		
TOTAL	847	16712.0554			

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Variable Initiative
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	832.3428	30.8275	2.9055	.0000
WITHIN GROUPS	818	8678.9018	10.6099		
TOTAL	845	9511.2447			

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Variable Skill Utilization
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	174.4271	6.4603	1.5625	.0308
WITHIN GROUPS	820	3387.2415	4.0820		
TOTAL	847	3561.6686			

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Variable Involvement
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	74.7909	2.7700	1.9884	.0030
WITHIN GROUPS	812	1160.3983	1.4291		
TOTAL	839	1235.1893			

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Variable Active Interest In Improvment
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	145.3871	5.3840	2.7200	.0000
WITHIN GROUPS	811	1605.3170	1.9794		
TOTAL	838	1750.6841			

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Variable Control
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	105.6186	3.9118	1.1978	.2251
WITHIN GROUPS	807	2636.0533	3.2665		
TOTAL	834	2741.6719			

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Variable Expectancy
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	86.9859	3.2217	1.2548	.1873
WITHIN GROUPS	805	2069.6616	2.5837		
TOTAL	832	2156.6475			

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Variable Negative Feedback Immediacy
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	77.7503	2.8796	1.3068	.1353
WITHIN GROUPS	820	1804.1695	2.2002		
TOTAL	847	1881.9198			

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Variable Resistence to Feedback
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	[illegible]	3.7597	[illegible]	.0560
WITHIN GROUPS	818	2059.3574	2.5538		
TOTAL	845	2130.5465			

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Variable Job Constraints
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	64.3309	2.3826	2.0996	.0011
WITHIN GROUPS	815	1239.4950	1.1349		
TOTAL	842	1303.7960			

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Variable Inspector Adequacy
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	500.1128	18.5227	5.1024	.0000
WITHIN GROUPS	818	2969.5243	3.6302		
TOTAL	845	3469.6371			

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Variable Resource Availability
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	277.4869	10.2773	2.8614	.0000
WITHIN GROUPS	816	2930.8635	3.5917		
TOTAL	843	3208.3504			

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Variable Blame
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	[illegible]	[illegible]	[illegible]	[illegible]
WITHIN GROUPS	817	[illegible]	[illegible]		
TOTAL	844	[illegible]			

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Variable Accountability and Correction
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	152.9541	5.6650	2.0196	.0017
WITHIN GROUPS	313	2280.4609	2.8050		
TOTAL	340	2433.4150			

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Variable Accountability and prevention
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	[illegible]	[illegible]	[illegible]	[illegible]
WITHIN GROUPS	[illegible]	[illegible]	[illegible]		
TOTAL	[illegible]	[illegible]			

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Variable Attitude Toward Problem Solving
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	[illegible]	[illegible]	[illegible]	[illegible]
WITHIN GROUPS	[illegible]	[illegible]	[illegible]		
TOTAL	[illegible]	[illegible]			

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Variable Inspection Use
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	[illegible]	[illegible]	5.1241	[illegible]	[illegible]
WITHIN GROUPS	309	[illegible]	[illegible]		
TOTAL	[illegible]	[illegible]			

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Variable Statistical Technique Practicality
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	[illegible]	[illegible]	[illegible]	1.0000	[illegible]
WITHIN GROUPS	307	[illegible]	[illegible]		
TOTAL	334	[illegible]			

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Variable Program Objective
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WITHIN GROUPS	[illegible]	[illegible]	[illegible]		
TOTAL	[illegible]	[illegible]			

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Variable Statistical Technique Use
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	101.2512	3.7500	1.0675	.3870
WITHIN GROUPS	815	2813.4570	3.4498		
TOTAL	842	2914.7082			

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Variable Perceived Quality Level
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	1790.3510	66.3093	1.[illegible]	.[illegible]
WITHIN GROUPS	820	25931.2044	31.6357		
TOTAL	847	27721.5554			

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Variable Actual Quality Level
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	379.2672	14.0469	1.0551	.39[illegible]
WITHIN GROUPS	813	9226.8203	13.3191		
TOTAL	840	9606.0880			

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Variable Customer System Responsiveness
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	3414.9205	126.4785	1.9077	.0033
WITHIN GROUPS	815	54101.1885	66.3005		
TOTAL	843	57516.1090			

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Variable Knowledge of Customer System
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	843.7161	31.2487	3.0315	.0000
WITHIN GROUPS	806	8173.2353	10.1406		
TOTAL	833	9016.9514			

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Variable Attitude Toward Customer System
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	199.5705	7.3948	1.5023	.0223
WITHIN GROUPS	815	4559.7736	5.5948		
TOTAL	842	4760.3441			

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Variable Customer Access
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	338.0459	12.5202	4.6135	.0000
WITHIN GROUPS	814	2209.0189	2.7138		
TOTAL	841	2547.0648			

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Variable Contract Knowledge
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	215.2797	7.9733	3.3541	.0000
WITHIN GROUPS	810	2344.9506	2.8950		
TOTAL	837	2560.2303			

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Variable Customer Emphasis
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	107.9596	3.9985	1.4349	.0775
WITHIN GROUPS	808	2707.1586	2.7880		
TOTAL	835	2815.1183			

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Variable Authority
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	217.7223	8.0638	2.5781	.0000
WITHIN GROUPS	804	2514.7200	3.1279		
TOTAL	831	2732.4423			

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Variable Customer Feedback Importance
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	208.8255	7.7343	3.3049	.0000
WITHIN GROUPS	806	2222.4789	2.7574		
TOTAL	833	2431.3044			

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Variable Customer Feedback Use (Pos or Neg)
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	241.4765	8.9436	3.0014	.0000
WITHIN GROUPS	807	2401.2540	2.9764		
TOTAL	834	2702.7305			

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Variable Customer Feedback Use (Negative Only)
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	158.2640	5.8616	1.7532	.0107
WITHIN GROUPS	807	2698.1025	3.3434		
TOTAL	834	2856.3665			

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Variable Change Based On Customer
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	52.6674	1.9506	.9119	.5687
WITHIN GROUPS	809	1730.0921	2.1412		
TOTAL	836	1782.7595			

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Variable Work Consistency
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	92.3284	3.4196	1.3853	.1000
WITHIN GROUPS	802	2415.5001	3.0119		
TOTAL	829	2507.8285			

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Variable Self Reported Quality Measure
By Variable Group ID

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	27	25.7246	.9528	1.3986	.0967
WITHIN GROUPS	732	532.7149	.6812		
TOTAL	809	558.4395			

LSD PROCEDURE for Supervisory Communication

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 4	Grp 3	Grp22	Grp 7	Grp14	Grp 1	Grp15	Grp25	Grp11	Grp23	Grp26	Grp 9	Grp19	Grp21	Grp 4	Grp 3	Grp 6	Grp 2	Grp10	Grp13	Grp20	Grp24	Grp27	Grp16	Grp 8	Grp17	Grp28	Grp 5
33.23	Grp14																												
33.36	Grp 3																												
33.76	Grp22																												
33.86	Grp 7																												
34.13	Grp14																												
34.27	Grp 1																												
34.56	Grp15																												
34.75	Grp25																												
35.55	Grp11																												
35.57	Grp23																												
35.59	Grp26																												
35.73	Grp 9																												
35.79	Grp19																												
36.03	Grp21																												
36.41	Grp 4																												
36.63	Grp 3																												
36.82	Grp 6																												
37.00	Grp 2																												
37.36	Grp10																												
37.54	Grp13																												
37.90	Grp20																												
38.30	Grp24																												
39.63	Grp27																												
39.95	Grp16	*	*	*	*	*	*																						
40.20	Grp 8	*	*	*	*	*	*																						
40.54	Grp17	*	*	*	*	*	*	*	*	*																			
41.56	Grp28	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*													
42.65	Grp 5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*									

LSD PROCEDURE for Corporate Culture

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	7 5 2 9 3 7 4 2 5 1 5 5 5 0 9 1 0 3 2 1 3 4 5 4 2 6 8 7
51.4000	Grp 7	
54.3300	Grp26	
55.2959	Grp22	
56.1379	Grp19	
56.2963	Grp10	
58.8333	Grp27	
57.2667	Grp14	
58.1724	Grp12	
58.3448	Grp 5	
58.8966	Grp 1	
59.2414	Grp 6	
59.6400	Grp15	
59.6429	Grp25	
60.3333	Grp17	*
60.4000	Grp 8	*
60.6897	Grp11	*
61.1667	Grp20	*
61.8333	Grp 3	*
62.5333	Grp 2	*
62.5862	Grp21	*
62.6071	Grp23	*
62.6207	Grp 4	*
63.0667	Grp16	*
63.8214	Grp24	*
64.7931	Grp 9	* *
66.5405	Grp18	* * * * * * *
66.9333	Grp28	* * * * * * *
7[illegible]	Grp17	* *

