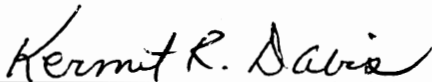EXPLORING CUSTOMER SATISFACTION IN REGIONAL HEALTH CARE:

A COMPARATIVE ANALYSIS OF DIRECT AND

INDIRECT EXPERIENCES

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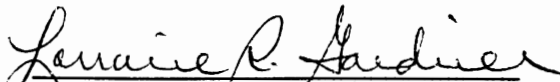
INDIRECT EXPERIENCES

Douglas Edward Turner

A Thesis

Submitted to

the Graduate Faculty of

Auburn University

in Partial Fulfillment of the

Requirements for the

Degree of

Master of Science

Auburn, Alabama

August 27, 1993

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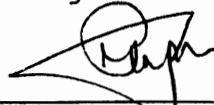INDIRECT EXPERIENCES

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VITA

Douglas Edward Turner was born October 7, 1955, in Corona, California. He graduated from Carbondale Community High School, Carbondale, Illinois, in 1973. After Honorably serving in the United States Air Force he returned to Carbondale, Illinois in 1977. He earned his Associate in Applied Sciences Degree and a Bachelors of Science Degree in Industrial Technology from Southern Illinois University, Carbondale, Illinois, in 1979 and 1980, respectively. He is married to the former Brenda Kay Glenn, also of Carbondale, Illinois. They and their daughter, Brandi Michelle, currently reside in Auburn, Alabama.

THESIS ABSTRACT

EXPLORING CUSTOMER SATISFACTION IN REGIONAL HEALTH CARE:

A COMPARATIVE ANALYSIS OF DIRECT AND

INDIRECT EXPERIENCES

Douglas Edward Turner

Master of Science, August 27, 1993
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Today's health care providers, similar to many other industries in the service sector, are measuring their service attainment level through the administration of customer satisfaction surveys. This feedback containing the customer satisfaction information is typically appraised and used by an organization to focus efforts on improving the adequacy of the service and its delivery.

When a survey instrument is utilized in a health care environment the customer satisfaction data are secured through feedback from patients in the form of post-treatment evaluations. These surveys measure the customers' perception of satisfaction based on their individual

interaction with the various areas contained within the health care provider's domain. This sphere can be separated into six distinct areas of interaction: Admissions, Doctors, Nursing Staff, Other Medical Staff, Non Medical Staff, and Facilities.

The sample data in this study segregates the respondents into two different categories of customers in the context of health care. The first is the traditional group as previously mentioned, ie, patients that are polled using post-treatment evaluations. This group is identified as those with "direct experience" (DE).

The second group of individuals are those who have had an "indirect experience" (IE) in a health care system. These individuals are either visitors or observers and have not experienced the service as a patient.

The premise that drives this research is that individuals with direct and indirect experience perceive quality differently. For example, IE individuals experience waiting room environments, nurses' stations, and unaccompanied travel through the facility. On the other hand, DE individuals are typically preoccupied with the actual delivery of the health care service.

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I. INTRODUCTION

The subject of quality in the context of hospital services is comprised of two major facets. One is the technical accomplishment of correct diagnosis and the efficacy of treatment, and the other is the individual level of satisfaction experienced by the patient. The question of technical quality is strictly controlled in terms of clinical standards established by the Joint Commission on Accreditation of Hospitals, as well as by peer review through hospital committees (Graham, 1990). The question of the magnitude of service quality however is, understandably, not that clear cut.

Today, most providers measure the service attainment level through post-treatment customer satisfaction surveys. These surveys typically measure the customers' perceptions of various factors pertaining to customer satisfaction including waiting time, friendliness and knowledge of personnel, and hospital amenities (Cunningham, 1991).

But research has hitherto focused only on patients, or actual customers with direct experiences with health care providers. To the best knowledge of the author, there has been no study that has dealt with the perceptions of satisfaction among people with indirect experiences

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(e.g., relatives, friends of patients) with the health care providers. Considering the power of "word of mouth" it is important that we study these perceptions based on indirect experiences in order to get a comprehensive picture of customer satisfaction in regional health care.

The purpose of this study is to explore the area of customer satisfaction in regional health care by comparing direct and indirect experiences. A "direct experience" individual (DE) is defined as one who actually uses the health service, and an "indirect experience" individual (IE) is defined as one who has direct contact with a "direct experience" individual in the context of using regional health care.

IE individuals are typically exposed to different health care aspects than DE individuals; examples include waiting room environments, nurses' stations, rest rooms, cafeteria, and general behavior of the hospital staff. As the IE individual interacts with these various health care aspects an opinion is formulated on the level of quality offered. DE individuals, on the other hand, are typically preoccupied with the actual delivery of the health care service, and may seldom focus on the same health care aspects that are primary in creating opinions formed by IE individuals.

As mentioned earlier, the perceptions of IE individuals can constitute a powerful component in "word of mouth"

information dissemination to potential DE individuals.
In addition some of the IE individuals may themselves be
potential DE individuals. With potential differences in
perspective between the IE and DE groups towards the same
environment, this study considers the components that might
comprise those differences. Exploring the framework created
for the IE group may be useful in developing operations
policies as well as strategy formulations including
strategic marketing for health care organizations.

II. REVIEW OF LITERATURE

The definition of quality includes two aspects, that of technical accomplishment of correct diagnosis and the efficacy of treatment, and that of customer satisfaction. The technical accomplishment aspect contains the concept of efficiency of performance is critical to the formula in achieving quality (King, 1985). In this arena customer satisfaction has two critical areas that must be identified; how customers are defined, and what determines their satisfaction.

To identify properly this research a review of its origins must first be done to understand why this topic has not as yet been investigated. Initially, responding to the needs of consumers, accountability for the services rendered began as an attempt to standardize the services offered. The history of the evaluation and control of medical services can be traced back to the 1860's with Florence Nightingale's attempt to establish a uniform system to gather and evaluate hospital statistics (Graham, 1990). The results generated for her research showed significant differences in mortality rates between various hospitals, but at the same time no mechanisms were available to systematically identify and rectify the responsible factors

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creating the higher mortality rates (Graham, 1990). With the establishment of the American College of Surgeons, an objective of improvement of hospital patient care was one of the specifically stated goals in its charter (Graham, 1990). The American College of Surgeons recognized that some vehicle was required to compare effective treatments at various facilities and return that information back to the individual locations to improve the entire system. The focal point of improvement was delivered by an accreditation process called the Hospital Standardization Program. This program achieved approximately a 95% accreditation rate by the 1950's (Palmer, 1983). But, as the medical community grew internally many new services were becoming associated with hospitals such as pharmacy and nursing. This created a need for a broader mechanism to monitor the complete health care system. Thus, the Joint Commission on Accreditation of Hospitals (J.C.A.H.) was established to continue the accreditation process. The J.C.A.H. is a private, not-for-profit organization used to certify facilities through on-site surveys based upon their own evolved standards (Graham, 1990).

These organizational initiatives were amplified when the United States government attempted to play an active role in the establishment of quality standards for medical services. With the introduction of Medicare in 1965, the government became a major financial contributor to the

health care industry, accounting for approximately 40% of all revenues received in the average hospital (Sunshine and Wright, 1987). This magnified the importance of the J.C.A.H. as an accreditation body as it became the stamp of approval for qualifying for Medicare payment (Millenson, 1987a).

The need for quality medical services further became a fiscal mandate for all health care facilities with the court judgement of <u>Daring vs Charleston Community Memorial Hospital</u> (1965), where the concept of corporate liability was established for the medical community. The theory applied in this judgement was that since the medical facility had the authority to regulate the practice of medicine and the ability to do so through accreditation, so it also had final dominion over negligence and the legal responsibility for it (King, 1985). This environment established the need for a minimum threshold of quality procedures in the medical community to minimize liability. In 1983 Medicare began to phase in a prospective payment system where fees would be set in advance for various procedures, or diagnosis related groups (D.G.R.) (Millenson, 1987a). This change in the reimbursement process would directly tie specific services to defined cost. The medical community would now be expected to conform to cost for like procedures at different locations. This change may have had a direct effect on the quality of service received, as there

are cost implications to both aspects of quality, that of
efficacy of treatment and customer satisfactions.
Individuals within the Health Care Financing Administration
(H.C.F.A.), the organization involved with the design of the
new payment system, expressed concerns about the impact on
quality. Jeffery Merrill, associate director of H.C.F.A.
stated, "We implemented...the most major piece of
legislation ever passed in this country, with the exception
of Medicare and Social Security, and we knew it could have
some effects in terms of quality. We could have looked
first (but) nobody cared" (Millenson, 1987a). The first
aspect of quality, that of technical accomplishment of
correct diagnosis and the efficacy of treatment, was still
in focus and the issue of quality control, but the issue of
customer satisfaction was subject to containment because of
cost.

The J.C.A.H. and the government continued to strive for
quality medical standards, and achieved monumental success
in the technical accomplishment of correct diagnosis and the
efficacy of treatment. Specifically, the Commission on
Professional and Hospital Activities (C.P.H.A.) has
assembled the largest patient information data base in the
world, used to supply the medical community with all types
of hospital statistics related to the technical aspects of
treatment (Sunshine and Wright, 1987). Quality in this
context is viewed as an inherent measurable attribute of the

goods, instead of some characteristic assigned to them (King, 1987). The viewpoint held traditionally by health care providers could be defined by the following, "Medical professionals know what's best for the patient, the patient can only comment about the service quality, but not clinical quality; therefore, the opinions of the patients aren't very germane" (Nelson, 1990a). This general belief within the medical community coincided with a quality mechanism then utilized in manufacturing, now characterized as the traditional view of quality (King, 1987). This method of quality reporting, the traditional view of quality, as borrowed from the manufacturing realm, utilizes four specific and unique cost categories (Schonberger and Knod, 1991); prevention, appraisal, internal failure, and external failure.

The costs identified with prevention and appraisal are efforts spent to ensure quality of the inputs or raw materials in producing the product or service, and the validation of the desired output in product or service respectively. Internal and external failure can be associated with the cost of not achieving the desired outcome in a product or service, with the cost of duplication or correction of an internal function when internal failure is identified, or external failure where rectification of a product or service is deemed necessary after the completion of the process. Juran's model of

optimum quality cost is successful in standardizing the
technical aspects of quality by minimizing variations and
failures, and also in creating a minimal cost structure in
controlling overall quality cost as depicted in Figure 1.
But with this composition it is infeasible to achieve zero
defects because of the apparent tradeoff between the two
cost groups; as failure costs declines, the cost of
prevention and appraisal increases. Stated differently,
that zero defect level exceeds the minimum cost point thus
making zero defect cost prohibitive. Therefore this
system's view of quality was only perceived as a measure to
minimize risk and to control cost (Schneiderman, 1986).

(A) - Prevention and appraisal
(B) - Internal and external
(C) - Total quality cost
(D) - Minimum total cost point
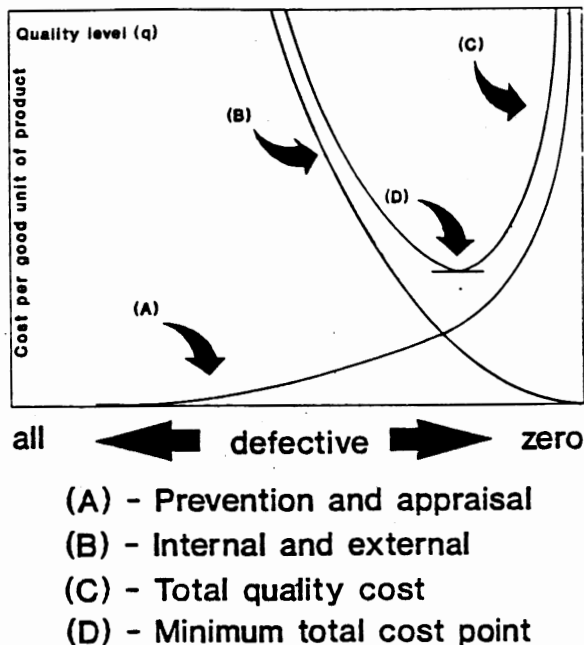
Figure 1. Traditional model of quality cost.

Source: Schneiderman, Arthur M. "Optimum Quality Cost and
Zero Defects: Are They Contradictory Concepts?." Quality
Progress, November 1986, pp. 28-31.

Since the mid 1980's the view of the cost of quality has been redelineated in manufacturing to state that the overall cost can be reduced to a minimal level while approaching zero defects. This new model, where optimum quality level equates to zero defects, transforms the quality system from a control measure into a tool for continuous improvement, theorizing that as quality increases overall cost will actually become lower in the long term as depicted in Figure 2.

The J.C.A.H. paralleled manufacturing in shifting to a new model of quality with the introduction of the "Agenda for Change" in 1987 (Graham, 1990). The focus of the change was to move progressively from clinical quality assurance to organizational wide improvement (Graham, 1990). The nucleus of the new program was still centered around the technical success in efficiency of treatment, but now communication between all involved parties would increase (Millenson, 1987b). These involved parties are best defined by J.M. Juran as customers; "include all persons who are impacted by our processes and our products" (Nelson, 1990a). In the health care environment, customers include patients, families, physicians, and employees (Nelson, 1990b). Of these customer groups, a Quality Assurance Task Force within the "Agenda for Change" format has focused on the specific function of broadening and improving the informational base from patient feedback.

(A) - Prevention and appraisal
(B) - Internal and external
(C) - Total quality cost
(D) - Minimum total cost point
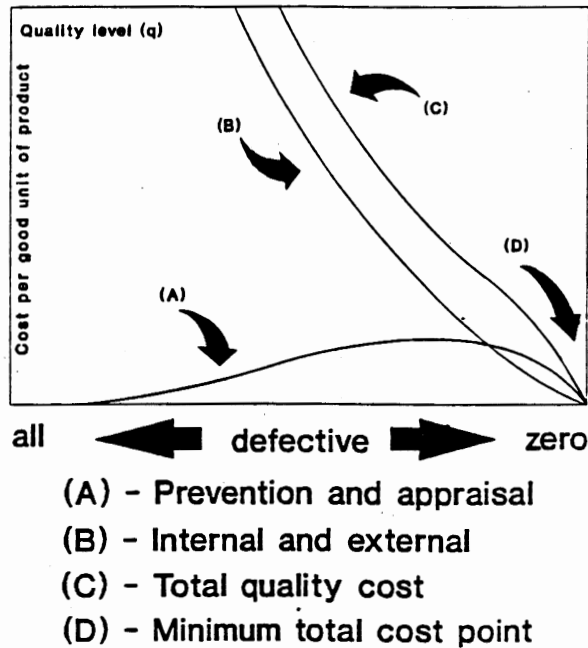
Figure 2.   Continuous improvement model of quality cost.

Source: Schneiderman, Arthur M. "Optimum Quality Cost and Zero Defects: Are They Contradictory Concepts?." Quality Progress, November 1986, pp. 28-31.

This task force has stated that patient feedback is integral to the success of improving quality (Graham, 1990). Similarly, attention is focused on reducing failures to approach the goal of zero defects, with defects detected through the volume of internal and external failures The emphasis is on continuous improvement. As previously defined, internal failures have in the past been effectively addressed in the medical community through mechanisms such as the C.P.H.A. In the realm of medical services as with many service industries, external failures are now best

defined by the acceptance or satisfaction of an outcome as defined by the customer.

Unlike the manufacturing product-based approach, where quality and customer satisfaction can be quantified by delivery time, conformance to specifications, freedom from deficiency, and fitness for use (Lehr, 1991), service organizations must use the concept of "total service level" that represents the successful delivery of a service or product, and the satisfaction of the customer from their viewpoint (King, 1985). In rendering a service transaction, given the assumption that the service has been successfully delivered to the customer, the remaining efforts are applied to determining the level of satisfaction achieved. In the arena of service operations two aspects are found that are not within the manufacturing environment; perishability, and intangible output. Perishability identifies the inability to stockpile the output being supplied to the customer, thus requiring "production" of the service on demand. Intangible output is the distinguishing characteristic that separates service operations from a manufacturing function (King, 1985). Intangible output for purposes of this study will be referenced as the remaining module of satisfaction beyond the point of receiving the tangible portion of the service at an acceptable level; eg: beyond the actual act of transportation of a passenger to their destination on a commercial airline (Hochschild, 1983). The remaining

considerations that comprise satisfaction are factors totally controlled by the individual customers, with these factors being measured against individual expectations (King, 1987).

As applied to medical services, the control and improvement of these factors can provide a dependent measurement of the quality of the health care service, and can be fundamental in assessing the provider's success in meeting the customers' expectations of service (Cleary, 1989). In fact from the customer's perspective, there is a high correlation between the patient's overall evaluation of the quality when compared to the general feeling of satisfaction with the medical experience (Steiber, 1988). There are both qualitative and quantitative methods to gather consumer information. A favored qualitative method for information gathering is the focus group (Cunningham, 1991). A focus group usually contains approximately a dozen consumers, each having had an interaction with the provider. The single largest advantage of this technique is the opportunity to clarify particular consumer statements with follow up questions. There are inherent problems with this method of data collection; such as the tendency of group members to be influenced by each other in the form of "peer pressure," and the nature of the typical response from the consumer to be anecdotal. The primary disadvantage of qualitative methods is the difficulty in extrapolating the

results of the project to the entire population.

The most widely used quantitative mechanism to extract consumer information is the telephone or written survey (John, 1991). The advantages and disadvantages of the quantitative method are reversed from those associated with qualitative; with the most significant difference being that the quantitative method may be statistically valid and extrapolated to the entire population (Cunningham, 1991). A 1990 survey of over two hundred hospitals showed that at least two-thirds conduct routine patient satisfaction surveys (Gillem and Nelson, 1990). Patient satisfaction surveys developed by medical sociology researchers consist of a set of questions that actually measures the patients' perceptions of all aspects of the medical service (Zeithaml, 1990). These surveys typically gather both aspects of quality; technical accomplishment of correct diagnosis and the efficacy of treatment, and customer satisfaction. As depicted in Table 1, a 1988 Gallup poll revealed that customer satisfaction was influenced more by the show of concern from the staff than by clinical care; inferring that after the delivery of acceptable treatment the patient's perception of the quality of care delivered can be greatly affected by the remaining non-clinical issues (Steiber, 1988).

Table 1.

SRI Gallup / Hospital Poll

	MEAN SATISFACTION RATING *	CORRELATION WITH QUALITY **	RANK OF CORRELATION COEFFICIENTS
CLEANLINESS	4.55	0.38	4
VISITING POLICY	4.50	0.18	9
PHYSICIAN CARE	4.58	0.44	3
NURSING CARE	4.47	0.56	2
ROOM APPEARANCE	4.40	0.37	5
CONCERN FROM STAFF	4.38	0.60	1
ADMISSIONS/DISCHARGE	4.31	0.34	6
PARKING	3.80	0.15	10
FOOD	3.63	0.27	8
COST OF CARE	3.39	0.33	7

*   5 Equals very high.
    1 Equals very low.

**   1.0 is a perfect positive correlation.
    0.0 represents no correlation.

    Based on 414 respondents.

Source: Steiber, Steven. "How Consumers Perceive Health Care Quality." Hospitals, April 5, 1988, pp. 84.

III. METHODOLOGY

Surveys for data collection can be used as a successful
tool in examining the opinions and judgments of customers.
Associated with expectancy theory as defined by Victor Vroom
(1964); it suggests that motivation is determined by how
much people want a particular outcome and how likely they
think they are to get it (Barney and Griffin, 1992). Vroom
bases the expectancy theory on requiring four components to
exist. The first being that behavior is impacted by both
the individual and the surrounding environment, followed by
the concept that an individual determines his/her own
behavior. Thirdly, different people have different types of
desires and needs, and finally that an individual will make
behavioral decisions based on their perception of how that
behavior will impact achieving a desired outcome (Barney and
Griffin, 1992).

When considering these components within the confines
of customer satisfaction as related to health care, a few
primary areas need to be established. First is the
identification of the customer; second, the defining of what
needs exist; and lastly, what the expectations are of those
needs and desires. In the review of existing surveys,
customer identification is typically represented by the

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classification of the type of patient, as opposed to the specific individual. The determination of what needs exist has historically been based on those areas that interact with the patient. These would be generally defined as functional areas (eg., admissions), the quality of the performance of the various areas (eg., friendliness, cleanliness, promptness), and the ease of use or accessibility to functions (Hidman and Fergsuson, 1989). The objective of measuring how the expectations of the needs and desires are met is ordinarily accomplished by an "after-only" design of comparing one post-treatment group to previous post-treatment group(s). Hospital Corporation of America identified a core group of four primary areas for survey purposes that are used throughout their own medical facilities and licensed to many others with the United States. These four areas are inpatients, physicians, employees, and community, and are all listed under the trademark of HQT (Hospital Quality Trends) (Gillem and Nelson, 1990). The inpatient instrument entitled "Your Hospital Stay: The Patient's Viewpoint", utilizes a sixty nine question survey to obtain customer information (See Appendix A) (H.C.A., 1990). The questions used in the HQT instruments have proven to be good indicators in measuring desirable characteristics associated with health care. Additionally, these survey instruments have been fruitful in producing the same results on repeated administrations, thus

establishing both validity and reliability throughout its five year development (Gillem and Nelson, 1990).

When a survey instrument is utilized in a health care environment, customer satisfaction data is secured through feedback from patients through the use of post-treatment evaluations. These surveys measure the customers' perceptions of satisfaction based on their individual interaction with the various areas contained within the health care provider's domain. This sphere can be separated into six distinct areas of interaction: admissions, doctors, nursing staff, other medical staff, non medical staff, and facilities.

The HQT instruments may exhibit a greater degree of refinement than those developed and administered by individual providers. They are however, still restricted only to the measurement of post-treatment. This feedback containing the customer satisfaction information is typically appraised and used by an organization to focus efforts on improving the adequacy of the service and its delivery.

The sample data in this study segregates the respondents into two different categories of customers in the context of health care. The first is the traditional group as previously mentioned, i.e., patients that are polled using post-treatment evaluations. This group is identified as those with "direct experience" (DE). The

second group of individuals is those who have had an "indirect experience" (IE) in a health care system. These individuals are either visitors or observers and have not experienced the service as a patient.

The premise that drives this research is that individuals with direct and indirect experience perceive quality differently. For example, IE individuals experience waiting room environments, nurses' stations, and unaccompanied travel through the facility. On the other hand, DE individuals are typically preoccupied with the actual delivery of the health care service.

From this proposition a specific hypothesis and two sub-hypotheses are tested using the sample data.

Hypothesis: **The overall quality satisfaction level of the DE differs from the overall quality satisfaction level of the IEs.**

Given the proposal that two separate customer groups exist, DE and IE; it is expected that two different models will exist comprising the factors of overall satisfaction. As the DE and IE groups are both exposed to the six core areas, separate analyses are performed using the six areas to identify differences between the two groups.

As the DE group is also possibly exposed to the additional areas of level of privacy, previous

hospitalizations, involvement in hospital selection, degree of communication during the process, receipt of pre-process information, and overall cost perception, these factors might have an impact on the overall satisfaction level of the DE group. To investigate this possibility a second series of analysis is performed in the second sub-hypothesis to identify the impact of these additional variables, both as a group and individually to the five core areas of interaction. Note that prior analysis of data revealed that the admissions process did not have a significant effect on satisfaction level. So only five core areas are considered from now on.

Sub-hypothesis 1: **The overall quality satisfaction level of IEs is a function of their perceptions of the doctors, nursing staff, other medical personnel, non medical personnel, and facilities.**

Sub-hypothesis 2: **The overall quality satisfaction level of DEs is a function of their perceptions of the doctors, nursing staff, other medical personnel, non medical personnel, facilities, level of privacy, previous hospitalizations, involvement in hospital selection,**

degree of communication during the process, receipt of pre-process information, and overall cost perception.

IV.   SURVEY DEVELOPMENT

The development of an instrument was necessary to accomplish the task of distinguishing between the IE and DE individual (See Appendix B). The survey consisted of a 59 item questionnaire with items included for the identification of the type of individual and demographic information. The type of responses recovered from this survey are detailed in the data response key in Appendix C. The validity of the questions and their criteria can be referenced back to other existing successful surveys used in HQT and others where the six basic areas of interaction are utilized (See Appendix D). As this survey instrument is of original design, the value of the survey's internal reliability has not been previously tested. The objective of this section is to establish the instruments ability to repeatedly measure data characteristics with consistency, thus minimizing the possibility of erroneous data used in the final research results.

