IMPROVING INTERNAL CUSTOMER SERVICE

THESIS

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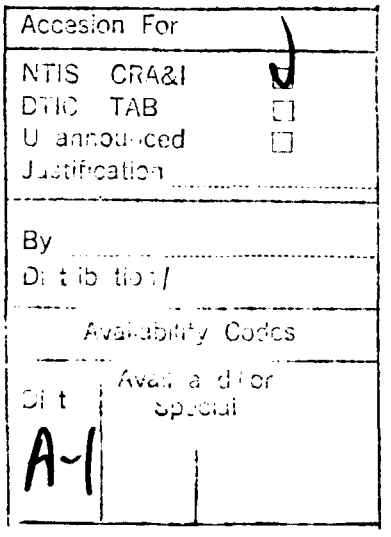

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Abstract

This ~~research~~ examined the evaluation criteria for the Malcolm Baldrige National Quality Award as possible predictors of quality internal customer service. The author attempted to develop a model to predict the level of customer service within an organization. The hypothesized model consisted of six independent variables: Leadership, Information and Analysis, Strategic Quality Planning, Human Resource Utilization, Quality Assurance, and Quality Improvement Results.

A survey instrument based on the Malcolm Baldrige Award criteria was used to gather information from DLA-O. Multiple regression analysis procedures were used to analyze the data and to develop a final model.

The final model consisted of four of the six independent variables. The strong predictors of internal customer service selected by these procedures are Quality Improvement Results, Quality Assurance, Human Resource Utilization, and Strategic Quality Planning. Leadership and Information and Analysis were not found to be significant in this analysis, but these variables might be predictors of the four variables selected. More research is needed in the public as well as the private sector to find a more comprehensive model.

IMPROVING INTERNAL CUSTOMER SERVICE

I. Introduction

Background

More and more American organizations, profit and non-profit, are becoming interested in the concepts of Total Quality Management (TQM). Businesses in the United States "have learned a hard lesson about the importance of quality in global competition" (39:45). Since World War II when many major economies of the world were destroyed, America had little competition in delivering goods and services throughout the world (28:144). Major competitors, like Japan, have emerged during the past two decades and U.S. organizations are learning that unless they realize the importance of quality, they will be at a disadvantage in ". . . penetrating foreign markets or competing domestically against high-quality producers from abroad. As fundamental as pricing, quality is essential to business strategy" (39:45).

The United States Air Force (USAF) is one of the American organizations adopting the ideals of Total Quality Management. The Air Force Logistics Command initiated the QP4 Program--Quality for People, Process, Product, and Performance Program, and the Air Logistics Center in

Sacramento, California initiated the concept of self-managing work teams, an innovative idea of from the TQM philosophy.

General Issue

As more U.S. organizations accept the importance of TQM, they are realizing a major aspect of TQM is quality customer service. Customer service has become more than a buzz word in today's business environment; it has become the key to excellence (36:52). With today's economic climate, quality service means survival for business organizations (25:43). Industrial marketers have shifted their emphasis from price to quality service (43:5). Companies are using customer service as a competitive edge in a crowded market with global competition, little price differences, and no perceived difference in product quality (6:24).

According to a recent Gallup Poll prioritizing business concerns, 615 companies' senior management executives put service quality at the top of their list (25:43). For profit-oriented organizations, ignoring the demands for quality customer service jeopardizes future sales, profits, and, ultimately, survival (42:16). For non-profit, goal-oriented organizations, ignoring service demands jeopardizes goal attainment and teamwork. "Companies are recognizing that treating customers and associates like people has a very high value" (21:20).

Customer service has become more that just one department of an organization; it has become the responsibility of everyone in the organization (26:12). Customer service is based on what the customer wants, how the customer's wants are fulfilled, and how satisfied the customer is with the product or service. Organizations are realizing customer service is also a strategy with the focus towards people, not product (24:1).

Customers are demanding quality service for several reasons including comtemporary lifestyles and complex technological products (42:16). People have less free time to spend solving problems with a product or service. Customers want reassurance they will have hassle-free shopping and available support if problems arise (42:16).

Customer service that is not of the quality customers expect have significant effects on an organization's business.

> The Technical Assistance Research Programs Institute (TARP), a research firm in Washington, says its studies indicate that 91 percent of unhappy customers will never again buy from the offending company and will let their dissatisfaction be known to at least nine other people. (42:17)

Another study indicates that to make up for one bad service experience, a customer will need to have 12 good experiences (9:11). "The wisdom lies in circumventing the negatives by increasing the positives" (9:11).

Though the USAF is not a business in the general sense of the word, it is an organization with external customers, such as the civilian population it defends, and internal customers. The USAF must have strong internal customer service to maintain strong teamwork between its service members in order to provide for a strong defense system for its external customers.

Problem Statement

Many organizations make the mistake of concentrating solely on the service quality extended to their external customers. They do not take into account, or even realize, internal customers exist. In order to achieve quality customer service, an organization must realize quality service begins within the organization with its internal customers.

The focus of this study is internal customer service--specifically, the internal customer service of the Defense Logistics Agency (DLA). The research objectives are to examine the current level of internal customer service within DLA so as to determine what variables may affect internal customer service within the agency and to develop a predictive model based on those variables.

Investigative Questions

In order to improve the overall quality of service, an organization's current level of internal customer service

must be assessed and the factors affecting the level of service quality must be determined. The following questions, which will be answered in the course of this research, will provide insight into these areas as well providing generic guidelines on how to improve internal customer service:

1. Do the Malcolm Baldrige National Quality Award evaluation criteria comprise a viable model for predicting the level of quality customer service within DLA?
2. Based on the survey of DLA, what does the internal customer service prediction model actually look like?

Limitations

Internal customers and internal customer service were defined only recently. A vast amount of research has been conducted on customer service, but this research is mostly limited to the general issue of customer service and external customers in regard to the civilian sector of business. Therefore, this study is exploratory in nature. The information gathered in this study's research will provide insight to the concept of internal customer service.

Definition of Terms

For the purpose of this study, the following definitions will be used:

Quality Customer Service. Customer service is a process that adds value to a product or service exchanged between two or more people. This added value is shared between all involved parties so that each is better off after the completion of their business than before their business took place (26:5).

> The new wave of thinking is that customer service is the interrelationships between all people involved with the organization -- the manufacturing and service departments, the internal and external customers. Every department has internal customers, so customer service covers every function. (40:20)

Quality can be defined as the "conformance to specifications" (12:17). Service quality is ". . . conformance to customer specifications; it is the customer's definition of quality, not management's, that counts" (4:35). From the first contact through the actual transaction to follow-up servicing, service quality covers everything involved in delivering the product or service (39:45). It is intangible and ". . . can be thought of as forming that context in which a product or service exists" (39:45).

External Customers. External customers are an organization's ultimate consumers. They purchase the end product or service an organization provides.

Internal Customers. Internal customers are all the individuals within an organization who work together to

provide the product or service to the external customer (36:52). For example, a personnel director's customers would be the management, labor union, and employees of his or her organization.

Summary

This chapter presented a brief discussion on the acceptance of TQM in American businesses as well as the USAF and on the importance of quality customer service, an aspect of TQM, to an organization's survival. The terms quality customer service, external customers, and internal customers were defined to aid in the discussion. Determining what factors affect the current level of internal customer service within DLA and developing a predictive model based on those factors were presented as the research objectives along with the investigative questions to be used in achieving the research objectives.

The remainder of this study is divided into four chapters. Chapter II will consist of a literature review concerning customer service in general with an emphasis on internal customer service and the possible factors affecting customer service based on the Malcolm Baldrige National Quality Award evaluation criteria. Chapter III will define the methodology used in this research, and the results of the research methods will be analyzed in Chapter IV. Finally, Chapter V will present the conclusions and recommendations drawn from the data gathered in this study.

II. Review of the Literature

Overview

This chapter reviews literature dealing with customer service and the Malcolm Baldrige National Quality Award. The topic of customer service is first introduced followed by a discussion of the literature. The discussion focuses on what customer service is and why it is important, what the Malcolm Baldrige Award is and its evaluation criteria, and how improving internal customer service will create better external customer service.

Introduction

Topic Statement. The purpose of this work is to provide insight into quality customer service as the dependent variable and into the Malcolm Baldrige National Quality Award evaluation areas as the independent variables. The literature review extends from an explanation of what customer service is, both external and internal, and its importance through a discussion of the evaluation criteria of the Malcolm Baldrige Award. Finally, the effects of internal customer service on external customer service are examined.

Justification. A study of this type is essential for organizations to understand how important quality customer service is today and what affects their customer service. From this work, the reader can draw his own conclusions of

how quality customer service affects his business. Also, service assessment criteria and quality improvement guidelines can be developed from the information in this review.

Scope. This study focuses on the importance of external and internal customer service and the evaluation criteria of the Malcolm Baldrige National Quality Award as possible factors for determining those customer service levels. The review is not intended to be an extensive review of all possible factors affecting customer service, only to review the Baldrige Award criteria as possible determinants of internal customer service and, ultimately, external customer service.

Method of Organization. The discussion of the literature is analytical. First, the focus is on what quality customer service is, both internal and external, and why customer service is so important today. Second, the dimensions of assessment criteria for the Malcolm Baldrige National Quality Award are discussed as potential predictors of internal customer service. Finally, the ways in which external customer service can be improved through better internal customer service are presented.

Discussion of Literature

Quality Customer Service. External customer service is based on consumer wants and needs and on organizational goals. "A customer-oriented firm is one that is committed

to meeting its customers' needs" (2:16). From the top management to the bottom level of the organization, the customer service commitment exists in all decisions and actions (2:16).

Customers look at service through three main dimensions: time, tangible, and intangible (30:274). "Customers assess service quality by comparing what they want or expect to what they actually get or perceive they are getting" (4:37).

The time dimension of quality service involves search, experience, and credence qualities (30:274). Search qualities include the customer's perceptions about the product or service before buying and stem from information the customer receives about the product or service (30:274). Experience quality is the customer's evaluation of the product or service after the purchase, and credence quality relates to the overall credibility of the product offer (30:274).

The tangible dimension of assessing service quality includes the physical attributes of an organization's facilities and the appearance of its employees (29:6). Buildings, grounds, offices, and equipment should be neat, clean, and attractive, and employees should present a well-groomed image (42:10). The facilities and people represent the quality standards of the organization and its product or service to the customer (30:275). "If you have a choice

between two dry cleaners you haven't used before, you might consider that the store with the cleanest windows will give you the cleanest clothes" (6:27).

The intangible dimension of customer service involves four distinct categories of customer expectations. These categories were defined by the Forum Corporation from a report by the Marketing Science Institute:

> · **Reliability**: Is what was promised provided dependably and accurately? Federal Express, for example, with its vast tracking system, usually can be relied on to get your package to its destination by 10:30 a.m. the next day. If they don't deliver, they run the risk of losing your business.
> · **Assurance**: Are the employees knowledgeable and courteous, and can they express trust and confidence? If you have a dispute concerning a bill you get from American Express, a simple telephone call to its toll-free number puts you immediately in touch with someone who has the authority to issue a credit until the dispute is resolved. When you hang up, you feel assured that something has been done about your complaint.
> · **Empathy**: Are caring and individual attention provided? Salespeople at Nordstrom keep personal notebooks and make the effort to call you by name the next time you come in.
> · **Responsiveness**: Is there a willingness to help customers and provide prompt service? One photocopier company schedules its emergency repair service at a time it know it can make, and then makes sure a repairperson gets there an hour early. (6:27)

"To earn a reputation for quality, an organization must meet--or exceed--customer expectations" (4:37). "Competing organizations provide the same *types* of service . . . but they do not provide the same quality of service" (4:35). When customers get "unexpected value or unanticipated

satisfaction," they react with delight (10:32). To beat the competition, an organization should go beyond meeting customer expectations to "delighting" customers, not just satisfying them (10:30).

> Customer delight is the delivery of products and services that exceed expectations. Customer delight represents excellence in every respect. It could include faster delivery, longer life, lower cost, clearly perceived value, consistent performance, or higher resale value. (10:30)

With society becoming less industrial, more technological, and more service-oriented, companies are committing themselves to increasing customer service levels (33:57). The customer and his satisfaction are becoming the key to success since ". . . competition is intensifying, and gaining the competitive edge is becoming more difficult" (17:24). A customer will not buy from a company that does not meet his expectations; so, a necessary goal of every organization is satisfying the customer (6:24). It costs five times as much to attract a new customer than to keep a current one (40:20). "So in today's competitive marketplace, excellent service makes excellent business sense, and companies are beginning to realize it" (40:20).