LSD PROCEDURE for Commitment

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	7	5	0	3	6	4	1	7	5	2	2	5	9	9	2	8	1	5	8	1	0	3	3	8	4	4	6	7
25.1667	Grp 7																												
26.3448	Grp 5																												
27.1000	Grp10																												
27.1852	Grp13																												
27.2759	Grp 6																												
27.3333	Grp14																												
27.5172	Grp21																												
27.7000	Grp22																												
27.8696	Grp15																												
28.0690	Grp12																												
28.1000	Grp22																												
28.1786	Grp25																												
28.2414	Grp19																												
28.3333	Grp 9																												
28.3667	Grp 2																												
29.1351	Grp18																												
29.3333	Grp 1																												
29.3333	Grp25																												
29.3448	Grp16																												
29.8214	Grp11	*	*																										
30.0000	Grp20	*	*																										
30.0714	Grp23	*	*																										
30.2000	Grp 3	*	*																										
30.5000	Grp23	*	*	*																									
30.5172	Grp24	*	*	*																									
30.7931	Grp 4	*	*	*	*	*	*																						
31.6552	Grp 8	*	*	*	*	*	*	*	*	*	*	*	*	*	*														
32.5490	Grp17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

LSD PROCEDURE for Management Interest

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	3 6 6 6 6 6 6 6 6 6 6 6 6 6 5 5 6 6 6 6 6 5 5 6 6 6 r r r r r r r r r r r r r r r r r r r r r r r r r r p p p p p p p p p p p p p p p p p p p p p p p p p p 2 1 2 2 1 1 1 1 2 2 1 2 1 2 1 2 1 2 5 3 2 7 7 8 9 4 6 1 9 6 3 5 2 2 1 0 4 5 0 8 3 7 1 6 2 4
2.3571	Grp25	
2.6897	Grp13	
2.7333	Grp 2	
2.7333	Grp17	
2.7667	Grp 7	
2.8214	Grp 3	
2.8333	Grp 9	
2.8333	Grp14	
2.9333	Grp26	
2.9621	Grp11	
2.9621	Grp19	
3.0000	Grp15	
3.0333	Grp 8	
3.1250	Grp16	
3.1724	Grp12	
3.1724	Grp22	
3.2000	Grp 1	
3.2000	Grp10	
3.2069	Grp 4	
3.2759	Grp 5	
3.5333	Grp20	*
3.5676	Grp18	*
3.7000	Grp28	* * * *
3.7059	Grp27	* * * * * * * * *
3.8966	Grp21	* * * * * * * * * * *
3.9655	Grp 6	* * * * * * * * * * *
4.1429	Grp23	* * * * * * * * * * * * *
4.7667	Grp24	* * * * * * * * * * * * * * * * * * *

LSD PROCEDURE for Assignment

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 7	Grp 6	Grp10	Grp18	Grp26	Grp11	Grp25	Grp19	Grp20	Grp24	Grp15	Grp23	Grp28	Grp 9	Grp14	Grp 3	Grp22	Grp 5	Grp16	Grp21	Grp 2	Grp27	Grp13	Grp 1	Grp17	Grp 4	Grp12	Grp 8
5.5000	Grp 7																												
5.5862	Grp 6																												
5.6000	Grp10																												
5.8378	Grp18																												
5.8667	Grp26																												
5.9333	Grp11																												
5.9643	Grp25																												
6.0000	Grp19																												
6.0000	Grp20																												
6.0000	Grp24																												
6.0400	Grp15																												
6.1429	Grp23	*																											
6.1667	Grp28	*																											
6.2000	Grp 9	*																											
6.2333	Grp14	*	*	*																									
6.2667	Grp 3	*	*	*																									
6.2667	Grp22	*	*	*																									
6.2759	Grp 5	*	*	*																									
6.3000	Grp16	*	*	*																									
6.3103	Grp21	*	*	*																									
6.3333	Grp 2	*	*	*																									
6.3333	Grp27	*	*	*																									
6.3462	Grp13	*	*	*																									
6.3667	Grp 1	*	*	*																									
6.3922	Grp17	*	*	*	*																								
6.4286	Grp 4	*	*	*																									
6.4483	Grp12	*	*	*	*																								
6.8552	Grp 8	*	*	*	*	*	*	*	*	*	*																		

LSD PROCEDURE for Frustration

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 5	Grp 2	Grp 6	Grp15	Grp25	Grp20	Grp17	Grp27	Grp13	Grp11	Grp10	Grp23	Grp 9	Grp12	Grp 7	Grp 8	Grp24	Grp 1	Grp26	Grp21	Grp 4	Grp 9	Grp16	Grp14	Grp18	Grp22	Grp 3
3.3929	Grp 5																											
3.4000	Grp 2																											
3.6552	Grp 6																											
3.7333	Grp15																											
3.7917	Grp25																											
3.8667	Grp20																											
3.9000	Grp17																											
3.9333	Grp27																											
4.0000	Grp13																											
4.0690	Grp11																											
4.2000	Grp10																											
4.3214	Grp23																											
4.4033	Grp 9	*	*																									
4.4643	Grp12	*	*																									
4.5667	Grp 7	*	*																									
4.5862	Grp 8	*	*																									
4.6000	Grp24	*	*																									
4.6207	Grp 1	*	*																									
4.6429	Grp26	*	*																									
4.7586	Grp21	*	*	*	*																							
4.8333	Grp 4	*	*	*	*		*																					
4.8966	Grp 9	*	*	*	*	*	*	*																				
4.9259	Grp16	*	*	*	*	*	*	*	*																			
5.0667	Grp14	*	*	*	*	*	*	*	*	*																		
5.2000	Grp18	*	*	*	*	*	*	*	*	*	*																	
5.2333	Grp22	*	*	*	*	*	*	*	*	*	*	*																
5.4333	Grp 3	*	*	*	*	*	*	*	*	*	*	*	*															

LSD PROCEDURE for Quality vs Productivity

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp26	Grp25	Grp 5	Grp 6	Grp 2	Grp 7	Grp21	Grp16	Grp12	Grp14	Grp11	Grp19	Grp13	Grp18	Grp 1	Grp22	Grp17	Grp 8	Grp 4	Grp10	Grp20	Grp15	Grp 3	Grp 9	Grp24	Grp23	Grp27	Grp28
2.9310	Grp26																												
2.9643	Grp25																												
3.1724	Grp 5																												
3.1724	Grp 6																												
3.4667	Grp 2																												
3.7333	Grp 7																												
3.7586	Grp21																												
3.8000	Grp16																												
3.8519	Grp12																												
3.8667	Grp14																												
3.8929	Grp11																												
3.9655	Grp19																												
4.0000	Grp13	*																											
4.0541	Grp18	*	*																										
4.0667	Grp 1	*	*																										
4.0667	Grp22	*	*																										
4.1176	Grp17	*	*	*	*																								
4.1724	Grp 8	*	*																										
4.1786	Grp 4	*	*																										
4.2000	Grp10	*	*																										
4.2000	Grp20	*	*																										
4.2500	Grp15	*	*																										
4.3667	Grp 3	*	*	*	*																								
4.4000	Grp 9	*	*	*	*																								
4.5667	Grp24	*	*	*	*	*																							
4.5714	Grp23	*	*	*	*	*																							
4.6000	Grp27	*	*	*	*	*																							
5.3333	Grp28	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*				

LSD PROCEDURE for Data Availability

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 5	Grp26	Grp 7	Grp10	Grp 1	Grp13	Grp15	Grp 6	Grp23	Grp24	Grp20	Grp 3	Grp25	Grp14	Grp16	Grp17	Grp27	Grp 8	Grp12	Grp18	Grp11	Grp 9	Grp21	Grp28	Grp22	Grp19	Grp 4	Grp 2
16.0370	Grp 5																												
17.1738	Grp26																												
18.1667	Grp 7																												
19.0667	Grp10																												
19.4138	Grp 1	*																											
19.5552	Grp13	*																											
19.7391	Grp15	*																											
19.7586	Grp 6	*																											
19.8214	Grp23	*																											
19.8333	Grp24	*																											
19.9310	Grp20	*																											
20.1000	Grp 3	*																											
20.1111	Grp25	*																											
20.4333	Grp14	*																											
20.7586	Grp16	*	*																										
20.9800	Grp17	*	*	*																									
21.0000	Grp27	*	*																										
21.0714	Grp 8	*	*																										
21.5926	Grp12	*	*	*																									
21.6667	Grp18	*	*	*																									
21.7143	Grp11	*	*	*																									
22.2667	Grp 9	*	*	*																									
22.4483	Grp21	*	*	*	*																								
22.6000	Grp28	*	*	*	*																								
22.7500	Grp22	*	*	*	*	*																							
23.2778	Grp19	*	*	*	*	*	*	*	*	*	*	*	*																
23.5862	Grp 4	*	*	*	*	*	*	*	*	*	*	*	*	*															
24.0667	Grp 2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*												