TEST METHOD

The survey instrument was tested for reliability through a test/retest method with the effects measured utilizing Pearson product-moment correlation coefficients,

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Pearson r, for each question (Schmidt, 1979). The value of r was obtained utilizing the covariation method. The objective was to sample a population consisting of a minimum of 75 individuals and then administer the questionnaire for a second time to the same group after a specified period of time. The sample group was identified as junior and senior students in a classroom environment. The group size was originally 132, but through the various constraints of invalidity such as new exposure to health care since the first test session, the final sample size was 106. Correlation coefficients have been established for all questions individually in the survey, with the exception of segregation and demographic data. The excluded items are questions 14 (identifying admission involvement), and 56 through 59 (demographic).

INVALIDITY ISSUES

To address the issues of invalidity in the design of the internal reliability test the following measures were utilized in this application to minimize their impact on the quality of the test.

The first variable is that of history, the possibility of an event occurring to a participant that alters their perception of the relevant issues being tested (Campbell and Stanley, 1963). This was controlled by isolating and removing all participants at the retest session that have

had any new exposures to hospital services or medical involvement in any capacity since the original test session. Thus the input data from both test and retest of these participants was eliminated from the correlation analysis. To assist in the issue of experimental isolation, a classroom testing environment is utilized in both testing sessions to enhance concentration and minimize external distractions.

The variable of maturation, where subjects modify their viewpoint on issues based on new life experiences is controlled by limiting the time lapse between the two test segments. The time period of 25 days was selected which exceeds the one to two week delay between test administrations that is typically utilized in health questionnaires, but not so long a delay to risk the occurrence of the issue of maturation (McDowell and Newell, 1987).

The effect of testing, or more accurately, the effect of retesting has in some studies revealed a slight increase in the degree of prejudice in participant attitude. This increase in reporting is primarily associated with highly sensitive personal bias topics such as attitudes towards minority groups and cultures. Unless an individual can attach emotional significance to the subject matter in this survey, it can be viewed as non-threatening, thus generating negligible changes in most participants. In the attempt to

minimize this issue the group was questioned prior to the first test session about emotional issues pertaining to, and possible resentment towards a health care provider. No participants were identified for elimination.

The issue of instrument decay, where participants become fatigued and make inaccurate responses on the admission of a test can not be eliminated. This condition can be minimized by selecting the administration time when the alertness of the participants is highest. It was determined that the best time for administration of both tests was at the beginning of the class session. Also prior to the administration of the retest it was stressed to the group that particular personal attention should be given to this issue.

RESULTS OF RELIABILITY

The overall performance revealed through the correlation analysis provides justification for use of the survey instrument (Appendix E). The reliability results are detailed in summary form in Table 2. The reliability status of each question has been determined by utilizing a correlation indicator range guide (Schmidt, 1979). This table identifies a high correlation as a r value between 0.80 and 0.98, and moderate correlation from 0.50 to 0.70.

In analysis of the coefficients, all reliability values exceed beyond the boundary of 0.7500 for moderate to high,

with the exception of questions 25 and 32, where the values were 0.7457 and 0.7368 respectively (Table 2). Cumulative performance shows a total of 42 test items classified as high correlation, 10 items moderate to high, and the two items previously discussed. The probable cause can be identified for both questions as each value is within 0.015 of the minimum target of 0.7500.

Through experimentation of the data values generated from the survey reliability study it was determined that the reliability of questions 25 and 32 could upgraded to the minimum target value through the manipulation of a lone event. As a single individual study participant was the determinant in preventing these questions from reaching the minimum value, the inference is that this could be the result of inattentiveness to the question. For question 32 a specific event, number 58, reveals X and Y values of 5 and 3 respectively (See Appendix E). This is the only event with a difference value of 2. Distribution of this response yields a correlation coefficient of 0.7600. When the same technique is applies to question 25 in event 66 with X and Y values of 4 and 2 respectively (See Appendix E), the minimum target value of the correlation coefficients is also achieved it now becomes 0.7684.

Table 2. CORRELATION ANALYSIS OF SURVEY QUESTIONS:
          ORDER OF PEARSON r VALUES

QUESTION NUMBER	CORRELATION COEFFICIENTS	QUESTION NUMBER	CORRELATION COEFFICIENTS
1	1.0000	22	0.8257
2	1.0000	27	0.8249
3	1.0000	47	0.8242
4	1.0000	38	0.8238
5	1.0000	26	0.8232
6	1.0000	24	0.8230
15	0.9940	48	0.8217
7	0.9866	23	0.8191
12	0.9676	21	0.8184
8	0.9524	29	0.8168
10	0.9451	52	0.8143
19	0.9381	37	0.8136
17	0.9330	31	0.8112
13	0.9121	43	0.8103
18	0.9005	40	0.8091
9	0.8888	50	0.8053
11	0.8888	46	0.7944
20	0.8848	51	0.7943
49	0.8841	54	0.7935
16	0.8804	44	0.7928
33	0.8749	55	0.7911
34	0.8543	36	0.7910
35	0.8534	45	0.7818
39	0.8494	30	0.7708
28	0.8480	53	0.7672
42	0.8317	25	0.7457
41	0.8280	32	0.7368

The rational for these lowest values can be best associated with the question type and content. In each case the question asked the participant to generalize an opinion based on personal values and perceptions, where no standard common measure can be applied. As these questions have been included in a vast number of previously administered surveys they shall remain in the instrument. However, question 25 is not utilized in this thesis analysis, and question 32 is one of five questions in the classification of facilities, the average correlation of these five facility factors with satisfaction is 0.81 (Table 3).

Revealed in the overall performance by classifications, questions related to the performance of doctors have the highest correlation between pre and post scores (0.85), with the questions associated with the group's nursing staff and facilities ranking the least (0.81). The inference can be made that participants hold a strongest conviction of their options about doctors, but decay when applied to nursing and facilities.

Table 3. OVERALL PERFORMANCE BASED ON CORRELATION
COEFFICIENTS BY CLASSIFICATION:

CLASSIFICATION	QUESTION NUMBER			MEAN
OTHER MEDICAL STAFF (OM)	Q22 0.8257	Q28 0.8480	Q37 0.8136	0.83
NON MEDICAL STAFF (NM)	Q23 0.8191	Q29 0.8168	Q38 0.8238	0.82
NURSING STAFF (NU)	Q21 0.8148	Q27 0.8249	Q36 0.7910	0.81
DOCTORS (DR)	Q20 0.8848	Q26 0.8232	Q35 0.8534	0.85
FACILITIES (FC)	Q30 0.7708 Q33 0.8749	Q31 0.8112 Q34 0.8534	Q32 0.7368	0.81

V.   DATA COLLECTION AND CONSOLIDATION

The survey instrument was administered to two different population types, students and community groups, between November 1992 and March 1993. Further, among the communities there were two groups corresponding to two geographical locations. A total number of approximately 660 surveys were collected from the five executions of the questionnaire. Each individual execution can be identified by the value of a last data point, number 60, ranging 1 through 5. The net total of 594 represents surveys that were audited for completeness; as any survey returned incomplete, with the exclusion of demographic information, was excluded from the study.

Due to the sizable length of the questionnaire the surveys were administered individually or in group meeting situations to assure a high response rate, which in actuality resulted in near a 100% response rate.

Seven distinct classifications can be derived from this instrument; listed below are definitions along with sample sizes:

DE with   - 31 - Direct Experience with admissions.

DE without   - 47 - Direct Experience without
                       admissions.

30

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IE with          -  41 - Indirect Experience with admissions.

IE without       - 355 - Indirect Experience without
                         admissions.

DE&IE with       -  79 - Direct and Indirect Experience with
                         admissions.

DE&IE without    -  10 - Direct and Indirect Experience without
                         admissions.

Non DE or IE     -  31 - Neither DE or IE, no experiences.
```

With the objective to compare DE and IE groups, the first analysis is to determine if the admissions process has a significant effect on the overall satisfaction of each group. It is believed that involvement in the admissions experience does not affect the overall level satisfaction level of any group, DE or IE. With the substantiation through the application of a large sample inference about the difference between two population means, the separation between with and without the admission experience classifications will be removed for the remaining study (Levin and Rubin, 1990). This will result in increasing the group sample sizes to 78 and 396, for DE and IE respectively.

The data was acquired in three different locations, namely the general populations of Southern Illinois, City of Auburn, and Auburn University. As question 60 denotes the executions of the questionnaire, Southern Illinois

corresponds to 4, City of Auburn to 5, and 1, 2, and 3 relating to different student groups at Auburn University. Comparative tests are performed to determine if different locations exhibit differing overall satisfaction levels due to regional influences.

To conduct this analysis the following computations are applied to the classification with admissions experience, and the classification without admission experience. Four overall satisfaction levels are determined by averaging the response of the two satisfaction questions asked to each group, one for each group and classification; questions 10 and 39 for the DE group, and questions 19 and 39 for the IE group. These values represent the data points used for the two group comparisons.

Inference about the Difference Between the Mean Satisfaction Levels of the populations of DE with admissions experience and DE without admissions experience

The null hypothesis (Ho: $(\mu1 - \mu2) = 0$) states that no difference exist between the mean satisfaction level of two classifications, while the alternate hypothesis (Ha: $(\mu1 - \mu2) \neq 0$) is that a significant difference does exist between the two population means. The sample sizes for DE with and without admissions experiences are large enough (>30) so the means of each have approximately normal

sampling distributions and the sample variances of each provide good approximations to the associated population variance. A summary of the two DE groups from Appendix F is given below.

DE without admissions: DE with admissions:

sample mean = 3.6170   sample mean = 3.4678

   variance = 0.7957   variance = 0.4156

sample size = 47   sample size = 31

The standard deviation of the sampling distribution of the difference in means is computed to be 0.1741791, yielding a t-value of 0.8029, and a degrees of freedom (df) of 76.00 for the t-test. The observed significance level (p-value) is 0.4245 (Appendix F). For a chosen level of significance of 0.001, the results indicate that the null is not rejected, or stated differently, a significant difference does not exist between the means of the two classifications of the DE group. This data suggests the consolidation of the two DE groups to establish a new data group size of 78.

Inference about the Difference Between Mean the Satisfaction
Levels of the populations of IE with admissions experience
and IE without admissions experience

The null hypothesis (Ho: $(\mu 1 - \mu 2) = 0$) states that no
difference exist between the mean satisfaction levels of the
two classifications, while the alternate hypothesis
(Ha: $(\mu 1 - \mu 2) \neq 0$) is that difference does exist in the two
population means. The sample sizes for IE with and without
admissions experiences are large enough so the means of each
have approximately normal sampling distributions and the
sample variances of each provide good approximations to the
associated population variance. The data from the two IE
groups are summarized below from Appendix F.

IE without admissions: IE with admissions:

sample mean = 3.469   sample mean = 3.476

    variance = 0.6191   variance = 0.4744

sample size = 355   sample size = 41

The standard deviation of the sampling distribution of
the difference in means is computed to be 0.1153892 for the
IE group, establishing a t-value of -0.0514 for the t-test.
A modified degrees of freedom is computed to be 394.0, and
an observed significance level (p-value) is calculated to be
0.9590 (Appendix F). Results of this test for the IE group

is that the null is not rejected and a significant difference does not exist between the two classifications of with and without admissions experience for the IE group.

Inference about the Difference Between the Mean Satisfaction Levels of Regional Populations

Three separate groups are formed utilizing the DE and IE groups cumulative total of 474, namely north (Southern Illinois), south (City of Auburn), and student (Auburn University). First, the groups of south and student is compared to determine if a difference exists in the overall satisfaction levels within a region. Second, the north group is compared to the consolidated group of south and student to identify regional differences.

In performing the first test the null hypothesis of (Ho: $(\mu_1 - \mu_2) = 0$) is established where no difference exists between the overall satisfaction levels of the south and student groups. The alternate hypothesis is (Ha: $(\mu_1 - \mu_2) \neq 0$), defining that a difference does exist in the two population means. The sample sizes for all three groups are sufficiently large to allow the means of each to have an approximately normal sampling distribution, the sample variances will be used as approximations to the related population variances. The data for all three groups are summarized below from Appendix F.

SOUTH: STUDENT:

sample mean = 3.625   sample mean = 3.444

    variance = 0.6054   variance = 0.5713

sample size = 36   sample size = 270

For this t-test the standard deviation of the sampling distribution of the difference in means is computed to be 0.1375958, producing a t-value of 1.3418, and a degrees of freedom (df) of 304.0, with an observed significance level (p-value) of 0.1807 (Appendix F). Comparing this p-value with a chosen level of significance of 0.001, our decision is that the null is not rejected, or that a significant difference does not exist between the means of the two groups. This allows for the consolidation of the south and student groups to represent a single region.

The second test in comparing the north and the consolidated south groups' overall mean satisfaction levels has a null hypothesis of (Ho: $(\mu 1 - \mu 2) = 0$) where no difference exist, and an alternate hypothesis of (Ha: $(\mu 1 - \mu 2) \neq 0$) where a difference does exist in the two population means.

SOUTH AND STUDENT: NORTH:

sample mean = 3.447   sample mean = 3.518

    variance = 0.5767   variance = 0.6704

sample size = 306   sample size = 168

In executing the t-test, the standard deviation of the sampling distribution of the difference in means is computed to be 0.0766493, yielding a t-value of -0.6957, and a degrees of freedom (df) of 472.0. An observed significance level (p-value) of 0.4869 is also produced (Appendix F). For a chosen level of significance of 0.001, no significant difference exist between the means of the two groups.

An additional test comparing north and south (excluding students) also reveals no differences between groups with the program output listed in Appendix F.

In summary, these experiments support the conclusion that geographic region is not a significant factor in affecting the overall satisfaction of the groups. The impact of this result is to allow the consolidation of the geographical regions for the purpose of future analysis. The effect is to increase the group sample sizes to 78 and 396, for DE and IE respectively.

VI.   ANALYSIS OF DATA

The survey instrument was administered to two different groups of respondents, those with direct experience and indirect experience. To ascertain if a difference exists between the two groups, a t-test is used to identify if the overall quality satisfaction level of the DE differs from the overall quality satisfaction level of the IEs.

Associated to the two sub-hypotheses, multiple linear regression models will be used to evaluate each group's overall quality satisfaction level against their perceptions of the doctors, nursing staff, other medical personnel, non medical personnel, and facilities. Also, associated with the DE sub-hypothesis, multiple linear regression models will be used to assess the relationships of level of privacy, previous hospitalizations, involvement in hospital selection, degree of communication during the process, receipt of pre-process information, and overall cost perception with the five core classifications.

Inferences and interpretation of the results of these examinations will be detailed in the conclusion section.

Hypothesis: **The overall quality satisfaction level of the DE differs from the overall quality satisfaction level of the IEs.**

To conduct this analysis the overall satisfaction levels were determined for the DE and IE group by averaging the responses to questions 10 and 39, and questions 19 and 39, respectively. Utilizing the software package SAS (SAS Institute, 1987) to conduct this appraisal, a t-test was employed to make statistical inferences about the difference in mean satisfaction levels between the populations of DE and IE.

The null hypothesis (Ho: $(\mu 1 - \mu 2) = 0$) states that no difference exists in the means of the two classifications. The alternate hypothesis (Ha: $(\mu 1 - \mu 2) \neq 0$) states that a significant statistical difference does exist in the two population means. Since both samples are of sufficient size, the distributions of the sample means are assumed to be approximately normal, and the sample variances of each will be used as approximations to the associated population variance. The following data is obtained from Appendix F.

Direct Experiences: Indirect Experiences:

sample mean = 3.5577   sample mean = 3.4697

   variance = 0.6427   variance = 0.6030

sample size = 78   sample size = 396

The standard deviation of the sampling distribution of the difference of means is computed to be 0.0988027, yielding a test statistic of 0.9100 with degrees of freedom of 472.0, and an observed p-value of 0.3633. When a significance value of 0.001 is used the decision is that the null is not rejected, or stated differently, a significant difference does not exist between the DE and IE groups.

Sub-hypothesis 1: **The overall quality satisfaction level of the IE is a function of their perceptions of the doctors, nursing staff, other medical personnel, non medical personnel, and facilities.**

To conduct this analysis the overall satisfaction level established from questions 19 and 39 was utilized as the dependent variable in a multiple linear regression model. The five remaining core areas of interaction; the perceptions of the doctors, nursing staff, other medical personnel, non medical personnel, and facilities determined the independent variables.

Utilizing SAS to conduct this analysis, the stepwise regression procedure is applied to determine a possible statistical model for the IE population. With stepwise the individual variables were selected in the following order DRI, NMI, NUI, and OMI, respectively, with the corresponding

models shown in Appendix F. The model with all five

independent variables was not produced by stepwise

regression. To determine the performance of the five

variable model and to investigate if any better model could

be found, the SAS procedure of 'PROC RSQUARE' is employed to

analyze all possible combinations of independent variables.

Models were selected by their performance in the regression

parameters of R-square, adjusted R-square, Mallow's Cp

value, the absolute value of C(p)-p, and F-statistics are

listed in Appendix F with a summary of the preferred models

in Table 5. In some instances a model may excel in more

than one of the performance criteria, in other situations

more than one model is listed as little difference exists in

the inspection values used.

Table 4. CORRELATION ANALYSIS OF IE REGRESSION:
          ORDER OF PEARSON r VALUES

          OSI - OVERALL SATISFACTION LEVEL
          OMI - OTHER MEDICAL STAFF
          NMI - NON MEDICAL STAFF
          NUI - NURSING STAFF
          DRI - DOCTORS
          FCI - FACILITIES

VARIABLE 1	VARIABLE 2	CORRELATION VALUE
NUI	NMI	0.98543
DRI	OMI	0.97149
FCI	OMI	0.96669
FCI	DRI	0.91650
FCI	NMI	0.87023
FCI	NUI	0.68641
DRI	NMI	0.60712
DRI	NUI	0.52787
NMI	OMI	0.51014
NUI	OMI	0.34031
DRI	OSI	0.70247
NUI	OSI	0.68579
OMI	OSI	0.67943
NMI	OSI	0.66068
FCI	OSI	0.53643

Table 5. REGRESSION MODELS FOR DEPENDENT VARIABLE:
          OSI WITH 5 INDEPENDENT VARIABLES (IE).

                OMI - OTHER MEDICAL STAFF
                NMI - NON MEDICAL STAFF
                NUI - NURSING STAFF
                DRI - DOCTORS
                FCI - FACILITIES

VARIABLES	R-SQUARE	ADJ.RSQ.	C(p)	|C(p)-p|	F	PROB>F
DRI -- --	0.47347	0.49218	66.966	64.966	382.859	0.0001
DRI NMI --	0.54485	0.54253	22.509	19.509	234.626	0.0001
DRI NMI NUI	0.56611	0.56278	5.286	1.286	170.050	0.0001
DRI NMI NUI OMI -- --	0.56866	0.56424	4.982	0.018	128.539	0.0001
DRI NMI NUI OMI FCI --	0.56975	0.56421	6.000	0.000	103.023	0.0001

All five of the tested core areas exhibit high
correlations as the r values are between 0.80 and 0.98
in some relationship to others (Schmidt, 1979). As three
areas; the perceptions of the doctors, other medical
personnel, and facilities are directly associated to each
other (see Table 4) it seems viable that one of these areas
can be successfully used as a predictor for the other two.
The remaining areas of perceptions of the nursing staff and
non medical personnel are also correlated. The areas of non
medical and facilities are closely correlated to each other
thus bridging the areas of nursing staff and non medical
personnel to the entire group. Based on the suggested
regression model from the stepwise process, utilizing the
absolute value of C(p)-p as a performance measure, the four
variable model produces the lowest value at 0.018 next to
the value of 0 for the five variable model. But with an
improvement in the adjusted R-square when removing the
perceptions of facilities in the four independent variable
model a strong model is also produced. Additionally, the
change in the absolute value of C(p)-p is only 0.018 from
the five to four independent variable model. The missing
variable of facilities can be best estimated using the
values established from the area of other medical personnel.
Reduction down to the three independent variable model is
unacceptable, even with a negligible difference of 0.026
from the four level model in reference to the adjusted

R-square value. The difference in the absolute value of C(p)-p for the three and four level models reports a unsuitable change, placing the four level model is significantly closer to zero than the three level model. If no restraints exist the obvious preferred model would be the five independent variable solution to secure feedback pertaining to all variables. But given any temperance, the four level model as determined by the stepwise procedure would be selected, as the perception of the missing independent variable, facilities, can be effectively correlated to other remaining core areas with the exception of the perceptions of the nursing staff. To reduce the model further in the removal of testing for the perceptions of other medical personnel causes an unacceptable change in the absolute value of C(p)-p, even though the new missing independent variable can be correlated to the areas of doctors and facilities. To summarize, the four variable level model exhibits superior values above all others in the tested criteria such as R-square and Mallow's C(p), it also is significant based on the F-value (128.539) and p-value associated with the F-statistic (0.0001).

Sub-hypothesis 2:   **The overall quality satisfaction level of the DE is a function of their perceptions of the doctors, nursing staff, other medical personnel,**

non medical personnel, facilities, level of privacy, previous hospitalizations, involvement in hospital selection, degree of communication during the process, receipt of pre-process information, and overall cost perception.

For this analysis the overall satisfaction level established from questions 10 and 39 was utilized as the dependent variable in a regression model. In the first analysis the independent variables consisted of the five remaining core areas of interaction; the perceptions of the doctors, nursing staff, other medical personnel, non medical personnel, and facilities.

In the second analysis the additional independent variables of level of privacy, previous hospitalizations, involvement in hospital selection, degree of communication during the process, receipt of pre-process information, and overall cost perception are included into the modeling process. Utilizing SAS to conduct this analysis, the stepwise regression procedure was applied to determine a possible regression model for the DE population. Additionally, as performed for the IE group, the SAS function of 'PROC RSQUARE' is employed to analyze all possible combinations of independent variables to determine

if any better model could be found in both the five and eleven variable environments. Listed below in Table 6 is the pairwise correlation coefficient for the eleven independent variables from Appendix F. Table 7 reflects the five variable regression model summary and Table 8 reflects the eleven variable regression model summary consolidated from Appendix F.

Table 6. CORRELATION ANALYSIS OF DE REGRESSION:
          ORDER OF PEARSON r VALUES

          OSD - OVERALL SATISFACTION LEVEL
          OMD - OTHER MEDICAL STAFF
          NMD - NON MEDICAL STAFF
          NUD - NURSING STAFF
          DRD - DOCTORS
          FCD - FACILITIES
           X6 - LEVEL OF PRIVACY
           X7 - PREVIOUS HOSPITALIZATIONS
           X8 - INVOLVEMENT IN HOSPITAL SELECTION
           X9 - DEGREE OF COMMUNICATION DURING PROCESS
          X10 - RECEIPT OF PRE-PROCESS INFORMATION
          X11 - OVERALL COST PERCEPTION

VARIABLE 1	VARIABLE 2	CORRELATION VALUE
NMD	X7	0.87520
DRD	NMD	0.86271
FCD	NUD	0.82005
NMD	X8	-0.78229
DRD	OMD	0.75848
NUD	X8	-0.74459
FCD	DRD	0.74054
NMD	X9	0.72157
NMD	X6	0.68608
DRD	X8	0.67910
NUD	X6	0.67403
NMD	X10	-0.66130
FCD	NMD	0.63435
FCD	OMD	0.58378
FCD	X11	-0.57677
FCD	X8	-0.52276

VARIABLE 1	VARIABLE 2	CORRELATION VALUE
DRD	X10	0.50476
FCD	X7	0.50072
FCD	X6	0.49957
DRD	X11	0.49811
DRD	X6	-0.41545
DRD	NUD	0.38387
DRD	X7	-0.38074
NMD	OMD	0.38073
NUD	NMD	0.37604
NUD	X9	0.35793
OMD	X7	0.31638
OMD	X8	-0.24870
FCD	X9	0.24555
FCD	X10	-0.21622
OMD	X6	-0.18992
OMD	X10	0.17167
NUD	X10	-0.14800
NUD	X7	0.12622
NUD	X11	-0.11789
OMD	X9	0.07335
DRD	X9	0.06985
NUD	OMD	-0.01524
NMD	X11	-0.04213
OMD	X11	0.03951

VARIABLE 1	VARIABLE 2	CORRELATION VALUE
DRD	OSD	0.69449
NUD	OSD	0.57497
FCD	OSD	0.54761
OMD	OSD	0.54521
NMD	OSD	0.48945
X9	OSD	0.28337
X8	OSD	0.08902
X10	OSD	0.08686
X6	OSD	-0.04024
X7	OSD	0.06771
X11	OSD	0.03826

Table 7.   REGRESSION MODELS FOR DEPENDENT VARIABLE:
           OSD WITH 5 INDEPENDENT VARIABLES (DE).