For an organization to stand above the competition, they must do more than satisfy the customer though. "The problem with mere satisfaction is that the customer expects to be satisfied; he or she finds nothing exceptional in mere satisfaction" (6:24). Service that exceeds expectation is a

necessity, not a luxury (37:46). A customer will be impressed by an organization that exceeds his expectations and will return to that organization (6:27).

Jay Spechler, author of When America Does It Right: Case Studies in Service Quality, suggests that service that is good is not good enough:

> In today's regional, national, and global marketplace, service has to be outstanding. If it is not outstanding it will be considered mediocre.
>
> These days, there is a different perception in the wind about customer service, a heightened awareness. People no longer tolerate what they tolerated previously. That's new to the American marketplace, but in other markets, awareness has been high for a long time.
>
> So the awareness elsewhere about service quality is different from what we have been accustomed to in the United States. But people's expectations here are increasing at a rapid pace. What was good or even great yesterday is not going to satisfy the day after tomorrow. Good is not good enough. (40:20-22)

Many companies are satisfying the customer, ". . . but going beyond satisfaction to customer delight will provide a distinct advantage to the company that does it first and does it well consistently" (10:32). One of the most powerful ways to shape a customer's perception of a company is through customer service (25:45). "Firms with exceptional service quality enjoy stronger customer loyalty" (39:46). Not only do those customers return for the same service or product, but they will also go to that company that impressed them for other products or services (39:46).

Loyal customers ". . . provide the stability that is so important to long-term profitability" (25:44). Outstanding customer service is valuable to customers and they will usually pay more for the higher quality service (39:45). "In addition, focus on the service issues in a product . . . can lead to a revitalization of the product" (5:24).

> As Warren Blanding of the Customer Service Institute points out, it is important to realize that customer service is an investment in future sales: 'The current sale has already been made. You have convinced the customer to come into your shop or office and buy your product or service. But the way that first transaction is handled is the key to future business.' (42:22)

"The American Management Association says that 65 percent of the average company's business comes from its present, satisfied customers" (42:16-17). Many companies could increase their competitiveness as well as their profitability through their present customer base by improving their customer service level (17:25). According to a study by the consultant, Technical Assistance Research Programs, for the White House Office of Consumer Affairs:

> · 96% of unhappy customers never complain about rude or discourteous service.
> · 90% or more of those dissatisfied with the service will not buy again or come back.
> · Each of those unhappy customers will tell their stories to at least nine other people.
> · 13% of those unhappy former customers will tell their stories to more than 20 people. (17:24-25)

"On the other hand, every satisfied customer will tell at least five others, some of whom might become your customers" (17:25).

Poor service quality not only costs organizations the loss of customers, but also costs the firm the loss of valuable time spent correcting errors, key distributors, and a high overall employee turnover rate (39:46). "A reputation for poor service will doom a company to continually higher costs for years" (39:46). "Quality of service is not *a* competitive advantage, it is *the* competitive advantage" (17:25).

> 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 of standards of service quality, timeliness, and delivery. Failure to take this initiative in service quality before a decline in market share, sales, or profits could well result in an inability to reverse any downward trend. (17:24)

For an organization to improve its external customer service, everyone in the organization must have a quality service attitude (38:46). "Each person in the organization is either in direct contact with the customer, or they support someone who is" (38:46). The person who buys the product or service is the ultimate consumer, the end-user, while a customer can be anyone supported directly whether internal or external to the organization (35:48). Well before a product or service reaches the consumer, a series

of supplier/customer relationships between internal customers molds the quality of the product or service (27:63).

Most employees in an organization never come in direct contact with the external customer, but at some point each employee is a customer who depends on work received from others (10:31).

> Every individual in an organization, at every level in the hierarchy, presides over a processing system: everyone is a user of inputs and a producer of outputs for an internal or external customer. (23:12)

Many people do not understand that their jobs are more than performing a series of tasks; they do not understand they are actually serving their internal customers (11:118).

> In the daily routine of business, not everyone gets along with each other. Whether due to personalities or disagreements about who's responsible for doing tasks, not everyone in accounting cooperates with sales, or those in the warehouse and transportation may be at odds with each other.
>
> Over time these disagreements can become turf battles. If not resolved, the relationships only worsen until they begin to affect your external customers directly. (36:52)

"This concept of the internal customer means that the rules for satisfying external customers apply to internal customers as well" (10:31). But, many organizations fail to look at the internal service levels; they are only concerned with external service levels (35:48). The service quality

between internal customers can have a direct impact on the consumer's service satisfaction (35:48). "Our individual and collective success depends upon satisfying customers' needs and meeting their expectation better than the competition" (11:120). This success ". . . requires a strong sense of teamwork and internal cooperation" established by having the same standards for providing quality service and solving problems applied to internal customers (35:48).

> It is anything you can do for your customer, whether an internal or external customer, to make him or her say: 'I am absolutely delighted.' This can translate into a distinct advantage in the increasingly competitive world. (10:30)

The Malcolm Baldrige National Quality Award. The Malcolm Baldrige National Quality Improvement Act of 1987, Public Law 100-107, created an annual quality award to promote quality improvement of goods and services in the United States (32:35). "It demonstrates the growing cooperation of business and government to achieve this goal" (15:21). The Malcolm Baldrige National Quality Award is comparable to Japan's Deming Application Prize and ". . . is an attempt to realize the same results in the United States as the Deming Prize has seen in Japan" (8:28). The Act and the Award were created to promote quality awareness, to recognize quality achievements in U.S. companies, and to publicize successful quality strategies (32:35).

"The Malcolm Baldrige National Quality Award has quickly become the focal point of quality improvement in America" (41:30). Businesses can compete for the award in one of three categories: manufacturing, services, or small businesses (32:35). A maximum of two awards are given in each category per year and winners can use the award for publicity and advertising (8:30, 32:35).

The Act came about as a result of President Reagan's legislation ". . . mandating a national study/conference on productivity in October 1982" (15:21). Leaders in government and industry were concerned with America's decreasing competitiveness in world markets and its decreasing productivity. Efforts by the National Advisory Council for Quality(NACQ) and the American Productivity and Quality Center(APQC) were already focused on finding ways to develop a quality awareness nationwide and to improve American productivity, quality, and competitiveness (15:21). The APQC conducted computer networking conferences from April to September 1983 to prepare for the White House Conference on Productivity. The APQC recommended the creation of a national quality award and a national quality association based on their computer conferences (15:21)

The report from the White House Conference on Productivity was published in April 1984 and

> . . . called for a national medal for productivity achievement to be awarded annually by the president in recognition of high levels of productivity achievement by organizations. Also

> recommended was a quality awareness campaign at the national level in both the public and private sectors to demonstrate the importance of improving quality, productivity, and international competitiveness. (15:22)

In September 1985, the Committee to Establish a National Quality Award (later to be known as the National Organization for the United States Quality Award) was formed by private sector academics and corporate quality leaders from various organizations, such as APQC, Ford Motor Company, and McDonald Douglas Corporation (15:22). These private organizations ". . . created the private sector mechanisms and laid the groundwork for a national quality award" (15:22-23). Actual legislation for a national quality award was introduced in August 1986 by Congressman Don Fuqua (15:23).

Efforts for a quality award gained momentum even after Fuqua left the House. Congressman Doug Walgren introduced House Bill 812, "National Quality Improvement Act of 1987," and Senator Bob Graham supported the bill in the Senate (15:24). The House passed the measure and sent it to the Senate; but before the Senate could act, Commerce Secretary Malcolm Baldrige was killed (15:24).

The Senate Committee on Commerce, Science, and Technology renamed the legislation in Baldrige's honor, ". . . and on August 20, 1987, President Reagan signed the Malcolm Baldrige National Quality Improvement Act of 1987 into law" (15:24).

> Baldrige was commerce secretary from 1980 until his death in July 1987. During his tenure, Baldrige developed and carried out Reagan administration trade policy, including international negotiations with China, India, and the Soviet Union; reduced the Commerce Department budget by more than 30%; and trimmed the department's administrative personnel by 25%. (31:25)

The National Institute of Standards and Technology(NIST) directs and manages the award program with broad direction from the Board of Overseers (15:24). The Act requires a Board of Overseers, consisting of at least five quality management experts appointed by the secretary of commerce, to review the activities with the award and make suggestion for improvement (15:24).

"The Malcolm Baldrige National Quality Award is a positive step in the U.S. strategy toward regaining global competitive advantage" (8:30). During the presentation of the first recipients' awards, former President Reagan said:

> The one trait that characterizes these winners is that they realize that quality improvement is a never-ending process, a companywide effort in which every worker plays a critical part. They realize that customer satisfaction through better quality is the goal. And they know that America's economic strength and future depend more and more upon the quality of its products. (31:25)

More than an annual presentation though, the Malcolm Baldrige Award is ". . . the driving force of a national movement, the hub around which the wheel of quality improvement in America turns" (15:26-27).

The Independent Variables. Competitors for the Malcolm Baldrige Award are judged by the Board of Examiners, which ". . . is a three-tiered structure consisting of nine judges, 28 senior examiners, and about 100 examiners" (15:25). Both judges and examiners are experts in quality improvement and are selected for their expertise and experience (15:25). Judges are chosen by the director of NIST and judges select the senior examiners and examiners (15:25).

The evaluation criteria for the award not only assess award applicants but also serve as a value system (32:35). The award examination was designed as an evaluation tool, an education/communications tool, and a vehicle for cooperation (32:36).

> It is adaptable to the needs of any organization, and is being used throughout the United States in four basic categories: assessment, setting up a quality system, communications, and education and training.
>
> The most significant uses of the award examination to date involve assessment--self-assessment, assessment of suppliers, and evaluation of candidates for awards. (32:36)

The award criteria are based on seven examination categories: leadership, information and analysis, strategic quality planning, human resource utilization, quality assurance of products and services, quality improvement results, and customer satisfaction (15:25, 16:18, 31:27). Customer satisfaction is the most important category in the

Malcolm Baldrige Award, making up 30 percent of the total examination points (8:30). For the purpose of this work, customer satisfaction is the dependent variable described earlier while the six other categories are the independent, predicting variables.

Leadership. The category of Leadership focuses primarily on ". . . how the senior executives create and sustain a clear and visible quality value system along with a supporting management system to guide all activities of the company" (16:19). This variable extends from senior management's personal involvement and visibility in promoting and developing a quality-oriented environment to the company's quality values in policies and actions to the integration of quality values and objectives in day-to-day operations across functional and departmental lines (16:19-20). Also covered by this possible predictor of customer satisfaction is how the company accepts its public responsibility of promoting quality awareness and of quality health, safety, and environmental protection (16:20).

Information and Analysis. Examined under the Information and Analysis category are ". . . the scope, validity, use, and management of data and information that underlie the company's total quality system" (16:21). This variable addresses the use of the company's information systems in quality planning, management, and evaluation, the management of key data for accuracy and availability, and

the analysis and use of data for decision making (16:21). The purpose of this category ". . . is to permit the applicant to demonstrate the breadth and depth of the data assembled as part of its total quality management effort" (16:21).

Strategic Quality Planning. Strategic quality planning is a common part of corporate strategic planning today (19:27). Under the award examination process, this category looks at ". . . the company's planning process for retaining or achieving quality leadership and how the company integrates quality improvement planning into overall business planning" (16:22). The Strategic Quality Planning variable includes employee involvement in planning, quality planning in relation to overall business planning, and sources of competitive and benchmark data for quality planning (16:22).

Human Resource Utilization. The Human Resource Utilization category examines how the company develops and uses a quality-oriented work force (16:23). Employees are a key factor to improving quality in a company. In 1988, Secretary of Labor William Brock stated that quality is not a changed product but a changed "human equation" (7:39). Conflict resolution techniques, performance evaluation, motivation, organizational structure, organizational communication and control, group dynamics, and job design are areas involved in the new human equation (13:567). This

variable addresses such personnel matters as quality orientation of employees, quality training, quality of work life, employee involvement, and employee recognition (16:23-24).

Quality Assurance of Products and Services. The Quality Assurance category ". . . examines the systematic approaches used by the company for total quality control of goods and services" (16:25). This variable is concerned with the design and introduction of new or improved products/services, the key characteristics of production, the quality assurance standards and measurements, and the company's documentation of quality assurance (16:25-26). Also examined under the potential customer service predictor of Quality Assurance are the selection of and long-term relationships with external suppliers and contractors and the auditing and inspection programs they use (16:27).

Quality Improvement Results. The sixth category of the Malcolm Baldrige Award evaluation criteria ". . . examines quality levels and quality improvement based upon objective measures" (16:27). Product and service quality trends and quality improvement initiatives and their results are addressed under this variable (16:27). This category also compares the company's quality improvements and product/service quality with other companies' quality improvements (16:28).