LSD PROCEDURE for Data Use

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp26	Grp19	Grp 7	Grp25	Grp24	Grp 5	Grp23	Grp 6	Grp14	Grp11	Grp22	Grp15	Grp 3	Grp10	Grp13	Grp20	Grp 9	Grp12	Grp28	Grp 2	Grp17	Grp18	Grp 4	Grp 8	Grp 1	Grp16	Grp27	Grp21
12.4829	Grp26																												
13.0000	Grp19																												
13.3333	Grp 7																												
13.5556	Grp25																												
13.6333	Grp24																												
13.7778	Grp 5																												
13.8571	Grp23																												
13.9655	Grp 6																												
14.2000	Grp14																												
14.3103	Grp11																												
14.4328	Grp22	*																											
14.5000	Grp15	*																											
14.5172	Grp 3	*																											
14.5333	Grp10	*																											
14.6800	Grp13	*																											
14.9667	Grp20	*	*																										
15.1333	Grp 9	*	*																										
15.1429	Grp12	*	*																										
15.2000	Grp28	*	*	*																									
15.3000	Grp 2	*	*	*																									
15.3922	Grp17	*	*	*	*	*																							
15.4324	Grp18	*	*	*	*	*																							
15.5517	Grp 4	*	*	*	*	*																							
15.6552	Grp 8	*	*	*	*	*																							
15.6667	Grp 1	*	*	*	*	*																							
15.9000	Grp16	*	*	*	*	*	*	*	*																				
16.4000	Grp27	*	*	*	*	*	*	*	*	*	*	*		*	*														
17.6552	Grp21	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*			

LSD PROCEDURE for Data Validity

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 5	Grp17	Grp 8	Grp27	Grp 3	Grp19	Grp14	Grp20	Grp25	Grp26	Grp 7	Grp23	Grp21	Grp15	Grp28	Grp11	Grp24	Grp10	Grp16	Grp 1	Grp 9	Grp 6	Grp 4	Grp22	Grp18	Grp 1	Grp12	Grp13
5.9966	Grp 5																												
6.1961	Grp17																												
6.4133	Grp 8																												
6.7333	Grp27																												
6.8667	Grp 3																												
6.8966	Grp19																												
6.9000	Grp14																												
6.9667	Grp20																												
7.27**	Grp25																												
7.1034	Grp26																												
7.1667	Grp 7																												
7.1786	Grp23																												
7.3214	Grp21																												
7.4583	Grp15	*																											
7.4828	Grp28	*																											
7.7241	Grp11	*	*																										
7.7667	Grp24	*	*																										
7.8333	Grp10	*	*																										
7.9667	Grp16	*	*	*																									
8.0333	Grp 1	*	*	*																									
8.1000	Grp 9	*	*	*																									
8.1034	Grp 6	*	*	*																									
8.1379	Grp 4	*	*	*																									
8.1667	Grp22	*	*	*																									
8.2162	Grp18	*	*	*	*																								
8.3793	Grp 1	*	*	*	*	*	*	*																					
8.4074	Grp12	*	*	*	*	*	*	*																					
8.6538	Grp13	*	*	*	*	*	*	*	*	*	*																		

LSD PROCEDURE for Job Specificity

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 15	Grp 13	Grp 10	Grp 6	Grp 23	Grp 12	Grp 22	Grp 7	Grp 9	Grp 16	Grp 18	Grp 2	Grp 25	Grp 14	Grp 27	Grp 24	Grp 19	Grp 11	Grp 5	Grp 1	Grp 21	Grp 8	Grp 17	Grp 28	Grp 3	Grp 20	Grp 26	Grp 4
18.5200	Grp15																												
20.0345	Grp13																												
20.5567	Grp10																												
20.9655	Grp 6																												
21.1429	Grp23																												
21.2567	Grp12																												
21.4667	Grp22																												
21.5667	Grp 7	*																											
21.6000	Grp 9	*																											
21.7333	Grp16	*																											
21.7838	Grp18	*																											
21.8333	Grp 2	*																											
21.9286	Grp25	*																											
22.0000	Grp14	*																											
22.2333	Grp27	*																											
22.5333	Grp24	*																											
22.6552	Grp19	*																											
22.7333	Grp11	*																											
23.3793	Grp 5	*	*																										
23.6000	Grp 1	*	*	*																									
23.6897	Grp21	*	*	*																									
23.7931	Grp 8	*	*	*																									
23.8235	Grp17	*	*	*	*	*	*																						
23.8333	Grp28	*	*	*																									
23.9667	Grp 3	*	*	*	*																								
24.0667	Grp20	*	*	*	*	*																							
24.2000	Grp26	*	*	*	*	*	*																						
24.2759	Grp 4	*	*	*	*	*	*																						

LSD PROCEDURE for Goal Clarity

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 7	Grp19	Grp13	Grp10	Grp15	Grp22	Grp25	Grp 2	Grp14	Grp 6	Grp26	Grp27	Grp 9	Grp 3	Grp18	Grp12	Grp16	Grp11	Grp 5	Grp23	Grp 4	Grp24	Grp 1	Grp21	Grp20	Grp 8	Grp17	Grp28
24.9333	Grp 7																												
25.1034	Grp19																												
25.1538	Grp13																												
25.9667	Grp10																												
26.0000	Grp15																												
26.0714	Grp22																												
26.1429	Grp25																												
26.7857	Grp 2																												
26.8333	Grp14																												
27.0690	Grp 6																												
27.1379	Grp26																												
27.4643	Grp27																												
27.7000	Grp 9																												
27.9333	Grp 3																												
28.2162	Grp18																												
28.2222	Grp12																												
28.6000	Grp16																												
28.7931	Grp11																												
28.8621	Grp 5	*																											
29.2857	Grp23	*	*	*																									
29.5517	Grp 4	*	*	*																									
29.5667	Grp24	*	*	*																									
29.6429	Grp 1	*	*	*																									
29.6429	Grp21	*	*	*																									
30.4333	Grp20	*	*	*	*	*	*	*																					
30.6207	Grp 8	*	*	*	*	*	*	*																					
31.5490	Grp17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										
31.9333	Grp28	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										

LSD PROCEDURE for Goal Difficulty

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	2	1	4	7	2	8	1	1	7	3	3	8	5	5	4	3	2	0	4	9	0	9	5	3	7	5	6	6
3.8276	Grp12																												
3.9643	Grp21																												
4.0345	Grp 4																												
4.1333	Grp 7																												
4.2414	Grp22																												
4.4000	Grp28																												
4.5000	Grp 1																												
4.5333	Grp11																												
4.5000	Grp27																												
4.6333	Grp 3																												
4.6538	Grp13																												
4.7027	Grp18	*																											
4.8571	Grp25	*	*																										
4.8667	Grp26	*	*																										
4.9333	Grp24	*	*	*																									
4.9655	Grp 8	*	*	*																									
4.9667	Grp 2	*	*	*																									
5.0333	Grp20	*	*	*	*																								
5.1000	Grp14	*	*	*	*	*																							
5.2333	Grp 9	*	*	*	*	*																							
5.2667	Grp10	*	*	*	*	*	*																						
5.3103	Grp19	*	*	*	*	*	*																						
5.3182	Grp15	*	*	*	*	*	*																						
5.3571	Grp23	*	*	*	*	*	*																						
5.4314	Grp17	*	*	*	*	*	*	*	*	*	*	*	*		*														
5.4483	Grp 5	*	*	*	*	*	*	*	*	*	*																		
5.5000	Grp16	*	*	*	*	*	*	*	*	*	*	*																	
5.5862	Grp 6	*	*	*	*	*	*	*	*	*	*	*	*	*															

LSD PROCEDURE for Personal Work Goal Support

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 13	Grp 7	Grp 14	Grp 22	Grp 11	Grp 12	Grp 25	Grp 3	Grp 9	Grp 6	Grp 21	Grp 1	Grp 23	Grp 19	Grp 15	Grp 27	Grp 4	Grp 18	Grp 26	Grp 24	Grp 10	Grp 2	Grp 8	Grp 16	Grp 17	Grp 20	Grp 5	Grp 26
4.0714	Grp 13																												
4.3000	Grp 7																												
4.3667	Grp 14																												
4.6071	Grp 22																												
4.7000	Grp 11																												
4.7037	Grp 12																												
4.7500	Grp 25																												
4.7667	Grp 3																												
4.7667	Grp 9																												
4.7931	Grp 6																												
4.8276	Grp 21																												
4.8333	Grp 1																												
4.8929	Grp 23																												
4.9286	Grp 19																												
4.9545	Grp 15																												
4.9643	Grp 27	*																											
5.0000	Grp 4	*																											
5.0000	Grp 18	*																											
5.0000	Grp 26	*																											
5.0333	Grp 24	*																											
5.1333	Grp 10	*																											
5.1667	Grp 2	*	*																										
5.2759	Grp 8	*	*	*																									
5.3333	Grp 16	*	*	*																									
5.6875	Grp 17	*	*	*	*	*	*	*	*	*	*	*	*																
5.6867	Grp 20	*	*	*	*	*	*	*	*	*	*																		
5.7586	Grp 5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*													
5.7667	Grp 26	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*													

LSD PROCEDURE for Goal Commonality

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp27	Grp16	Grp26	Grp12	Grp28	Grp15	Grp13	Grp22	Grp24	Grp21	Grp11	Grp 1	Grp 4	Grp 7	Grp14	Grp 3	Grp 9	Grp25	Grp20	Grp 2	Grp 6	Grp13	Grp23	Grp19	Grp10	Grp 8	Grp 5	Grp17
3.5172	Grp27																												
3.9000	Grp16						*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4.2667	Grp26																												
4.4000	Grp12																												
4.4000	Grp28																												
4.5600	Grp15																												
4.5676	Grp13																												
4.6552	Grp22																												
4.7667	Grp24																												
4.8621	Grp21																												
4.8966	Grp11																												
4.9333	Grp 1																												
4.9655	Grp 4																												
5.0000	Grp 7																												
5.0000	Grp14																												
5.0333	Grp 3																												
5.0333	Grp 9																												
5.0714	Grp25																												
5.1000	Grp20																												
5.1034	Grp 2																												
5.1034	Grp 6																												
5.1379	Grp13																												
5.1429	Grp23																												
5.1724	Grp19																												
5.2667	Grp10																												
5.3793	Grp 8																												
5.5862	Grp 5																												
5.7059	Grp17																												