```
           OMD - OTHER MEDICAL STAFF
           NMD - NON MEDICAL STAFF
           NUD - NURSING STAFF
           DRD - DOCTORS
           FCD - FACILITIES
```

VARIABLES	R-SQUARE	ADJ.RSQ.	C(p)	|C(p)-p|	F	PROB>F
DRD -- --	0.48232	0.47551	9.935	7.935	78.110	0.0001
DRD NUD --	0.52482	0.51215	5.044	2.044	41.418	0.0001
DRD NUD FCD	0.54537	0.52694	3.712	0.288	29.590	0.0001
DRD NUD FCD NMD -- --	0.55569	0.53134	4.040	0.960	22.825	0.0001
DRD NUD FCD NMD OMD --	0.55593	0.52509	6.000	0.000	18.027	0.0001

Table 8.   REGRESSION MODELS FOR DEPENDENT VARIABLE:
           OSD WITH 11 INDEPENDENT VARIABLES (DE).

           OMD - OTHER MEDICAL STAFF
           NMD - NON MEDICAL STAFF
           NUD - NURSING STAFF
           DRD - DOCTORS
           FCD - FACILITIES
            X6 - LEVEL OF PRIVACY
            X7 - PREVIOUS HOSPITALIZATIONS
            X8 - INVOLVEMENT IN HOSPITAL SELECTION
            X9 - DEGREE OF COMMUNICATION DURING PROCESS
           X10 - RECEIPT OF PRE-PROCESS INFORMATION
           X11 - OVERALL COST PERCEPTION

VARIABLES			R-SQUARE	ADJ.RSQ.	C(p)	|C(p)-p|	F	PROB>F
DRD	--	--	0.48232	0.47551	6.398	4.398	70.810	0.0001
DRD	NUD	--	0.52482	0.51215	1.797	1.203	41.418	0.0001
DRD	NUD	FCD	0.54537	0.52694	0.606	3.394	29.590	0.0001
DRD	NUD	X6	0.52487	0.50561	3.790	0.210	27.249	0.0001
DRD NUD FCD X9	--	--	0.55759	0.53335	0.708	4.292	23.002	0.0001
DRD NUD X9 X11	--	--	0.54407	0.51909	2.808	2.192	21.778	0.0001
DRD NUD FCD NMD X9	--		0.56597	0.53583	1.407	4.593	18.777	0.0001
DRD NUD FCD NMD X7	--		0.55618	0.52536	2.927	3.073	18.046	0.0001
DRD NUD FCD NMD X8	X9		0.57186	0.53568	2.493	4.507	15.805	0.0001
DRD NUD FCD X8	X9	X10	0.56490	0.52813	3.573	3.427	15.363	0.0001
DRD NUD FCD NMD X7 X8 X9	--	--	0.57325	0.53057	4.277	3.723	13.433	0.0001
DRD NUD FCD NMD X9 X10 X11	--	--	0.56728	0.52401	5.203	2.797	13.110	0.0001

VARIABLES	R-SQUARE	ADJ.RSQ.	C(p)	|C(p)-p|	F	PROB>F
DRD NUD FCD NMD X7 X8 X9 X11 --	0.57385	0.52444	6.184	2.816	11.614	0.0001
DRD NUD FCD X7 X8 X9 X10 X11 --	0.56838	0.51834	7.032	1.968	11.358	0.0001
DRD NUD FCD NMD X7 X8 X9 X10 X11	0.57453	0.51822	8.077	1.923	10.203	0.0001
DRD NUD FCD NMD OMD X7 X9 X10 X11	0.56905	0.51202	8.928	1.072	9.977	0.0001
DRD NUD FCD NMD OMD X7 X8 X9 X10 X11 -- --	0.57502	0.51159	10.001	0.999	9.065	0.0001
DRD NUD FCD OMD X6 X7 X8 X9 X10 X11 -- --	0.56886	0.50451	10.959	0.041	8.840	0.0001
DRD NUD FCD NMD OMD X6 X7 X8 X9 X10 X11 --	0.57503	0.50420	12.000	0.000	8.119	0.0001

The results of the first analysis reveals that the best model other than the five variable model for the absolute value of C(p)-p as the selection criteria is the three variable solution, where the areas of the doctors, nursing staff, and other medical personnel are the independent variables. The adjusted R-square value for the three variable solution is the best of all solutions offered, and the absolute value of C(p)-p is improved over three times beyond the four variable model.

When stepwise regression was conducted using five independent variables and eleven independent variables as candidates, it produced an identical three variable model in each case; the perceptions in the areas of doctors, nursing staff, and facilities. The four variable model (DRD, NUD, FCD, X9) obtained from the 'PROC RSQUARE' procedure listed in Table 8 for eleven variables, substitutes the independent variable degree of communication during process for the variable of non medical found in the four variable model listed in Table 7 with a nominal net improvement of 0.002 in adjusted R-square. Similarly, when comparing the five variable model in Table 7 and the five variable model (DRD, NUD, FCD, NMD, X9) from Table 8, a higher level of adjusted R-square is reported from the model in Table 8. Based on these facts the five independent variable model set will be omitted as a source in yielding the best overall models for the DE group, the eleven variable model set will be the

subject of investigation for the remaining analysis in this section for the DE group.

The five variable model (DRD, NUD, FCD, NMD, X9) can be selected as the best viable model with an adjusted R-square value of 0.53583; this model also has a C(p) of 1.407 that is well below the average of values reported in Table 8. Closely associated to that value is the four variable model (NUD, DRD, FCD, X9) with an adjusted R-square of 0.53335, where the C(p) value is favorably reduced approximately in half to 0.708.

Given the criteria of the minimum absolute value of C(p)-p, the selection of the ten variable model (DRD, NUD, FCD, OMD, X6, X7, X8, X9, X10, X11) produces a value of 0.041. This model does report a net loss of 0.03 from the best possible value of adjusted R-square and a highly inflated C(p) value.

In reviewing the results from the regression models produced for the DE group the four variable model (DRD, NUD, FCD, X9) is favored over the model determined by the stepwise procedure (DRD, NUD, FCD). With a nominal reduction in the adjusted R-square just below the best possible value of 0.53583, this four variable model has a C(p) value of 0.708 (next to the minimum) and an adjusted R-square of 0.53335. The model is significant with a F-value of 23.002 and a p-value associated with the F-statistic that is less than or equal to 0.0001.

In considering the correlation between pairs of independent variables (Table 6), those variables demonstrating significance, greater than 0.70, are the areas of perceptions of the doctors, nursing staff, non medical personnel, facilities, previous hospitalizations, involvement in hospital selection, and degree of communication during the process. These variables may be used to estimate other independent variables if the model selected neglects their incorporation. The independent variables of level of privacy, degree of pre-process information, and overall cost perception have moderate to low correlation to the other independent variables, and would require inclusion into the model if reporting for these was desired.

VII. CONCLUSIONS AND RECOMMENDATIONS

ADMISSIONS PROCESS

The first analysis reviewed was designed to determine if participation in the admissions process has a statistically significant relationship with the overall satisfaction of either the DE or IE group. The results of the analysis reveals that little impact occurred to the overall satisfaction level of either group tested. This particular outcome does not necessarily predict that involvement in the admissions process has little impact on the customers satisfaction, as the mean values for the series of admissions questions were 3.15 and 3.04 for the IE and DE groups respectively. If these values were notably different than the value of 3, then they could have a measurable impact on the mean satisfaction levels. In many instances the admissions process may be the first level of interaction a customer has with a health care facility. Given the nature of first impressions it seems rational that a facility with a perceived poor admissions process will negatively reflect on the overall customer experience. For this reason this area of review should be considered for inclusion in any investigation until proven insignificant.

REGIONAL INFLUENCES

The issue of possible regional influences in the overall satisfaction levels were discussed in the second segment of the data collection and consolidation section. Even though the results show slight variations in the mean satisfaction levels, no significant differences were observed. The reported mean values for the overall satisfaction level for the groups north, south, student, and consolidated south are 3.5179, 3.6250, 3.4444, and 3.4657, respectively.

DIFFERENCES IN DE AND IE GROUPS

The primary focus of this study was to explore the possibilities of the second customer group by reviewing the overall quality satisfaction level of the DE and IEs. The data produced from the experiment revealed that little difference existed between the two groups tested. The mean values from each group varied only 0.025 from each other and produced an overall average of 3.4841. The inference made from these results is that the IE and DE groups are undivided in their view of overall satisfaction. The modest differential in values of this study does suggest a validation for the concept of customer testing.Possibly as important is that just through the administration of surveys the hospital's image is reinforced as a caring institution (Roberts and Beck, 1989).

As the hospital industry continues towards ever increasing competition, the need for a high perception of satisfaction is paramount to retaining and attracting customers. As with any other service industry, an organization that can affect a positive change in its customers satisfaction level should ultimately enjoy rewards reflected in higher market share, if the increase in customer satisfaction level is above that of the competition (Hochschild, 1983). Surveys can be the successful market research tool for generating the needed information used for decisions pertaining to hospitals' marketing efforts. Additionally, this information is vital to the success of hospitals' strategic planning process. The specific issue then becomes as to how to improve the overall value associated with satisfaction. This concern is addressed through the sub-hypothesis for the IE group, a similar test for the DE group, and an additional test for DE group with eleven independent variables.

IE FACTORS OF OVERALL SATISFACTION

In reviewing the results from regression models generated for the IE group, the four variable model is the preferred solution having the best value of adjusted R-square (0.56424) and the smallest absolute value of C(p)-p. Of the five core areas of interaction, the variable of facilities was not included. A possible explanation could

be the high degree of correlation with the other four independent variables. As it may be difficult to segregate the contribution of any individual variable in the presence of others, reasonable explanations do exist. One supposition could be that the IE group, visitors, may not experience and interact with as many of the facets of the facility as the actual patient would. The function of finding and transporting oneself to and from other segments of the facility such as radiology or therapy is not a task usually associated to the IE group. The high association of the overall satisfaction of the IE group to the area of doctors is difficult to justify as the interaction level between the groups would presumably be low. The functions performed by doctors subject to IE interaction and judgement are restricted to doctor and visitor consultations, visitor observation of administration services, or conclusions established about doctors through communication with patients. Of these possibilities the conclusions about doctors by IE customer from patient communication when combined with the general association of doctors to issues of clinical quality, may best explain the high correlation value (Cunningham, 1991).

Given the constraints of time, a doctor will primarily focus his/her efforts on maximizing the satisfaction of DE customers, thus the amount of interaction time available for IE customers is usually finite and limited. A possible

alternative to increase the perceived level of satisfaction in the area of doctors may be to increase the reporting and communication to the IEs about doctors' abilities and successes. The remaining three areas accounting for variation in overall satisfaction appear to correspond in order as to the level of interaction one would expect of a visitor, but due to the level of multicollinearity present between variables this cannot be validated. Excluding the issue of multicollinearity, two primary inferences could be established pertaining to the non medical and nursing staff areas. First, an improvement in overall satisfaction could be achieved from elevating the perceptions of IEs towards those associated with the area of non medical. A high quantity or volume of observations by visitors of non medical personnel seems reasonable to expect given the nature of various housekeeping duties performed during visitor hours. Of the nursing staff, given a perceived high degree of proficiency in their duties, increasing the view of their importance through increased interaction with visitors may also yield higher overall customer satisfaction levels. Overall it is suggested that a health care facility could improve customer satisfaction levels by promoting the positive functions performed by doctors, non medical staff, and nursing staff. Furthermore, such facilities should expand resources to maintain a trained staff in each of these areas in order to affect satisfaction levels of IEs.

DE FACTORS OF OVERALL SATISFACTION

The DE group was evaluated twice; utilizing the same five core areas as used in the IE analysis, and second the additional independent variables of level of privacy, previous hospitalizations, involvement in hospital selection, degree of communication during the process, receipt of pre-process information, and overall cost perception were included into the modeling process.

When employing the five core areas in the DE modeling procedure, a different set of significant variables were exhibited than those established for the IE group. The selected variables through the stepwise procedure includes the area of perceptions of the doctors (DRD), nursing staff (NUD), and facilities (FCD), in that order.

As in the IE examination, the area of perception of the doctors seems to play the most significant role in explaining a large proportion of the variation, but due to the high degree of multicollinearity it is difficult to segregate the contribution of any individual variable in the presence of others. Theoretically, unlike the IE group, the quantity or level of interaction between doctors and the DE group is perceived to be high. This viewpoint is based on the concept that doctor interaction is a primary element and function in the hospitalization of DE members. Improvement in this variable is possibly first tied closest to the clinical quality, then secondly, the quantity and quality of

direct interactions or room visits.

The second factor identified by the stepwise procedure is that of the nursing staff. It would be reasonable to expect that the DE group would place a significance to the nursing staff, as patient interaction is the nucleus of the nursing function. It seems illogical to attempt to increase the quantity of interaction through the nursing function, the only recourse is to attempt to increase the perceived importance of their role. The third variable of facilities recognized by the stepwise procedure infers that in contrast to the IE group, location and access to the various elements of the facilities is meaningful. This is reasonable as few hospitalizations of patients results in the confinement to a single area (McDowell and Newell, 1987). Most hospitals environments place a great deal of effort on the orientation and communication of direction to the various areas of the facility. Additionally, the utilization of a transportation department is usually available for the conveyance of patients and may in fact contribute to the sense of confusion and disorientation.

When reviewing all available models, the four variable model (DRD, NUD, FCD, X9) is selected as best explaining the DE group overall satisfaction. With the adjusted R-square only nominally reduced from the maximum of 0.53583 achieved by the five variable model with NMD, NUD, DRD, FCD, and X9, and one of the lowest absolute values of C(p)-p, this four

variable model out performs the others. The model is found to be significant with a F-value of 23.002 and a p-value of 0.0001 or less.

Inclusion of the last independent variable, the degree of communication during the process (X9), infers that the patient's overall mean satisfaction level may benefit by being actively involved in the treatment process. As with any foreign situation, an individual will perceive a greater degree of control as they gain understanding of the new environment (Vroom, 1964).

RECOMMENDATIONS

Even though the t-test exhibited no significant difference in the overall mean satisfaction levels for the IE and DE groups, the fact that the stepwise procedure established two different independent variable models suggest that a second customer group does exist. But with the exhibited level of multicollinearity between the independent variables may negate this premise. It would be prudent for a health care organization to assume that the IE group is identifiable with their own set of independent variables. Because the next DE group can only come from existing IE individuals, and their opinions eventually become important.

The survey developed and used in this analysis is comprised of questions similar to those currently

administered by health care providers, most notably the HQT
mechanisms. It is interesting to note that during the
review of applicable literature and existing surveys the
subject of multicollinearity could not be found for
consideration, yet the many of the surveys reviewed had
ample discussion about the distinct segments (core areas) of
the operation and their individual satisfaction measurement.
 This could present a possible oversight in how current
instruments are used and interpreted.

     Assuming that a facility elects to invest the required
resources to conduct any survey for marketing research, it
should consider improvements in the instrument to maximize
the content of the evaluation information returned. The
second customer base, if it indeed exists, can be probed
simultaneously with the DE group with little change to the
administration of the instrument, and a modest change to the
design. The use of the "after-only" administration could
continue to be used for the DE group in the current
administration format; while perhaps a secondary location
such as the waiting rooms or snack area could offer the same
survey to the potential IE group.

     Two options exist in capturing the IE group responses;
a second separate IE specific survey, or a consolidated
instrument such as designed for this research. The
advantages of the consolidated instrument as opposed to the
IE specific survey are the issues of increased cost

associated with a second instrument, and the frustration or

confusion of a participant responding to the wrong

instrument thus generating erroneous data. The consolidated

design, in its complete form allows for the segregation of

seven different groups, but to maintain a manageable format

the two base classifications of DE and IE would be

recommended. The suggested design change would be to modify

the existing research instrument to the five core areas

including the addition of the area of degree of

communication during process, and reintroducing the variable

of admissions until proven otherwise. Many of the survey

instruments reviewed for this research seem adaptable to

these changes and also the inclusion of segregation

questions required for DE and IE groups. It is proposed

that identifying and understanding the 'other' customer

group far overwhelms the investment required to implement

the design changes. As all IE customers have the potential

of becoming DEs, their views can have an impact on their

health care decisions. If the information is utilized to

improve the health care environment as perceived by IEs,

then members of this group may hold a stronger allegiance to

that facility if and when they become a DE member. On the

other extreme, an IE member with a negative perspective

towards a particular facility may avoid utilizing that

facility at all cost, regardless of the perceived quality of

the corresponding DE group. In fact the new instrument

could continue to be used as a DE group only survey until
the organization is prepared to expanded its analysis of the
data.

Good patient care has typically meant good nursing,
effective communication, and compassion (Cunningham, 1991).
But the perspectives of all customers towards the same
environment compels organizations to study and understand
their actions to maximize their acceptance in the market
place. Even though administrating the survey instrument is
by itself is good public relations, it is necessary to
exploit the available data to maximize the customers'
satisfaction (Roberts and Beck, 1989). Both DE and IE
information should be utilized in the development of
operational policies and strategic formulations for a health
care provider. In the context of health care, this study
creates a new avenue for consideration in how customers are
defined. Further analysis and dissection by others using
this research as a base hopefully may result in improving
the way the health care market identifies their consumers.
This knowledge should assist an organization in responding
to the needs and expectations of their customers, propelling
them above their competitors.

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APPENDICES

APPENDIX A

HOSPITAL CORPORATION OF AMERICA

PATIENT SURVEY

YOUR HOSPITAL STAY: THE PATIENT'S VIEWPOINT

Q

Your Hospital Stay: The Patient's Viewpoint

Please answer this questionnaire for your most recent stay in our hospital. For each question, "X" one box that best answers the question.

BACKGROUND ON YOUR HOSPITAL STAY

1. Before this hospitalization, about how many times have you been admitted to this same hospital and stayed one or more nights?
   - $\square_1$ Never, this was the first time ever
   - $\square_2$ One other time
   - $\square_3$ Two other times
   - $\square_4$ Three or more other times

2. Have you ever been treated before at this hospital as an out-patient or an emergency room patient?
   - $\square_1$ Yes
   - $\square_2$ No

3. Thinking about your recent hospitalization, who chose this hospital? ("X" ALL THAT APPLY. YOU MAY CHOOSE MORE THAN ONE.)
   - $\square_1$ Doctor chose
   - $\square_2$ Patient or family member chose
   - $\square_3$ Someone else chose
   - $\square_4$ My insurance/health plan requires it
   - $\square_5$ My insurance/health plan encourages it

4. Were you admitted to the hospital . . .
   - $\square_1$ Through the Emergency Room
   - $\square_2$ Through the Admitting Office
   - $\square_3$ Other (SPECIFY):_____
   - $\square_4$ Transferred from another institution

5. The time it took to get you settled in your room was . . .
   - $\square_5$ Excellent
   - $\square_4$ Very Good
   - $\square_3$ Good
   - $\square_2$ Fair
   - $\square_1$ Poor

6. For *most* of your stay, were you . . .
   - [ ]₁ Alone in a private room
   - ☐₂ Alone in a semi-private room
   - ☐₃ In a room with other patient(s)

7. For *most* of your stay, were you on a special diet or could you eat regular foods?
   - ☐₁ Regular or unrestricted diet
   - ☐₂ Liquid diet
   - ☐₃ Special diet (other than liquid)
   - ☐₄ Don't know

8. During your hospital stay, how much help did you need with your everyday activities (eating, bathing, dressing, using the bathroom, getting out of bed)? Did you need . . .
   - ☐₁ A lot of help
   - ☐₂ Quite a bit of help
   - ☐₃ Some help
   - ☐₄ Little help
   - ☐₅ Never needed help

9. During your hospital stay, how much pain did you experience?
   - ☐₁ A lot of pain
   - ☐₂ Quite a bit of pain
   - ☐₃ Some pain
   - ☐₄ A little pain
   - ☐₅ No pain at all

10. Do you think that the amount of time you spent in the hospital was . . .
    - ☐₁ About right
    - ☐₂ Too short
    - ☐₃ Too long
    - ☐₄ Not sure

11. Where did you (the patient) stay in the hospital? In a section of the hospital for . . . ("X" ALL THAT APPLY. YOU MAY CHOOSE MORE THAN ONE.)
    - ☐₁ Adult surgery
    - ☐₂ Adult non-surgery
    - ☐₃ Heart/Coronary Care
    - ☐₄ Intensive/Critical Care
    - ☐₅ Childbirth/Maternity
    - ☐₆ Children/Pediatrics (not newborns)
    - ☐₇ Other
    - ☐₈ Can't recall type of unit

Now we would like you to rate some things about your hospital stay in terms of whether they were Excellent, Very Good, Good, Fair or Poor. Please mark only one answer for each statement. If something does not apply to you, mark "Doesn't Apply".

	Excellent	Very Good	Good	Fair	Poor	Doesn't Apply

ADMISSION: ENTERING THE HOSPITAL

12. EFFICIENCY OF THE ADMITTING PROCEDURE: Ease of getting admitted, including the amount of time it took
□5 □4 □3 □2 □1 □6

13. PREPARATION FOR ADMISSION: How clear and complete was information about how to prepare for your stay in the hospital and what to expect once you got there
□5 □4 □3 □2 □1 □6

14. ATTENTION OF ADMITTING STAFF TO YOUR INDIVIDUAL NEEDS: Their handling of your personal needs and wants
□5 □4 □3 □2 □1 □6

YOUR DAILY CARE IN THE HOSPITAL

15. CONSIDERATION OF YOUR NEEDS: Willingness of hospital staff to meet your needs
□5 □4 □3 □2 □1 □6

16. COORDINATION OF CARE: The teamwork of all the hospital staff who took care of you
□5 □4 □3 □2 □1 □6

17. HELPFULNESS AND CHEERFULNESS: Ability of hospital staff to make you comfortable and reassure you
□5 □4 □3 □2 □1 □6

18. SENSITIVITY TO PROBLEMS: Sensitivity of hospital staff to your special problems or concerns
□5 □4 □3 □2 □1 □6

KEEPING YOU INFORMED

19. EASE OF GETTING INFORMATION: Willingness of hospital staff to answer your questions
□5 □4 □3 □2 □1 □6

20. INSTRUCTIONS: How well nurses and other staff explained about tests, treatments and what to expect
□5 □4 □3 □2 □1 □6

21. INFORMING FAMILY OR FRIENDS: How well they were kept informed about your condition and needs
□5 □4 □3 □2 □1 □6

	Excellent	Very Good	Good	Fair	Poor	Doesn't Apply

YOUR NURSES

22. SKILL OF NURSES: How well things were done, like giving medicine and handling IVs — □5 □4 □3 □2 □1 □6

23. ATTENTION OF NURSES TO YOUR CONDITION: How often nurses checked on you to keep track of how you were doing — □5 □4 □3 □2 □1 □6

24. NURSING STAFF RESPONSE TO YOUR CALLS: How quick they were to help — □5 □4 □3 □2 □1 □6

25. CONCERN AND CARING BY NURSES: Courtesy and respect you were given; friendliness and kindness — □5 □4 □3 □2 □1 □6

26. INFORMATION GIVEN BY NURSES: How well nurses communicated with patients, families and doctors — □5 □4 □3 □2 □1 □6

YOUR DOCTOR

27. ATTENTION OF DOCTOR TO YOUR CONDITION: How often doctors checked on you to keep track of how you were doing — □5 □4 □3 □2 □1 □6

28. AVAILABILITY OF DOCTOR: How easy it was to get your doctor when needed — □5 □4 □3 □2 □1 □6

29. CONCERN AND CARING BY DOCTORS: Courtesy and respect you were given; friendliness and kindness — □5 □4 □3 □2 □1 □6

30. SKILL OF DOCTORS: Ability to diagnose problems, thoroughness of examinations, and skill in treating your condition — □5 □4 □3 □2 □1 □6

31. INFORMATION GIVEN BY DOCTORS: Amount of information you were given about your illness and treatment; what to do after leaving the hospital — □5 □4 □3 □2 □1 □6

32. COORDINATION: Teamwork among all the doctors who cared for you — □5 □4 □3 □2 □1 □6

OTHER HOSPITAL STAFF

33. HOUSEKEEPING STAFF: How well they did their jobs and how they acted towards you — □5 □4 □3 □2 □1 □6

	Excellent	Very Good	Good	Fair	Poor	Doesn't Apply
34. LABORATORY STAFF: How well they did their jobs and how they acted towards you	□5	□4	□3	□2	□1	□6
35. X-RAY STAFF: How well they did their jobs and how they acted towards you	□5	□4	□3	□2	□1	□6
36. PHYSICAL THERAPY STAFF: How well they did their jobs and how they acted towards you	□5	□4	□3	□2	□1	□6
37. TRANSPORTATION STAFF: How well they did their jobs and how they acted towards you	□5	□4	□3	□2	□1	□6
38. IV STARTERS: Skill of staff who started your IV	□5	□4	□3	□2	□1	□6

LIVING ARRANGEMENTS

	Excellent	Very Good	Good	Fair	Poor	Doesn't Apply
39. PRIVACY: Provisions for your privacy	□5	□4	□3	□2	□1	□6
40. CONDITION OF YOUR ROOM: Cleanliness, comfort, lighting, and temperature	□5	□4	□3	□2	□1	□6
41. SUPPLIES AND FURNISHING: Completeness of supplies provided for your use, condition of the furniture and how well things worked	□5	□4	□3	□2	□1	□6
42. RESTFULNESS OF ATMOSPHERE: Amount of peace and quiet	□5	□4	□3	□2	□1	□6
43. QUALITY OF FOOD: Overall, how good it tasted, serving temperature, and variety available	□5	□4	□3	□2	□1	□6
44. SIGNS AND DIRECTIONS: Ease of finding your way around the hospital	□5	□4	□3	□2	□1	□6
45. HOSPITAL BUILDING: How you would rate the hospital building overall	□5	□4	□3	□2	□1	□6
46. PARKING: Number of spaces available, convenience of location, and cost	□5	□4	□3	□2	□1	□6
47. PROVISIONS FOR FAMILY AND FRIENDS: Adequacy of visiting hours and facilities for them; visitors treated like welcome guests	□5	□4	□3	□2	□1	□6

DISCHARGE: LEAVING THE HOSPITAL

	Excellent	Very Good	Good	Fair	Poor	Doesn't Apply
48. DISCHARGE PROCEDURES: Time it took to be discharged from the hospital and how efficiently it was handled	□5	□4	□3	□2	□1	□6

	Excellent	Very Good	Good	Fair	Poor	Doesn't Apply
49. DISCHARGE INSTRUCTIONS: How clearly and completely you were told what to do and what to expect when you left the hospital	$\square_5$	$\square_4$	$\square_3$	$\square_2$	$\square_1$	$\square_6$
50. COORDINATION OF CARE AFTER DISCHARGE: Hospital staff's effort to provide for your needs after you left the hospital	$\square_5$	$\square_4$	$\square_3$	$\square_2$	$\square_1$	$\square_6$

BILLING BY HOSPITAL

	Excellent	Very Good	Good	Fair	Poor	Doesn't Apply
51. EXPLANATIONS ABOUT COSTS AND HOW TO HANDLE YOUR HOSPITAL BILLS: The completeness and accuracy of information and the willingness of hospital staff to answer your questions about finances	$\square_5$	$\square_4$	$\square_3$	$\square_2$	$\square_1$	$\square_6$
52. EFFICIENCY OF BILLING: How fast you got your bill, how accurate and understandable it was	$\square_5$	$\square_4$	$\square_3$	$\square_2$	$\square_1$	$\square_6$

LOOKING BACK ON YOUR CARE

	Excellent	Very Good	Good	Fair	Poor	Doesn't Apply
53. HOSPITAL QUALITY: Overall quality of care and services you received from the hospital	$\square_5$	$\square_4$	$\square_3$	$\square_2$	$\square_1$	$\square_6$
54. THE OUTCOME OF YOUR HOSPITAL STAY: How much you were helped by the hospitalization	$\square_5$	$\square_4$	$\square_3$	$\square_2$	$\square_1$	$\square_6$
55. HOSPITAL IMAGE: How good the hospital's reputation is in your community	$\square_5$	$\square_4$	$\square_3$	$\square_2$	$\square_1$	$\square_6$

OVERALL SATISFACTION WITH HOSPITAL

Here are things that people sometimes say about their hospital stay. Please tell us whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with each statement.

	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
56. The care I received at the hospital was so good that I have bragged about it to family and friends.	$\square_4$	$\square_3$	$\square_2$	$\square_1$
57. At all times it was clear to me which doctor was responsible for my care.	$\square_4$	$\square_3$	$\square_2$	$\square_1$

YOUR OVERALL HEALTH STATUS

OVERALL HEALTH: DURING THE PAST 2 WEEKS

How would you rate your health in general?

Excellent	Very Good	Good	Fair	Poor
□5	□4	□3	□2	□1

DAILY ACTIVITIES: DURING THE PAST 2 WEEKS

How much difficulty did you have doing your daily work or chores, both inside and outside the house, because of your health?

No Difficulty at All	A Little Difficulty	Some Difficulty	Much Difficulty	Could Not Do
□5	□4	□3	□2	□1

CHANGE IN CONDITION

How would you rate your overall health now compared to when you were admitted to the hospital?

Much better	A little better	About the same	A little worse	Much worse
□5	□4	□3	□2	□1

DAILY ACTIVITIES: DURING THE 2 WEEKS BEFORE HOSPITAL STAY

How much difficulty did you have doing your daily work or chores, both inside and outside the house, because of your health?

No Difficulty at All	A Little Difficulty	Some Difficulty	Much Difficulty	Could Not Do
□5	□4	□3	□2	□1

RETURN TO WORK

About how long after you left the hospital did you return to your regular paying job?

☐6 Does not apply - do not work at a paying job
☐5 Have not returned to work yet
☐4 Returned within a week
☐3 Returned within 2-3 weeks
☐2 Returned within 4-5 weeks
☐1 Returned after more than 6 weeks

RETURN TO DAILY ROUTINE

About how long after you left the hospital did you return to your regular daily routine?

☐5 Have not returned to my regular daily routine
☐4 Returned within a week
☐3 Returned within 2-3 weeks
☐2 Returned within 4-5 weeks
☐1 Returned after more than 6 weeks

RECOMMENDATIONS AND SUGGESTIONS

58. Would you recommend this hospital to your family and friends if they needed hospital care?

☐4 Definitely would

☐3 Probably would

☐2 Probably would not

☐1 Definitely would not

☐5 Does not apply to me because I do not live near hospital

59. How likely would you be to return to this hospital if you ever need to be hospitalized again?

☐7 I'm 100% sure that I'd return

☐6 It's very likely that I'd return

☐5 I probably would return

☐4 I'm not sure if I would return

☐3 I probably would not return

☐2 It's very unlikely that I'd return

☐1 I'm 100% sure that I would not return

☐8 Does not apply to me because I do not live near hospital

☐9 Does not apply to me because my insurance plan requires or encourages me to go somewhere else

60. WHY WOULD YOU RETURN OR NOT RETURN TO THIS HOSPITAL? Please give us your honest opinions. Also, if you would not return, where would you rather go and why?

_____

_____

_____

_____

_____

61. NEEDED IMPROVEMENTS: Please tell us what the hospital could do to improve the quality of the care and services that you received and do a better job of meeting your needs.

_____

_____

_____

_____

_____

62. GOOD OR BAD SURPRISES: Did anything happen during your stay in the hospital that surprised you? If so, please tell us what it was.

GOOD SURPRISES:_____

_____

BAD SURPRISES:_____

_____

If you need additional space for comments feel free to attach additional pages.

FACTS ABOUT YOU (These next few questions are for statistical purposes.)

63. What was the last grade of school you (the patient) completed?
    - ☐₁ Eighth grade or less
    - ☐₂ Some high school
    - ☐₃ High school graduate
    - ☐₄ Technical/Trade/Vocational school (after high school)
    - ☐₅ Some college
    - ☐₆ Two-year college graduate
    - ☐₇ Four-year college graduate
    - ☐₈ Postgraduate

64. You are. . .
    - ☐₁ White
    - ☐₂ Black
    - ☐₃ Hispanic
    - ☐₄ Oriental
    - ☐₅ American Indian
    - ☐₆ Other (SPECIFY):_____

65. In the past six months, where have you heard, seen or read anything about this hospital? ("X" ALL THAT APPLY)
    - ☐₁ Family or friends
    - ☐₂ From a doctor
    - ☐₃ From other medical persons or hospital employees
    - ☐₄ Through my work
    - ☐₅ Television
    - ☐₆ Newspaper
    - ☐₇ Radio
    - ☐₈ Magazines
    - ☐₉ Billboards
    - ☐₁₀ Printed material through the mail
    - ☐₁₁ Other ways (SPECIFY):_____

66. Have you received your bill(s) from the hospital?
    - ☐₁ Yes, it came in less than two weeks
    - ☐₂ Yes, it came in two to four weeks
    - ☐₃ Yes, it took more than four weeks
    - ☐₄ No, I have not yet received my bill
    - ☐₅ Does not apply to me

67. What type of health insurance, if any, do you expect to pay for most of your hospital bill? ("X" ALL THAT APPLY)
    - ☐₁ None
    - ☐₂ Blue Cross/Blue Shield
    - ☐₃ Medicare
    - ☐₄ Medicaid
    - ☐₅ Other type of government program (e.g. General Relief or Aid to Dependent Children)
    - ☐₆ Private or commercial health insurance plan (e.g. Prudential, Aetna) which allows you to use any physician or hospital you want
    - ☐₇ Private or commercial health insurance plan (e.g., Aetna, Kaiser, Prudential) which requires or prefers that you use certain physicians or hospitals
    - ☐₈ Other insurance (SPECIFY):_____
    - ☐₉ I don't know type of insurance

68. Are you or any member of your immediate family an employee of this hospital?
    - ☐₁ No
    - ☐₂ I am an employee of hospital
    - ☐₃ My family member is an employee

69. Who filled out this questionnaire?
    - ☐₁ Patient
    - ☐₂ Patient with assistance of family member or friend
    - ☐₃ Family member or friend, because patient is 17 years old or younger
    - ☐₄ Family member or friend, because patient deceased
    - ☐₅ Family member or friend for other reasons than 3 or 4 above

Thank you for your time and assistance!
Please double check to make sure you answered all questions. Then mail the questionnaire in the postage-paid envelope to: NCG Research, 2100 West End Avenue, Suite 800, Nashville, TN 37203

APPENDIX B

SURVEY FORM FOR DE & IE INDIVIDUALS

PLEASE ANSWER ALL QUESTIONS ON THE FOLLOWING PAGES
THANK YOU AGAIN

Q1 > Have you been hospitalized recently?
　__yes　__no

　If yes, approximately how long ago?
　__within a year　__two years　__three years　__longer

　If no, **PLEASE GO TO** ********* **QUESTION 14** *********

Q2 > Was your hospital stay an emergency or a scheduled
　visit?
　__emergency　__scheduled

Q3 > Did you have a private room?
　__yes　__no

Q4 > Was this your first stay at a hospital?
　__yes　__no

　If no, how many times before?
　__once　__twice　__three times　__four times
　__five or more

Q5 > The average length of the hospital stays were
　approximately?
　__1-3 days　__4-7 days　__8-14 days　__15-30 days
　__longer

Q6 > The hospital you were in was chosen by?
　__your doctor　__you　__both you and your doctor

Q7 > Did anyone explain the procedures or treatments to you
　before they were conducted or administered?
　__not at all　__rarely　__often　__very often　__always

Q8 > Were your medications explained to you?
　__not at all　__rarely　__often　__very often　__always

Q9 > Before you went into the hospital, did you learn what
　to expect during your stay?
　__yes　__no

Q10> Overall, how would you rate the care and attention you received during your stay at the hospital?
__poor __fair __good __very good __excellent

Q11> Did any factors influence your opinion or judgment about what to expect from the hospital?
__hospital advertising __talking with friends or family __previous experience from staying at hospitals __none

Q12> **DID YOU HAVE TO PAY FOR ANY PART OF THE HOSPITAL STAY**

(not covered by insurance)?
__yes __no

If yes, about how much?
__less than $150 __$150-$300 __$300-$450
__$450-$600 __$600-$750 __$750-$1000
__$1000-$1500 __over $1500

Q13> **IN YOUR OPINION, THE COST OF OVERALL HOSPITAL CARE YOU HAVE RECEIVED**, (in the hospitals you have been) has been:

__**FAR LESS** expensive than expected.
__**LESS** expensive than expected.
__**ABOUT EVEN.**
__**MORE** expensive than expected.
__**FAR MORE** expensive than expected.

QUESTION 14 > Were you involved in the admission process?
__yes __no

If no, **PLEASE GO TO** ********** QUESTION 18 **********

Q15> The admission process was what you expected it to be?
__no __ a little __somewhat __very much __completely

Q16> The admission process was well organized?
__no __little __somewhat __very much __completely

Q17> The admission process was handled quickly?
__no __little __somewhat __very much __completely

QUESTION 18 > Have you ever visited friends or family in a hospital?
__yes __no

IF YES,, how long ago?
__within a year __two years __three years __longer

Q19> **IF YES**, overall, how would you rate the care and attention received by the patient you visited at the hospital?
__poor __fair __good __very good __excellent

PLEASE CONTINUE IF YOU HAVE BEEN EITHER A PATIENT OR A VISITOR,

IF NOT PLEASE GO TO ***** QUESTION 40 *****

	EXCELLENT	VERY GOOD	GOOD	FAIR	POOR
Q20> The needs were quickly responded to by the **DOCTORS**?	5	4	3	2	1
Q21> .... the **NURSING STAFF**?	5	4	3	2	1
Q22> ... the **OTHER MEDICAL STAFF**?	5	4	3	2	1
Q23> ..... the **NON-MEDICAL STAFF**?	5	4	3	2	1
Q24> Was the staff courteous?	5	4	3	2	1
Q25> Generally, the patient received privacy when needed or requested?	5	4	3	2	1
Q26> Professional and competent skills were exhibited by the **DOCTORS**?	5	4	3	2	1
Q27> .... the **NURSING STAFF**?	5	4	3	2	1
Q28> ... the **OTHER MEDICAL STAFF**?	5	4	3	2	1
Q29> ..... the **NON-MEDICAL STAFF**?	5	4	3	2	1
Q30> The hospital room was clean?	5	4	3	2	1
Q31> Did everything in the room work?	5	4	3	2	1
Q32> The hospital was clean?	5	4	3	2	1

	EXCELLENT	VERY GOOD	GOOD	FAIR	POOR
Q33> How easy was it to find your way around the hospital?	5	4	3	2	1
Q34> Parking facilities were?	5	4	3	2	1
Q35> Your **EXPECTATIONS** were met by the **DOCTORS**?	5	4	3	2	1
Q36> .... the **NURSING STAFF**?	5	4	3	2	1
Q37> ... the **OTHER MEDICAL STAFF**?	5	4	3	2	1
Q38> ..... the **NON-MEDICAL STAFF**?	5	4	3	2	1
Q39> Overall, your total satisfaction with this hospital was met?	5	4	3	2	1

How **IMPORTANT ARE THE FOLLOWING** factors to **YOU** in rating areas of customer service and satisfaction for hospitals.

	GREATEST	HIGH	MIDDLE	LOW	LEAST
QUESTION 40 >Expertise of the Nursing staff.	5	4	3	2	1
Q41> Ease of checking in and out.	5	4	3	2	1
Q42> Communication and explanations from the nursing staff to you.	5	4	3	2	1
Q43> The quality of non-medical services (eg., meals).	5	4	3	2	1
Q44> The newness of the equipment.	5	4	3	2	1
Q45> The cleanliness of the hospital.	5	4	3	2	1
Q46> The abilities of the Doctors.	5	4	3	2	1
Q47> Parking ease/close to building.	5	4	3	2	1
Q48> Time spent waiting for other medical services (eg.,x-ray, therapy).	5	4	3	2	1
Q49> Doctors visits in the hospital.	5	4	3	2	1

	GREATEST	HIGH	MIDDLE	LOW	LEAST
Q50> The role of non-medical staff.	5	4	3	2	1
Q51> The role of the Doctors.	5	4	3	2	1
Q52> The admissions process.	5	4	3	2	1
Q53> The role of the Nurses.	5	4	3	2	1
Q54> The role of other medical staff.	5	4	3	2	1
Q55> The actual facility/location.	5	4	3	2	1

THANK YOU FOR YOUR PARTICIPATION IN THIS STUDY, ALTHOUGH THIS COMPLETES THE SURVEY, THE FOLLOWING 4 QUESTIONS WILL GREATLY HELP IN DETERMINING THE DEMOGRAPHICS OF THE PARTICIPANTS.

Q56> __male __female

Q57> Age _____

Q58> What household income level best defines your situation?
__under $15,000 __$15,000-$30,000 __$30,000-$50,000
__$50,000-$70,000 __over $70,000

Q59> Highest level of education completed in your household?
__some high school __high school __technical school
__4 year college __more than four year college

APPENDIX C

SURVEY DATA RESPONSE KEY

DATA RESPONSE KEY

This data key identifies how individual responses are recorded and classified. Additional questions are asked in this survey instrument for use in future research, and will not be utilized in this particular study. Each question of a given classification are allotted equal weight values.

Q1 > Have you been hospitalized recently?
     1_yes 0_no
     Identifying a DE individual, exclude beyond three years.
     1_within a year 2_two years 3_three years 0_longer

Q2 > Was your hospital stay an emergency or a scheduled visit?
     0_emergency 1_scheduled
     Segregate emergency patients from scheduled stays.

     DE PRIVACY LEVEL - Q3.
Q3 > Did you have a private room?
     1_yes 0_no

DE EXPERIENCE LEVEL - Q4 and Q5 are multiplied to establish DE experience level.

Q4 > Was this your first stay at a hospital?
     1_yes 0_no
     2_once 3_twice 4_three times 5_four times
     6_five or more

Q5 > The average length of the hospital stays were approximately?

Midpoint value selected for the first four classes, LONGER class is truncated at 45.

     1_1-3 days 2_4-7 days 3_8-14 days 4_15-30 days
     5_longer

DE INVOLVEMENT - Q6 - Hospital selection.

Q6 > The hospital you were in was chosen by?
     0_your doctor 1_you 1_both you and your doctor

DE COMMUNICATION DURING PROCESS - Q7 and Q8 represent
questions in the transfer of information to DE. Q7 and Q8
are averaged together to generate response.

Q7 > Did anyone explain the procedures or treatments to you
      before they were conducted or administered?
      1_not at all 2_rarely 3_often 4_very often 5_always

Q8 > Were your medications explained to you?
      1_not at all 2_rarely 3_often 4_very often 5_always

DE COMMUNICATION PRE-PROCESS - Q9 represent DE expectations
modified by staff.

Q9 > Before you went into the hospital, did you learn what
      to expect during your stay?
      1_yes 0_no

DE OVERALL SATISFACTION LEVEL - Q10 and Q39 are averaged to
establish dependent variable value.

Q10> Overall, how would you rate the care and attention you
      received during your stay at the hospital?
      1_poor 2_fair 3_good 4_very good 5_excellent

INDIVIDUAL INFLUENCES ON DE EXPECTATIONS - Q11.

Q11> Did any factor influence your opinion or judgment
      about what to expect from the hospital?
      1_hospital advertising 2_talking with friends or
      family 3_previous experience from staying at hospitals
      0_none

FINANCIAL INFLUENCES ON DE EXPECTATIONS - Q12.
Midpoint value selected for the first four classes, LONGER
class is truncated at 2000.

Q12> Did you have to pay for any part of the hospital stay
      (not covered by insurance)?
      1__yes 0_no If yes, about how much?
      2_less than $150 3_$150-$300 4_$300-$450
      5_$450-$600 6_$600-$750 7_$750-$1000
      8_$1000-$1500 9_over $1500

Q13> IN YOUR OPINION, THE COST OF OVERALL HOSPITAL CARE YOU
     HAVE RECEIVED, (in the hospitals you have been) has
     been:
     1_**FAR LESS** expensive than expected.
     2_**LESS** expensive than expected.
     3_**ABOUT EVEN.**
     4_**MORE** expensive than expected.
     5_**FAR MORE** expensive than expected.

ADMISSION CLASSIFCATION - Q14 - Q17.

Q14> Were you involved in the admission process?
      1_yes   0_no

Q15> The admission process was what you expected it to be?
     1_no   2_ a little 3_somewhat 4_very much
     5_completely

Q16> The admission process was well organized?
     1_no   2_little 3_somewhat 4_very much 5_completely

Q17> The admission process was handled quickly?
     1_no   2_little 3_somewhat 4_very much 5_completely

Q18> Have you ever visited friends or family in an hospital?
        1_yes   0_no
     Identifying a IE individual, exclude beyond three
     years.
     1_within a year 2_two years 3_three years 0_longer

IE OVERALL SATISFACTION LEVEL - Q19 and Q39 are averaged to
establish dependent variable value.

Q19> If yes, overall, how would you rate the care and
     attention received by the patient you visited at the
     hospital?
     1_poor 2_fair 3_good 4_very good 5_excellent

     Q24 through Q55 are valued on the 5 point scale, in
     example:

     Q24> Was the staff courteous?

     Q25> Generally, the patient recieved
          privacy when needed or requested?

RESPONDENT OPINIONS

OTHER MEDICAL CLASSIFICATION - Q22, Q28, and Q37.

NON MEDICAL CLASSIFICATION - Q23, Q29, and Q38.

NURSE CLASSIFICATION - Q21, Q27, and Q36.

DOCTOR CLASSIFICATION - Q20, Q26, and Q35.

FACILITIES CLASSIFICATION - Q30, Q31, Q32, Q33, and Q34.

IMPORTANCE WEIGHING FACTORS

ADMISSIONS CLASSIFICATION - Q41 and Q52.

OTHER MEDICAL CLASSIFICATION - Q48, and Q54.

NON MEDICAL CLASSIFICATION - Q43 and Q50.

NURSE CLASSIFICATION - Q40, Q42, and Q53.

DOCTOR CLASSIFICATION - Q46, Q49, and Q51.

FACILITIES CLASSIFICATION - Q44, Q45, Q47, and Q55.

Q56> 1_male 2_female

Q57> Age _--_

Q58> What household income level best defines your
     situation?
     Midpoint value selected for the first four classes,
     over $70,000 is truncated at $90,000.
     $7,500_under $15,000 $22,500_$15,000-$30,000
     $40,000_$30,000-$50,000 $60,000_$50,000-$70,000
     $90,000_over $70,000

Q59> Highest level of education completed in your household?
     1_some high school 2_high school 3_technical school
     4_year college 5_more than four year college

FLOW DIAGRAM

YES ← **Q1› Have you been hospitalized recently?** → NO

Over three years ago? →

Within a year, two, or three?

DE questions 2 through 13

YES ← **Q14› Were you involved in the admission process?** → NO

Questions 15 through 17

YES ← **Q18› Have you visited family or friends in a hospital?** → NO

Over three years ago? →

Within a year, two, or three?

YES ← **Do you qualify either as a patient or visitor?** → NO

Questions 20 through 39

Questions 40 through 59

APPENDIX D

VALIDITY REFERENCES

This appendix identifies the reference and basis of reliability for the questions in the direct and indirect experience survey instrument. Each question is listed in order of appearance with associated citations from previous surveys. The citation for each question is listed by citation number with page, question number, abstract of the question, and the responses available to the participants. A listing of the citations used can be found on the last page of this appendix.

Q1> - Hospitalized Recently.

Citation - Number 4, page 1, question 1.
Abstract - "Before this hospitalization, about how many times have you been admitted to this same hospital and stayed one or more nights."
Available responses - Never, once, twice, three or more.

Citation - Number 7, page 7, question 2.
Abstract - "Date of release."
Available responses - Date.

Q2> - Type of Hospital Stay.

Citation - number 4, page 1, question 4.
Abstract - "Were you admitted to the hospital."
Available responses - Through the emergency room, admitting office, other (specify), transferred from another institution.

Citation - number 7, page 7, question 7.
Abstract - "Were you treated as; inpatient, outpatient, emergency."
Available responses - Inpatient, outpatient, emergency.

Q3> - Private Room.

Citation - number 3, page 171, question 3.
Abstract - "For most of your stay, were you in your room alone or with other patient(s)."
Available responses - Alone, others.

Citation - Number 4, page 2, question 6.
Abstract - "For most of your stay, were you."
Available responses - Alone, alone in a semi-private room, in room with other patient(s).

Citation - Number 6, page 286, question 5.
Abstract - "Privacy...arrangements for your privacy."
Available responses - Excellent, very good, good, fair,
poor, no contact.

Citation - Number 7, page 7, question 3.
Abstract - "Room number."
Available responses - Room number.

Q4> - First Hospitalization.

Citation - Number 3, page 171, question 2.
Abstract - "Have you ever been hospitalized at Brigham and
Women's Hospital before...and stayed one or more nights."
Available responses - Yes, no.

Citation - Number 4, page 2, question 10.
Abstract - "Do you think that the amount of time you spent
in the hospital was."
Available responses - About right, too short, too long, not
sure.

Q5> - Length of Hospitalization.

Citation - Number 3, page 171, question 1.
Abstract - "Prior to this hospitalization, about how many
times have you been admitted to a hospital and stayed one or
more nights."
Available responses - Never, one, two, three or more.

Citation - Number 4, page 1, question 1.
Abstract - "Before this hospitalization, about how many
times have you been admitted to this same hospital and
stayed one or more nights."
Available responses - Never, once, twice, three or more.

Q6> - Hospital Selection.

Citation - Number 3, page 175, question 36.
Abstract - "Why did you come to Brigham and Women's Hospital
for your hospitalization."
Available responses - Reputation, friend's recommendation,
patient's physician on staff, physician referral, yellow
pages, transfer, advertisement, ambulance driver.

<u>Citation</u> - Number 4, page 1, question 3.
<u>Abstract</u> - "Thinking about your recent hospitalization, who chose this hospital."
<u>Available responses</u> - Doctor, patient, someone else, required by heath plan, encourage by health plan.

Q7> - Explanations of Procedures and Treatments.

<u>Citation</u> - Number 1, page 125, question 18.
<u>Abstract</u> - "To what extent did the following hospital personnel, if you had contact with them during your stay; X-ray, blood team, operating nurses, delivery nurses."
<u>Available responses</u> - Completely, very much, somewhat, not at all.

<u>Citation</u> - Number 4, page 3, question 20.
<u>Abstract</u> - "Instructions: How well nurses and other staff explained about test, treatments and what to expect."
<u>Available responses</u> - Excellent, very good, good, fair, poor, doesn't apply.

<u>Citation</u> - Number 5, page 33a, question 2.
<u>Abstract</u> - "Did you receive explanations by a nurse before each procedure and treatment."
<u>Available responses</u> - Yes, no and explain.

Q8> - Explanations of Medications.

<u>Citation</u> - Number 4, page 3, question 20.
<u>Abstract</u> - "Instructions: How well nurses and other staff explained about test, treatments and what to expect."
<u>Available responses</u> - Excellent, very good, good, fair, poor, doesn't apply.

<u>Citation</u> - Number 5, page 33a, question 5.
<u>Abstract</u> - "Did the nurse explain use of any medication given to you."
<u>Available responses</u> - Yes, no and explain.

Q9> - Pre-admission Meeting.

Citation - Number 4, page 3, question 13.
Abstract - "Preparation for admission: how clear and
complete was information about how to prepare for your stay
in the hospital and what to expect once you got there."
Available responses - Excellent, very good, good, fair,
poor, doesn't apply.

Citation - Number 6, page 286, question 1.
Abstract - "Admissions...information you were given about
what to expect."
Available responses - Excellent, very good, good, fair,
poor, no contact.

Q10> - Overall Care and Attention for DE.

Citation - Number 4, page 6, question 54.
Abstract - "Hospital quality: Overall quality of care and
services you received."
Available responses - Excellent, very good, good, fair,
poor, doesn't apply.

Citation - Number 5, page 33a, question 6.
Abstract - "After you had left the Emergency Center, did you
feel that the nurses who took care of you gave you the best
possible care."
Available responses - Yes, no and explain.

Citation - Number 7, page 6, question 1.
Abstract - "How would you rate EAMC on the overall quality
that you received during your stay."
Available responses - Excellent, good, fair, poor, no
opinion.

Q11> - Influencing Factor on Selection.

Citation - Number 3, page 175, question 36.
Abstract - "Why did you come to Brigham and Women's Hospital
for your hospitalization."
Available responses - Reputation, friend's recommendation,
patient's physician on staff, physician referral, yellow
pages, transfer, advertisement, ambulance driver, other
short answer.

Citation - Number 4, page 9, question 65.
Abstract - "In the past six months, where have you heard, seen or read anything about this hospital."
Available responses - Family, friends, doctors, work, television, newspaper, radio, magazines.

Q12> - Out of Pocket Expense.

Citation - Number 4, page 9, question 67.
Abstract - "What type of health insurance, if any, do you expect to pay for most of your hospital bill."
Available responses - None, Blue Cross, Medicare, other.

Q13> - Expected Hospital Expense.

Citation - Originated by author.
Abstract - A control variable to determine impact of expected individual cost on opinion.

Q14>Q15>Q16>Q17> - Admissions Process.

Citation - Number 4, page 3, question 12.
Abstract - "Efficiency of the admitting procedure: Ease getting admitted."
Available responses - Excellent, very good, good, fair, poor, doesn't apply.

Citation - Number 7, page 2, question 2.
Abstract - "Did anyone do anything extra to make checking in and out easier."
Available responses - No, yes and explain.

Citation - Number 7, page 3, question 5.
Abstract - "Do you have any suggestions that would make entering and leaving EAMC easier."
Available responses - Short answer.

Q18>Q19 - Visitation of Others.

Citation - Originated by author.
Abstract - A control factor for segregation of groups.

Q20>Q21>Q22>Q23 - Promptness and Response.

Citation - Number 2, page 209, question 10.
Abstract - "The staff was promptly and adequately responded
to my needs, concerns, and problems."
Available responses - Yes, no, don't know and comments.

Citation - Number 4, page 4, question 24.
Abstract - "Nursing staff response to your calls: how quick
they were to help."
Available responses - Excellent, very good, good, fair,
poor, doesn't apply.

Citation - Number 7, page 2, question 3.
Abstract - "Please tell us how you feel about the following
staff/units who help take care of during your last stay; did
they meet your needs; 21 groups defined (ie: nurses,
volunteers, dietitian)."
Available responses - Yes, no.

Q24> - Courteous.

Citation - Number 2, page 209, question 6.
Abstract - "The staff was courteous to me."
Available responses - Yes, no, don't know and comments.

Citation - Number 4, page 4, questions 24, 29.
Abstract - "Concern and courtesy were given to you by the
nursing staff (doctors)."
Available responses - Excellent, very good, good, fair,
poor, doesn't apply.

Citation - Number 5, page 33a, question 1.
Abstract - "Were you treated in a courteous and respectful
manner by the nurses during your stay in the Emergency
Center."
Available responses - Yes, no and explain.
Citation - Number 7, page 2, question 3.
Abstract - "Please tell us how you feel about the following
staff/units who help take care of during your last stay;
were they friendly; 21 groups defined (ie: nurses,
volunteers, dietitian)."
Available responses - Yes, no.

Q25> - Privacy.

Citation - Number 2, page 209, question 7.
Abstract - "The staff gave me privacy whenever necessary."
Available responses - Yes, no, don't know and comments.

Citation - Number 4, page 5, questions 39.
Abstract - "Privacy: Provisions for your privacy."
Available responses - Excellent, very good, good, fair, poor, doesn't apply.

Q26>Q27>Q28>Q29 - Competency.

Citation - Number 2, page 209, question 5.
Abstract - "The staff members competently demonstrated their professional skills and expertise."
Available responses - yes, no, don't know and comments.

Citation - Number 3, page 174, questions 15,19.
Abstract - "Overall, the skill of the nurses (doctors) who cared for you."
Available responses - excellent, very good, good, fair, poor.

Citation - Number 4, page 4, questions 22, 30.
Abstract - "Skill of nurses, skill of doctors ability to diagnose."
Available responses - Excellent, very good, good, fair, poor, doesn't apply.

Citation - Number 7, page 2, question 3.
Abstract - "Please tell us how you feel about the following staff/units who help take care of during your last stay; did they seem to know what they were doing; 21 groups defined (ie: nurses, volunteers, dietitian)."
Available responses - yes, no.

Q30> - Hospital Room Clean.

Citation - Number 4, page 5, questions 40.
Abstract - "Cleanliness, comfort of your room."
Available responses - Excellent, very good, good, fair, poor, doesn't apply.

Citation - Number 7, page 6, question 2.
Abstract - "Please rate our housekeeping services; did we kept your room clean."
Available responses - Yes, no.

Q31> - <u>Working Condition of Room Appliances.</u>

<u>Citation</u> - Number 4, page 5, questions 40.
<u>Abstract</u> - "Supplies and furnishing, how well everything worked."
<u>Available responses</u> - Excellent, very good, good, fair, poor, doesn't apply.

<u>Citation</u> - Number 7, page 6, question 2.
<u>Abstract</u> - "Please rate our housekeeping services; did everything in your room work."
<u>Available responses</u> - Yes, no.

Q32> - <u>Overall Hospital Clean.</u>

<u>Citation</u> - Number 1, page 125, question 26.
<u>Abstract</u> - "How did each of the following features of the hospital compare with what you expected; the equipment and facilities."
<u>Available responses</u> - Much better, somewhat better, about the same, somewhat worse, much worse.

<u>Citation</u> - Number 1, page 125, question 13.
<u>Abstract</u> -"How clean were the public areas such as the lounges, corridors, and bathrooms."
<u>Available responses</u> - Completely clean, very clean, not very clean, not at all.

<u>Citation</u> - Number 4, page 5, questions 45.
<u>Abstract</u> - "How would you rate the overall hospital building."
<u>Available responses</u> - Excellent, very good, good, fair, poor, doesn't apply.

Q33> - <u>Ease of Finding Way Around.</u>

<u>Citation</u> - Number 3, page 174, question 23.
<u>Abstract</u> - "The ease of finding your way around the hospital."
<u>Available responses</u> - Excellent, very good, good, fair, poor.

<u>Citation</u> - Number 4, page 5, question 44.
<u>Abstract</u> - "Signs and directions: Ease of finding your way around."
<u>Available responses</u> - Excellent, very good, good, fair, poor, doesn't apply.

Q34> - Parking Ease.

Citation - Number 7, page 3, question 5.
Abstract - "Do you have any suggestions that would make entering and leaving EAMC easier."
Available responses - Short answer.

Q35>Q36>Q37>Q38 - Expectations of Customer.

Citation - Number 1, page 125, question 26.
Abstract - "How did each of the following features of the hospital compare with what you expected; the kind of service you got at the hospital."
Available responses - Much better, somewhat better, about the same, somewhat worse, much worse.

Citation - Number 7, page 6, question 2.
Abstract - "How would you rate the employees and staff of EAMC."
Available responses - Excellent, good, fair, poor, no opinion.

Q39> - Customers Total Satisfaction.

Citation - Number 1, page 125, question 1.
Abstract - "Overall, how satisfied were you with your stay at the hospital."
Available responses - Completely satisfied, satisfied, dissatisfied, completely dissatisfied.

Citation - Number 3, page 174, questions 15,19.
Abstract - "Overall, the skill of the nurses (doctors) who cared for you."
Available responses - excellent, very good, good, fair, poor.

Q40> - Nursing Staff Expertise.

Citation - Number 3, page 174, questions 15,19.
Abstract - "Overall, the skill of the nurses (doctors) who cared for you."
Available responses - excellent, very good, good, fair, poor.

Q41> - Ease of Check in/out.

<u>Citation</u> - Number 4, page 3, question 12.
<u>Abstract</u> - "Efficiency of the admitting procedure: Ease getting admitted."
<u>Available responses</u> - Excellent, very good, good, fair, poor, doesn't apply.

<u>Citation</u> - Number 7, page 2, question 2.
<u>Abstract</u> - "Did anyone do anything extra to make checking in and out easier."
<u>Available responses</u> - No, yes and explain.

Q42> - Communication from Nursing.

<u>Citation</u> - Number 7, page 4, question 1.
<u>Abstract</u> - "Please tell us how you feel about the following staff/units who help take care of during your last stay; did they clearly explain things you needed to know; 21 groups defined (ie: nurses, volunteers, dietitian)."
<u>Available responses</u> - Yes, no.

Q43> - Quality of Non-medical Service.

<u>Citation</u> - Number 7, page 5, question 1.
<u>Abstract</u> - "Please rate or food service; taste, quantity, temperature, choices."
<u>Available responses</u> - Yes, no.

Q44> - Newness of Equipment.

<u>Citation</u> - Number 1, page 125, question 26.
<u>Abstract</u> - "How did each of the following features of the hospital compare with what you expected; the equipment and facilities."
<u>Available responses</u> - Much better, somewhat better, about the same, somewhat worse, much worse.

Q45> - Cleanliness of Hospital.

Citation - Number 1, page 125, question 13.
Abstract -"How clean were the public areas such as the
lounges, corridors, and bathrooms."
Available responses - Completely clean, very clean, not very
clean, not at all.

Citation - Number 4, page 5, questions 45.
Abstract - "How would you rate the overall hospital
building."
Available responses - Excellent, very good, good, fair,
poor, doesn't apply.

Q46> - Ability of Doctors.

Citation - Number 2, page 209, question 5.
Abstract - "The staff members competently demonstrated their
professional skills and expertise."
Available responses - yes, no, don't know and comments.

Citation - Number 3, page 174, questions 15,19.
Abstract - "Overall, the skill of the nurses (doctors) who
cared for you."
Available responses - excellent, very good, good, fair,
poor.

Q47> - Parking Ease.

Citation - Number 7, page 3, question 5.
Abstract - "Do you have any suggestions that would make
entering and leaving EAMC easier."
Available responses - Short answer.

Q48> - Time waited for services.

Citation - Number 1, page 125, question 22.
Abstract - "How satisfied were you that tests and procedures
were done promptly as scheduled."
Available responses - Completely satisfied, satisfied,
dissatisfied, completely dissatisfied.

<u>Citation</u> - Number 7, page 2, question 3.
<u>Abstract</u> - "How long did you have wait in any of the
following areas; admissions, emergency room, E.K.G., lab, X-
ray, and discharge."
<u>Available responses</u> - Does not apply, no wait, 10-20 min.,
21-30 min., more than 30 min.

<u>Q49> - Doctors Visits.</u>

<u>Citation</u> - Number 2, page 209, question 10.
<u>Abstract</u> - "The staff was promptly and adequately responded
to my needs, concerns, and problems."
<u>Available responses</u> - Yes, no, don't know and comments.

<u>Citation</u> - Number 7, page 2, question 3.
<u>Abstract</u> - "Please tell us how you feel about the following
staff/units who help take care of during your last stay; did
they meet your needs; 21 groups defined (ie: nurses,
volunteers, dietitian)."
<u>Available responses</u> - Yes, no.

<u>Q50> - Role of Non-medical.</u>

<u>Citation</u> - Number 7, page 2, question 3.
<u>Abstract</u> - "Please tell us how you feel about the following
staff/units who help take care of during your last stay; did
they meet your needs; 21 groups defined (ie: nurses,
volunteers, dietitian)."
<u>Available responses</u> - Yes, no.

<u>Citation</u> - Number 2, page 209, question 5.
<u>Abstract</u> - "The staff members competently demonstrated their
professional skills and expertise."
<u>Available responses</u> - yes, no, don't know and comments.

<u>Q51> - Role of Doctors.</u>

<u>Citation</u> - Number 7, page 6, question 2.
<u>Abstract</u> - "How would you rate the employees and staff of
EAMC."
<u>Available responses</u> - Excellent, good, fair, poor, no
opinion.

Q52> - Admissions Process.

Citation - Number 4, page 3, question 12.
Abstract - "Efficiency of the admitting procedure: Ease getting admitted."
Available responses - Excellent, very good, good, fair, poor, doesn't apply.

Citation - Number 7, page 2, question 2.
Abstract - "Did anyone do anything extra to make checking in and out easier."
Available responses - No, yes and explain.

Q53> - Role of Nurses.

Citation - Number 7, page 6, question 2.
Abstract - "How would you rate the employees and staff of EAMC."
Available responses - Excellent, good, fair, poor, no opinion.

Citation - Number 4, page 4, question 24.
Abstract - "Nursing staff response to your calls: how quick they were to help."
Available responses - Excellent, very good, good, fair, poor, doesn't apply.

Citation - Number 7, page 2, question 3.
Abstract - "Please tell us how you feel about the following staff/units who help take care of during your last stay; did they meet your needs; 21 groups defined (ie: nurses, volunteers, dietitian)."
Available responses - Yes, no.

Q54> - Role of Other Medical Staff.

Citation - Number 7, page 6, question 2.
Abstract - "How would you rate the employees and staff of EAMC."
Available responses - Excellent, good, fair, poor, no opinion.

Citation - Number 7, page 2, question 3.
Abstract - "Please tell us how you feel about the following staff/units who help take care of during your last stay; did they meet your needs; 21 groups defined (ie: nurses, volunteers, dietitian)."
Available responses - Yes, no.

Q55> - Facility and Location.

Citation - Number 3, page 174, question 23.
Abstract - "The ease of finding your way around the hospital."
Available responses - Excellent, very good, good, fair, poor.

Citation - Number 4, page 5, question 44.
Abstract - "Signs and directions: Ease of finding your way around."
Available responses - Excellent, very good, good, fair, poor, doesn't apply.

Q34> - Parking Ease.

Citation - Number 7, page 3, question 5.
Abstract - "Do you have any suggestions that would make entering and leaving EAMC easier."
Available responses - Short answer.

Q56> - Gender.

Citation - Number 1, page 7, question 5.
Abstract - "Are you: male, female."
Available responses - Male, female.

Q57> - Age.

Citation - Number 1, page 7, question 6.
Abstract - "Your age."
Available responses - Age.

Q58> - Household income.

Citation - Number 3, page 175, question 39.
Abstract - "Which of the following income categories best describes your total household income."
Available responses - $7,500 or less, $7,501 to $ 5,000, $25,001 to $50,000, $50,001 or more.

Q59> - Level of education.

Citation - Number 4, page 8, question 63.
Abstract - "What was the last grade of school you (the patient) completed."
Available responses - Eighth grade or less, some high school, high school graduate, technical school, some college, two-year college graduate, four-year college graduate, post graduate.

CITATIONS

1. Abramowitz, Susan et al. "Analyzing Patient Satisfaction: A Multianalytic Approach." Quality Review, April 1987.

2. Bulau, Judith M. Quality Assurance Policies and Procedures for Ambulatory Health Care, Rockville, Maryland: Aspen Publishers, 1990.

3. Cleary, Paul D. et al. "Patient Assessments of Hospital Care" Quality Review, June 1989.

4. Hospital Corporation of America, Your Hospital Stay: The Patient's Viewpoint." Hospital Corporation of America, 69 question survey, 1990.

5. Morgan, Susan et al. "Measuring ED Patient Satisfaction with a Questionnaire." Journal of Emergency Nursing, Vol. 12, No. 4, August 1986.

6. Nelson, Eugene C. "The Patient Comment Card: A system to Gather Customer Feedback," Quality Review, September 1991.

7. Post Patient Survey, East Alabama Medical Center 2000 Pepperell Parkway, Opelika, Al. 1990.

APPENDIX E

SURVEY RELIABILITY STUDY

PREFACE

As the survey instrument used in thesis is of original design, the value of the survey's internal reliability has not been previously tested. The section is a consolidated report from the complete reliability study where each question was examined using the Pearson's correlation coefficient for pre & post responses. This appendix contains examples showing the calculations for the Pearson's correlation coefficients and a summary table.

EXAMPLE: QUESTION   25

EVENT NUMBER	TEST X	RETEST Y	X^2	Y^2	[X*Y]
1	5	5	25	25	25
2	3	3	9	9	9
3	4	4	16	16	16
4	5	5	25	25	25
5	3	4	9	16	12
6	4	4	16	16	16
7	4	4	16	16	16
8	4	3	16	9	12
9	4	4	16	16	16
10	5	5	25	25	25
11	5	5	25	25	25
12	3	3	9	9	9
13	3	3	9	9	9
14	3	4	9	16	12
15	4	4	16	16	16
16	5	5	25	25	25
17	4	4	16	16	16
18	3	3	9	9	9
19	3	3	9	9	9
20	3	3	9	9	9
21	4	4	16	16	16
22	4	4	16	16	16
23	4	4	16	16	16
24	4	4	16	16	16
25	4	3	16	9	12
26	4	4	16	16	16
27	3	3	9	9	9
28	4	3	16	9	12
29	5	4	25	16	20
30	3	3	9	9	9
31	4	4	16	16	16
32	2	2	4	4	4
33	5	4	25	16	20
34	3	4	9	16	12
35	3	3	9	9	9
36	5	3	25	9	15
37	4	4	16	16	16
38	2	2	4	4	4
39	5	5	25	25	25
40	3	4	9	16	12
41	4	4	16	16	16
42	5	5	25	25	25
43	4	4	16	16	16
44	5	4	25	16	20
45	3	3	9	9	9

QUESTION 25

EVENT NUMBER	TEST X	RETEST Y	X^2	Y^2	[X*Y]
46	2	3	4	9	6
47	3	4	9	16	12
48	4	4	16	16	16
49	4	3	16	9	12
50	4	4	16	16	16
51	2	3	4	9	6
52	3	3	9	9	9
53	4	5	16	25	20
54	3	3	9	9	9
55	3	3	9	9	9
56	2	3	4	9	6
57	3	4	9	16	12
58	3	3	9	9	9
59	3	4	9	16	12
60	4	4	16	16	16
61	2	3	4	9	6
62	4	4	16	16	16
63	4	3	16	9	12
64	4	5	16	25	20
65	4	4	16	16	16
66	4	2	16	4	8
67	4	4	16	16	16
68	3	3	9	9	9
69	3	2	9	4	6
70	4	4	16	16	16
71	3	4	9	16	12
72	5	5	25	25	25
73	3	3	9	9	9
74	5	5	25	25	25
75	3	2	9	4	6
76	3	2	9	4	6
77	4	4	16	16	16
78	5	5	25	25	25
79	4	4	16	16	16
80	5	5	25	25	25
81	4	4	16	16	16
82	3	3	9	9	9
83	3	3	9	9	9
84	4	4	16	16	16
85	5	5	25	25	25
86	3	3	9	9	9
87	5	5	25	25	25
88	4	4	16	16	16
89	5	5	25	25	25
90	3	3	9	9	9

QUESTION 25

EVENT NUMBER	TEST X	RETEST Y	X^2	Y^2	[X*Y]
91	5	4	25	16	20
92	3	3	9	9	9
93	3	3	9	9	9
94	3	3	9	9	9
95	3	3	9	9	9
96	4	4	16	16	16
97	4	4	16	16	16
98	3	4	9	16	12
99	4	4	16	16	16
100	3	3	9	9	9
101	2	2	4	4	4
102	4	4	16	16	16
103	5	4	25	16	20
104	4	4	16	16	16
105	5	4	25	16	20
106	5	4	25	16	20
106	395	391	1551	1511	1512

(A)   SUM OF X SQUARED = 395^2 = 156025

(B)   SUM OF Y SQUARED = 391^2 = 152881

(C)   N*SUM OF [X*Y] = 106 * 1512 = 160272

(D)   TOTAL X * TOTAL Y = 395 * 391 = 154445

(E)   NUMERATOR = (C) - (D) = 160272 - 154445 = <u>5827</u>

(F)   N*SUM OF X SQUARED = 106 * 1551 = 164406

(G)   N*SUM OF Y SQUARED = 106 * 1511 = 160166

(H)   DENOMINATOR = SQUARE ROOT OF [(F) - (A)] * [(G) - (B)]

$$= \sqrt{(164406 - 156025) * (160166 - 152881)}$$

$$= \sqrt{8381 * 1285} = \underline{7813.81}$$

$$\text{PEARSON } r = \frac{(E)}{(H)} = \frac{5827}{7813.81} = \underline{0.7457}$$

QUESTION   32

EVENT NUMBER	TEST X	RETEST Y	X^2	Y^2	[X*Y]
1	4	5	16	25	20
2	4	3	16	9	12
3	3	3	9	9	9
4	5	5	25	25	25
5	4	4	16	16	16
6	5	4	25	16	20
7	5	4	25	16	20
8	5	5	25	25	25
9	5	5	25	25	25
10	4	4	16	16	16
11	5	5	25	25	25
12	4	4	16	16	16
13	3	3	9	9	9
14	5	4	25	16	20
15	4	4	16	16	16
16	4	4	16	16	16
17	4	4	16	16	16
18	4	3	16	9	12
19	3	3	9	9	9
20	2	3	4	9	6
21	4	4	16	16	16
22	5	4	25	16	20
23	3	4	9	16	12
24	4	3	16	9	12
25	4	4	16	16	16
26	4	4	16	16	16
27	4	4	16	16	16
28	3	2	9	4	6
29	4	4	16	16	16
30	4	4	16	16	16
31	4	4	16	16	16
32	3	2	9	4	6
33	5	5	25	25	25
34	5	4	25	16	20
35	4	4	16	16	16
36	3	3	9	9	9
37	4	4	16	16	16
38	3	3	9	9	9
39	4	4	16	16	16
40	4	4	16	16	16
41	4	4	16	16	16
42	4	5	16	25	20
43	3	3	9	9	9
44	5	5	25	25	25
45	3	3	9	9	9

QUESTION 32

EVENT NUMBER	TEST X	RETEST Y	2 X	2 Y	[X*Y]
46	2	3	4	9	6
47	3	4	9	16	12
48	4	4	16	16	16
49	3	3	9	9	9
50	4	4	16	16	16
51	3	3	9	9	9
52	5	4	25	16	20
53	3	4	9	16	12
54	3	3	9	9	9
55	2	2	4	4	4
56	4	3	16	9	12
57	5	4	25	16	20
58	5	3	25	9	15
59	3	4	9	16	12
60	4	3	16	9	12
61	3	3	9	9	9
62	3	3	9	9	9
63	5	5	25	25	25
64	5	5	25	25	25
65	4	4	16	16	16
66	5	5	25	25	25
67	4	4	16	16	16
68	3	3	9	9	9
69	3	4	9	16	12
70	4	4	16	16	16
71	5	4	25	16	20
72	5	5	25	25	25
73	4	5	16	25	20
74	5	5	25	25	25
75	5	5	25	25	25
76	3	3	9	9	9
77	4	4	16	16	16
78	5	5	25	25	25
79	4	4	16	16	16
80	5	5	25	25	25
81	5	4	25	16	20
82	4	4	16	16	16
83	4	4	16	16	16
84	3	3	9	9	9
85	5	4	25	16	20
86	4	4	16	16	16
87	4	5	16	25	20
88	4	3	16	9	12
89	4	5	16	25	20
90	3	3	9	9	9

QUESTION 32

EVENT NUMBER	TEST X	RETEST Y	X^2	Y^2	[X*Y]
91	4	4	16	16	16
92	4	5	16	25	20
93	3	2	9	4	6
94	3	3	9	9	9
95	3	3	9	9	9
96	4	4	16	16	16
97	4	3	16	9	12
98	2	2	4	4	4
99	4	4	16	16	16
100	4	4	16	16	16
101	3	3	9	9	9
102	5	5	25	25	25
103	4	4	16	16	16
104	5	5	25	25	25
105	4	4	16	16	16
106	4	4	16	16	16
106	416	407	1702	1631	1648

(A) SUM OF X SQUARED = 416^2 = 173056

(B) SUM OF Y SQUARED = 407^2 = 165649

(C) N*SUM OF [X*Y] = 106 * 1648 = 174688

(D) TOTAL X * TOTAL Y = 416 * 407 = 169312

(E) NUMERATOR = (C) - (D) = 174688 - 169312 = <u>5376</u>

(F) N*SUM OF X SQUARED = 106 * 1702 = 180412

(G) N*SUM OF Y SQUARED = 106 * 1631 = 172886

(H) DENOMINATOR = SQUARE ROOT OF [(F) - (A)] * [(G) - (B)]

$$= \sqrt{(180412 - 173056) * (172886 - 165649)}$$

$$= \sqrt{7356 * 7237} = \underline{7296.26}$$

$$\text{PEARSON } r = \frac{(E)}{(H)} = \frac{5376}{7296.26} = \underline{0.7368}$$

CORRELATION ANALYSIS OF SURVEY QUESTIONS:
ORDER OF PEARSON r VALUES

QUESTION NUMBER	CORRELATION COEFFICIENTS	QUESTION NUMBER	CORRELATION COEFFICIENTS
1	1.0000	22	0.8257
2	1.0000	27	0.8249
3	1.0000	47	0.8242
4	1.0000	38	0.8238
5	1.0000	26	0.8232
6	1.0000	24	0.8230
15	0.9940	48	0.8217
7	0.9866	23	0.8191
12	0.9676	21	0.8184
8	0.9524	29	0.8168
10	0.9451	52	0.8143
19	0.9381	37	0.8136
17	0.9330	31	0.8112
13	0.9121	43	0.8103
18	0.9005	40	0.8091
9	0.8888	50	0.8053
11	0.8888	46	0.7944
20	0.8848	51	0.7943
49	0.8841	54	0.7935
16	0.8804	44	0.7928
33	0.8749	55	0.7911
34	0.8543	36	0.7910
35	0.8534	45	0.7818
39	0.8494	30	0.7708
28	0.8480	53	0.7672
42	0.8317	25	0.7457
41	0.8280	32	0.7368

APPENDIX F

SAS RELEASE 6.03

PROGRAMS AND OUTPUTS

SAS PROGRAM - T test for difference in mean satisfaction levels for DE with and DE without admissions experience.