Improving Customer Service. An organization can improve external customer service by improving internal customer service. For the purposes of this work, internal customer service is the dependent variable, customer satisfaction.

Buyers are favoring suppliers who help to resolve price, quality, and service problems and ". . . provide a positive influence on profitability" (43:7). For an organization to achieve quality service, the company must require everyone to understand and to behave in ways that will cause the customers to think they are receiving high quality, value-added service on a consistent basis (38:46). "Management should encourage employees to think of new ways to serve customers; they should portray value-adding in relative, as well as absolute terms" (22:5).

According to George T. Selin, president of Selin Corp., a human resources and organizational development consulting firm, "The only way to improve the ultimate quality of service to your bill-paying customers is to develop an internal service teamwork attitude" (35:48). A customer-oriented company instills employees with a sense that their work adds value that is passed on to their internal customers and ultimately the consumer (22:5). Once all levels of an organization are focused on quality, every employee is held accountable for excellent quality service (39:47).

> In our opinion, quality performance can be improved if organizations can create an entrepreneurial viewpoint on the part of each individual, while fostering a team effort in which all employees can help the organization meet its broad goals.
>
> If employees(from the bottom to the top of the organization) viewed their jobs as does the entrepreneur, it would become apparent that to stay in business one would have to:
>
> - Know the customers and their needs--i.e., the market--in order to produce usable products and services.
> - Efficiently manage limited resources to meet these needs.
> - Be creative, innovative, and willing to take risks. (23:12)

Many organizations feel only training personnel in customer contact positions can improve service. Most customers base their buying decisions on their total experience with a company though. This total experience involves everyone in a company since each employee either has direct contact with the consumer or supports another employee who does (34:59).

> Customers want the comfort of people who care, and who show it genuinely. At the same time, employees respond to their customers in exactly the way management and associates treat them. (21:21)

Benjamin Schneider, a management professor at the University of Maryland, found that customers received superior service from employees who felt management had a strong commitment to service quality and that employee turnover and morale were also strongly related to customer satisfaction (44:62-64). "Customer orientation and employee

orientation are closely interwoven" (1:408). Employees need to understand that they should treat each other the way they would treat the consumer (36:52). A company-wide service attitude means management must clearly define what quality service means to the organization and must instill this attitude with internal customers (36:52).

> In companies that have recently started customer service improvement programs, management has made the conscious decision that excellent service is the way to go, has stated it clearly, and has tried to create an environment where employees make the effort to serve the customer, whether internal or external. (6:27)

An organization can establish quality customer service through a strong people-orientation towards service, "unhappy employees do not produce happy customers" (2:16). Quality customer service can be maintained by the company who recognizes what customers want and who establishes appropriate standards, but the company must also maintain a quality service level in their work force (4:38). Companies must realize that no one person or department is responsible for consumer satisfaction, it is the responsibility of the entire organization (9:16). Warren Blanding of the Customer Service Institute advises, "The secret of good service is to do things for a customer the way the customer would do them if given the opportunity" (42:22).

Organizations should incorporate the standards of quality customer service as a way of life (36:52). Managers

should be responsible for the overall quality and goals of customer service (42:24). Performance objectives and employee performance appraisals should focus on providing quality service to every customer (inside and outside) of the organization (11:116). David Bowen, a University of Southern California professor, conducted a study on two groups of Main Street banks. Bowen found:

> A strong correlation between customer and employee views of service quality and the internal climate for service: When employees view an organization's human resources policies favorably, customers view the quality of service they receive favorably. (25:45)

"The practical reality of the business environment is that both external and internal customers are critical to your continued success" (36:52).

> The service chain is only as strong as its weakest link. With everyone in the organization focused on providing high quality service to each other, the ultimate customer will benefit and your profitability will improve. (35:48)

Conclusion

This study briefly explained what customer service is to today's organizations. More than a buzz word or a single department, customer service is the key to the survival and success of an organization. Customers are demanding quality customer service to meet their more contemporary and complex lifestyles. If those demands are not met by one organization, the customer will find another organization to

satisfy those demands. "Ultimately, competition based on service quality may be an effective way to strengthen U.S. industries and help them compete in global markets" (39:48).

Quality customer service is not only the service level extended to external customers, it is also the service levels between internal customers. It is that internal customer service level as the dependent variable, customer satisfaction, that is the focus of this work.

Quality in U.S. industries is the focus of the Malcolm Baldrige National Quality Improvement Act of 1987. The Act was created to establish a quality awareness in the United States, to recognize quality achievements in U.S. companies, and to publicize successful quality improvement strategies (32:28). The Act also established an award for recognizing quality improvement in organizations, the Malcolm Baldrige National Quality Award.

The independent variables are based on the examination criteria of the Malcolm Baldrige National Quality Award. The categories included in the assessment criteria are Leadership, Information and Analysis, Strategic Quality Planning, Human Resource Utilization, Quality Assurance of Products and Services, Quality Improvement Results, and Customer Satisfaction (16:18). These categories, except Customer Satisfaction, are described as possible predictors of Customer Satisfaction, or, in other words, internal customer service.

Excellent internal customer service establishes a team-oriented service attitude that is reflected throughout the company and ultimately through excellent service to external customers. An organization can improve its customer service quality in several ways, but the keys are to realize service is the responsibility of the entire organization and to listen to what the customer expects. There is no sense in investing in advertising and selling operations if the staff who delivers the goods and services are "uninformed, inefficient, unenthusiastic and discourteous" (3:124).

III. Methodology

Overview

The methods used to solve the research problem are discussed in this chapter. Specifically, the questionnaire used to collect the data will be described along with the definition of the sample population surveyed. Finally, the measurement scale and the data analysis techniques will be identified and discussed.

Introduction

This study uses a case study approach, a case study of the Defense Logistics Agency, to answer the investigative questions posed in Chapter I. The case study approach is used to analyze conditions and to explore interrelationships (18:61). It is the preferred instrument when the focus is on a contemporary phenomenon, like internal customer service, with real life application (14). The case study of DLA is based on a cross-sectional study of the Supply Operations Directorate(DLA-O) of DLA. The cross-sectional study uses a survey questionnaire completed by all DLA-O employees.

Instrument Design

To solve the research problem, a cross-sectional survey of DLA was conducted by the questionnaire in Appendix A. The survey instrument used to collect the necessary data was

created by Dr. Robert P. Steel and Dr. Kenneth R. Jennings, professors of Management and Organizational Behavior for the School of Systems and Logistics, Air Force Institute of Technology, Air University.

The questionnaire is divided into two sections. Section I obtains demographic data and Section II collects data about the presence and strength of the possible predictors of internal customer service. Section II of the questionnaire is based on the evaluation criteria of the Malcolm Baldrige National Quality Award.

Dr. Steel and Dr. Jennings designed the survey instrument to assist DLA-O in improving its product and service quality. Through its design, the instrument also is a viable instrument for determining what possible variables might affect quality service levels between internal customers.

Sample/Population

The survey sample consists of the entire Supply Operations Directorate of DLA. A census of the 128 individuals in DLA-O completed the questionnaire. The sample represents the population of DLA and includes all DLA-O employees from the bottom of the organization to top management, military and civilian.

Data Collection

All DLA-O employees completed the survey in conjunction with a research effort by an Air Force Institute of Technology(AFIT) consulting team working in conjunction with a team of Air Force Reserve consultants. The teams were gathering information of the quality improvement efforts within DLA.

The consulting teams distributed and collected the surveys with assistance from DLA-O management. The data was collected to research DLA-O's employee perceptions of quality, including customer service, throughout DLA. Responses to all survey questions were read by an optical scanner into a computer data file for analysis.

Measurement

The questionnaire gathered data on how the employees view quality and customer satisfaction within DLA ranked on a seven point Likert scale. The Likert scale was used because it provides a greater volume of data and is more reliable than the Thurstone scale (18:258). The Likert scale is also easy to use in studying how responses differ between people and units of people (18:258).

Data Analysis

Data analysis was performed using programs developed for the SAS statistical software system. The SAS programs obtained descriptive statistics and correlation matrices and

performed factor analysis and multiple regression analysis. Multiple regression analysis was used to test the significance of the six independent variables as possible predictors of customer satisfaction.

Factor Analysis. A factor analysis was performed on the survey instrument to group the questionnaire items into seven factors. The principle component method with one varimax rotation verified the items grouped into the six independent variables and one dependent variable of the hypothesized prediction model of customer service. The factor analysis performed fairly well given that the 94 items had to be grouped based on 128 completed questionnaires. The results of this analysis are shown in Appendix B and support the validity of the use of the survey instrument for this research.

Regression Analysis. Multiple regression analysis is used to test the significance of the full hypothesized model of possible predictors of customer service. The use of two or more independent variables to predict a dependent variable supports the use of this technique. The SAS statistical software package is used to perform a full model regression analysis as well as a stepwise regression analysis of the six independent variables.

The variable inflation (VIF) and tolerance (TOL) options are used in combination with regression procedure. The output of this procedure provides analysis of variance

statistics, parameter estimates, multicollinearity tests, and the Durbin-Watson statistic, which is used to test for variable independence.

Stepwise regression analysis tests the variables in different combinations to create the "best" prediction model. In SAS, this analysis can be a regular stepwise procedure (Stepwise), a forward procedure, or a backward procedure. The Stepwise method can enter or remove variables to test several equations for the most appropriate model.

The forward procedure begins with a basic regression equation and adds variables based on their significance levels to the model. This procedure differs from Stepwise in that once a variable is entered into the model, it cannot be removed. The significance level of the variable to the model is tested based on a comparison of variable's contribution to the model (its F-statistic) to the predetermined entry level of significance. If the variable's F-statistic is greater than the set entry level, the variable is allowed to enter the model.

The backward method begins with a full model of all the independent variables and removes them one at a time. The model's overall F-statistic is the basis for removal from the model. If a variable does not contribute significantly to the model's significance, it is removed, and, once a variable is removed, it cannot re-enter the model.

Reliability Analysis. The reliability of each variable is tested using the split-half technique and the Spearman-Brown correction formula. The split-half technique tests the reliability of a variable by splitting the results of the questionnaire items grouped under that variable in half and comparing the halves. "If the results are similar, the instrument is said to have a high reliability . . ." (18:99). However, the number of items in the groupings can affect the outcome of the split-half test--the larger the number, the greater the reliability (18:99). To adjust the reliability based on the size of the groupings, the Spearman-Brown correction formula is used. This formula adjusts the results of the split-half test to more accurately reflect the actual reliability of the variables (18:99).

Summary

This chapter explained that the case study approach was used to answer the investigative questions posed in Chapter I. Cross-sectional surveys were conducted by a questionnaire developed by a team of AFIT professors to gather information on employee perceptions of quality in DLA, including customer service. A Likert scale was used to measure the survey responses. The data was then analyzed using SAS programs such as factor analysis and multiple regression analysis. The analyzed data will then be used to answer the investigative questions. Conclusions and

recommendations will be drawn from the data and investigative questions in response to the problem statement in Chapter I.

IV. Analysis and Findings

Overview

This chapter describes the procedures used to analyze the survey response data and explains the findings of the analysis. First, the survey description and purpose are presented. Second, the data analysis is explained as well as the statistical analysis procedures. Finally, the chapter examines the findings of the data analysis.

Survey Instrument

The purpose of the survey is to measure employee attitudes and perceptions of quality within an organization. The survey was developed based on the evaluation criteria for the Malcolm Baldrige National Quality Award and is used in this study to examine possible predictors of customer service. Statements are grouped in the survey according to the variable, or category, they represent. Employees respond to the statements with their level of agreement or disagreement based on a seven point Likert scale. The actual survey is in Appendix A and Table I lists the variables used in this study, the variable aliases used in the computer analyses, and the numbers of the statements grouped under each variable.

Table I
Variables, Aliases, and Survey Statements

Variable	SAS Aliases	Associated Statements
Leadership	LEADER	7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24
Information and Analysis	INFORM	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
Strategic Quality Planning	PLANNING	36, 37, 38, 39, 40, 41, 42, 43, 44
Human Resource Utilization	RESOURCE	45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64
Quality Assurance	QA	65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79
Quality Improvement Results	RESULTS	80, 81, 82, 83, 84, 85, 86
Customer Satisfaction	CS	87, 88, 89, 90 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

Analysis

The data is analyzed through multiple regression methods supported by the SAS statistical software. A regression analysis of the whole model begins the statistical analysis. To test for multicollinearity, variance inflation and tolerance are requested in addition to the regression information. The Durbin-Watson statistic is used to test the variables for serial correlation. The output from this initial analysis is presented in Table II.