LSD PROCEDURE for Goal Commitment

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 1	Grp22	Grp25	Grp 7	Grp12	Grp14	Grp 4	Grp20	Grp 3	Grp26	Grp19	Grp 9	Grp10	Grp23	Grp15	Grp29	Grp 2	Grp18	Grp27	Grp 6	Grp11	Grp16	Grp21	Grp17	Grp 8	Grp24	Grp28	Grp 5
3.6000	Grp 1																												
3.7241	Grp22																												
4.0000	Grp25																												
4.1667	Grp 7																												
4.2414	Grp12																												
4.2667	Grp14																												
4.2759	Grp 4																												
4.4138	Grp20																												
4.4667	Grp 3																												
4.4667	Grp26																												
4.5172	Grp19																												
4.5333	Grp 9																												
4.5667	Grp10	*																											
4.6429	Grp23	*																											
4.6522	Grp15	*																											
4.6667	Grp29	*																											
4.7000	Grp 2	*	*																										
4.7297	Grp18	*	*																										
4.7333	Grp27	*	*																										
4.7586	Grp 6	*	*																										
4.7931	Grp11	*	*																										
4.8333	Grp16	*	*																										
5.0000	Grp21	*	*	*																									
5.0400	Grp17	*	*	*	*																								
5.0690	Grp 8	*	*	*																									
5.1000	Grp24	*	*	*																									
5.2333	Grp28	*	*	*	*	*	*	*																					
5.5207	Grp 5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

LSD PROCEDURE for Participation

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 7	Grp10	Grp26	Grp 6	Grp 5	Grp27	Grp19	Grp25	Grp 9	Grp22	Grp14	Grp15	Grp21	Grp 2	Grp16	Grp13	Grp11	Grp23	Grp12	Grp 1	Grp20	Grp 8	Grp18	Grp24	Grp 4	Grp28	Grp 3	Grp17
31.2000	Grp 7																												
32.7857	Grp10																												
33.1034	Grp26																												
33.3333	Grp 6																												
33.7500	Grp 5																												
34.3793	Grp27																												
34.7931	Grp19																												
34.8929	Grp25																												
35.1333	Grp 9																												
35.7429	Grp22																												
35.4667	Grp14																												
36.4000	Grp15																												
36.7067	Grp21																												
36.9310	Grp 2																												
37.0333	Grp16																												
37.0500	Grp13																												
37.1786	Grp11																												
37.3333	Grp23																												
37.4444	Grp12																												
38.4138	Grp 1	*																											
38.9655	Grp20	*																											
39.0714	Grp 8	*																											
39.4324	Grp18	*	*	*	*																								
39.6786	Grp24	*	*	*																									
40.9259	Grp 4	*	*	*	*	*	*																						
41.2000	Grp28	*	*	*	*	*	*	*																					
43.3448	Grp 3	*	*	*	*	*	*	*	*	*	*	*	*	*	*														
44.6078	Grp17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

LSD PROCEDURE for Supervisory Relations

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 14	Grp 25	Grp 22	Grp 11	Grp 15	Grp 26	Grp 7	Grp 27	Grp 19	Grp 13	Grp 12	Grp 2	Grp 21	Grp 3	Grp 16	Grp 10	Grp 1	Grp 4	Grp 9	Grp 23	Grp 6	Grp 17	Grp 20	Grp 24	Grp 18	Grp 8	Grp 28	Grp 5
16.5000	Grp 14																												
16.9643	Grp 25																												
17.7500	Grp 22																												
17.8621	Grp 11																												
18.1818	Grp 15																												
18.2333	Grp 26																												
18.9333	Grp 7																												
20.0000	Grp 27																												
20.1059	Grp 19																												
20.1800	Grp 13																												
20.2857	Grp 12																												
20.6667	Grp 2	*																											
20.7586	Grp 21	*	*																										
20.7857	Grp 3	*	*																										
20.9667	Grp 16	*	*																										
21.1667	Grp 10	*	*																										
21.2000	Grp 1	*	*																										
21.2069	Grp 4	*	*																										
21.2333	Grp 9	*	*																										
21.3214	Grp 23	*	*																										
21.3793	Grp 6	*	*																										
21.6216	Grp 17	*	*	*	*																								
21.8667	Grp 20	*	*	*	*																								
22.4667	Grp 24	*	*	*	*	*	*																						
23.1951	Grp 18	*	*	*	*	*	*	*																					
23.3929	Grp 8	*	*	*	*	*	*	*																					
24.9333	Grp 28	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*								
25.4138	Grp 5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	

LSD PROCEDURE for Trust

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp26	Grp27	Grp25	Grp 7	Grp14	Grp 5	Grp10	Grp 2	Grp19	Grp 8	Grp16	Grp 3	Grp21	Grp11	Grp 6	Grp 4	Grp13	Grp 9	Grp15	Grp 1	Grp22	Grp23	Grp20	Grp17	Grp12	Grp18	Grp24	Grp28
18.3103	Grp26																												
18.5517	Grp27																												
18.8800	Grp25																												
19.4000	Grp 7																												
19.6786	Grp14																												
19.9310	Grp 5																												
20.1034	Grp10	*																											
20.9667	Grp 2	*																											
21.0000	Grp19	*																											
21.2759	Grp 8	*																											
21.3667	Grp16	*																											
21.6897	Grp 3	*																											
22.1071	Grp21	*																											
22.1923	Grp11	*																											
22.3103	Grp 6	*	*																										
22.3214	Grp 4	*	*																										
22.3478	Grp13	*																											
22.5667	Grp 9	*	*																										
22.7727	Grp15	*	*																										
22.8276	Grp 1	*	*	*																									
23.0357	Grp22	*	*	*																									
23.1429	Grp23	*	*	*	*																								
23.1667	Grp20	*	*	*	*																								
23.5400	Grp17	*	*	*	*	*	*	*																					
23.7308	Grp12	*	*	*	*	*																							
23.9722	Grp18	*	*	*	*	*	*	*																					
24.1333	Grp24	*	*	*	*	*	*	*																					
25.7333	Grp28	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

LSD PROCEDURE for Personal Responsibility

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 5	Grp13	Grp11	Grp19	Grp10	Grp12	Grp 2	Grp22	Grp18	Grp24	Grp 6	Grp 5	Grp 9	Grp23	Grp14	Grp21	Grp16	Grp20	Grp 3	Grp 7	Grp 4	Grp27	Grp28	Grp 1	Grp 8	Grp25	Grp26	Grp17
20.0800	Grp 5																												
20.2000	Grp13																												
20.9000	Grp11																												
21.8552	Grp19																												
21.7333	Grp10																												
21.7500	Grp12																												
21.8000	Grp 2																												
22.4138	Grp22	*																											
22.4324	Grp18	*																											
22.5667	Grp24	*																											
22.6207	Grp 6	*																											
22.6897	Grp 5	*																											
23.2333	Grp 9	*	*	*																									
23.2857	Grp23	*	*	*																									
23.3667	Grp14	*	*	*																									
23.3793	Grp21	*	*	*																									
23.4667	Grp16	*	*	*																									
23.4667	Grp20	*	*	*																									
23.5000	Grp 3	*	*	*																									
23.6000	Grp 7	*	*	*																									
23.8621	Grp 4	*	*	*	*	*																							
23.9333	Grp27	*	*	*	*	*	*	*																					
23.9333	Grp28	*	*	*	*	*	*	*																					
24.0333	Grp 1	*	*	*	*	*	*	*																					
24.0345	Grp 8	*	*	*	*	*	*	*																					
24.2857	Grp25	*	*	*	*	*	*	*																					
24.5333	Grp26	*	*	*	*	*	*	*	*	*																			
24.8621	Grp17	*	*	*	*	*	*	*	*	*	*	*																	