```
DATA PRDE;
INPUT GROUP $ OSV @@;
CARDS;
Y 4.0 Y 4.5 Y 3.5 Y 2.0 Y 3.5 Y 3.5 Y 3.5 Y 5.0 Y 4.0 Y 4.5
Y 3.0 Y 2.5 Y 3.5 Y 3.5 Y 3.5 Y 3.0 Y 3.0 Y 3.0 Y 3.5 Y 3.5
Y 3.0 Y 3.0 Y 4.0 Y 3.0 Y 3.5 Y 3.5 Y 4.5 Y 2.5 Y 3.0 Y 4.0
Y 3.5 N 2.5 N 4.5 N 4.5 N 5.0 N 3.5 N 3.5 N 3.5 N 3.5 N 3.5
N 4.0 N 3.0 N 4.5 N 4.0 N 4.0 N 3.0 N 4.0 N 3.0 N 3.5 N 4.0
N 4.0 N 3.5 N 4.0 N 4.5 N 4.5 N 3.5 N 3.0 N 2.5 N 5.0 N 3.0
N 3.5 N 2.0 N 4.5 N 2.5 N 3.0 N 4.0 N 1.0 N 3.0 N 5.0 N 3.0
N 3.0 N 2.5 N 2.5 N 5.0 N 4.5 N 4.5 N 3.0 N 5.0
PROC TTEST DATA = PRDE;
CLASS GROUP;
VAR OSV;
TITLE 'COMPARISON OF DE WITH AND WITHOUT ADMISSIONS';
RUN;
```

SAS OUTPUT - T test for difference in mean satisfaction levels for DE with and DE without admissions experience.

COMPARISON OF DE WITH AND WITHOUT ADMISSIONS

TTEST PROCEDURE

Variable: OSV

GROUP	N	Mean	Std Dev	Std Error	Min.	Max.
WITHOUT	47	3.6170	0.8920	0.1301	1.0000	5.0000
WITH	31	3.4678	0.6447	0.1158	2.0000	5.0000

Variances	T	DF	Prob>|T|
Unequal	0.8571	75.3	0.3941
Equal	0.8029	76.0	0.4245

For H0: Variances are equal
$F' = 1.91$
$DF = (46,30)$
$Prob>F' = 0.0624$

SAS PROGRAM - T test for difference in mean satisfaction
levels for IE with and IE without admissions experience.