Table II
Regression Output for the Whole Model

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	6	11791.12890	1965.18815	40.045	0.0001
Error	101	4956.53777	49.07463		
C Total	107	16747.66667			

Root MSE	7.00533	R-square	0.7040
Dep Mean	59.38889	Adj R-sq	0.6865
C.V.	11.79569		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob >|T|
INTERCEP	1	6.401621	3.83952333	1.667	0.0986
LEADER	1	0.019190	0.06089119	0.315	0.7533
INFORM	1	-0.052324	0.08955905	-0.584	0.5604
PLANNING	1	0.154855	0.15743507	0.984	0.3277
RESOURCE	1	0.094729	0.06358495	1.490	0.1394
QA	1	0.284032	0.09439511	3.009	0.0033
RESULTS	1	0.853795	0.18582998	4.594	0.0001

Variable	DF	Tolerance	Variance Inflation
INTERCEP	1	.	0.00000000
LEADER	1	0.35873097	2.78760430
INFORM	1	0.35993275	2.77829680
PLANNING	1	0.24252308	4.12331887
RESOURCE	1	0.26765962	3.73608837
QA	1	0.26393562	3.78880269
RESULTS	1	0.43270239	2.31105728

Durbin-Watson D	2.044
(For Number of Obs.)	108
1st Order Autocorrelation	-0.033

From this output, many aspects of the overall model can be analyzed. First, the whole model F statistic (Prob>F) suggests that all six independent variables contribute to the model. However, the significance of each variable to the model cannot be determined from the initial regression analysis. For example, in the whole model with an alpha of 0.05, QA (Quality Assurance) and RESULTS (Quality Improvement Results) seem to be insignificant as predictors of customer satisfaction, with Prob>|T| of 0.0033 and 0.0001 respectively. The stepwise regression procedures analyzed later test the actual significance of each variable more extensively.

Secondly, based on the Variance Inflation (VIF) and Tolerance (TOL) output, no multicollinearity seems to be present. The absence or presence of collinearity is measured by the TOL, while the VIF measures the amount of variance inflation on the explained variation of the dependent variable, customer satisfaction. No multicollinearity exists if the TOL > 0.2 and the VIF < 5.0, which appears to be the case in this analysis.

The Durbin-Watson (DW) statistic is the final aspect of the regression procedure to be examined. The DW for the model is 2.044. On consulting the DW table, the model DW falls within the acceptable limits, 2 < DW < 4 - du, or 2 < 2.044 < 4 - 1.78. Therefore, the null hypothesis of independent variables can be accepted.

Once the validity of the full model has been established, the six possible predictors are further analyzed using the SAS stepwise, forward, and backward regression procedures. Appendix C contains the SAS regression program and the full output. Summaries of the results of the three procedures are presented in this chapter. The SAS stepwise regression procedure output is presented first.

The SAS stepwise procedure attempts to search for the best model by entering the independent variables into the regression equation one at a time. A variable is allowed to enter the model if its Prob>F stays at or below 0.15. If a variable's Prob>F value goes above 0.15, that variable is removed. A model of only the most significant variables is created through this procedure. The summary of the stepwise procedure is exhibited in Table III.

Table III
Summary of Stepwise Regression Procedure

Step	Variable Entered	Num In	Partial R**2	Model R**2	C(p)	F	Prob>F
1	RESULTS	1	0.5751	0.5751	40.99	143.50	0.0001
2	QA	2	0.1108	0.6859	5.18	37.04	0.0001
3	RESOURCE	3	0.0142	0.7001	2.34	4.92	0.0287

The stepwise regression procedure resulted in a model of three predicting variables: RESULTS (Quality Improvement Results), QA (Quality Assurance), and RESOURCE (Human Resource Utilization). According to the procedure, these

three variables are the most significant contributors to the prediction model of customer satisfaction.

The forward regression procedure is analyzed next. A summary of the results of the forward procedure is presented in Table IV and delivers a somewhat different model. This is not unexpected since the forward regression procedure does not allow a variable to be removed from the model once that variable has entered. This procedure also uses a 0.5 significance level, which is higher than the stepwise procedure.

Table IV
Summary of Forward Regression Procedure

Step	Variable Entered	Num In	Partial R**2	Model R**2	C(p)	F	Prob>F
1	RESULTS	1	0.5751	0.5751	40.99	143.50	0.0001
2	QA	2	0.1108	0.6859	5.18	37.04	0.0001
3	RESOURCE	3	0.0142	0.7001	2.34	4.92	0.0287
4	PLANNING	4	0.0027	0.7029	3.40	0.95	0.3315

The forward regression procedure includes PLANNING (Strategic Quality Planning) with the three variables extracted in the stepwise procedure. As can be seen by this variable's Prob>F value, the higher alpha value allowed entry of PLANNING into the model.

Backward regression is the final regression procedure used on the customer satisfaction model. Backward regression differs from the other regression procedures. It begins with the full model and subsequently checks each

variable, one at a time, for its contribution to the overall F-statistic. Variables are eliminated from the model if their Prob>F is less than or equal to 0.1. The results of the backward regression procedure are illustrated in Table V.

Table V
Summary of Backward Regression Procedure

Variable	Estimate	Error	Sum of Squares	F	Prob>F
INTERCEP	6.78687701	3.61624654	170.09183557	3.52	0.0634
RESOURCE	0.12299526	0.05542541	237.80359619	4.92	0.0287
QA	0.29912645	0.07802954	709.66123113	14.70	0.0002
RESULTS	0.89464825	0.17609942	246.37388848	25.81	0.0001

The results of the backward regression procedure are the same as the stepwise regression procedure. The values of the three variables' Prob>F are basically the same in both the backward and the stepwise procedures as well as the forward regression procedure. These results strongly support the three variables, RESOURCE, QA, AND RESULTS, as predictors of customer satisfaction.

Based on the results of the regression procedures, four independent variables qualify as predictors of customer satisfaction. RESOURCE (Human Resource Utilization), QA (Quality Assurance), RESULTS (Quality Improvement Results), and PLANNING (Strategic Quality Planning) all contribute significantly to the model. Testing their reliabilities is the next step in this analysis.

The reliabilities of each of the four independent variables and the dependent variable are tested using the split-half technique and the Spearman-Brown correction formula. The split-half technique divides the results of each variable's survey statements in half, then compares them. Each variable's reliability is actually tested by correlating its halves. The SAS proc corr procedure is used to correlate each variable's halves and generates Pearson correlation coefficients for each variable half.

The Spearman-Brown correction formula is

$$rtt = \frac{2rhh}{1 + rhh} \qquad (1)$$

where rtt is the reliability of the total test and rhh is the self-correlation of the half test. The Pearson correlation coefficient is used for the rhh in equation (1) to determine each variable's reliability. The more reliable the variable, the closer its rtt is to one. The results from the reliability testing procedure are in Table VI for the four independent variables being tested and the dependent variable, customer satisfaction. The results of the reliability testing of all the variables are in Appendix D.

Table VI
Reliability Testing Results

	PLAN1	PLAN2
PLAN1	1.00000 0.0	0.68617 0.0001
PLAN2	0.68617 0.0001	1.00000 0.0

rtt (PLANNING) = 0.81388

	RESOR1	RESOR2
RESOR1	1.00000 0.0	0.80474 0.0001
RESOR2	0.80474 0.0001	1.00000 0.0

rtt (RESOURCE) = 0.89181

	QA1	QA2
QA1	1.00000 0.0	0.85097 0.0001
QA2	0.85097 0.0001	1.00000 0.0

rtt (QA) = 0.91949

	RESULTS1	RESULTS2
RESULTS1	1.00000 0.0	0.62341 0.0001
RESULTS2	0.62341 0.0001	1.00000 0.0

rtt (RESULTS) = 0.76803

	CS1	CS2
CS1	1.00000 0.0	0.76400 0.0001
CS2	0.76400 0.0001	1.00000 0.0

rtt (CS) = 0.86621

As can be seen in Table VI, all the variables have high levels of reliability. Therefore, the four variables (RESULTS, RESOURCE, PLANNING, and QA) are the most valid predictors of customer satisfaction in this analysis.

Findings

In this data analysis, four independent variables contribute significantly to the prediction of customer satisfaction. The model of customer satisfaction is subsequently represented as Customer Satisfaction = Quality Improvement Results + Quality Assurance + Human Resource Utilization + Strategic Quality Planning (CS = RESULTS + QA + RESOURCE + PLANNING).

Summary

The data analysis resulted in a regression model for customer satisfaction, or internal customer service, containing four independent variables. The findings do not totally support the hypothesized model of customer satisfaction, but the strength of the contribution of the four variables were confirmed by the model's high Adjusted R-Squared value, the variables' high significance values, and the variables' high reliability values.

V. Conclusions and Recommendations

Conclusions

Strong internal customer service is the key to excellent external customer service. Both public and private sector organizations need quality customer service to attain their goals. This research reviewed literature pertaining to internal and external customer service as well as to the Malcolm Baldrige National Quality Award. Specifically, this study used the case study method to present six of the seven evaluation areas for the Malcolm Baldrige Award as predictors of the seventh evaluation area, customer satisfaction (used in this study to represent internal customer service). Two basic investigative questions provided the direction of this study and are answered next.

Investigative Question 1: Do the Malcolm Baldrige National Quality Award evaluation criteria comprise a viable model for predicting the level of quality customer service within an organization? The Malcolm Baldrige Naticnal Quality Award uses seven evaluation criteria. The criteria include leadership, information and analysis, strategic quality planning, human resource utilization, quality assurance, quality improvement results, and customer satisfaction. The hypothesized prediction model used in this study is Customer Satisfaction = Leadership +

Information and Analysis + Strategic Quality Planning + Human Resource Utilization, + Quality Assurance + Quality Improvement Results and is graphically represented in Figure 1.

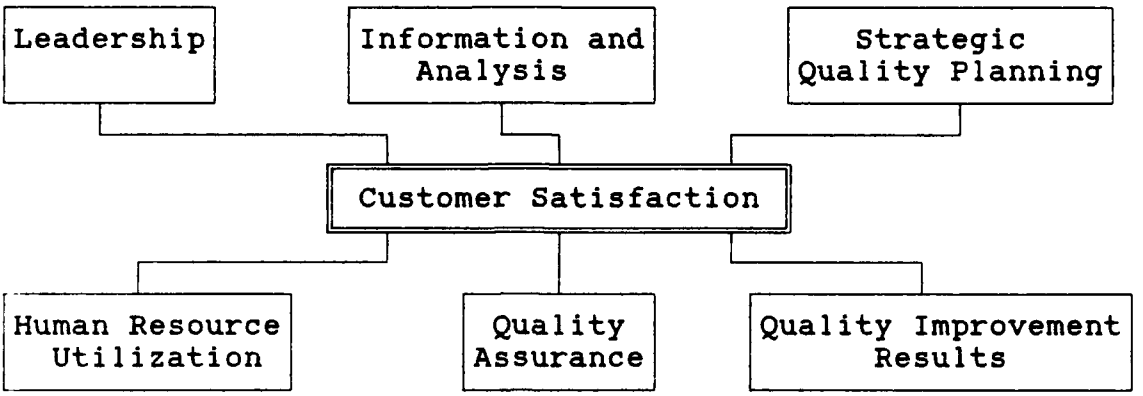

Figure 1. The Hypothesized Customer Satisfaction Model

The data analysis of the survey of the Defense Logistics Agency (DLA) shows that the variables, Leadership and Information and Analysis, are ineffective in the hypothesized model. This could be due to the fact that DLA is a government agency; however, further research is warranted to explain the actual ineffectiveness of these variables.

Investigative Question 2: Based on the survey of DLA, what does the internal customer service prediction model actually look like? The data collected by the survey instrument suggest a prediction model with fewer variables than the hypothesized model. Out of the six variables hypothesized, four emerged from the data analysis as

significant predictors of customer satisfaction. The three regression analysis procedures used in this research suggest the final customer satisfaction model is Customer Satisfaction = Quality Improvement Results + Quality Assurance + Human Resource Utilization + Strategic Quality Planning. Figure 2 contains a graphic representation of the actual model.