LSD PROCEDURE Role Clarity

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp27	Grp10	Grp15	Grp 6	Grp 5	Grp26	Grp23	Grp12	Grp14	Grp25	Grp 7	Grp24	Grp13	Grp16	Grp 2	Grp22	Grp11	Grp21	Grp 9	Grp18	Grp19	Grp17	Grp 8	Grp20	Grp 3	Grp28	Grp 4	Grp 1
11.2667	Grp27																				*	*	*	*	*	*	*	*	*
11.7000	Grp10																				*	*	*	*	*	*	*	*	*
11.8400	Grp15																				*	*	*	*	*	*	*	*	*
12.0345	Grp 6																				*	*	*	*	*	*	*	*	*
12.0690	Grp 5																				*	*	*	*	*	*	*	*	*
12.2000	Grp26																				*	*	*	*	*	*	*	*	*
12.3214	Grp23																				*	*	*	*	*	*	*	*	*
12.4000	Grp12																				*	*	*	*	*	*	*	*	*
12.4000	Grp14																				*	*	*	*	*	*	*	*	*
12.4643	Grp25																				*	*	*	*	*	*	*	*	*
12.5333	Grp 7																				*	*	*	*	*	*	*	*	*
12.7000	Grp24																				*	*	*	*	*	*	*	*	*
12.7778	Grp13																				*	*	*	*	*	*	*	*	*
12.8333	Grp16																				*	*	*	*	*	*	*	*	*
12.9000	Grp 2																				*	*	*	*	*	*	*	*	*
12.9643	Grp22																				*	*	*	*	*	*	*	*	*
12.9667	Grp11																				*	*	*	*	*	*	*	*	*
13.0345	Grp21																				*	*	*	*	*	*	*	*	*
13.1667	Grp 9																				*	*	*	*	*	*	*	*	*
13.4865	Grp18	*																											
13.8276	Grp19	*																											
14.3333	Grp17	*	*	*	*	*	*	*																					
14.4138	Grp 8	*	*	*	*	*	*																						
14.6667	Grp20	*	*	*	*	*	*	*	*	*																			
14.7333	Grp 3	*	*	*	*	*	*	*	*	*	*	*																	
15.1667	Grp28	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*											
15.7241	Grp 4	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*								
15.7333	Grp 1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*								

LSD PROCEDURE for Initiative

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp23	Grp 8	Grp11	Grp21	Grp14	Grp26	Grp 9	Grp27	Grp25	Grp 7	Grp 4	Grp12	Grp 2	Grp 3	Grp15	Grp22	Grp13	Grp 1	Grp20	Grp19	Grp18	Grp 6	Grp28	Grp 5	Grp16	Grp17	Grp10	Grp24
4.5000	Grp23																												
5.4118	Grp 8																												
5.4133	Grp11																												
5.4828	Grp21																												
5.8621	Grp14																												
5.8667	Grp26																												
6.0379	Grp 9																												
6.0667	Grp27																												
6.1765	Grp25																												
6.2000	Grp 7																												
6.2414	Grp 4																												
6.4483	Grp12	*																											
6.5333	Grp 2	*																											
6.5333	Grp 3	*																											
6.5500	Grp15	*																											
6.6429	Grp22	*																											
6.7857	Grp13	*																											
6.8667	Grp 1	*																											
7.0000	Grp20	*																											
7.0690	Grp19	*																											
7.4054	Grp18	*	*	*	*																								
7.6552	Grp 6	*	*	*	*	*	*																						
7.8214	Grp28	*	*	*	*	*	*																						
8.0345	Grp 5	*	*	*	*	*	*	*	*	*	*	*																	
8.1000	Grp16	*	*	*	*	*	*	*	*	*	*	*																	
8.1765	Grp17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*												
8.2083	Grp10	*	*	*	*	*	*	*	*	*	*	*	*	*	*														
8.5667	Grp24	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										

LSD PROCEDURE for Skill Utilization

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp22	Grp21	Grp10	Grp26	Grp24	Grp27	Grp 4	Grp 5	Grp 1	Grp 7	Grp 9	Grp20	Grp18	Grp14	Grp 8	Grp 6	Grp11	Grp 3	Grp 5	Grp12	Grp 2	Grp 3	Grp19	Grp17	Grp25	Grp16	Grp23	Grp23
3.3103	Grp22																												
3.3448	Grp21																												
3.4333	Grp10																												
3.5000	Grp26																												
3.6667	Grp24																												
3.7000	Grp27																												
3.8241	Grp 4																												
3.8750	Grp 5																												
4.0333	Grp 1																												
4.0333	Grp 7																												
4.1333	Grp 9																												
4.1379	Grp20																												
4.2432	Grp18																												
4.2667	Grp14																												
4.2759	Grp 8																												
4.3103	Grp 6																												
4.3103	Grp11																												
4.3333	Grp 3																												
4.4483	Grp 5	*	*																										
4.4828	Grp12	*	*	*																									
4.5333	Grp 2	*	*	*	*																								
4.5667	Grp 3	*	*	*	*																								
4.5862	Grp19	*	*	*	*																								
4.5862	Grp17	*	*	*	*	*																							
4.6736	Grp25	*	*	*	*																								
4.7333	Grp16	*	*	*	*	*	*																						
4.7667	Grp23	*	*	*	*	*	*	*																					
5.0714	Grp23	*	*	*	*	*	*	*	*																				

LSD PROCEDURE for Involvement

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 3	Grp19	Grp18	Grp14	Grp13	Grp 1	Grp28	Grp 6	Grp22	Grp 4	Grp24	Grp12	Grp20	Grp 8	Grp 9	Grp25	Grp26	Grp27	Grp11	Grp 7	Grp 5	Grp21	Grp10	Grp17	Grp16	Grp 2	Grp23	Grp15
5.5000	Grp 3																												
5.5517	Grp19																												
5.5556	Grp18																												
5.7241	Grp14																												
5.7407	Grp13																												
6.0333	Grp 1																												
6.0667	Grp28																												
6.0690	Grp 6																												
6.0690	Grp22																												
6.1034	Grp 4																												
6.1333	Grp24	*																											
6.1429	Grp12	*																											
6.1667	Grp20	*	*	*																									
6.1724	Grp 8	*	*	*																									
6.2000	Grp 9	*	*	*																									
6.2500	Grp25	*	*	*																									
6.2667	Grp26	*	*	*																									
6.2667	Grp27	*	*	*																									
6.2759	Grp11	*	*	*																									
6.3333	Grp 7	*	*	*																									
6.3448	Grp 5	*	*	*	*																								
6.3571	Grp21	*	*	*	*																								
6.3793	Grp10	*	*	*	*	*																							
6.4138	Grp17	*	*	*	*	*																							
6.4667	Grp16	*	*	*	*	*																							
6.5333	Grp 2	*	*	*	*	*																							
6.5714	Grp23	*	*	*	*	*																							
6.6552	Grp15	*	*	*	*	*																							

LSD PROCEDURE for Active Interest In Improvement

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp24	Grp10	Grp 2	Grp 6	Grp16	Grp14	Grp 5	Grp25	Grp12	Grp19	Grp23	Grp 7	Grp11	Grp 4	Grp22	Grp13	Grp15	Grp26	Grp21	Grp18	Grp26	Grp 9	Grp17	Grp20	Grp 3	Grp 1	Grp27	Grp 8
4.1667	Grp24																												
4.4333	Grp10							*																					
4.5333	Grp 2							*	*																				
4.5517	Grp 6							*	*																				
4.6333	Grp16							*	*	*																			
4.8667	Grp14							*	*	*	*																		
4.8966	Grp 5	*	*	*	*	*	*																						
4.9259	Grp25	*	*	*	*	*	*																						
4.9615	Grp12	*	*	*	*	*	*																						
5.0000	Grp19	*	*	*	*	*	*																						
5.0357	Grp23	*	*	*	*	*	*																						
5.0667	Grp 7	*	*	*	*	*	*																						
5.0667	Grp11	*	*	*	*	*	*																						
5.1034	Grp 4	*	*	*	*	*	*																						
5.1034	Grp22	*	*	*	*	*	*																						
5.1852	Grp13	*	*	*	*	*	*																						
5.2609	Grp15	*	*	*	*	*	*																						
5.2857	Grp28	*	*	*	*	*	*																						
5.2759	Grp21	*	*	*	*	*	*																						
5.3143	Grp18	*	*	*	*	*	*																						
5.3667	Grp26	*	*	*	*	*	*																						
5.4667	Grp 9	*	*	*	*	*	*																						
5.4902	Grp17	*	*	*	*	*	*																						
5.6333	Grp20	*	*	*	*	*	*	*																					
5.6667	Grp 3	*	*	*	*	*	*	*	*																				
5.7241	Grp 1	*	*	*	*	*	*	*	*	*																			
5.7667	Grp27	*	*	*	*	*	*	*	*	*	*																		
5.8621	Grp 8	*	*	*	*	*	*	*	*	*	*	*																	

LSD PROCEDURE for Resistence to Feedback

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 14	Grp 28	Grp 1	Grp 26	Grp 3	Grp 11	Grp 13	Grp 19	Grp 12	Grp 8	Grp 25	Grp 18	Grp 9	Grp 4	Grp 27	Grp 15	Grp 5	Grp 22	Grp 17	Grp 20	Grp 2	Grp 16	Grp 21	Grp 24	Grp 10	Grp 6	Grp 7	Grp 23
2.0333	Grp14																												
2.1333	Grp28																												
2.1667	Grp 1																												
2.2667	Grp26																												
2.3000	Grp 3																												
2.4000	Grp11																												
2.4483	Grp13																												
2.4483	Grp19																												
2.5000	Grp12																												
2.5172	Grp 8																												
2.5185	Grp25																												
2.5676	Grp18																												
2.6333	Grp 9																												
2.6552	Grp 4																												
2.6667	Grp27																												
2.6800	Grp15																												
2.6897	Grp 5																												
2.7500	Grp22																												
2.8000	Grp17	*																											
2.8000	Grp20																												
2.8333	Grp 2																												
2.8667	Grp16	*																											
3.1379	Grp21	*	*	*	*	*																							
3.1667	Grp24	*	*	*	*	*																							
3.2000	Grp10	*	*	*	*	*																							
3.2069	Grp 6	*	*	*	*	*																							
3.2667	Grp 7	*	*	*	*	*	*	*	*	*																			
3.3214	Grp23	*	*	*	*	*	*	*	*	*																			