```
DATA PRIE;
INPUT GROUP $ OSV @@;
CARDS;
Y 2.5 Y 4.0 Y 2.5 Y 4.5 Y 3.0 Y 3.5 Y 4.0 Y 4.5 Y 3.0 Y 3.0
Y 3.5 Y 3.0 Y 3.5 Y 3.0 Y 5.0 Y 3.0 Y 3.0 Y 3.0 Y 2.5 Y 3.5
Y 2.5 Y 5.0 Y 3.0 Y 3.0 Y 4.0 Y 4.0 Y 4.0 Y 3.5 Y 2.5 Y 2.5
Y 3.0 Y 4.0 Y 4.0 Y 4.0 Y 4.0 Y 3.5 Y 4.5 Y 4.0 Y 3.5 Y 3.5
Y 3.0 N 2.5 N 2.0 N 3.0 N 4.0 N 3.0 N 3.5 N 2.0 N 4.0 N 2.0
N 3.5 N 5.0 N 4.0 N 2.0 N 3.0 N 4.0 N 3.0 N 3.0 N 4.0 N 4.0
N 3.0 N 4.0 N 3.5 N 3.5 N 4.0 N 4.0 N 4.5 N 3.0 N 4.0 N 3.0
N 3.0 N 4.0 N 2.5 N 3.0 N 4.0 N 4.0 N 4.5 N 3.5 N 3.5 N 3.0
N 5.0 N 3.0 N 3.0 N 3.5 N 3.0 N 4.0 N 3.5 N 2.0 N 4.0 N 5.0
N 4.0 N 3.5 N 2.5 N 2.0 N 4.0 N 4.0 N 4.0 N 4.5 N 4.0 N 4.0
N 3.5 N 4.5 N 3.5 N 2.5 N 3.0 N 3.0 N 3.0 N 4.5 N 4.0 N 5.0
N 2.5 N 4.0 N 3.5 N 2.0 N 3.5 N 4.0 N 4.5 N 3.5 N 4.0 N 2.0
N 4.0 N 2.5 N 3.0 N 3.0 N 3.0 N 3.5 N 4.0 N 3.0 N 4.0 N 2.5
N 4.0 N 3.0 N 3.0 N 3.0 N 3.5 N 4.0 N 3.5 N 3.5 N 3.5 N 4.0
N 3.5 N 3.0 N 3.5 N 3.0 N 3.0 N 4.5 N 3.5 N 2.5 N 4.0 N 4.5
N 3.5 N 4.0 N 2.5 N 2.5 N 2.0 N 4.5 N 2.5 N 4.5 N 3.0 N 3.0
N 4.0 N 3.0 N 4.0 N 3.0 N 5.0 N 1.5 N 3.5 N 3.0 N 3.0 N 3.5
N 3.5 N 3.0 N 4.0 N 3.5 N 4.0 N 4.5 N 4.5 N 3.0 N 3.5 N 4.0
N 4.0 N 3.5 N 3.0 N 3.5 N 5.0 N 2.5 N 3.0 N 4.5 N 3.0 N 5.0
N 2.0 N 4.0 N 3.0 N 2.5 N 2.0 N 3.5 N 5.0 N 4.5 N 3.5 N 3.5
N 4.5 N 3.5 N 4.0 N 5.0 N 3.5 N 4.0 N 4.0 N 4.0 N 3.5 N 1.5
N 3.0 N 3.0 N 4.0 N 3.0 N 3.0 N 5.0 N 2.5 N 3.5 N 2.5 N 3.0
N 5.0 N 4.5 N 2.0 N 3.5 N 2.5 N 5.0 N 3.5 N 2.5 N 4.0 N 4.0
N 4.0 N 3.5 N 3.5 N 3.5 N 5.0 N 3.5 N 4.5 N 2.0 N 3.5 N 4.5
N 3.5 N 3.0 N 4.0 N 3.5 N 3.5 N 4.0 N 5.0 N 2.5 N 3.0 N 3.0
N 4.0 N 3.5 N 2.5 N 4.0 N 4.5 N 2.0 N 4.0 N 3.5 N 4.0 N 4.0
N 3.0 N 4.0 N 2.5 N 4.0 N 3.5 N 3.0 N 3.0 N 3.0 N 4.0 N 2.5
N 2.5 N 4.0 N 2.0 N 3.0 N 2.5 N 4.5 N 3.5 N 3.0 N 2.5 N 3.0
N 4.0 N 4.0 N 1.5 N 4.0 N 3.0 N 3.0 N 3.0 N 4.5 N 4.0 N 4.0
N 5.0 N 4.0 N 2.0 N 4.0 N 3.0 N 4.5 N 3.5 N 4.0 N 4.0 N 4.5
N 4.0 N 3.0 N 3.0 N 3.0 N 3.0 N 3.0 N 3.0 N 3.5 N 5.0 N 3.5
N 5.0 N 3.0 N 4.0 N 3.0 N 3.0 N 4.0 N 3.5 N 1.5 N 3.5 N 4.0
N 3.5 N 4.0 N 3.5 N 4.0 N 5.0 N 4.0 N 2.5 N 2.0 N 4.0 N 3.5
N 3.5 N 4.0 N 5.0 N 3.0 N 3.0 N 2.0 N 3.5 N 3.0 N 4.0 N 2.5
N 3.5 N 4.0 N 3.0 N 4.0 N 3.0 N 3.0 N 4.0 N 2.0 N 4.5 N 3.0
N 3.0 N 4.0 N 3.0 N 4.5 N 3.0 N 3.5 N 4.0 N 4.0 N 3.0 N 4.0
N 3.0 N 4.5 N 1.5 N 3.0 N 4.0 N 3.5 N 4.0 N 4.0 N 4.5 N 3.0
N 3.5 N 4.0 N 3.0 N 3.5 N 1.5 N 4.0 N 3.5 N 4.0 N 3.0 N 4.0
N 2.0 N 3.0 N 2.5 N 4.0 N 3.0 N 1.0 N 4.0 N 4.0 N 3.5 N 3.5
N 3.5 N 3.0 N 3.5 N 4.5 N 4.0 N 2.5
PROC TTEST DATA = PRIE;
CLASS GROUP;
VAR OSV;
TITLE 'COMPARISON OF IE WITH AND WITHOUT ADMISSIONS';
RUN;
```

SAS OUTPUT - T test for difference in mean satisfaction
levels for IE with and IE without admissions experience.

COMPARISON OF IE WITH AND WITHOUT ADMISSIONS

TTEST PROCEDURE

Variable: OSV

GROUP	N	Mean	Std Dev	Std Error	Min.	Max.
WITHOUT	355	3.469	0.7868	0.04176	1.0000	5.0000
WITH	41	3.476	0.6888	0.10757	2.5000	5.0000

Variances	T	DF	Prob>¦T¦
Unequal	-0.0572	52.8	0.9546
Equal	-0.0514	394.0	0.9590

For H0: Variances are equal
F' = 1.31
DF = (354,40)
Prob>F' = 0.3057

SAS PROGRAM - T test for difference in mean satisfaction
levels for student and south regional groups.