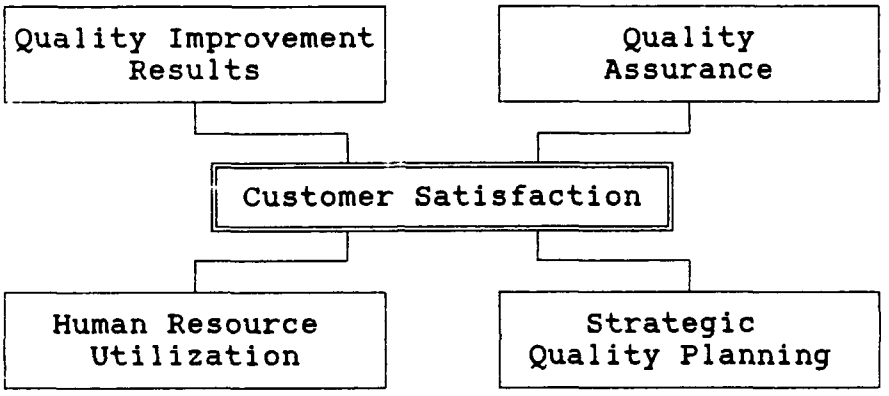

Figure 2. Final Customer Satisfaction Prediction Model

Recommendations

This research created a prediction model of internal customer service based on the evaluation criteria of the Malcolm Baldrige National Quality Award. The model is depicted in Figure 2 but may not be the best model for customer service. The Baldrige Award committee suggest the model to be represented as seen in Figure 3.

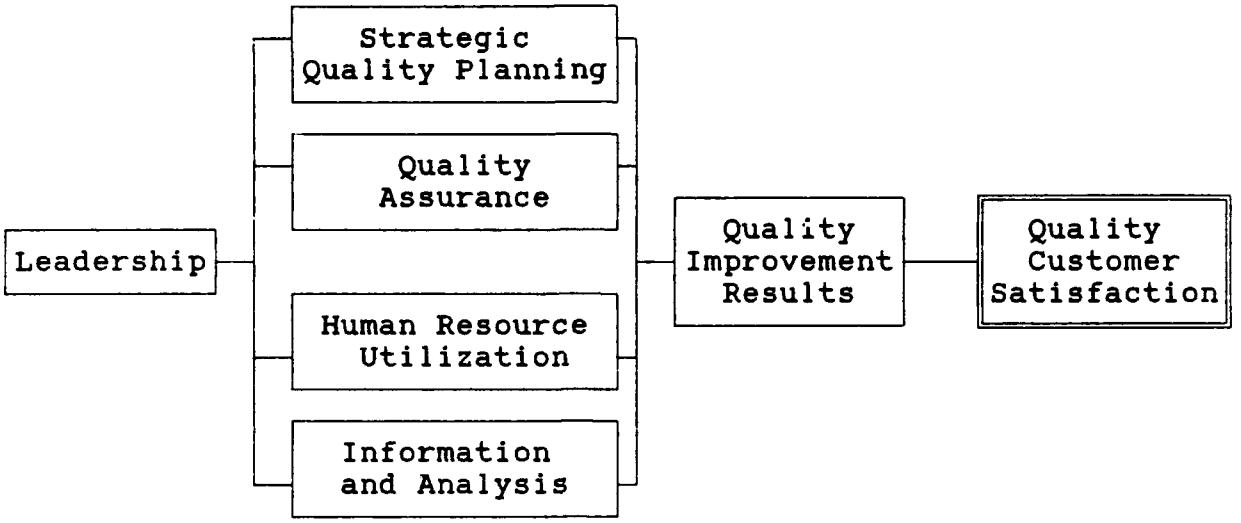

Figure 3. The Proposed Malcolm Baldrige National Quality Award Committee Model

The structure of the model in Figure 3 seems to be more representative of the actual causal structure of the quality efforts in organizations today. Therefore, the prediction model created in this research might have a similar causal structure and the Leadership and Information and Analysis variables in the hypothesized and committee models may actually be predictors of the other four variables. A causal model based on this structure and the data analysis of this study might be more accurately represented by Figure 4.

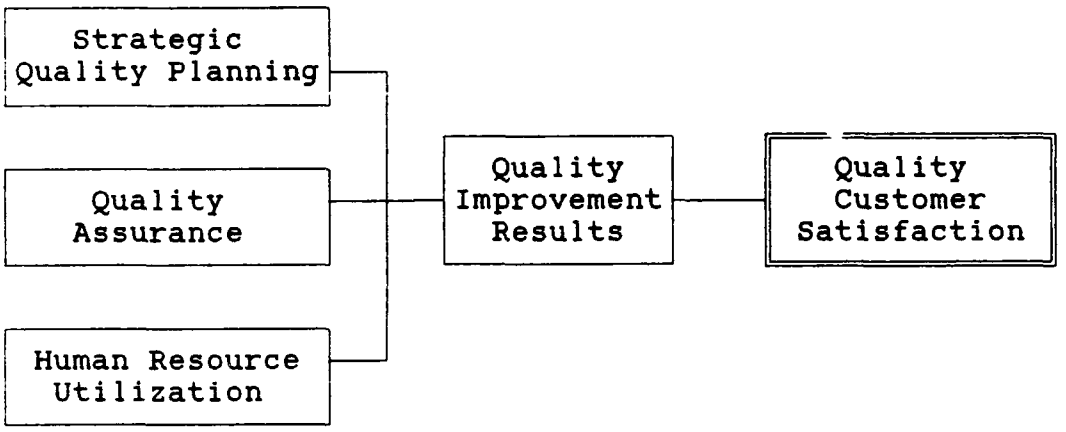

Figure 4. The Proposed Causal Model for Predicting Customer Satisfaction

Further research is needed to test the model found from this research and the hypothesized model. Since this study is based on information collected from a government agency, the model might not be generic to other organizations. It is recommended that both public and private organizations be surveyed to create a more comprehensive model for any organization to use.

The key to survival in this day and age is quality--quality customer service and quality products. Every organization has external and internal customers and must extend excellent customer service to every one of those customers to establish a strong front in today's competitive business environment and unstable global peacetime environment. All the variables affecting customer service are not known, but four significant predictors of quality customer service are Strategic Quality Planning (an organization's quality planning process), Quality Assurance

(the quality control system in an organization), Human Resource Utilization (the quality training, involvement and recognition of employees), and Quality Improvement Results (the quality levels and trends in an organization compared to its competitors).

Appendix A: Quality Management Questionnaire

This questionnaire is designed to assist DLA-O in its efforts to improve the quality of its products and services. To learn how people from different vantage points in DLA-O view quality, we are asking many of your coworkers to complete the same survey. The results will be analyzed and reported back to DLA-O in terms of group averages. Individual responses will be kept confidential. By completing the survey and adding your views to those of your coworkers, you make it possible for your organization to get a more complete picture of how concern for quality influences the work of employees throughout the organization.

This questionnaire is in two parts. Part I contains six items requesting BACKGROUND INFORMATION. These items are used to form groups of similar employees for purposes of analysis and feedback. Part II contains ninety-four items dealing with EMPLOYEE VIEWS OF QUALITY. Each of these items asks about your views on some aspect of quality as it relates to your job, your department, or your organization. If the response choices for a particular item do not fit your situation exactly, use the one that is closest to the way you feel now.

Answer all of the survey items on the machine-scored answer sheet provided.

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

1. Make heavy black marks that fill the space (of the response you select).

2. Erase cleanly any responses you wish to change.

3. Do not make any stray markings on the response sheet.

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

5. Do not mark on the survey booklet.

When you are finished, place the completed answer sheet and the booklet in the return envelope.

By participating in this survey, you help DLA-O do a better job in managing quality. Thanks for your cooperation.

Part I: BACKGROUND INFORMATION

1. How long have you been working in your present job?

   1. 6 months or less.
   2. 7-11 months.
   3. 1-2 years.
   4. 3-4 years.
   5. 5-10 years.
   6. 11-20 years.
   7. more than 20 years.

2. How long have you been employed by your present employer?

   1. 6 months or less.
   2. 7-11 months.
   3. 1-2 years.
   4. 3-4 years.
   5. 5-10 years.
   6. 11-20 years.
   7. more than 20 years.

3. What is your primary organizational function?

   1. Supply management.
   2. Depot operations.
   3. Transportation.
   4. Readiness support.
   5. Customer service.
   6. Administration.
   7. Other.

4. Does your job involve direct contact with DLA-O's clients or customers?

   1. Yes.
   2. No.

5. If the answer to items 4 is no, who is the primary recipient of your direct labor?

   1. Coworkers in my division or function.
   2. People in other HQ DLA Directorates or functions.
   3. Vendors or suppliers.
   4. Military Services.
   5. Other.

6. Which of the following would most accurately describe your current organizational level?

   1. Top management.
   2. Middle management. (Division level)
   3. First-line supervision. (Branch level)
   4. Direct labor. (Project officer)
   5. Staff.
   6. Other.

Part II: Employee Views of Quality

****

Use the following rating scale to indicate whether you agree or disagree with each of the statements in Part II.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree or disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

****

7. Top management works hard to project a corporate image of "quality first" to the general public.

8. Top management of DLA-O is making quality a priority around here.

9. Top managers take an active part in promoting quality throughout DLA-O.

10. Top management is committed to finding new ways to improve the quality of the product/services we produce.

11. People in DLA-O feel that quality is everybody's responsibility.

12. We have policies and guidelines designed to promote "quality workmanship" throughout DLA-O.

13. Day-today I make sure I comply with DLA policies and guidelines that apply directly to the quality of my own work.

14. We are often pressured into taking shortcuts to meet deadlines.

15. Goals and objectives relating to improving the quality of our products/services are clearly spelled out.

16. When employees attempt to improve quality, management is supportive and provides an adequate level of resources (e.g., time, money, etc.).

17. In DLA-O managers from all levels get involved in promoting quality.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree or disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

18. The quality of our products/services suffers because people in different divisions and branches are not able to cooperate.

19. Defective work is frequently passed on from one DLA-O division or branch to the next.

20. If a quality problem involves another directorate or division, we will form a quality improvement team with employees from the other group to solve the problem.

21. Management encourages each of us to think of the "customer" first, even if our "customer" happens to be another employee from a different part of DLA-O.

22. Management takes advantage of every opportunity to promote quality awareness among our suppliers and distributors.

23. Management encourages employee participation in business groups and associations promoting better quality.

24. Management would refuse to consider any work process that could crate a safety or health hazard for employees.

25. We have quality standards and indicators for all of the jobs around here that need them.

26. Quality data relating to most of the important work of our division are routinely collected.

27. Employees in this division are asked for their suggestions about the types of quality indicators that should be used to check the quality of their work.

28. We do not seem to collect the right types of data about quality.

29. Whenever I need information on a quality issue, I can count on getting the data promptly.

30. Frequently, the quality data we are given are out-of-date.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree or disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

31. When quality problems occur, the data are usually available to determine their cause.

32. We try to use quality data to prevent problems, not just fix them once they've occurred.

33. When we discover a defect or problem in the work, we set aside time to study the problem in order to find its cause.

34. The right kinds of training have been made available to our division on problem-solving techniques for improving quality.

35. When we take action to improve quality, we always follow-up to see how successful our ideas were.

36. Most employees have little or no input into the company's planning process.

37. Management tries to make suppliers and distributors more quality conscious.

38. I have a clear understanding of DLA-O's goals and objectives for improving quality.

39. Quality control is poorly coordinated between directorates and/or divisions of DLA.

40. Top management's plans have little relationship to the types of quality problems employees face on a day-to-day basis.

41. DLA's long-run goal is to be the "quality leader" in DoD.

42. We believe it is important to compare the quality of our products/services to those of other services in DoD.

43. We use the data we collect on the quality of our product/services in the planning process.

44. Quality goals are given a great deal of lip service around here, but we rarely are given sufficient time or resources to achieve them.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree or disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

45. Management is usually responsive to feedback from the employees.

46. Around here, the employees are taken for granted.

47. Our management believes that people are the key to good quality.

48. If I discovered a flaw or defect in our work, I would have to get my supervisor's approval before I could take action to correct the problem.

49. If my supervisor and I disagreed over the reason for a quality problem, I would have little choice but to accept his or her view of the problem.

50. Employees in our division are encouraged to participate as members of quality improvement teams.

51. I am currently a member of a quality improvement team.

52. Employee suggestions for improving quality are given serious consideration by management.

53. Higher-level managers are always willing to talk to employees about quality.

54. Employees in DLA-O have more control over the quality of their work than ever before.

55. Employees in our division or branch serve on quality improvement teams with employees from other divisions and/or other organizations (e.g., suppliers, customers, etc.)

56. The orientation given to new employees includes a discussion of the importance of quality.

57. Employees in my division were given sufficient training on how to evaluate and improve quality.

58. Most of the training DLA-O provided us on techniques of statistical process control will never be used in the work we do.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree or disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

59. When an employee suggests a way to improve quality, management makes an effort to recognize the employee for his or her contribution.