LSD PROCEDURE for Job Constraints

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 7	Grp14	Grp 2	Grp 5	Grp 3	Grp24	Grp17	Grp26	Grp 9	Grp 8	Grp19	Grp21	Grp27	Grp25	Grp20	Grp23	Grp22	Grp10	Grp 4	Grp18	Grp16	Grp11	Grp 1	Grp28	Grp12	Grp 6	Grp15	Grp13
3.0667	Grp 7																												
3.1724	Grp14																												
3.2333	Grp 2																												
3.2414	Grp 5																												
3.3448	Grp 3																												
3.3667	Grp24																												
3.3922	Grp17																												
3.5000	Grp26																												
3.5333	Grp 9																												
3.5517	Grp 8																												
3.5517	Grp19																												
3.6552	Grp21																												
3.6667	Grp27																												
3.6786	Grp25																												
3.7333	Grp20																												
3.7500	Grp23																												
3.7857	Grp22	*																											
3.8000	Grp10	*																											
3.8276	Grp 4	*																											
3.8730	Grp18	*	*	*	*																								
4.0000	Grp16	*	*	*	*																								
4.0370	Grp11	*	*	*	*																								
4.1333	Grp 1	*	*	*	*	*	*	*																					
4.1333	Grp28	*	*	*	*	*	*	*																					
4.1667	Grp12	*	*	*	*	*	*	*																					
4.2414	Grp 6	*	*	*	*	*	*	*	*	*																			
4.2917	Grp15	*	*	*	*	*	*	*	*	*	*																		
4.3571	Grp13	*	*	*	*	*	*	*	*	*	*																		

LSD PROCEDURE for Inspector Adequacy

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 4	Grp13	Grp 1	Grp 8	Grp28	Grp26	Grp12	Grp25	Grp 2	Grp27	Grp11	Grp18	Grp 3	Grp22	Grp 7	Grp14	Grp 9	Grp 6	Grp19	Grp21	Grp15	Grp16	Grp23	Grp17	Grp 5	Grp20	Grp10	Grp24
2.7241	Grp 4																												
3.1034	Grp13																												
3.4138	Grp 1																												
3.4828	Grp 8																												
3.6000	Grp28																												
3.7567	Grp26	*																											
3.8276	Grp12	*																											
3.8929	Grp25	*																											
3.9333	Grp 2	*																											
3.9333	Grp27	*																											
3.9667	Grp11	*																											
4.0541	Grp18	*	*																										
4.1333	Grp 3	*	*																										
4.1852	Grp22	*	*																										
4.2667	Grp 7	*	*																										
4.2667	Grp14	*	*																										
4.3333	Grp 9	*	*																										
4.3793	Grp 6	*	*																										
4.4286	Grp19	*	*	*																									
4.5172	Grp21	*	*	*	*																								
4.6800	Grp15	*	*	*	*	*	*	*																					
5.0000	Grp16	*	*	*	*	*	*	*	*	*	*	*	*	*															
5.0357	Grp23	*	*	*	*	*	*	*	*	*	*	*	*	*															
5.3137	Grp17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*									
5.4483	Grp 5	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*									
5.6000	Grp20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*								
5.6667	Grp10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*								
5.7000	Grp24	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*								

LSD PROCEDURE for Resource Availability

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	3 2	6 9	6 4	5 7	6 7	6 8	6 9	6 3	6 3	6 4	6 0	6 5	6 5	6 5	6 4	6 2	6 6	6 0	6 7	6 8	6 1	6 5	6 1	6 2	6 6	6 8	6 1
2.6000	Grp 3																											
2.7333	Grp 2																											
3.1000	Grp 9																											
3.1333	Grp14																											
3.1667	Grp27																											
3.2000	Grp 7																											
3.2069	Grp 8																											
3.2143	Grp19																											
3.3103	Grp13																											
3.4286	Grp22																											
3.4333	Grp24																											
3.4667	Grp20																											
3.4667	Grp26																											
3.5000	Grp25																											
3.5172	Grp 5																											
3.8207	Grp 4	*																										
3.9276	Grp12	*	*																									
3.9655	Grp 6	*	*																									
3.9667	Grp10	*	*																									
4.0000	Grp17	*	*	*	*																							
4.1351	Grp18	*	*	*	*	*	*	*																				
4.1379	Grp21	*	*	*	*	*																						
4.3200	Grp15	*	*	*	*	*	*	*	*																			
4.3793	Grp11	*	*	*	*	*	*	*	*	*																		
4.4444	Grp22	*	*	*	*	*	*	*	*	*	*																	
4.6333	Grp16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*												
4.7000	Grp23	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*												
4.7857	Grp 1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*												

LSD PROCEDURE for Blame

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp26	Grp27	Grp25	Grp 4	Grp10	Grp 3	Grp11	Grp15	Grp 5	Grp12	Grp 8	Grp19	Grp 2	Grp 1	Grp 7	Grp 6	Grp 9	Grp14	Grp21	Grp20	Grp 1	Grp22	Grp16	Grp24	Grp17	Grp26	Grp23	Grp18
2.4667	Grp26															*	*	*	*	*	*	*	*	*	*	*	*	*	*
2.5667	Grp27															*	*	*	*	*	*	*	*	*	*	*	*	*	*
2.8571	Grp25																									*	*	*	*
2.8966	Grp 4																									*	*	*	*
2.9333	Grp10																									*	*	*	*
3.0000	Grp 3																									*	*	*	*
3.0333	Grp11																									*	*	*	*
3.0417	Grp15																									*	*	*	*
3.1034	Grp 5																									*	*	*	*
3.1034	Grp12																									*	*	*	*
3.1724	Grp 8																									*	*	*	*
3.1786	Grp19																									*	*	*	*
3.2000	Grp 2																									*	*	*	*
3.2333	Grp 3																									*	*	*	*
3.3667	Grp 7	*																								*	*	*	*
3.3793	Grp 6	*																								*	*	*	*
3.4000	Grp 9	*																								*	*	*	*
3.4333	Grp14	*																								*	*	*	*
3.4828	Grp21	*	*																							*	*	*	*
3.5333	Grp20	*	*																							*	*	*	*
3.5000	Grp 1	*	*																							*	*	*	*
3.6296	Grp22	*	*																							*	*	*	*
3.6333	Grp16	*	*																							*	*	*	*
3.6667	Grp24	*	*																							*	*	*	*
3.7843	Grp17	*	*	*	*	*																				*	*	*	*
3.8333	Grp26	*	*	*	*	*																				*	*	*	*
3.8571	Grp23	*	*	*	*	*																				*	*	*	*
4.0000	Grp18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

LSD PROCEDURE for Accountability and Correction

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 4	Grp 3	Grp 8	Grp13	Grp12	Grp 7	Grp19	Grp22	Grp27	Grp11	Grp21	Grp 2	Grp10	Grp18	Grp 9	Grp14	Grp25	Grp 6	Grp 1	Grp20	Grp28	Grp16	Grp24	Grp15	Grp26	Grp17	Grp 5	Grp23
4.5172	Grp 4											*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
4.6333	Grp 3																												
4.7586	Grp 8																												
4.8519	Grp13																												
4.9643	Grp12																												
5.0667	Grp 7																												
5.0714	Grp19																												
5.2592	Grp22																												
5.3000	Grp27																												
5.3448	Grp11																												
5.4138	Grp21	*																											
5.4333	Grp 2	*																											
5.4667	Grp10	*																											
5.4865	Grp18	*	*																										
5.5000	Grp 9	*	*																										
5.6000	Grp14	*	*	.																									
5.6429	Grp25	*	*	*																									
5.6897	Grp 6	*	*	*																									
5.7000	Grp 1	*	*	*																									
5.7000	Grp20	*	*	*																									
5.7000	Grp28	*	*	*																									
5.8000	Grp16	*	*	*	*																								
5.8333	Grp24	*	*	*	*	*																							
5.8750	Grp15	*	*	*	*																								
5.9000	Grp26	*	*	*	*	*																							
5.9286	Grp17	*	*	*	*	*	*	*																					
6.1379	Grp 5	*	*	*	*	*	*	*																					
6.1786	Grp23	*	*	*	*	*	*	*	*	*																			