```
DATA REGION;
INPUT Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16
Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24 Q25 Q26 Q27 Q28 Q29 Q30 Q31
Q32 Q33 Q34 Q35 Q36 Q37 Q38 Q39 Q40 Q41 Q42 Q43 Q44 Q45 Q46
Q47 Q48 Q49 Q50 Q51 Q52 Q53 Q54 Q55 Q56 Q57 Q58 Q59 Q60;
IF Q60 = 1 THEN REG = 2;
IF Q60 = 2 THEN REG = 2;
IF Q60 = 3 THEN REG = 2;
IF Q60 = 4 THEN OTH = 1;
IF Q60 = 5 THEN REG = 1;
IF Q1 = 0 THEN OS = (Q19 * 0.5) + (Q39 * 0.5);
IF Q1 = 1 THEN OS = (Q10 * 0.5) + (Q39 * 0.5);
IF Q1 = 2 THEN OS = (Q10 * 0.5) + (Q39 * 0.5);
IF Q1 = 3 THEN OS = (Q10 * 0.5) + (Q39 * 0.5);
CARDS;
(IE AND DE DATA FROM PAGE 129-144 AND 146-149 USED HERE)
PROC TTEST;
CLASS REG;
VAR OS;
RUN;
```

SAS OUTPUT - T test for difference in mean satisfaction levels for south and student regional groups.

COMPARISON OF SOUTH (1) AND STUDENT (2)

TTEST PROCEDURE

Variable: OS

GROUP	N	Mean	Std Dev	Std Error	Min.	Max.
1	36	3.625	0.7780	0.12967	2.0000	5.0000
2	270	3.444	0.7559	0.04600	1.0000	5.0000

Variances	T	DF	Prob>|T|
Unequal	1.3123	44.3	0.1962
Equal	1.3418	304.0	0.1807

For H0: Variances are equal
F' = 1.06
DF = (35,269)
Prob>F' = 0.7638

SAS PROGRAM - T test for difference in mean satisfaction levels for consolidated and north regional groups.

```
DATA REGION;
INPUT Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16
Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24 Q25 Q26 Q27 Q28 Q29 Q30 Q31
Q32 Q33 Q34 Q35 Q36 Q37 Q38 Q39 Q40 Q41 Q42 Q43 Q44 Q45 Q46
Q47 Q48 Q49 Q50 Q51 Q52 Q53 Q54 Q55 Q56 Q57 Q58 Q59 Q60;
IF Q60 = 1 THEN REG = 1;
IF Q60 = 2 THEN REG = 1;
IF Q60 = 3 THEN REG = 1;
IF Q60 = 4 THEN REG = 2;
IF Q60 = 5 THEN REG = 1;
IF Q1 = 0 THEN OS = (Q19 * 0.5) + (Q39 * 0.5);
IF Q1 = 1 THEN OS = (Q10 * 0.5) + (Q39 * 0.5);
IF Q1 = 2 THEN OS = (Q10 * 0.5) + (Q39 * 0.5);
IF Q1 = 3 THEN OS = (Q10 * 0.5) + (Q39 * 0.5);
CARDS;
(IE AND DE DATA FROM PAGE 129-144 AND 146-149 USED HERE)
PROC TTEST;
CLASS REG;
VAR OS;
RUN;
```

SAS OUTPUT - T test for difference in mean satisfaction levels for consolidated south and north regional groups.

COMPARISON OF CONSOLIDATED SOUTH (1) AND NORTH (2)

TTEST PROCEDURE

Variable: OS

GROUP	N	Mean	Std Dev	Std Error	Min.	Max.
1	306	3.447	0.7594	0.04341	1.0000	5.0000
2	168	3.518	0.8188	0.06317	1.0000	5.0000

Variances	T	DF	Prob>|T|
Unequal	-0.6807	322.6	0.4966
Equal	-0.6957	472.0	0.4869

For H0: Variances are equal
F' = 1.16
DF = (167,305)
Prob>F' = 0.2606

SAS PROGRAM - T test for difference in mean satisfaction levels for south and north regional groups.

```
DATA REGION;
INPUT Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16
Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24 Q25 Q26 Q27 Q28 Q29 Q30 Q31
Q32 Q33 Q34 Q35 Q36 Q37 Q38 Q39 Q40 Q41 Q42 Q43 Q44 Q45 Q46
Q47 Q48 Q49 Q50 Q51 Q52 Q53 Q54 Q55 Q56 Q57 Q58 Q59 Q60;
IF Q60 = 1 THEN OTH = 1;
IF Q60 = 2 THEN OTH = 2;
IF Q60 = 3 THEN OTH = 3;
IF Q60 = 4 THEN REG = 2;
IF Q60 = 5 THEN REG = 1;
IF Q1 = 0 THEN OS = (Q19 * 0.5) + (Q39 * 0.5);
IF Q1 = 1 THEN OS = (Q10 * 0.5) + (Q39 * 0.5);
IF Q1 = 2 THEN OS = (Q10 * 0.5) + (Q39 * 0.5);
IF Q1 = 3 THEN OS = (Q10 * 0.5) + (Q39 * 0.5);
CARDS;
  (IE AND DE DATA FROM PAGE 129-144 AND 146-149 USED HERE)
PROC TTEST;
CLASS REG;
VAR OS;
RUN;
```

<u>SAS OUTPUT - T test for difference in mean satisfaction</u>
<u>levels for south and north regional groups.</u>

COMPARISON OF SOUTH (1) AND NORTH (2)

TTEST PROCEDURE

Variable: OS

GROUP	N	Mean	Std Dev	Std Error	Min.	Max.
1	36	3.625	0.7780	0.12967	2.0000	5.0000
2	168	3.518	0.8188	0.06317	1.0000	5.0000

Variances	T	DF	Prob>│T│
Unequal	0.7428	53.0	0.4609
Equal	0.7186	202.0	0.4732

For H0: Variances are equal
F' = 1.11
DF = (167,35)
Prob>F' = 0.7453

<u>SAS PROGRAM - T test for difference in mean satisfaction</u>
<u>levels for DE and IE.</u>

```
DATA SAT;
INPUT GROUP $ OSV @@;
CARDS;
D 4.0 D 4.5 D 3.5 D 2.0 D 3.5 D 3.5 D 3.5 D 5.0 D 4.0 D 4.5
D 3.0 D 2.5 D 3.5 D 3.5 D 3.5 D 3.0 D 3.0 D 3.0 D 3.5 D 3.5
D 3.0 D 3.0 D 4.0 D 3.0 D 3.5 D 3.5 D 4.5 D 2.5 D 3.0 D 4.0
D 3.5 D 2.5 D 4.5 D 4.5 D 5.0 D 3.5 D 3.5 D 3.5 D 3.5 D 3.5
D 4.0 D 3.0 D 4.5 D 4.0 D 4.0 D 3.0 D 4.0 D 3.0 D 3.5 D 4.0
D 4.0 D 3.5 D 4.0 D 4.5 D 4.5 D 3.5 D 3.0 D 2.5 D 5.0 D 3.0
D 3.5 D 2.0 D 4.5 D 2.5 D 3.0 D 4.0 D 1.0 D 3.0 D 5.0 D 3.0
D 3.0 D 2.5 D 2.5 D 5.0 D 4.5 D 4.5 D 3.0 D 5.0
I 2.5 I 4.0 I 2.5 I 4.5 I 3.0 I 3.5 I 4.0 I 4.5 I 3.0 I 3.0
I 3.5 I 3.0 I 3.5 I 3.0 I 5.0 I 3.0 I 3.0 I 3.0 I 2.5 I 3.5
I 2.5 I 5.0 I 3.0 I 3.0 I 4.0 I 4.0 I 4.0 I 3.5 I 2.5 I 2.5
I 3.0 I 4.0 I 4.0 I 4.0 I 4.0 I 3.5 I 4.5 I 4.0 I 3.5 I 3.5
I 3.0 I 2.5 I 2.0 I 3.0 I 4.0 I 3.0 I 3.5 I 2.0 I 4.0 I 2.0
I 3.5 I 5.0 I 4.0 I 2.0 I 3.0 I 4.0 I 3.0 I 3.0 I 4.0 I 4.0
I 3.0 I 4.0 I 3.5 I 3.5 I 4.0 I 4.0 I 4.5 I 3.0 I 4.0 I 3.0
I 3.0 I 4.0 I 2.5 I 3.0 I 4.0 I 4.0 I 4.5 I 3.5 I 3.5 I 3.0
I 5.0 I 3.0 I 3.0 I 3.5 I 3.0 I 4.0 I 3.5 I 2.0 I 4.0 I 5.0
```