60. If a group of employees developed a way to improve quality, DLA-O would recognize the entire group rather than singling out individuals.

61. All things considered, I'm pretty satisfied with DLA-O as a place to work.

62. All things considered, I'm pretty satisfied with DLA's efforts to improve quality.

63. DLA's efforts to improve quality have not been at the expense of employee comfort or morale.

64. Management provides employees with feedback about how well we are doing in accomplishing our quality objectives.

65. As an agency, we go to great lengths to design quality into new products and/or services as they are being developed.

66. DLA-O uses information on customer preferences and desires as a basis for decisions about product quality and design.

67. When a manufacturing or delivery system is designed for a new product or service, DLA provides for quality control at every step of the production process.

68. DLA-O views quality as the joint responsibility of all divisions and branches, not just those with manufacturing or customer-contact.

69. The products and services DLA-O produces are thoroughly tested for quality before they are delivered to our customers.

70. The quality indicators for my own job accurately reflect the true quality of my work.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree or disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

71. Quality standards are the same for all employees doing the same job.

72. DLA is always searching for better indicators of quality.

73. We check the quality of our work frequently, not just every once in a while.

74. DLA encourages us to keep records of our quality measurements.

75. We try to keep quality records up-to-date.

76. Each division in DLA-O has its own set of quality indicators and standards.

77. Quality assurance is a manufacturing/service delivery problem, it has little relevance to the work of other divisions like supply management, depot operations, transportation or readiness support.

78. DLA keeps track of the quality performance of other organizations we rely on like suppliers, distributors, etc.

79. DLA-O gives special recognition to suppliers and distributors who do a good job in the area of maintaining high quality standards.

80. It seems to me that the quality of our products/services is currently the best its ever been.

81. Because of the improvements we have made in product/service quality, we are becoming recognized as a DoD leader in this area.

82. The military services seem to be gaining an edge over us in the area of quality.

83. Other divisions and branches of DLA-O that work with us are just giving lip service to quality goals.

84. Our suppliers make little effort to cooperate with us in order to improve quality.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree or disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

85. The recommendations of quality improvement teams are usually implemented by management.

86. Quality improvement teams have done little to improve the quality of our products/services.

87. DLA-O tries hard to keep tabs on what customers like and dislike about our products/services.

88. DLA-O often seems out of touch with what our customers really want.

89. The way things are now, its pretty easy for defective work to slip by and reach our customers.

90. We rarely get any feedback in this division about customer satisfaction with the quality of our work.

91. When a customer complains about a problem with a product or service of ours, DLA policies often make it difficult for us to solve the problem quickly.

92. DLA takes great pride in its concern for customer satisfaction.

93. If customers have problems with our products/services, we make it easy for them to get the kind of help they need.

94. All customer complaints must be recorded and reported in a standard format.

95. From what I see, it seems like we are getting fewer customer complaints about our products/services.

96. We get a lot of repeat customers because they are satisfied with the products/services they received.

97. We make a determined effort to find out if our customers were satisfied with the products/services they received.

98. We use information on customer satisfaction to improve our product/services.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree or disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

99. Compared to other directorates, DLA-O has low rates of customer complaints and/or product returns.

100. By-and-large, the data we see on customer satisfaction indicates that customers are very satisfied with the quality of our products/services.

Appendix B: SAS Factor Analysis Program and Results

```
options ls=72;

data temp;
infile dla missover;
     input @9 item7 16 item8 17 item9 18 item10 19 item11 20
          item12 21 item13 22 item14 23 item15 24 item16 25
          item17 26 item18 27 item19 28 item20 29 item21 30
          item22 31 item23 32 item24 33 item25 34 item26 35
          item27 36 item28 37 item29 38 item30 39 item31 40
          item32 41 item33 42 item34 43 item35 44 item36 45
          item37 46 item38 47 item39 48 item40 49 item41 50
          item42 51 item43 52 item44 53 item45 54 item46 55
          item47 56 item48 57 item49 58 item50 59 item51 60
          item52 61 item53 62 item54 63 item55 64 item56 65
          item57 66 item58 67 item59 68 item60 69 item61 70
          item62 71 item63 72 item64 73 item65 74 item66 75
          item67 76 item68 77 item69 78 item70 79 item71 80
          #2 item72 9 item73 10 item74 11 item75 12
          item76 13 item77 14 item78 15 item79 16 item80 17
          item81 18 item82 19 item83 20 item84 21 item85 22
          item86 23 item87 24 item88 25 item89 26 item90 27
          item91 28 item92 29 item93 30 item94 31 item95 32
          item96 33 item97 34 item98 35 item99 36
          item100 37;

          item_14=8-item14;
          item_18=8-item18;
          item_19=8-item19;
          item_28=8-item28;
          item_30=8-item30;
          item_36=8-item36;
          item_39=8-item39;
          item_40=8-item40;
          item_44=8-item44;
          item_46=8-item46;
          item_48=8-item48;
          item_49=8-item49;
          item_58=8-item58;
          item_77=8-item77;
          item_82=8-item82;
          item_83=8-item83;
          item_84=8-item84;
          item_86=8-item86;
          item_88=8-item88;
          item_89=8-item89;
          item_90=8-item90;
          item_91=8-item91;
```

```
      drop item14 item18 item19 item28 item30 item36 item39
           item40 item44 item46 item48 item49 item58 item77
           item82 item83 item84 item86 item88 item89 item90
           item91;

proc factor data=temp nfactors=7 rotate=varimax round;
```

Initial Factor Method: Principal Components

Rotation Method: Varimax

Orthogonal Transformation Matrix

	1	2	3	4
1	0.55899	0.41007	0.39771	0.34771
2	-0.58115	0.36176	-0.17556	-0.19735
3	-0.32910	-0.59013	0.50305	0.19983
4	0.43650	-0.20601	-0.28719	-0.58849
5	0.08559	-0.29831	-0.31943	0.11577
6	-0.12064	0.30933	0.51511	-0.55177
7	-0.17051	0.35440	-0.32876	0.36884

	5	6	7
1	0.32342	0.28605	0.23209
2	0.57330	0.21230	0.29644
3	-0.05438	0.26842	0.41885
4	-0.07175	0.19835	0.54198
5	0.18867	0.73037	-0.46820
6	-0.33372	0.35614	-0.28594
7	-0.64160	0.31850	0.29682

Rotation Method: Varimax

Rotated Factor Pattern

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
ITEM7	17	69 *	14	-3
ITEM8	23	72 *	2	3
ITEM9	30 *	78 *	4	-4
ITEM10	35 *	64 *	9	19
ITEM11	25	69 *	9	3
ITEM12	31 *	52 *	10	40 *
ITEM13	2	54 *	6	37 *
ITEM15	45 *	35 *	26	31 *
ITEM16	43 *	25	10	6
ITEM17	48 *	54 *	19	11
ITEM20	56 *	22	9	-3
ITEM21	48 *	57 *	12	11
ITEM22	45 *	55 *	34 *	8
ITEM23	58 *	27 *	11	11
ITEM24	-10	38 *	11	-18
ITEM25	47 *	21	34 *	30 *
ITEM26	60 *	7	24	11
ITEM27	67 *	20	7	20
ITEM29	55 *	27	34 *	24
ITEM31	59 *	14	44 *	20
ITEM32	47 *	21	47 *	-1

ITEM33	48	*	18		27		17	
ITEM34	61	*	11		0		13	
ITEM35	62	*	-4		18		23	
ITEM37	19		25		41	*	25	
ITEM38	31	*	22		18		25	
ITEM41	2		30	*	12		12	
ITEM42	-7		26		23		9	
ITEM43	39	*	15		15		47	*
ITEM45	51	*	25		21		0	
ITEM47	23		37	*	15		19	
ITEM50	48	*	33	*	15		8	
ITEM51	41	*	16		2		11	
ITEM52	34	*	28	*	21		14	
ITEM53	36	*	22		12		24	
ITEM54	42	*	18		19		17	
ITEM55	53	*	3		19		17	
ITEM56	26		27	*	5		22	
ITEM57	53	*	22		-1		30	*
ITEM59	32	*	14		-6		11	
ITEM60	-3		10		16		26	
ITEM61	27		37	*	15		-1	
ITEM62	36	*	41	*	30	*	25	
ITEM63	1		21		0		5	
ITEM64	50	*	15		11		25	
ITEM65	41	*	23		49	*	19	
ITEM66	20		31	*	12		37	*
ITEM67	31	*	12		48	*	28	*
ITEM68	15		32	*	18		18	
ITEM69	32	*	20		50	*	39	*
ITEM70	33	*	14		35	*	31	*
ITEM71	32	*	8		2		27	*
ITEM72	34	*	26		6		26	*
ITEM73	24		41	*	12		35	*
ITEM74	59	*	26		15		33	*
ITEM75	52	*	19		21		33	*
ITEM76	30	*	2		1		62	*
ITEM78	29	*	10		16		50	*
ITEM79	34	*	0		7		44	*
ITEM80	14		8		38	*	12	
ITEM81	38	*	19		41	*	35	*
ITEM85	12		4		30	*	31	*
ITEM87	25		4		28	*	51	*
ITEM92	-2		52	*	20		24	
ITEM93	20		21		41	*	32	*
ITEM94	18		4		40	*	33	*
ITEM95	14		11		11		42	*
ITEM96	2		22		34	*	50	*
ITEM97	8		16		25		53	*
ITEM98	7		14		38	*	40	*
ITEM99	6		8		12		39	*
ITEM100	10		32	*	40	*	42	*
ITEM_14	35	*	1		-3		6	
ITEM_18	10		10		4		7	

ITEM_19	-17		22		22		15	
ITEM_28	43	*	-6		48	*	13	
ITEM_30	27	*	2		48	*	25	
ITEM_36	47	*	19		3		0	
ITEM_39	55	*	11		38	*	7	
ITEM_40	40	*	6		22		13	
ITEM_44	51	*	12		32	*	3	
ITEM_46	25		11		-1		-7	
ITEM_48	1		-2		7		3	
ITEM_49	4		-6		10		-2	
ITEM_58	32	*	-11		54	*	-1	
ITEM_77	-12		7		-12		-3	
ITEM_82	-9		10		3		-35	*
ITEM_83	37	*	13		46	*	5	
ITEM_84	8		10		27	*	6	
ITEM_86	1		6		72	*	2	
ITEM_88	3		25		50	*	1	
ITEM_89	4		22		61	*	16	
ITEM_90	21		-5		25		-12	
ITEM_91	17		16		50	*	1	

Rotation Method: Varimax

Rotated Factor Pattern

	FACTOR5		FACTOR6		FACTOR7	
ITEM7	13		14		0	
ITEM8	27	*	6		4	
ITEM9	11		9		13	
ITEM10	20		13		11	
ITEM11	6		12		-16	
ITEM12	11		0		-1	
ITEM13	15		-7		-3	
ITEM15	23		5		-4	
ITEM16	47	*	12		20	
ITEM17	27	*	9		8	
ITEM20	-16		7		0	
ITEM21	-5		17		15	
ITEM22	0		20		18	
ITEM23	9		23		8	
ITEM24	23		27	*	15	
ITEM25	14		9		-17	
ITEM26	3		26		-11	
ITEM27	21		-1		7	
ITEM29	-7		1		5	
ITEM31	5		2		7	
ITEM32	10		8		11	
ITEM33	-1		18		9	
ITEM34	21		-9		8	
ITEM35	-11		26		7	
ITEM37	27	*	19		16	
ITEM38	54	*	6		-6	

ITEM41	45	*	31	*	8		
ITEM42	47	*	23		-22		
ITEM43	-2		27	*	1		
ITEM45	37	*	38	*	19		
ITEM47	36	*	23		41	*	
ITEM50	48	*	-8		7		
ITEM51	28	*	-9		-5		
ITEM52	40	*	35	*	27	*	
ITEM53	34	*	8		41	*	
ITEM54	31	*	11		23		
ITEM55	21		-4		14		
ITEM56	23		8		-2		
ITEM57	16		-12		16		
ITEM59	36	*	54	*	16		
ITEM60	51	*	35	*	-6		
ITEM61	39	*	22		27	*	
ITEM62	41	*	22		1		
ITEM63	34	*	1		30	*	
ITEM64	34	*	28	*	5		
ITEM65	18		10		18		
ITEM66	11		6		21		
ITEM67	9		11		10		
ITEM68	53	*	-1		26		
ITEM69	12		4		-5		
ITEM70	20		-4		-17		
ITEM71	1		20		37	*	
ITEM72	38	*	21		23		
ITEM73	12		19		26		
ITEM74	12		24		-1		
ITEM75	-4		26		-8		
ITEM76	9		17		-22		
ITEM78	16		22		16		
ITEM79	5		33	*	-5		
ITEM80	31	*	49	*	10		
ITEM81	20		35	*	13		
ITEM85	39	*	34	*	4		
ITEM87	26		8		24		
ITEM92	27		20		38	*	
ITEM93	-5		-3		40	*	
ITEM94	-1		-15		7		
ITEM95	20		35	*	18		
ITEM96	12		12		10		
ITEM97	15		7		32	*	
ITEM98	36	*	12		40	*	
ITEM99	5		30	*	33	*	
ITEM100	26		8		28	*	
ITEM_14	-1		44	*	21		
ITEM_18	-3		47	*	5		
ITEM_19	-25		56	*	-8		
ITEM_28	-3		10		9		
ITEM_30	-27	*	-5		29	*	
ITEM_36	3		3		31	*	
ITEM_39	-1		27	*	14		

ITEM_40	-8		29	*	40 *
ITEM_44	14		31	*	24
ITEM_46	35	*	62	*	28 *
ITEM_48	6		6		76 *
ITEM_49	10		12		61 *
ITEM_58	18		5		-4
ITEM_77	36	*	-12		5
ITEM_82	9		11		1
ITEM_83	19		18		27 *
ITEM_84	28	*	43	*	16
ITEM_86	13		1		10
ITEM_88	20		17		46 *
ITEM_89	19		35	*	1
ITEM_90	49	*	4		19
ITEM_91	0		25		3

NOTE: Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.267195 have been flagged by an '*'.