LSD PROCEDURE for Accountability and Prevention

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 22	Grp 7	Grp 3	Grp 21	Grp 2	Grp 13	Grp 14	Grp 4	Grp 12	Grp 25	Grp 8	Grp 9	Grp 27	Grp 28	Grp 19	Grp 11	Grp 16	Grp 6	Grp 18	Grp 24	Grp 17	Grp 1	Grp 10	Grp 15	Grp 5	Grp 20	Grp 23	Grp 26
4.5185	Grp22																												
4.8000	Grp 7																												
4.9667	Grp 3																												
5.3214	Grp21	*																											
5.3448	Grp 2	*																											
5.4483	Grp13	*																											
5.5000	Grp14	*																											
5.5172	Grp 4	*																											
5.5517	Grp12	*	*																										
5.5714	Grp25	*	*																										
5.6071	Grp 8	*	*																										
5.6667	Grp 9	*	*																										
5.7000	Grp27	*	*																										
5.7333	Grp28	*	*	*																									
5.7500	Grp19	*	*	*																									
5.7586	Grp11	*	*	*																									
5.7667	Grp16	*	*	*																									
5.7931	Grp 6	*	*	*																									
5.8649	Grp18	*	*	*																									
5.9333	Grp24	*	*	*																									
6.0980	Grp17	*	*	*	*	*																							
6.1000	Grp 1	*	*	*	*	*																							
6.1333	Grp10	*	*	*	*	*																							
6.2000	Grp15	*	*	*	*	*																							
6.2069	Grp 5	*	*	*	*	*	*																						
6.2333	Grp20	*	*	*	*	*	*																						
6.2500	Grp23	*	*	*	*	*	*																						
6.3000	Grp26	*	*	*	*	*	*	*	*																				

LSD PROCEDURE for Attitude Toward Problem Solving

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	5 2 3 0 7 9 3 5 4 6 4 3 5 6 8 6 1 1 7 8 2 7 2 8 3 4 1 0
3.3793	Grp 5	
3.5333	Grp 2	
3.7000	Grp 3	
3.8667	Grp10	
3.9333	Grp27	
3.9667	Grp 9	
4.0345	Grp13	
4.0370	Grp25	
4.1000	Grp14	
4.1333	Grp26	
4.1379	Grp 4	
4.1429	Grp19	
4.2400	Grp15	
4.2667	Grp16	
4.2667	Grp28	
4.3103	Grp 6	
4.3704	Grp11	
4.4667	Grp 1	*
4.4667	Grp 7	*
4.6757	Grp18	* * *
4.7241	Grp12	* * *
4.7647	Grp17	* * * *
4.8889	Grp22	* * * *
5.0000	Grp 8	* * * * * *
5.0000	Grp23	* * * * * *
5.0000	Grp24	* * * * * *
5.2069	Grp21	* * * * * * * * * * * * *
5.3000	Grp20	* * * * * * * * * * * * * * * * *

LSD PROCEDURE for Inspection Use

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp25	Grp5	Grp19	Grp24	Grp26	Grp27	Grp2	Grp17	Grp3	Grp10	Grp6	Grp11	Grp4	Grp14	Grp16	Grp20	Grp18	Grp12	Grp15	Grp22	Grp7	Grp9	Grp23	Grp21	Grp25	Grp11	Grp8	Grp3
4.0000	Grp25																												
4.0690	Grp 5																												
4.1071	Grp19																												
4.1667	Grp24																												
4.2667	Grp26																												
4.3103	Grp27																												
4.4000	Grp 2																												
4.5490	Grp17																												
4.5517	Grp 3																												
4.5667	Grp10																												
4.5862	Grp 6																												
4.6207	Grp11																												
4.6552	Grp 4																												
4.6667	Grp14																												
4.7000	Grp16																												
4.7000	Grp20																												
4.7568	Grp18																												
4.7931	Grp12																												
4.8182	Grp15																												
4.3462	Grp22																												
4.9000	Grp 7	*																											
4.9667	Grp 9	*	*																										
5.1071	Grp23	*	*	*	*																								
5.1724	Grp 1	*	*	*	*	*																							
5.1724	Grp 3	*	*	*	*	*																							
5.2857	Grp21	*	*	*	*	*	*	*																					
5.3333	Grp28	*	*	*	*	*	*	*	*																				
5.3214	Grp [illegible]	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*							

LSD PROCEDURE for Perceived Quality Level

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	G G G G G G G G G G G G G G G G G G G G G G G G G G G G r r r r r r r r r r r r r r r r r r r r r r r r r r r r p p p p p p p p p p p p p p p p p p p p p p p p p p p p 1 1 2 1 1 1 2 2 2 1 1 1 2 2 2 2 1 2 3 9 5 6 0 2 6 2 1 9 8 7 2 4 8 6 8 7 5 1 5 0 3 4 7 1 4 3
18.8000	Grp13	
19.4333	Grp 9	
20.1724	Grp 5	
20.1724	Grp 6	
20.4667	Grp10	
20.6000	Grp 2	
21.0667	Grp26	
21.0690	Grp12	
21.1000	Grp11	
21.5357	Grp19	
21.5667	Grp28	
21.5667	Grp27	*
21.7407	Grp22	*
22.0233	Grp14	*
22.0690	Grp 8	*
22.1667	Grp16	*
22.5675	Grp18	* *
22.6000	Grp 7	* *
22.6000	Grp15	* *
22.8966	Grp21	* *
22.9643	Grp25	* *
23.1000	Grp20	* * * *
23.1429	Grp23	* * * *
23.5862	Grp 4	* * * * * *
23.6078	Grp17	* * * * * * * *
24.1000	Grp 1	* * * * * * * *
24.2333	Grp24	* * * * * * * * *
24.5667	Grp 3	* * * * * * * * * * * * *

LSD PROCEDURE for Customer System Responsiveness

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group														
29.2000	Grp13														
30.5[illegible]	Grp 5														
31.0370	Grp11														
3[illegible].3979	Grp25														
32.2667	Grp24														
32.2857	Grp19														
32.5000	Grp21														
[illegible]724	Grp12														
33.3667	Grp14	*													
33.5000	Grp16	*													
33.5333	Grp 7	*													
33.9667	Grp1[illegible]	*													
34.0000	Grp26	*													
34.0714	Grp23	*													
34.2414	Grp 6	*													
34.4333	Grp 9	*													
34.7667	Grp10	*	*												
34.7667	Grp18	*	*												
35.0690	Grp 8	*	*												
35.0800	Grp15	*	*												
35.2[illegible]43	Grp 4	*	*												
35.3000	Grp 2	*	*	*											
35.4054	Grp[illegible]	*	*	*											
35.5556	Grp 3	*	*	*											
36.3333	Grp [illegible]	*	*	*	*										
36.5000	Grp20	*	*	*	*	*	*								
36.7667	Grp27	*	*	*	*	*	*	*							
37.9[illegible]	Grp[illegible]	*	*	*	*	*	*	*	*	*	*	*	*	*	*

LSD PROCEDURE for Knowledge of Customer System

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group
3.3929	Gro 0
3.4138	Gro 7
3.5517	Gro 5
3.5862	Gro 9
3.7407	Gro13
3.8276	Gro 1
3.8333	Gro15
4.0345	Gro26
4.0000	Gro24
4.3667	Gro27
4.6000	Gro 6
4.7037	Gro21
4.7241	Gro12
4.8400	Gro 7
4.8333	Gro25
5.1000	Gro 4	* *
5.2143	Gro19	* * *
5.3000	Gro 2	* * * *
5.5357	Gro17	* * * * * *
5.5714	Gro18	* * * * * *
5.6429	Gro 8	* * * * * * *
5.7222	Gro22	* * * * * * * *
5.7600	Gro10	* * * * * * *
5.8667	Gro20	* * * * * * * * * *
6.0000	Gro 3	* * * * * * * * * *
6.1071	Gro 4	* * * * * * * * * * * *
6.6552	Gro 2	* * * * * * * * * * * * * *
7.0667	Gro 1	* * * * * * * * * * * * * * * * *

LSD PROCEDURE for Attitude Toward Customer System

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	
3.4667	Group 2	
3.4828	Group 5	
3.5667	Group11	
3.7000	Group16	
3.7931	Group 1	
3.8000	Group20	
3.8030	Group23	
3.8571	Group13	
3.9000	Group14	
4.0333	Group26	
4.0357	Group29	
4.1111	Group27	
4.1481	Group22	
4.2000	Group24	
4.2069	Group12	
4.2143	Group 4	
4.2400	Group15	
4.2759	Group 3	* *
4.2759	Group 8	* *
4.3571	Group25	* * *
4.4000	Group 9	* * *
4.4828	Group 6	* * * *
4.4857	Group10	* * * *
4.5172	Group 7	* * * *
4.5200	Group17	* * * * * * *
4.5357	Group28	* * * * * *
4.6000	Group 1	* * * * * * *
4.6552	Group 9	* * * * * * * * *

LSD PROCEDURE for Customer Access

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp22	Grp 8	Grp19	Grp 3	Grp 9	Grp21	Grp25	Grp12	Grp14	Grp 7	Grp20	Grp13	Grp 4	Grp 1	Grp26	Grp23	Grp 5	Grp24	Grp 6	Grp 2	Grp11	Grp16	Grp28	Grp18	Grp10	Grp17	Grp15	Grp27
3.6667	Grp22																												
3.9310	Grp 8																												
4.2143	Grp19																												
4.3793	Grp 3																												
4.6897	Grp 9	*																											
4.7143	Grp21	*																											
4.7500	Grp25	*																											
4.7931	Grp12	*	*																										
5.0000	Grp14	*	*																										
5.0667	Grp 7	*	*	*																									
5.0667	Grp20	*	*	*																									
5.1034	Grp13	*	*	*																									
5.2500	Grp 4	*	*	*	*																								
5.3333	Grp 1	*	*	*	*																								
5.4828	Grp26	*	*	*	*																								
5.5000	Grp23	*	*	*	*																								
5.5172	Grp 5	*	*	*	*																								
5.5333	Grp24	*	*	*	*	*																							
5.5517	Grp 6	*	*	*	*	*																							
5.6000	Grp 2	*	*	*	*	*	*	*																					
5.6667	Grp11	*	*	*	*	*	*	*	*																				
5.7000	Grp16	*	*	*	*	*	*	*	*																				
5.7667	Grp28	*	*	*	*	*	*	*	*																				
5.8075	Grp18	*	*	*	*	*	*	*	*	*																			
5.9333	Grp10	*	*	*	*	*	*	*	*	*	*	*																	
6.0000	Grp17	*	*	*	*	*	*	*	*	*	*	*	*																
6.1200	Grp15	*	*	*	*	*	*	*	*	*	*	*	*																
6.1667	Grp27	*	*	*	*	*	*	*	*	*	*	*	*	*															