```
I 4.0 I 3.5 I 2.5 I 2.0 I 4.0 I 4.0 I 4.0 I 4.5 I 4.0 I 4.0
I 3.5 I 4.5 I 3.5 I 2.5 I 3.0 I 3.0 I 3.0 I 4.5 I 4.0 I 5.0
I 2.5 I 4.0 I 3.5 I 2.0 I 3.5 I 4.0 I 4.5 I 3.5 I 4.0 I 2.0
I 4.0 I 2.5 I 3.0 I 3.0 I 3.0 I 3.5 I 4.0 I 3.0 I 4.0 I 2.5
I 4.0 I 3.0 I 3.0 I 3.0 I 3.5 I 4.0 I 3.5 I 3.5 I 3.5 I 4.0
I 3.5 I 3.0 I 3.5 I 3.0 I 3.0 I 4.5 I 3.5 I 2.5 I 4.0 I 4.5
I 3.5 I 4.0 I 2.5 I 2.5 I 2.0 I 4.5 I 2.5 I 4.5 I 3.0 I 3.0
I 4.0 I 3.0 I 4.0 I 3.0 I 5.0 I 1.5 I 3.5 I 3.0 I 3.0 I 3.5
I 3.5 I 3.0 I 4.0 I 3.5 I 4.0 I 4.5 I 4.5 I 3.0 I 3.5 I 4.0
I 4.0 I 3.5 I 3.0 I 3.5 I 5.0 I 2.5 I 3.0 I 4.5 I 3.0 I 5.0
I 2.0 I 4.0 I 3.0 I 2.5 I 2.0 I 3.5 I 5.0 I 4.5 I 3.5 I 3.5
I 4.5 I 3.5 I 4.0 I 5.0 I 3.5 I 4.0 I 4.0 I 4.0 I 3.5 I 1.5
I 3.0 I 3.0 I 4.0 I 3.0 I 3.0 I 5.0 I 2.5 I 3.5 I 2.5 I 3.0
I 5.0 I 4.5 I 2.0 I 3.5 I 2.5 I 5.0 I 3.5 I 2.5 I 4.0 I 4.0
I 4.0 I 3.5 I 3.5 I 3.5 I 5.0 I 3.5 I 4.5 I 2.0 I 3.5 I 4.5
I 3.5 I 3.0 I 4.0 I 3.5 I 3.5 I 4.0 I 5.0 I 2.5 I 3.0 I 3.0
I 4.0 I 3.5 I 2.5 I 4.0 I 4.5 I 2.0 I 4.0 I 3.5 I 4.0 I 4.0
I 3.0 I 4.0 I 2.5 I 4.0 I 3.5 I 3.0 I 3.0 I 3.0 I 4.0 I 2.5
I 2.5 I 4.0 I 2.0 I 3.0 I 2.5 I 4.5 I 3.5 I 3.0 I 2.5 I 3.0
I 4.0 I 4.0 I 1.5 I 4.0 I 3.0 I 3.0 I 3.0 I 4.5 I 4.0 I 4.0
I 5.0 I 4.0 I 2.0 I 4.0 I 3.0 I 4.5 I 3.5 I 4.0 I 4.0 I 4.5
I 4.0 I 3.0 I 3.0 I 3.0 I 3.0 I 3.0 I 3.0 I 3.5 I 5.0 I 3.5
I 5.0 I 3.0 I 4.0 I 3.0 I 3.0 I 4.0 I 3.5 I 1.5 I 3.5 I 4.0
I 3.5 I 4.0 I 3.5 I 4.0 I 5.0 I 4.0 I 2.5 I 2.0 I 4.0 I 3.5
I 3.5 I 4.0 I 5.0 I 3.0 I 3.0 I 2.0 I 3.5 I 3.0 I 4.0 I 2.5
I 3.5 I 4.0 I 3.0 I 4.0 I 3.0 I 3.0 I 4.0 I 2.0 I 4.5 I 3.0
I 3.0 I 4.0 I 3.0 I 4.5 I 3.0 I 3.5 I 4.0 I 4.0 I 3.0 I 4.0
I 3.0 I 4.5 I 1.5 I 3.0 I 4.0 I 3.5 I 4.0 I 4.0 I 4.5 I 3.0
I 3.5 I 4.0 I 3.0 I 3.5 I 1.5 I 4.0 I 3.5 I 4.0 I 3.0 I 4.0
I 2.0 I 3.0 I 2.5 I 4.0 I 3.0 I 1.0 I 4.0 I 4.0 I 3.5 I 3.5
I 3.5 I 3.0 I 3.5 I 4.5 I 4.0 I 2.5
PROC TTEST DATA = SAT;
CLASS GROUP;
VAR OSV;
TITLE 'COMPARISON OF DE AND IE SATISFACTION';
RUN;
```

<u>SAS OUTPUT - T test for difference in mean satisfaction
levels for DE and IE.</u>

COMPARISON OF DIRECT AND INDIRECT SATISFACTION

TTEST PROCEDURE

Variable: OSV

GROUP	N	Mean	Std Dev	Std Error	Min.	Max.
DIRECT	78	3.5577	0.8017	0.0908	1.0000	5.0000
INDIRECT	396	3.4697	0.7765	0.03902	1.0000	5.0000

Variances	T	DF	Prob>|T|
Unequal	0.8906	107.4	0.3751
Equal	0.9100	472.0	0.3633

For H0: Variances are equal
F' = 1.07
DF = (77,395)
Prob> F' = 0.6854

<u>SAS PROGRAM - Stepwise regression analysis for IE population
with 5 independent variables.</u>


```
DATA TEST1A;
INPUT Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16
Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24 Q25 Q26 Q27 Q28 Q29 Q30 Q31
Q32 Q33 Q34 Q35 Q36 Q37 Q38 Q39 Q40 Q41 Q42 Q43 Q44 Q45 Q46
Q47 Q48 Q49 Q50 Q51 Q52 Q53 Q54 Q55 Q56 Q57 Q58 Q59 Q60 @@;
OSI = (Q19 * 0.5) + (Q39 * 0.5);
OMI = (Q22 + Q28 + Q37) / 3;
NMI = (Q23 + Q29 + Q38) / 3;
NUI = (Q21 + Q27 + Q36) / 3;
DRI = (Q20 + Q26 + Q35) / 3;
FCI = (Q30 + Q31 + Q32 + Q33 + Q34) / 5;
CARDS;
0 . . . . . . . . . . . 1 3 3 1 3 2 2 3 3 1 2 3 4 4 4 3 5
5 5 2 2 3 3 3 3 3 5 3 4 3 4 5 5 1 4 5 2 5 5 5 5 4 2 20 5 5 1
0 . . . . . . . . . . . 1 3 4 1 1 4 4 4 3 3 3 4 5 4 3 3 5
5 5 5 5 4 3 3 3 4 4 4 4 4 5 5 5 2 4 4 3 5 3 4 3 3 1 22 5 5 3
0 . . . . . . . . . . . 1 4 3 3 1 3 3 2 3 3 2 3 4 2 3 3 3
4 3 3 4 4 2 3 3 2 2 3 2 2 3 3 4 4 3 4 3 4 3 2 3 4 1 44 3 2 4
0 . . . . . . . . . . . 1 4 4 3 1 4 3 4 4 4 4 4 5 5 5 5 5
5 5 3 3 5 5 5 5 5 5 5 4 5 5 4 5 3 4 5 5 5 5 5 5 5 1 .  3 4 5
```

```
0 . . . . . . . . . . . . 1 4 3 3 1 3 2 2 2 3 4 3 3 3 3 3 4
3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 3 4 4 4 4 4 4 4 4 2 .   2 3 4
0 . . . . . . . . . . . . 1 1 1 1 1 3 4 4 4 3 3 2 4 4 4 3 3
5 4 4 4 4 4 4 3 4 4 3 4 3 3 5 5 3 4 5 3 5 4 5 4 4 2 .   5 4 2
0 . . . . . . . . . . . . 1 5 5 5 1 4 3 4 4 4 5 5 4 4 4 4 5
5 5 5 5 4 5 4 4 4 4 5 4 5 4 5 5 5 4 5 4 5 5 5 4 5 2 47 3 5 4
0 . . . . . . . . . . . . 1 3 4 4 1 5 3 4 5 5 4 4 4 5 4 4 3
4 4 5 5 4 5 4 4 4 5 4 4 3 5 5 5 4 4 5 4 5 4 5 5 5 1 21 3 4 2
0 . . . . . . . . . . . . 1 3 3 3 1 3 3 3 3 3 3 3 3 3 3 3 3
3 3 3 3 3 3 3 3 3 4 3 4 2 4 5 5 2 3 5 3 5 2 4 4 3 2 50 4 2 4
0 . . . . . . . . . . . . 1 3 3 1 1 4 3 2 2 2 2 3 2 2 2 2
2 2 2 2 1 1 1 1 2 5 5 5 5 5 5 5 4 5 5 5 5 5 5 5 2 .   4 4 4
0 . . . . . . . . . . . . 1 4 2 2 1 4 3 5 3 3 3 4 3 5 3 3 4
5 4 5 4 3 5 3 3 3 4 4 4 3 3 4 4 3 3 3 4 3 4 3 4 2 .   3 4 4
0 . . . . . . . . . . . . 1 5 3 4 1 2 4 4 3 3 5 5 4 4 4 3 5
5 5 4 4 4 4 4 4 4 4 3 4 3 4 4 4 4 3 4 3 4 3 4 4 4 2 62 3 2 4
0 . . . . . . . . . . . . 1 4 4 4 1 4 3 3 3 3 3 3 3 3 3 3 3
3 3 2 2 2 3 3 3 3 3 3 3 3 2 3 3 2 3 2 2 3 3 3 2 3 1 63 4 3 4
0 . . . . . . . . . . . . 1 3 1 2 1 3 3 3 3 3 4 4 4 4 4 4 3
4 4 4 5 3 3 3 3 3 4 3 4 3 4 4 5 5 4 4 5 4 5 4 4 4 1 63 3 3 4
0 . . . . . . . . . . . . 1 5 5 5 1 5 5 5 5 5 5 5 5 5 5 5 5
5 5 5 4 5 5 5 5 5 5 4 4 4 5 5 5 5 4 4 5 4 5 4 4 2 53 2 2 4
0 . . . . . . . . . . . . 1 5 5 5 2 3 2 3 3 3 2 3 3 3 3 4 4
4 4 3 3 3 3 3 3 3 4 4 4 4 4 4 3 3 4 4 3 4 4 4 2 37 4 5 4
0 . . . . . . . . . . . . 1 3 2 1 1 3 3 4 3 3 3 3 3 3 3 3 4
4 4 2 2 2 3 3 3 3 3 3 3 1 3 3 3 2 2 2 3 3 2 3 3 3 2 41 3 5 4
0 . . . . . . . . . . . . 1 3 3 3 1 3 2 3 3 2 3 3 3 3 2 2 3
3 3 3 3 3 2 3 3 3 4 3 3 3 3 4 4 3 3 2 3 3 3 3 3 1 23 2 4 4
0 . . . . . . . . . . . . 1 4 3 1 3 2 1 2 3 1 2 5 4 4 3 1 3
5 3 3 4 4 4 3 2 3 3 4 4 3 5 4 5 3 5 4 3 5 3 4 3 4 1 24 2 5 1
0 . . . . . . . . . . . . 1 3 3 3 1 3 3 4 2 2 4 4 5 4 3 3 3
5 4 4 4 4 4 3 3 4 5 4 5 4 4 5 5 4 4 3 5 3 5 3 3 2 20 5 5 2
0 . . . . . . . . . . . . 1 3 3 3 1 3 2 3 3 3 3 3 3 3 3 3 3
3 3 3 2 2 2 2 2 2 3 3 3 3 3 3 3 2 3 2 3 3 3 3 3 3 2 53 1 2 4
0 . . . . . . . . . . . . 1 3 3 3 1 5 3 5 5 5 5 4 5 5 5 4 5
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4 4 3 3 4 4 4 2 4 5 4 4 4 5 5 5 4 5 4 5 4 4 4 3 4 2 21 2 2 1
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O . . . . . . . . . . . . . O . . . . 2 4 4 4 3 3 4 4 4 4 3 3 4
4 4 3 5 4 4 3 3 4 4 4 4 3 4 4 5 4 3 4 3 5 4 4 3 5 1 23 5 4 1
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3 2 1 1 4 4 4 4 2 5 4 5 3 5 5 5 3 3 4 3 4 3 5 4 3 2 41 5 5 4
PROC STEPWISE DATA = TEST1A;
MODEL OSI = OMI NMI NUI DRI FCI;
PROC RSQUARE DATA = TEST1A OUTEST = EST CP ADJRSQ SSE AIC;
MODEL OSI = OMI NMI NUI DRI FCI;
PROC CORR;
VAR OSI OMI NMI NUI DRI FCI;
RUN;
```

SAS OUTPUT - Stepwise regression analysis for IE population with 5 independent variables.

Stepwise Procedure for Dependent Variable OSI

Step 1   Variable DRI Entered   R-square = 0.49346473   C(p) = 66.96586667

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	1	99.91286522	99.91286522	382.86	0.0001
Error	393	102.55928668	0.26096511		
Total	394	202.47215190			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob>F
INTERCEP	1.28441785	0.11945853	30.16898945	115.61	0.0001
DRI	0.62862302	0.03212705	99.91286522	382.86	0.0001

Bounds on condition number: 1,   1

Step 2   Variable NMI Entered   R-square = 0.54484905   C(p) = 22.50855702

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	2	110.31675967	55.15837984	234.63	0.0001
Error	392	92.15539223	0.23509029		
Total	394	202.47215190			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob>F
INTERCEP	1.01259677	0.12051971	16.59554812	70.59	0.0001
NMI	0.29549192	0.04441861	10.40389445	44.25	0.0001
DRI	0.42124124	0.04360752	21.93681726	93.31	0.0001

Bounds on condition number: 2.045168,   8.180672

Step 3   Variable NUI Entered   R-square = 0.56611005   C(p) = 5.28618316

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	3	114.62151925	38.20717308	170.05	0.0001
Error	391	87.85063265	0.22468192		
Total	394	202.47215190			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob>F
INTERCEP	0.87724122	0.12181204	11.65267910	51.86	0.0001
NMI	0.25223968	0.04453428	7.20785559	32.08	0.0001
NUI	0.24040015	0.05492175	4.30475958	19.16	0.0001
DRI	0.26054618	0.05626029	4.81874137	21.45	0.0001

Bounds on condition number: 3.561859,   26.72557

Step 4   Variable OMI Entered   R-square = 0.56865874   C(p) = 4.98187160

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	4	115.13755891	28.78438973	128.54	0.0001
Error	390	87.33459299	0.22393485		
Total	394	202.47215190			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob>F
INTERCEP	0.87012258	0.12169974	11.44730631	51.12	0.0001
OMI	0.10092115	0.06648160	0.51603966	2.30	0.1298
NMI	0.21839745	0.04973638	4.31785892	19.28	0.0001
NUI	0.18653974	0.06530873	1.82693008	8.16	0.0045
DRI	0.25256237	0.05641238	4.48859229	20.04	0.0001

Bounds on condition number: 4.578519,   61.58884

All variables 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 OSI

Step	Variable Entered Removed	Number In	Partial R**2	Model R**2	C(p)	F	Prob>F
1	DRI	1	0.4935	0.4935	66.9659	382.8591	0.0001
2	NMI	2	0.0514	0.5448	22.5086	44.2549	0.0001
3	NUI	3	0.0213	0.5661	5.2862	19.1593	0.0001
4	OMI	4	0.0025	0.5687	4.9819	2.3044	0.1298

<u>SAS PROGRAM - Stepwise regression analysis for DE population
with 5 independent variables.</u>

```
DATA TEST2A;
INPUT Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16
Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24 Q25 Q26 Q27 Q28 Q29 Q30 Q31
Q32 Q33 Q34 Q35 Q36 Q37 Q38 Q39 Q40 Q41 Q42 Q43 Q44 Q45 Q46
Q47 Q48 Q49 Q50 Q51 Q52 Q53 Q54 Q55 Q56 Q57 Q58 Q59 Q60 @@;
OSD = (Q10 * 0.5) + (Q39 * 0.5);
OMD = (Q22 + Q28 + Q37) / 3;
```

```
NMD = (Q23 + Q29 + Q38) / 3;
NUD = (Q21 + Q27 + Q36) / 3;
DRD = (Q20 + Q26 + Q35) / 3;
FCD = (Q30 + Q31 + Q32 + Q33 + Q34) / 5;
CARDS;
1 0 1 6 2 1 3 4 0 4 4 3 4 1 3 3 1 0 0 4 4 4 4 4 5 5 5 5 5 5
5 5 4 5 4 4 4 4 4 4 4 4 4 4 4 5 3 4 4 4 4 4 4 2 60 3 5 4
1 0 0 2 1 1 5 5 1 5 4 6 4 1 5 5 3 0 0 3 5 4 4 5 4 4 5 4 4 5
5 5 5 5 4 5 5 5 4 5 4 5 5 5 5 5 4 5 5 4 5 4 5 4 4 2 43 4 5 4
1 0 0 6 1 1 3 3 1 3 5 0 1 1 4 4 5 0 0 4 4 4 4 4 4 4 4 4 4 4
4 4 3 3 4 4 4 4 4 4 5 4 3 5 4 4 4 2 4 4 4 4 4 4 4 1 21 3 2 1
2 1 0 1 1 0 2 3 1 1 0 4 4 1 3 3 2 0 0 2 3 3 2 3 5 3 5 4 4 4
5 4 4 3 3 5 4 3 3 5 4 5 4 4 5 5 3 4 3 4 5 3 5 4 3 2 22 1 4 2
3 0 0 1 3 0 1 1 0 3 2 7 3 1 3 3 1 0 0 4 2 3 3 2 2 4 3 3 3 4
4 4 4 2 4 4 4 4 4 4 4 4 3 3 3 4 3 4 4 4 4 4 4 4 1 41 1 2 4
1 0 1 2 1 1 4 4 1 3 3 0 3 1 4 4 4 0 0 4 4 4 2 2 2 5 4 3 2 5
5 5 1 2 5 4 3 2 4 4 3 3 2 5 5 5 4 4 4 3 5 2 3 3 3 1 21 1 2 2
2 0 0 2 3 0 5 5 0 3 3 8 5 1 4 4 4 0 0 5 5 5 5 5 5 5 5 5 5 5
5 5 5 4 4 4 4 4 4 4 4 4 4 4 4 3 3 4 3 4 4 4 4 2 44 2 3 4
2 1 1 1 1 1 5 3 1 5 4 2 4 1 4 3 3 0 0 5 5 5 3 5 5 5 5 5 5 5
5 5 5 3 5 5 5 5 5 5 5 5 5 5 5 5 4 4 5 5 5 5 5 5 1 .  4 5 5
3 0 1 4 2 0 4 2 0 4 3 0 5 1 2 3 1 0 0 4 4 3 2 3 4 4 3 3 3 4
4 4 3 2 4 2 2 2 4 3 4 4 3 4 4 5 4 5 5 4 5 4 4 4 4 1 20 5 5 1
1 1 0 3 2 1 5 3 1 5 2 7 3 1 2 4 4 0 0 4 3 3 3 4 5 4 3 3 3
3 3 2 5 3 4 3 3 4 3 3 4 3 3 3 5 3 4 4 3 5 2 4 4 4 1 22 3 2 2
2 0 0 4 3 0 3 3 1 3 1 1 2 1 3 1 1 0 0 4 3 3 3 4 3 3 3 3 4
3 4 3 3 3 4 4 3 3 3 3 3 3 4 3 4 3 4 4 3 4 4 3 4 1 36 1 3 4
1 1 0 3 2 1 2 1 0 2 2 0 6 1 1 2 2 0 0 2 3 3 2 3 2 2 2 2 3 5
3 3 4 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 4 4 3 3 4 4 1 22 5 5 1
1 0 0 4 3 1 5 4 0 4 4 8 3 1 2 2 3 0 0 3 5 4 3 4 4 2 4 3 3 3
3 3 4 4 3 4 4 4 3 4 4 4 4 5 3 4 4 3 4 3 4 5 4 4 1 .  4 2 4
1 1 0 1 1 0 5 3 1 4 2 1 4 1 3 3 4 0 0 3 5 2 3 2 4 5 2 1 4 5
3 3 4 3 4 3 2 3 3 5 4 4 3 3 5 5 4 3 4 3 5 3 5 4 4 2 20 5 5 2
2 1 1 1 1 0 3 3 1 4 4 0 3 1 3 4 2 0 0 4 3 4 4 3 3 3 3 4 4 3
3 3 4 3 3 3 4 3 3 4 4 4 3 3 3 4 3 2 2 3 3 3 3 2 3 .  .  .  . 5
3 1 0 3 2 0 2 3 0 3 1 0 2 1 4 4 3 0 0 4 3 3 3 4 3 3 3 4 4 3
4 3 2 2 4 3 3 3 3 5 4 4 4 3 3 2 3 4 3 3 3 4 3 3 2 39 3 3 5
2 1 0 2 2 1 2 3 0 4 4 0 2 1 2 3 3 0 0 3 3 2 3 4 3 3 3 3 4 2
3 3 4 3 3 4 3 3 2 4 3 3 4 2 2 3 3 4 3 4 3 3 3 3 1 29 2 2 5
3 1 1 1 2 1 2 2 1 3 4 0 2 1 2 3 3 0 0 4 3 3 3 2 3 4 4 4 3 4
4 4 3 4 3 3 2 3 3 4 4 3 3 4 2 3 3 3 3 3 3 2 3 3 4 .  .  .  . 5
1 1 1 1 2 1 3 4 0 4 4 0 3 1 3 3 3 0 0 4 4 3 3 3 4 3 3 4 3 3
2 2 2 2 3 2 3 3 3 3 4 4 3 3 3 2 3 3 4 3 3 3 4 3 3 1 37 1 4 5
1 0 1 1 1 1 5 5 0 3 0 0 3 1 4 4 3 0 0 3 3 3 3 5 4 4 4 3 5
5 5 3 3 4 4 4 4 4 5 4 5 4 4 5 5 4 4 3 3 5 4 5 4 3 2 20 1 2 2
1 1 1 2 1 1 3 3 0 3 4 0 2 1 2 3 4 0 0 4 3 4 3 3 2 2 4 3 3 3
4 4 2 2 3 4 4 3 3 2 3 4 3 3 3 4 3 3 3 4 4 4 4 3 3 .  .  .  . 5
2 1 0 3 2 1 2 3 1 3 4 3 3 1 3 2 3 0 0 4 3 3 3 3 2 3 4 4 4 3
3 3 4 3 3 4 3 4 3 4 3 3 3 4 3 3 4 4 2 2 2 3 3 4 3 1 39 3 4 5
2 1 0 6 5 1 4 4 1 4 4 3 3 1 4 4 3 0 0 4 5 4 4 5 4 4 4 4 4 4
4 4 4 4 4 4 4 4 4 4 4 3 4 4 4 4 4 3 4 4 4 2 4 4 4 1 70 3 5 4
3 0 0 2 2 0 2 3 0 2 4 6 4 1 3 2 2 0 0 3 3 2 3 4 2 4 3 3 3 2
```