Variance explained by each factor

FACTOR1	FACTOR2	FACTOR3	FACTOR4	FACTOR5	FACTOR6
11.52576	7.58994	7.02496	5.86686	5.75491	4.82243

FACTOR7
4.391845

Final Communality Estimates: Total = 46.976729

ITEM7	ITEM8	ITEM9	ITEM10	ITEM11	ITEM12
0.560736	0.646204	0.731991	0.648477	0.589443	0.543136

ITEM13	ITEM15	ITEM16	ITEM17	ITEM20	ITEM21
0.462901	0.538783	0.527724	0.656535	0.403609	0.632866

ITEM22	ITEM23	ITEM24	ITEM25	ITEM26	ITEM27
0.693757	0.505312	0.351781	0.524586	0.517092	0.582323

ITEM29	ITEM31	ITEM32	ITEM33	ITEM34	ITEM35
0.552008	0.603353	0.510935	0.405271	0.465757	0.554593

ITEM37	ITEM38	ITEM41	ITEM42	ITEM43	ITEM45
0.462500	0.528539	0.416739	0.455373	0.497359	0.678879

ITEM47	ITEM50	ITEM51	ITEM52	ITEM53	ITEM54
0.605444	0.611424	0.295814	0.617092	0.537861	0.438197

ITEM55	ITEM56	ITEM57	ITEM59	ITEM60	ITEM61
0.413623	0.258624	0.482318	0.585660	0.496307	0.505069

ITEM62	ITEM63	ITEM64	ITEM65	ITEM66	ITEM67
0.664280	0.253052	0.546840	0.573530	0.347616	0.443813

ITEM68	ITEM69	ITEM70	ITEM71	ITEM72	ITEM73
0.535870	0.564818	0.416048	0.363246	0.497079	0.484289

ITEM74	ITEM75	ITEM76	ITEM78	ITEM79	ITEM80
0.613601	0.542614	0.560044	0.469131	0.421362	0.534023

ITEM81	ITEM85	ITEM87	ITEM92	ITEM93	ITEM94
0.654950	0.470303	0.524954	0.627703	0.515717	0.330357

ITEM95	ITEM96	ITEM97	ITEM98	ITEM99	ITEM100
0.412143	0.450019	0.506490	0.633320	0.383122	0.594388

ITEM_14	ITEM_18	ITEM_19	ITEM_28	ITEM_30	ITEM_36
0.365953	0.251098	0.527717	0.451609	0.525425	0.362749

ITEM_39	ITEM_40	ITEM_44	ITEM_46	ITEM_48	ITEM_49
0.560871	0.479510	0.560758	0.657992	0.584585	0.409679

ITEM_58	ITEM_77	ITEM_82	ITEM_83	ITEM_84	ITEM_86
0.439355	0.180798	0.161676	0.508679	0.383982	0.553202

ITEM_88	ITEM_89	ITEM_90	ITEM_91
0.608862	0.403182	0.373884	0.594443

Appendix C: SAS Regression Program and Output

```
options ls=72;

data temp;
infile dla missover;
     input @9 jobtime 10 tenure 11 function 12 client 13
          recip 14 orglevel 15 item7 16 item8 17 item9 18
          item10 19 item11 20 item12 21 item13 22 item14 23
          item15 24 item16 25 item17 26 item18 27 item19 28
          item20 29 item21 30 item22 31 item23 32 item24 33
          item25 34 item26 35 item27 36 item28 37 item29 38
          item30 39 item31 40 item32 41 item33 42 item34 43
          item35 44 item36 45 item37 46 item38 47 item39 48
          item40 49 item41 50 item42 51 item43 52 item44 53
          item45 54 item46 55 item47 56 item48 57 item49 58
          item50 59 item51 60 item52 61 item53 62 item54 63
          item55 64 item56 65 item57 66 item58 67 item59 68
          item60 69 item61 70 item62 71 item63 72 item64 73
          item65 74 item66 75 item67 76 item68 77 item69 78
          item70 79 item71 80
          #2 item72 9 item73 10 item74 11 item75 12
          item76 13 item77 14 item78 15 item79 16 item80 17
          item81 18 item82 19 item83 20 item84 21 item85 22
          item86 23 item87 24 item88 25 item89 26 item90 27
          item91 28 item92 29 item93 30 item94 31 item95 32
          item96 33 item97 34 item98 35 item99 36
          item100 37;

          item_14=8-item14;
          item_18=8-item18;
          item_19=8-item19;
          item_28=8-item28;
          item_30=8-item30;
          item_36=8-item36;
          item_39=8-item39;
          item_40=8-item40;
          item_44=8-item44;
          item_46=8-item46;
          item_48=8-item48;
          item_49=8-item49;
          item_58=8-item58;
          item_77=8-item77;
          item_82=8-item82;
          item_83=8-item83;
          item_84=8-item84;
          item_86=8-item86;
          item_88=8-item88;
          item_89=8-item89;
          item_90=8-item90;
          item_91=8-item91;
```

```
     leader=item7+item8+item9+item10+item11+item12+item13
          +item_14+item15+item16+item17+item_18+item_19
          +item20+item21+item22+item23+item24;

     inform=item25+item26+item27+item_28+item29+item_30
          +item31+item32+item33+item34+item35;

     planning=item_36+item37+item38+item_39+item_40+item41
          +item42+item43+item_44;

     resource=item45+item_46+item47+item_48+item_49+item50
          +item51+item52+item53+item54+item55+item56+item57
          +item_58+item59+item60+item61+item62+item63
          +item64;

     qa=item65+item66+item67+item68+item69+item70+item71
          +item72+item73+item74+item75+item76+item_77
          +item78+item79;

     results=item80+item81+item_82+item_83+item_84+item85
          +item_86;

     cs=item87+item_88+item_89+item_90+item_91+item92+item93
          +item94+item95+item96+item97+item98+item99
          +item100;

proc reg;
     model cs=leader inform planning resource qa results/VIF
          TOL P DW;
proc stepwise;
     model cs=leader inform planning resource qa results/
          stepwise;
proc stepwise;
     model cs=leader inform planning resource qa results/
          forward;
proc stepwise;
     model cs=leader inform planning resource qa results/
          backward;
```

Model: MODEL1
Dependent Variable: CS

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	6	11791.12890	1965.18815	40.045	0.0001
Error	101	4956.53777	49.07463		
C Total	107	16747.66667			

Root MSE	7.00533	R-square	0.7040
Dep Mean	59.38889	Adj R-sq	0.6865
C.V.	11.79569		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob>|T|
INTERCEP	1	6.401621	3.83952333	1.667	0.0986
LEADER	1	0.019190	0.06089119	0.315	0.7533
INFORM	1	-0.052324	0.08955905	-0.584	0.5604
PLANNING	1	0.154855	0.15743507	0.984	0.3277
RESOURCE	1	0.094729	0.06358495	1.490	0.1394
QA	1	0.284032	0.09439511	3.009	0.0033
RESULTS	1	0.853795	0.18582998	4.594	0.0001

Variable	DF	Tolerance	Variance Inflation
INTERCEP	1	.	0.00000000
LEADER	1	0.35873097	2.78760430
INFORM	1	0.35993275	2.77829680
PLANNING	1	0.24252308	4.12331887
RESOURCE	1	0.26765962	3.73608837
QA	1	0.26393562	3.78880269
RESULTS	1	0.43270239	2.31105728

Durbin-Watson D	2.044
(For Number of Obs.)	108
1st Order Autocorrelation	-0.033

Stepwise Procedure for Dependent Variable CS

Step 1 Variable RESULTS Entered R-square = 0.57514497
C(p) = 40.98999266

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	1	9632.33622593	9632.33622593	143.50	0.0001
Error	106	7115.33044074	67.12575887		
Total	107	16747.66666667			

Variable	Parameter Estimate	Standard Error	Type II SS	F	Prob>F
INTERCEP	11.2942833	4.0915752	511.476253	7.62	0.0068
RESULTS	1.7125675	0.1429639	9632.336225	143.50	0.0001

Bounds on condition number: 1, 1

Step 2 Variable QA Entered R-square = 0.68592694
C(p) = 5.18350440

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	2	11487.67570035	5743.83785018	114.66	0.0001
Error	105	5259.99096631	50.09515206		
Total	107	16747.66666667			

Variable	Parameter Estimate	Standard Error	Type II SS	F	Prob>F
INTERCEP	5.72847239	3.6510311	123.322483	2.46	0.1197
QA	0.39767973	0.0653460	1855.339474	37.04	0.0001
RESULTS	1.04931393	0.1647143	2033.028841	40.58	0.0001

Bounds on condition number: 1.778703, 7.114814

Step 3 Variable RESOURCE Entered R-square = 0.70012614
C(p) = 2.33775030

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	3	11725.47929654	3908.49309885	80.9	0.0001
Error	104	5022.18737012	48.29026317		
Total	107	16747.66666667			

Variable	Parameter Estimate	Standard Error	Type II SS	F	Prob>F
INTERCEP	6.78687701	3.6162465	170.091835	3.52	0.0634
RESOURCE	0.12299526	0.0554254	237.803596	4.92	0.0287
QA	0.29912645	0.0780295	709.661231	14.70	0.0002
RESULTS	0.89464825	0.1760994	1246.373888	25.81	0.0001

Pounds on condition number: 2.884854, 22.87475

All variables left in the model are significant at the 0.1500 level.
No other variable met the 0.1500 significance level for entry into the model.

Summary of Stepwise Procedure for Dependent Variable CS

Step	Variable Entered	Num In	Partial R**2	Model R**2	C(p)	F	Prob>F
1	RESULTS	1	0.5751	0.5751	40.99	143.50	0.0001
2	QA	2	0.1108	0.6859	5.18	37.04	0.0001
3	RESOURCE	3	0.0142	0.7001	2.34	4.92	0.0287

Forward Selection Procedure for Dependent Variable CS

Step 1 Variable RESULTS Entered R-square = 0.57514497
C(p) = 40.98999266

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	1	9632.33622593	9632.33622593	143.50	0.0001
Error	106	7115.33044074	67.12575887		
Total	107	16747.66666667			

Variable	Parameter Estimate	Standard Error	Type II SS	F	Prob>F
INTERCEP	11.2942833	4.0915752	511.476253	7.62	0.0068
RESULT	1.7125675	0.1429639	9632.336226	143.50	0.0001

Bounds on condition number: 1, 1

Step 2 Variable QA Entered R-square = 0.68592694
C(p) = 5.18350440

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	2	11487.67570035	5743.83785018	114.66	0.0001
Error	105	5259.99096631	50.09515206		
Total	107	16747.66666667			

Variable	Parameter Estimate	Standard Error	Type II SS	F	Prob>F
INTERCEP	5.7284723	3.6510311	123.322483	2.46	0.1197
QA	0.3976797	0.0653460	1855.339474	37.04	0.0001
RESULTS	1.0493139	0.1647143	2033.028841	40.58	0.0001

Bounds on condition number: 1.778703, 7.114814

Step 3 Variable RESOURCE Entered R-square = 0.70012614
C(p) = 2.33775030

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	3	11725.47929654	3908.49309885	80.94	0.0001
Error	104	5022.18737012	48.29026317		
Total	107	16747.66666667			

Variable	Parameter Estimate	Standard Error	Type II SS	F	Prob>F
INTERCEP	6.7868770	3.6162465	170.091835	3.52	0.0634
RESOURCE	0.1229952	0.0554254	237.803596	4.92	0.0287
QA	0.2991264	0.0780295	709.661231	14.70	0.0002
RESULTS	0.8946482	0.1760994	1246.373888	25.81	0.0001

Bounds on condition number: 2.884854, 22.87475

Step 4 Variable PLANNING Entered R-square = 0.70287210
C(p) = 3.40064161

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	4	11771.46755976	2942.86688994	60.91	0.0001
Error	103	4976.19910691	48.31261269		
Total	107	16747.66666667			

Variable	Parameter Estimate	Standard Error	Type II SS	F	Prob>F
INTERCEP	7.0686126	3.6285917	183.338077	3.79	0.0541
PLANNING	0.1429184	0.1464855	45.988263	0.95	0.3315
RESOURCE	0.1005909	0.0600060	135.765235	2.81	0.0967
QA	0.2679299	0.0843435	487.527578	10.09	0.0020
RESULTS	0.8443545	0.1835283	1022.595587	21.17	0.0001

Bounds on condition number: 3.626021, 49.47259

No other variable met the 0.5000 significance level for entry into the model.