LSD PROCEDURE for Customer Knowledge

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 6	Grp10	Grp 2	Grp17	Grp 5	Grp 1	Grp15	Grp27	Grp16	Grp11	Grp14	Grp21	Grp24	Grp 4	Grp 3	Grp 9	Grp22	Grp18	Grp28	Grp19	Grp12	Grp25	Grp20	Grp 8	Grp23	Grp26	Grp13	Grp 7
2.7500	Grp 6																												
3.4000	Grp10																												
3.4667	Grp 2																												
3.4706	Grp17																												
3.5172	Grp 5																												
3.7667	Grp 1	*																											
3.8696	Grp15	*																											
3.9000	Grp27	*																											
3.9333	Grp16	*																											
3.9655	Grp11	*																											
4.0333	Grp14	*																											
4.0714	Grp21	*																											
4.1000	Grp24	*																											
4.1429	Grp 4	*																											
4.2069	Grp 3	*																											
4.2414	Grp 9	*																											
4.2593	Grp22	*																											
4.2703	Grp18	*	*		*																								
4.3103	Grp28	*	*		*																								
4.3929	Grp19	*	*	*	*																								
4.4138	Grp12	*	*	*	*	*																							
4.4286	Grp25	*	*	*	*	*																							
4.4333	Grp20	*	*	*	*	*																							
4.6552	Grp 8	*	*	*	*	*	*																						
4.7143	Grp23	*	*	*	*	*	*																						
4.8000	Grp26	*	*	*	*	*	*	*	*	*	*	*																	
4.8555	Grp13	*	*	*	*	*	*	*	*	*	*	*	*																
5.0000	Grp 7	*	*	*	*	*	*	*	*	*	*	*	*	*															

LSD PROCEDURE for Authority

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 r r r r r r r r r r r r r r r r r r r r r r r r r r r p p p p p p p p p p p p p p p p p p p p p p p p p p p 2 2 2 1 1 1 1 2 2 1 2 2 1 1 1 1 2 2 5 4 2 3 0 8 7 8 2 6 7 1 3 6 4 1 2 5 1 3 9 5 3 2 0 3 4 7
2.7586	Grp 5	
2.3000	Grp24	
2.3889	Grp22	
2.3929	Grp23	
3.3333	Grp10	
3.3929	Grp19	
3.4000	Grp 7	
3.4333	Grp15	
3.7000	Grp 2	* *
3.7500	Grp 6	* *
3.8824	Grp17	* * * *
3.8929	Grp21	* * * *
3.8966	Grp 3	* * * *
3.8966	Grp26	* * * *
3.9000	Grp14	* * * *
4.0000	Grp 1	* * * *
4.0345	Grp28	* * * *
4.1429	Grp25	* * * *
4.2069	Grp11	* * * *
4.2162	Grp18	* * * * *
4.2414	Grp 9	* * * * *
4.2500	Grp16	* * * *
4.2593	Grp13	* * * * *
4.2963	Grp12	* * * * *
4.3667	Grp20	* * * * * * * *
4.3929	Grp 8	* * * * * * * *
4.4286	Grp 4	* * * * * * * *
4.5000	Grp27	* * * * * * * * *

LSD PROCEDURE for Customer Feedback Importance

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.010 LEVEL

Mean	Group	Group 4 5 6 1 6 3 5 2 7 9 8 4 7 4 2 5 3 9 1 5 1 3 3 9 7 5 3 1
3.3000	Grp24	
3.8958	Grp 5	
4.0714	Grp 6	
4.2632	Grp22	
4.3000	Grp16	
4.3214	Grp23	
4.5000	Grp15	
4.5517	Grp12	
4.6875	Grp17	*
4.6897	Grp10	*
4.7297	Grp 8	* *
4.7500	Grp 4	*
4.8667	Grp 7	* *
4.9333	Grp14	* * *
4.9655	Grp 1	* * *
4.9655	Grp25	* * *
5.0000	Grp13	* * *
5.1034	Grp 9	* * *
5.1379	Grp11	* * *
5.1429	Grp25	* * *
5.1786	Grp21	* * * * *
5.2414	Grp 3	* * * * * *
5.3667	Grp20	* * * * * *
5.3929	Grp 9	* * * * * *
5.4000	Grp27	* * * * * * * *
5.4667	Grp18	* * * * * * * * *
5.5862	Grp 8	* * * * * * * * * * *
5.6333	Grp 2	* * * * * * * * * * * * * * *

LSD PROCEDURE for Customer Feedback Use (Pos or Neg)

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp 7	Grp10	Grp24	Grp 6	Grp22	Grp 5	Grp23	Grp17	Grp20	Grp25	Grp27	Grp26	Grp21	Grp19	Grp 6	Grp 4	Grp 1	Grp 2	Grp 3	Grp18	Grp12	Grp 9	Grp11	Grp 4	Grp 8	Grp15	Grp16	Grp 1
2.9657	Grp 7																												
3.3793	Grp10																												
3.4000	Grp24																												
3.4286	Grp 6																												
3.4815	Grp22																												
3.4828	Grp 5																												
3.6000	Grp23																												
3.6600	Grp17																												
3.7000	Grp20																												
3.7037	Grp25																												
3.7333	Grp27																												
3.7586	Grp26																												
3.7857	Grp21																												
3.9286	Grp19	*																											
3.9667	Grp 6	*																											
4.0000	Grp 4	*																											
4.1724	Grp 1	*																											
4.2000	Grp 2	*																											
4.2069	Grp 3	*																											
4.2963	Grp18	*																											
4.2414	Grp12	*																											
4.2759	Grp 9	*																											
4.2857	Grp11	*																											
4.5357	Grp 4	*	*	*	*	*	*	*	*																				
4.5833	Grp 8	*	*	*	*	*	*	*	*	*	*	*	*																
4.8333	Grp15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*													
4.9655	Grp16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*										
5.4000	Grp 1	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

LSD PROCEDURE for Customer Feedback Use (Negative Only)

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE 0.050 LEVEL

Mean	Group	Grp21	Grp 3	Grp 2	Grp20	Grp 7	Grp25	Grp26	Grp22	Grp14	Grp13	Grp18	Grp10	Grp27	Grp 5	Grp12	Grp 1	Grp17	Grp 4	Grp24	Grp11	Grp16	Grp15	Grp 6	Grp23	Grp28	Grp 9	Grp19	Grp 8
2.5714	Grp21																												
2.9555	Grp 3																												
3.0333	Grp 2																												
3.0667	Grp20																												
3.1333	Grp 7																												
3.1429	Grp25																												
3.1736	Grp26																												
3.2593	Grp22																												
3.2667	Grp14																												
3.3214	Grp13																												
3.3784	Grp18																												
3.3793	Grp10																												
3.4667	Grp27																												
3.5862	Grp 5	*																											
3.5862	Grp12	*																											
3.5667	Grp 1	*																											
3.7843	Grp17	*																											
3.7857	Grp 4	*																											
3.8000	Grp24	*																											
3.8276	Grp11	*																											
3.9000	Grp16	*																											
3.9130	Grp15	*																											
4.0357	Grp 6	*	*	*	*																								
4.0357	Grp23	*	*	*	*																								
4.1000	Grp28	*	*	*	*	*	*																						
4.1379	Grp 9	*	*	*	*	*	*	*																					
4.1429	Grp19	*	*	*	*	*	*	*																					
4.5[illegible]	Grp 8	*	*	*	*	*	*	*	*	*	*	*	*	*															

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This research studied the relationship between hypothesized predictors of quality performance and a readily available performance indicator, the Oregon Productivity Matrix Score. The authors attempted to develop a formula for predicting quality performance, the Quality Quotient, as well as testing the discriminability of the predictors.

To gather information, a survey developed specifically for this research was sent to each of the five Air Force Air Logistics Centers. The data were analyzed primarily using multiple regression analysis and discriminant analysis. The results of these analyses highlighted the ability of specific predictors for both prediction and discrimination using the Oregon Productivity score (standardized as a Z-score) as a dependent variable.

In addition to providing strong predictive ability, two of the regression formula beta coefficients surprised the researchers by having a negative effect on the dependent variable (although stated to have a positive effect by quality experts). Survey participants who were members of the top performing organizations believed that their organizations' data collection systems were more complicated than necesssary, and that statistical techniques should only be used by experts in the Quality field.

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