Summary of Forward Selection Procedure for Dependent Variable CS

Step	Variable Entered	Num In	Partial R**2	Model R**2	C(p)	F	Prob>F
1	RESULTS	1	0.5751	0.5751	40.99	143.50	0.0001
2	QA	2	0.1108	0.6859	5.18	37.04	0.0001
3	RESOURCE	3	0.0142	0.7001	2.34	4.92	0.0287
4	PLANNING	4	0.0027	0.7029	3.40	0.95	0.3315

Backward Elimination Procedure for Dependent Variable CS

Step 0 All Variables Entered R-square = 0.70404607
C(p) = 7.00000000

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	6	11791.12889924	1965.18814987	40.04	0.0001
Error	101	4956.53776743	49.07463136		
Total	107	16747.66666667			

Variable	Parameter Estimate	Standard Error	Type II SS	F	Prob>F
INTERCEP	6.4016212	3.8395233	136.421359	2.78	0.0986
LEADER	0.0191902	0.0608911	4.874271	0.10	0.7533
INFORM	-0.0523244	0.0895590	16.751283	0.34	0.5604
PLANNING	0.1548552	0.1574350	47.479474	0.97	0.3277
RESOURCE	0.0947290	0.0635849	108.921874	2.22	0.1394
QA	0.2840318	0.0943951	444.316147	9.05	0.0033
RESULTS	0.8537948	0.1858299	1035.935100	21.11	0.0001

Bounds on condition number: 4.123319, 117.151

Step 1 Variable LEADER Removed R-square = 0.70375503
C(p) = 5.09932365

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	5	11786.25462754	2357.25092551	48.46	0.0001
Error	102	4961.41203913	48.64129450		
Total	107	16747.66666667			

Variable	Parameter Estimate	Standard Error	Type II SS	F	Prob>F
INTERCEP	6.7055798	3.6999702	159.764890	3.28	0.0729
INFORM	-0.0487696	0.0884527	14.787067	0.30	0.5826
PLANNING	0.1659222	0.1527897	57.362192	1.18	0.2801
RESOURCE	0.1009143	0.0602126	136.626798	2.81	0.0968
QA	0.2888424	0.0927405	471.832109	9.70	0.0024
RESULTS	0.8487707	0.1843256	1031.369270	21.20	0.0001

Bounds on condition number: 3.91818, 80.08168

Step 2 Variable INFORM Removed R-square = 0.70287210
C(p) = 3.40064161

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	4	11771.46755976	2942.86688994	60.91	0.0001
Error	103	4976.19910691	48.31261269		
Total	107	16747.66666667			

Variable	Parameter Estimate	Standard Error	Type II SS	F	Prob>F
INTERCEP	7.0686126	3.6285917	183.338077	3.79	0.0541
PLANNING	0.1429184	0.1464855	45.988263	0.95	0.3315
RESOURCE	0.1005909	0.0600060	135.765235	2.81	0.0967
QA	0.2679299	0.0843435	487.527578	10.09	0.0020
RESULTS	0.8443545	0.1835283	1022.595587	21.17	0.0001

Bounds on condition number: 3.626021, 49.47259

Step 3 Variable PLANNING Removed R-square = 0.70012614
C(p) = 2.33775030

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	3	11725.47929654	3908.49309885	80.94	0.0001
Error	104	5022.18737012	48.29026317		
Total	107	16747.66666667			

Variable	Parameter Estimate	Standard Error	Type II SS	F	Prob>F
INTERCEP	6.7868770	3.6162465	170.091835	3.52	0.0634
RESOURCE	0.1229952	0.0554254	237.803596	4.92	0.0287
QA	0.2991264	0.0780295	709.661231	14.70	0.0002
RESULTS	0.8946482	0.1760994	1246.373888	25.81	0.0001

Bounds on condition number: 2.884854, 22.87475

All variables left in the model are significant at the 0.1000 level.

Summary of Backward Elimination Procedure for Dependent Variable CS

Step	Variable Removed	Num In	Partial R**2	Model R**2	C(p)	F	Prob>F
1	LEADER	5	0.0003	0.7038	5.10	0.10	0.7533
2	INFORM	4	0.0009	0.7029	3.40	0.30	0.5826
3	PLANNING	3	0.0027	0.7001	2.34	0.95	0.3315

Appendix D: SAS Correlation Program and Results

```
options ls=72;

data temp;
infile dla missover;
     input @9 item7 16 item8 17 item9 18 item10 19 item11 20
          item12 21 item13 22 item14 23 item15 24 item16 25
          item17 26 item18 27 item19 28 item20 29 item21 30
          item22 31 item23 32 item24 33 item25 34 item26 35
          item27 36 item28 37 item29 38 item30 39 item31 40
          item32 41 item33 42 item34 43 item35 44 item36 45
          item37 46 item38 47 item39 48 item40 49 item41 50
          item42 51 item43 52 item44 53 item45 54 item46 55
          item47 56 item48 57 item49 58 item50 59 item51 60
          item52 61 item53 62 item54 63 item55 64 item56 65
          item57 66 item58 67 item59 68 item60 69 item61 70
          item62 71 item63 72 item64 73 item65 74 item66 75
          item67 76 item68 77 item69 78 item70 79 item71 80
          #2 item72 9 item73 10 item74 11 item75 12
          item76 13 item77 14 item78 15 item79 16 item80 17
          item81 18 item82 19 item83 20 item84 21 item8  22
          item86 23 item87 24 item88 25 item89 26 item90 27
          item91 28 item92 29 item93 30 item94 31 item.5 32
          item96 33 item97 34 item98 35 item99 36
          item100 37;

          item_14=8-item14;
          item_18=8-item18;
          item_19=8-item19;
          item_28=8-item28;
          item_30=8-item30;
          item_36=8-item36;
          item_39=8-item39;
          item_40=8-item40;
          item_44=8-item44;
          item_46=8-item46;
          item_48=8-item48;
          item_49=8-item49;
          item_58=8-item58;
          item_77=8-item77;
          item_82=8-item82;
          item_83=8-item83;
          item_84=8-item84;
          item_86=8-item86;
          item_88=8-item88;
          item_89=8-item89;
          item_90=8-item90;
          item_91=8-item91;
```

```
leader1=item7+item9+item11+item13+item15+item17
     +item_19+item21+item23;

leader2=item8+item10+item12+item_14+item16+item_18
     +item20+item22+item24;

inform1=item25+item27+item29+item31+item33+item35;

inform2=item26+item_28+item_30+item32+item34;

plan1=item37+item_39+item41+item43;

plan2=item_36+item38+item_40+item42+item_44;
     resor1=item45+item47+item_49+item51+item53+item55
     +item57+item59+item61+item63;

resor2=item46+item_48+item50+item52+item54+item56
     +item_58+item60+item62+item64;

qa1=item65+item67+item69+item71+item73+item75
     +item_77+item79;

qa2=item66+item68+item70+item72+item74+item76+item78;

results1=item81+item_83+item85;

results2=item80+item_82+item_84+item_86;

cs1=item87+item_89+item_91+item93+item95+item97+item99;

cs2=item_88+item_90+item92+item94+item96+item98
     +item100;

proc corr;
     var leader1 leader2;
proc corr;
     var inform1 inform2;
proc corr;
     var plan1 plan2;
proc corr;
     var resor1 resor2;
proc corr;
     var qa1 qa2;
proc corr;
     var results1 results2;
proc corr;
     var cs1 cs2;
```

Correlation Analysis

2 'VAR' Variables: LEADER1 LEADER2

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
LEADER1	124	39.0323	10.4686	4840.0	11.0000	62.0000
LEADER2	122	36.0410	8.8555	4397.0	13.0000	57.0000

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / Number of Observations

	LEADER1	LEADER2
LEADER1	1.00000 0.0 124	0.84940 0.0001 120
LEADER2	0.84940 0.0001 120	1.00000 0.0 122

2 'VAR' Variables: INFORM1 INFORM2

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
INFORM1	125	20.6640	7.5754	2583.0	6.0000	42.0000
INFORM2	127	17.0551	5.8232	2166.0	5.0000	33.0000

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / Number of Observations

	INFORM1	INFORM2
INFORM1	1.00000 0.0 125	0.82429 0.0001 125
INFORM2	0.82429 0.0001 125	1.00000 0.0 127

2 'VAR' Variables: PLAN1 PLAN2

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
PLAN1	127	16.4094	4.1564	2084.0	5.0000	28.0000
PLAN2	126	16.9762	5.3344	2139.0	5.0000	35.0000

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / Number of Observations

	PLAN1	PLAN2
PLAN1	1.00000 0.0 127	0.68617 0.0001 125
PLAN2	0.68617 0.0001 125	1.00000 0.0 126

2 'VAR' Variables: RESOR1 RESOR2

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
RESOR1	119	38.0504	10.9806	4528.0	13.0000	64.0000
RESOR2	122	40.0246	8.5845	4883.0	19.0000	64.0000

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / Number of Observations

	RESOR1	RESOR2
RESOR1	1.00000 0.0 119	0.80474 0.0001 117
RESOR2	0.80474 0.0001 117	1.00000 0.0 122

2 'VAR' Variables: QA1 QA2

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
QA1	125	32.7680	7.4619	4096.0	14.0000	53.0000
QA2	122	28.9508	7.1626	3532.0	12.0000	49.0000

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / Number of Observations

	QA1	QA2
QA1	1.00000 0.0 125	0.85097 0.0001 122
QA2	0.85097 0.0001 122	1.00000 0.0 122

2 'VAR' Variables: RESULTS1 RESULTS2

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
RESULTS1	128	11.9141	2.9671	1525.0	3.0000	21.0000
RESULTS2	19	16.4806	3.3310	2126.0	7.0000	28.0000

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / Number of Observations

	RESULTS1	RESULTS2
RESULTS1	1.00000 0.0 128	0.62341 0.0001 128
RESULTS2	0.62341 0.0001 128	1.00000 0.0 129

2 'VAR' Variables: CS1 CS2

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
CS1	125	29.2000	6.5513	3650.0	9.0000	49.0000
CS2	126	30.5952	6.8319	3855.0	11.0000	49.0000

Pearson Correlation Coefficients / Prob > |R| under Ho:
Rho=0 / Number of Observations

	CS1	CS2
CS1	1.00000 0.0 125	0.76400 0.0001 123
CS2	0.76400 0.0001 123	1.00000 0.0 126

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13. ABSTRACT (Maximum 200 words)

This research examined the evaluation criteria for the Malcolm Baldrige National Quality Award as possible predictors of quality internal customer service. The author attempted to develop a model to predict the level of customer service within an organization. The hypothesized model consisted of six independent variables: Leadership, Information and Analysis, Strategic Quality Planning, Human Resource Utilization, Quality Assurance, and Quality Improvement Results. A survey instrument based on the Malcolm Baldrige Award criteria was used to gather information from DLA-O. Multiple regression analysis procedures were used to analyze the data and to develop a model. The final model consisted of four of the six independent variables. The strong predictors of internal customer service selected by these procedures are Quality Improvement Results, Quality Assurance, Human Resource Utilization, and Strategic Quality Planning. Leadership and Information and Analysis were not found to be significant in this analysis, but these variables might be predictors of the four variables selected. More research is needed in the public as well as the private sector to find a more comprehensive model.

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