```
3 3 2 3 4 3 3 3 4 3 3 4 3 2 2 3 3 4 3 4 2 3 3 2 3 . .  . . 5
2 1 0 1 1 1 2 3 0 4 1 0 3 1 3 2 2 0 0 4 3 3 3 4 3 3 4 4 4 4
3 3 3 2 4 4 4 3 3 4 3 4 3 3 3 4 4 3 3 4 4 4 3 3 3 . .  . . 5
1 0 0 3 1 1 5 5 1 3 0 5 4 1 3 3 3 0 0 3 3 3 4 4 4 5 4 4 5 5
5 4 5 4 5 5 4 4 4 4 4 5 5 5 5 5 4 5 4 4 5 5 5 5 2 1 20 5 4 2
1 1 1 1 1 1 5 5 1 4 1 7 3 1 3 4 4 0 0 3 3 3 3 4 4 4 4 4 4 4
5 5 2 3 5 5 4 4 5 4 3 5 4 4 5 5 2 3 5 4 4 3 4 4 4 1 22 2 4 2
2 0 1 1 2 0 1 2 0 2 2 0 2 1 3 2 2 0 0 4 4 3 3 4 3 2 3 3 4 2
2 4 3 2 3 4 4 4 3 3 3 3 4 3 4 4 2 2 3 3 3 4 2 4 4 . .  . . 5
2 1 1 1 3 0 2 3 0 3 2 3 4 1 3 4 2 0 0 4 3 3 3 2 3 4 3 3 4 3
3 4 2 3 3 2 4 4 3 4 3 3 4 3 2 3 3 4 3 3 4 3 4 4 3 . .  . . 5
1 2 0 2 1 0 4 2 1 4 0 0 5 1 5 5 3 0 0 3 4 4 4 4 5 5 5 5 5 5
5 3 3 4 4 4 4 4 4 5 5 5 5 5 5 5 4 5 5 5 5 4 5 5 4 2 21 5 5 2
2 1 0 2 1 1 2 3 1 3 3 2 2 1 3 4 4 0 0 4 3 3 3 4 3 4 4 4 4 3
3 2 3 4 5 4 4 5 4 3 3 3 4 4 3 5 4 4 3 3 4 2 4 3 4 2 27 3 2 5
2 1 0 3 2 0 5 2 0 3 4 0 4 0 . . . 0 0 2 1 2 2 2 4 1 2 2 4
2 4 3 3 4 1 2 2 2 5 3 5 5 5 5 5 3 3 5 2 5 3 5 2 3 2 57 5 5 4
1 0 0 3 5 0 2 1 0 5 2 8 1 0 . . . 0 0 4 4 4 4 4 4 4 4 4 4 4
4 4 3 4 4 4 4 4 4 5 5 5 4 4 5 5 4 4 5 4 5 5 5 5 4 1 37 2 5 4
2 1 1 1 3 1 3 3 0 4 2 0 4 0 . . . 0 0 3 3 3 3 4 4 5 5 5 5 5
5 5 3 5 5 5 5 5 5 4 5 4 4 5 5 5 5 3 5 5 5 5 5 5 1 69 2 2 4
1 0 1 2 1 1 2 2 1 5 4 3 4 0 . . . 0 0 4 3 3 3 4 5 4 5 4 5
5 5 5 5 4 5 5 5 5 5 4 5 4 5 5 5 3 4 5 3 5 0 5 5 4 1 25 3 4 4
1 0 1 3 1 1 1 5 0 3 3 0 3 0 . . . 0 0 5 5 5 5 5 5 5 5 5 5 5
5 5 3 4 5 3 4 4 4 5 4 5 5 4 5 5 3 5 5 5 4 5 4 3 1 75 2 4 4
1 0 1 3 2 0 4 3 1 4 0 4 3 0 . . . 0 0 3 5 4 4 4 3 4 4 4 4 5
4 5 3 3 2 4 4 4 3 5 4 4 4 4 4 5 3 3 5 4 5 3 5 5 3 2 25 5 4 3
3 0 1 4 2 0 4 2 0 5 2 0 4 0 . . . 0 0 3 2 2 3 2 2 3 2 2 2 3
3 3 3 3 3 2 2 2 2 3 3 3 2 3 3 4 3 3 3 2 3 3 2 2 3 1 63 2 3 4
2 1 0 4 2 1 3 3 0 4 2 8 4 0 . . . 0 0 3 3 3 2 3 3 4 4 3 3 3
3 3 3 3 4 3 3 2 3 4 3 4 3 3 3 4 3 3 2 3 3 3 2 2 1 26 1 4 3
1 0 1 3 1 1 3 2 0 3 2 7 4 0 . . . 0 0 5 4 4 4 5 4 3 3 4 4 5
5 5 5 5 5 4 4 4 4 5 5 4 4 4 5 5 4 4 5 3 5 5 5 4 4 1 47 1 2 4
2 1 0 6 2 1 1 1 0 4 3 2 4 0 . . . 0 0 4 4 4 4 5 4 4 4 4 4 4
4 4 4 4 4 4 4 4 4 3 4 4 4 4 4 4 5 2 2 4 4 5 4 4 4 2 . 1 2 4
2 1 1 2 1 0 2 2 0 3 2 3 3 0 . . . 0 0 3 2 3 3 2 4 3 3 3 3 4
5 5 4 1 3 3 3 3 3 3 3 2 2 3 4 3 2 3 2 3 3 3 2 3 3 1 31 2 4 4
1 1 1 1 2 1 2 2 1 5 3 8 3 0 . . . 0 0 3 3 3 2 2 4 4 1 1 4
4 4 4 4 1 1 1 1 4 5 4 4 4 4 5 5 4 4 3 3 5 3 4 3 4 2 64 3 3 4
2 1 0 3 2 0 5 2 0 4 2 7 4 0 . . . 0 0 3 4 3 3 3 4 4 4 3 3 4
4 4 4 4 4 4 4 3 4 5 4 4 4 4 5 5 2 3 4 2 5 2 4 2 3 1 48 2 3 4
2 1 0 2 1 1 5 3 1 5 2 0 5 0 . . . 0 0 3 4 3 3 3 4 3 4 3 3 3
4 3 4 3 4 4 4 3 3 4 4 5 2 5 5 5 2 3 3 2 4 2 4 3 3 1 21 5 5 1
2 0 0 2 3 0 5 5 0 3 4 3 2 0 . . . 0 0 4 3 3 4 3 3 3 3 4 2 3
3 4 3 3 4 3 3 3 3 4 4 4 3 3 4 5 4 3 3 4 3 4 4 4 3 4 2 . 3 3 4
1 0 0 3 1 1 3 4 0 4 3 0 3 0 . . . 0 0 3 5 4 4 5 5 4 5 5 5 5
5 5 5 4 4 4 4 5 4 5 3 5 5 5 5 5 4 3 3 5 4 4 5 5 2 31 2 4 4
1 0 0 4 3 1 5 4 0 3 3 0 4 0 . . . 0 0 3 3 1 1 3 1 3 1 1 4 4
4 4 4 3 3 1 1 3 3 4 3 4 3 5 4 5 3 3 4 3 5 3 4 3 2 1 21 3 4 3
3 0 1 4 1 1 3 3 0 4 2 7 2 0 . . . 0 0 4 4 3 3 3 4 4 4 3 3 4
4 3 4 2 4 4 3 3 3 4 4 4 3 4 5 5 3 4 4 2 4 3 4 3 4 1 21 5 5 3
1 1 1 4 2 0 2 3 0 3 5 0 5 0 . . . 0 0 5 4 3 4 4 3 4 3 2 5 5
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5 4 5 4 5 4 4 5 5 5 4 4 3 4 3 4 3 2 4 4 3 4 3 5 4 1 .  5 4 5
2 1 0 4 1 1 5 5 0 4 4 3 4 0 . . . 0 0 3 3 3 3 3 3 5 5 5 5 5
5 5 2 2 4 4 4 3 4 5 4 5 3 4 5 5 3 3 4 3 4 2 2 4 3 1 21 5 4 2
1 0 1 3 2 1 3 4 0 4 0 1 3 0 . . . 0 0 2 3 4 3 2 4 4 2 3 3 4
4 4 5 3 4 2 3 3 3 5 3 4 3 2 4 5 3 3 4 2 4 3 4 3 2 2 23 2 4 2
1 0 0 3 1 1 5 5 1 4 1 3 2 0 . . . 0 0 2 4 3 3 3 4 3 3 3 3 3
2 4 2 2 4 3 3 3 4 4 4 4 3 3 4 5 3 3 3 3 4 3 3 3 3 2 20 3 2 5
3 0 1 4 1 0 4 2 1 4 0 2 1 0 . . . 0 0 3 4 3 3 3 4 5 5 4 3 5
3 5 3 3 5 4 4 3 5 4 3 4 3 5 4 5 4 4 4 3 5 3 4 4 4 1 21 3 2 2
2 1 0 1 2 1 2 3 0 4 4 1 1 0 . . . 0 0 3 5 5 5 5 5 5 5 5 5 5
5 5 3 3 5 5 5 5 5 5 3 4 3 4 5 5 3 4 5 4 5 4 5 4 3 2 39 4 2 4
1 1 0 5 2 0 2 3 0 3 1 0 2 1 . . . 0 0 3 3 3 2 4 4 4 4 4 3 4
5 5 4 5 4 4 3 3 4 4 4 4 3 3 5 5 4 4 4 3 4 4 3 3 4 1 85 3 5 4
2 0 1 6 1 1 2 1 0 2 0 4 2 0 . . . 0 0 5 4 4 4 5 4 4 5 5 5 4
4 4 4 3 4 4 4 4 4 4 4 4 4 4 4 3 4 4 4 4 4 4 4 4 2 19 1 4 2
1 1 1 1 1 1 3 2 1 2 4 2 0 0 . . . 0 0 2 3 3 3 2 3 4 3 3 3 3
3 3 2 2 3 3 3 3 3 3 3 4 2 4 4 4 3 3 3 3 4 3 3 2 3 1 .  5 4 3
1 0 0 1 2 1 1 3 0 5 0 0 3 0 . . . 0 0 3 5 5 5 5 3 5 5 5 5 5
5 5 3 5 5 5 5 5 5 5 4 3 2 2 3 5 3 4 5 2 3 2 3 3 3 1 .  5 5 5
3 0 0 3 5 0 2 1 0 4 0 8 4 0 . . . 0 0 4 4 3 3 2 3 4 3 3 3 3
2 3 2 3 4 3 3 3 2 4 4 4 4 3 5 5 2 3 4 2 5 3 5 3 3 1 28 1 4 2
3 1 1 1 3 1 3 3 0 4 2 0 3 0 . . . 0 0 2 3 3 3 4 3 4 4 4 3 4
4 4 2 2 4 4 4 4 3 4 3 4 3 3 4 5 3 3 4 4 5 4 4 3 3 1 21 3 2 2
2 0 1 2 1 1 2 2 1 2 3 0 5 0 . . . 0 0 2 3 3 3 2 2 2 3 3 3 4
2 4 1 1 2 3 3 3 2 4 4 5 3 4 5 5 5 5 3 5 5 5 4 5 2 21 2 4 3
2 0 1 3 1 1 1 5 0 5 3 0 4 0 . . . 0 0 4 4 4 4 5 5 5 5 5 4 4
4 4 4 3 4 4 4 4 4 4 4 5 4 5 5 5 4 4 5 4 5 4 4 4 4 1 .  5 5 5
3 2 1 3 2 0 4 3 1 3 2 0 3 0 . . . 0 0 3 2 2 4 2 2 4 3 3 4 3
5 3 2 3 3 2 2 2 2 4 4 5 3 4 3 5 2 3 4 2 5 3 3 3 3 2 21 4 4 2
1 0 1 5 2 1 4 4 4 3 4 0 1 0 . . . 0 0 3 4 4 5 4 4 4 4 4 3 3
3 4 4 2 4 4 4 4 3 4 3 3 2 4 4 5 3 4 4 3 5 3 5 5 5 1 20 5 5 3
1 0 0 6 2 1 1 1 0 4 0 8 4 0 . . . 0 0 3 4 3 2 4 2 4 4 3 3 4
4 4 3 2 4 4 3 3 4 4 4 4 3 4 4 5 3 4 4 4 5 4 4 4 2 21 4 4 2
1 0 1 2 1 0 2 2 0 1 2 0 2 0 . . . 0 0 2 2 3 3 3 3 4 3 3 3 3
3 4 4 4 1 2 2 3 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 1 22 5 5 3
2 1 1 1 2 1 2 2 1 3 2 1 4 0 . . . 0 0 3 2 2 3 2 3 2 3 2 2 3
3 3 3 3 3 2 3 3 3 3 3 3 2 3 3 2 2 2 3 2 2 3 2 2 2 3 1 24 3 4 3
2 1 1 1 1 0 5 3 1 5 0 8 3 0 . . . 0 0 5 5 5 5 5 5 5 5 5 5 5
5 5 4 2 5 5 5 5 5 4 3 4 3 3 4 4 5 3 5 5 5 4 4 5 4 1 27 5 5 5
1 1 1 3 1 1 2 5 1 3 2 0 3 0 . . . 0 0 3 3 3 3 3 3 3 3 3 3 2
2 2 3 3 3 3 3 3 3 4 2 3 2 3 3 4 3 3 4 3 5 3 4 4 3 1 21 3 4 1
3 0 1 2 3 1 1 2 0 2 4 3 5 0 . . . 0 0 3 2 2 2 3 3 3 4 4 4 4
2 4 4 4 4 4 4 4 3 2 3 4 3 4 4 4 3 4 4 4 4 4 4 4 1 53 2 4 4
1 1 0 1 1 1 3 3 0 3 4 8 5 0 . . . 0 0 3 5 2 2 3 3 3 5 3 2 3
3 2 1 3 3 5 3 3 2 3 3 4 3 4 4 5 3 3 4 3 4 3 5 4 3 1 49 4 3 4
1 0 1 2 1 1 2 2 0 3 3 1 5 0 . . . 0 0 1 2 2 2 4 4 4 4 4 4 5
5 5 3 2 2 3 2 2 2 4 3 4 3 3 4 5 3 3 5 4 5 3 4 3 3 2 20 5 4 2
1 1 1 1 1 0 5 4 1 5 2 7 4 0 . . . 0 0 5 4 4 5 5 5 5 4 4 5 5
5 5 5 5 5 4 5 5 5 4 2 5 5 4 5 5 3 3 5 3 5 3 4 3 3 1 23 5 4 5
1 0 1 3 2 0 5 5 0 5 4 2 4 0 . . . 0 0 4 3 3 4 4 4 5 4 4 4 5
5 5 3 3 4 4 4 4 4 4 4 4 4 4 5 5 4 4 4 5 4 4 4 4 1 .  4 5 4
2 1 0 3 1 1 5 5 1 4 5 0 4 0 . . . 0 0 5 4 4 3 4 5 5 5 5 4 5
```

```
5 5 4 5 5 5 5 5 5 4 5 4 5 5 5 5 4 4 4 5 4 5 5 4 1 41 1 3 4
1 1 0 1 1 1 5 5 1 4 0 1 4 0 . . . 0 0 2 2 2 1 4 1 3 3 3 2 2
2 3 3 3 2 3 3 2 2 4 3 4 3 4 5 3 3 4 3 4 4 3 4 4 4 1 21 3 4 1
1 0 0 6 2 0 5 2 1 5 3 0 3 0 . . . 0 0 4 5 4 4 5 5 5 5 5 4 4
4 5 3 3 5 5 4 4 5 5 3 5 5 5 5 5 5 4 5 5 4 5 4 5 4 4 2 51 5 3 4
PROC STEPWISE DATA = TEST2A;
MODEL OSD = OMD NMD NUD DRD FCD;
PROC RSQUARE DATA = TEST2A OUTEST = EST CP ADJRSQ SSE AIC;
MODEL OSD = OMD NMD NUD DRD FCD;
PROC CORR;
VAR OSD OMD NMD NUD DRD FCD;
RUN;
```

SAS OUTPUT – Stepwise regression analysis for DE population with 5 independent variables.

Stepwise Procedure for Dependent Variable OSD

Step 1   Variable DRD Entered   R-square = 0.48232249   C(p) = 9.93447766

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	1	23.87032559	23.87032559	70.81	0.0001
Error	76	25.62005903	0.33710604		
Total	77	49.49038462			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob>F
INTERCEP	0.73437335	0.34189659	1.55528802	4.61	0.0349
DRD	0.76731317	0.09118570	23.87032559	70.81	0.0001

Bounds on condition number: 1,   1

Step 2   Variable NUD Entered   R-square = 0.52482180   C(p) = 5.04378361

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	2	25.97363275	12.98681638	41.42	0.0001
Error	75	23.51675186	0.31355669		
Total	77	49.49038462			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob>F
INTERCEP	0.45997570	0.34634102	0.55306732	1.76	0.1882
NUD	0.24314174	0.09387851	2.10330716	6.71	0.0115
DRD	0.60185274	0.10869825	9.61283457	30.66	0.0001

Bounds on condition number: 1.527714,   6.110856

```
Step 3    Variable FCD Entered      R-square = 0.54536946   C(p) = 3.71225530

                  DF       Sum of Squares    Mean Square        F    Prob>F

Regression         3        26.99054445      8.99684815     29.59    0.0001
Error             74        22.49984017      0.30405189
Total             77        49.49038462

                Parameter        Standard         Type II
Variable         Estimate          Error     Sum of Squares      F    Prob>F

INTERCEP        0.19693373       0.37014027      0.08607068     0.28    0.5963
NUD             0.20318992       0.09499086      1.39119621     4.58    0.0357
DRD             0.51709200       0.11664155      5.97553503    19.65    0.0001
FCD             0.19720256       0.10783128      1.01691170     3.34    0.0715

Bounds on condition number:      1.814145,     14.94799
----------------------------------------------------------------------
```

All variables 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 OSD

          Variable        Number   Partial    Model
Step    Entered Removed     In      R**2      R**2      C(p)        F     Prob>F

  1     DRD                  1      0.4823    0.4823    9.9345    70.8095   0.0001
  2     NUD                  2      0.0425    0.5248    5.0438     6.7079   0.0115
  3     FCD                  3      0.0205    0.5454    3.7123     3.3445   0.0715
```

SAS PROGRAM - Stepwise regression analysis for DE population with 11 independent variables.

```
DATA TEST2B;
INPUT Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16
Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24 Q25 Q26 Q27 Q28 Q29 Q30 Q31
Q32 Q33 Q34 Q35 Q36 Q37 Q38 Q39 Q40 Q41 Q42 Q43 Q44 Q45 Q46
Q47 Q48 Q49 Q50 Q51 Q52 Q53 Q54 Q55 Q56 Q57 Q58 Q59 Q60 @@;
OSD = (Q10 * 0.5) + (Q39 * 0.5);
OMD = (Q22 + Q28 + Q37) / 3;
NMD = (Q23 + Q29 + Q38) / 3;
NUD = (Q21 + Q27 + Q36) / 3;
DRD = (Q20 + Q26 + Q35) / 3;
FCD = (Q30 + Q31 + Q32 + Q33 + Q34) / 5;
 X6 = Q3;
 X7 = (Q4 * Q5);
 X8 = Q6;
 X9 = (Q7 + Q8) / 2;
X10 = Q9;
X11 = Q13;
CARDS;
1 0 1 6 2 1 3 4 0 4 4 3 4 1 3 3 1 0 0 4 4 4 4 4 5 5 5 5 5 5
5 5 4 5 4 4 4 4 4 4 4 4 4 4 4 4 5 3 4 4 4 4 4 4 4 2 60 3 5 4
1 0 0 2 1 1 5 5 1 5 4 6 4 1 5 5 3 0 0 3 5 4 4 5 4 4 5 4 4 5
5 5 5 5 4 5 5 5 4 5 4 5 5 5 5 5 4 5 5 4 5 4 5 4 4 2 43 4 5 4
```

```
1 0 0 6 1 1 3 3 1 3 5 0 1 1 4 4 5 0 0 4 4 4 4 4 4 4 4 4 4 4
4 4 3 3 4 4 4 4 4 4 5 4 3 5 4 4 4 2 4 4 4 4 4 4 4 1 21 3 2 1
2 1 0 1 1 0 2 3 1 1 0 4 4 1 3 3 2 0 0 2 3 3 2 3 5 3 5 4 4 4
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4 5 3 3 5 5 4 4 5 5 3 5 5 5 5 5 4 5 5 4 5 4 5 4 5 4 4 2 51 5 3 4
PROC STEPWISE DATA = TEST2B;
MODEL  OSD = OMD NMD NUD DRD FCD X6 X7 X8 X9 X10 X11;
PROC RSQUARE DATA = TEST2B OUTEST = EST CP ADJRSQ SSE AIC;
MODEL OSD = OMD NMD NUD DRD FCD X6 X7 X8 X9 X10 X11;
```

```
PROC CORR;
VAR OSD OMD NMD NUD DRD FCD X6 X7 X8 X9 X10 X11;
RUN;
```

SAS OUTPUT - Stepwise regression analysis for DE population with 11 independent variables.

Stepwise Procedure for Dependent Variable OSD

Step 1   Variable DRD Entered   R-square = 0.48232249   C(p) = 6.39773526

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	1	23.87032559	23.87032559	70.81	0.0001
Error	76	25.62005903	0.33710604		
Total	77	49.49038462			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob>F
INTERCEP	0.73437335	0.34189659	1.55528802	4.61	0.0349
DRD	0.76731317	0.09118570	23.87032559	70.81	0.0001

Bounds on condition number: 1,   1

Step 2   Variable NUD Entered   R-square = 0.52482180   C(p) = 1.79739400

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	2	25.97363275	12.98681638	41.42	0.0001
Error	75	23.51675186	0.31355669		
Total	77	49.49038462			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob>F
INTERCEP	0.45997570	0.34634102	0.55306732	1.76	0.1882
NUD	0.24314174	0.09387851	2.10330716	6.71	0.0115
DRD	0.60185274	0.10869825	9.61283457	30.66	0.0001

Bounds on condition number: 1.527714,   6.110856

Step 3   Variable FCD Entered   R-square = 0.54536946   C(p) = 0.60624611

	DF	Sum of Squares	Mean Square	F	Prob>F
Regression	3	26.99054445	8.99684815	29.59	0.0001
Error	74	22.49984017	0.30405189		
Total	77	49.49038462			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob>F
INTERCEP	0.19693373	0.37014027	0.08607068	0.28	0.5963
NUD	0.20318992	0.09499086	1.39119621	4.58	0.0357
DRD	0.51709200	0.11664155	5.97553503	19.65	0.0001
FCD	0.19720256	0.10783128	1.01691170	3.34	0.0715

Bounds on condition number: 1.814145,   14.94799

All variables 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 OSD

Step	Variable Entered Removed	Number In	Partial R**2	Model R**2	C(p)	F	Prob>F
1	DRD	1	0.4823	0.4823	6.3977	70.8095	0.0001
2	NUD	2	0.0425	0.5248	1.7974	6.7079	0.0115
3	FCD	3	0.0205	0.5454	0.6062	3.3445	0.0715

SAS OUTPUT - Regression models for dependent variable: OSI with 5 independent variables (IE).

Variables			R-square	Adj.Rsq.	C(p)	|C(p)-p|	F	Prob>F
DRI	--	--	0.47347	0.49218	66.966	64.966	382.859	0.0001
NUI	--	--	0.47031	0.46896	87.902	85.902	348.942	0.0001
OMI	--	--	0.46162	0.46025	95.800	93.800	336.969	0.0001
NMI	--	--	0.43650	0.43507	118.500	116.500	304.432	0.0001
FCI	--	--	0.28776	0.28595	252.900	250.900	158.781	0.0001
NMI	DRI	--	0.54485	0.54253	22.509	19.509	234.626	0.0001
NMI	NUI	--	0.54231	0.53998	24.804	21.804	232.238	0.0001
OMI	DRI	--	0.54028	0.53793	26.642	23.642	230.334	0.0001
NUI	DRI	--	0.53051	0.52812	35.472	32.472	221.475	0.0001
DRI	FCI	--	0.51009	0.50759	53.940	50.940	204.069	0.0001
OMI	NMI	--	0.50882	0.50631	55.084	52.084	203.038	0.0001
OMI	NUI	--	0.50658	0.50406	57.113	54.113	201.224	0.0001
NUI	FCI	--	0.49017	0.48757	71.941	68.941	188.445	0.0001
OMI	FCI	--	0.48842	0.48581	73.528	70.528	187.126	0.0001
NMI	FCI	--	0.46362	0.46089	95.900	92.900	169.413	0.0001
NMI	NUI	DRI	0.56611	0.56278	5.286	1.286	170.050	0.0001
OMI	NMI	DRI	0.55964	0.55626	11.140	7.140	165.634	0.0001
NMI	DRI	FCI	0.54854	0.54507	21.174	17.174	158.358	0.0001
OMI	NUI	DRI	0.54733	0.54386	22.263	18.263	157.590	0.0001
OMI	DRI	FCI	0.54667	0.54319	22.860	18.860	157.170	0.0001
OMI	NMI	NUI	0.54649	0.54301	23.025	19.025	157.055	0.0001
NUI	NUI	FCI	0.54511	0.54162	24.269	20.269	156.186	0.0001
OMI	DRI	FCI	0.53740	0.53385	31.240	27.240	151.410	0.0001

Variables			R-square	Adj.Rsq.	C(p)	¦C(p)-p¦	F	Prob>F
OMI	NMI	FCI	0.51921	0.51552	47.692	43.692	140.746	0.0001
OMI	NUI	FCI	0.51853	0.51484	48.301	44.301	140.368	0.0001
OMI NMI NUI DRI	--	--	0.56866	<u>0.56424</u>	4.982	0.018	128.539	0.0001
NMI NUI DRI FCI	--	--	0.56717	0.56273	6.326	1.326	127.763	0.0001
OMI NMI DRI FCI	--	--	0.56200	0.55751	11.000	6.000	120.137	0.0001
OMI NUI DRI FCI	--	--	0.55201	0.54741	20.038	15.038	125.104	0.0001
OMI NMI NUI FCI	--	--	0.54926	0.54463	22.524	17.524	120.137	0.0001
OMI NMI NUI DRI FCI		--	0.56975	<u>0.56421</u>	6.000	0.000	103.023	0.0001

SAS OUPUT - Regression models for dependent variable: OSD
with 5 independent variables (DE).

Variables			R-square	Adj.Rsq.	C(p)	¦C(p)-p¦	F	Prob>F
DRD	--	--	0.48232	0.47551	9.935	7.935	78.110	0.0001
NUD	--	--	0.33059	0.32178	34.537	32.537	37.532	0.0001
FCD	--	--	0.29987	0.29066	39.516	37.516	32.552	0.0001
OMD	--	--	0.29725	0.28800	39.942	37.942	32.146	0.0001
NMD	--	--	0.23957	0.22956	49.294	47.294	23.943	0.0001
NUD	DRD	--	0.52482	0.51215	5.044	2.044	41.418	0.0001
DRD	FCD	--	0.51726	0.50439	6.270	3.270	40.181	0.0001
OMD	DRD	--	0.49971	0.48637	9.115	6.115	37.457	0.0001
NMD	DRD	--	0.48431	0.47055	11.613	8.613	35.217	0.0001
NUD	FCD	--	0.42463	0.40929	21.289	18.289	27.675	0.0001
OMD	FCD	--	0.38758	0.37125	27.296	24.296	23.732	0.0001
NMD	NUD	--	0.35190	0.33462	33.081	30.081	20.361	0.0001
OMD	NUD	--	0.34952	0.33217	33.468	30.468	20.149	0.0001
NMD	FCD	--	0.34077	0.32319	34.885	31.885	19.385	0.0001
OMD	NMD	--	0.30426	0.28571	40.805	37.805	16.399	0.0001
NUD	DRD	FCD	0.54537	0.52694	3.712	0.288	29.590	0.0001
NMD	NUD	DRD	0.52775	0.50860	6.569	2.569	27.565	0.0001
OMD	NUD	DRD	0.52506	0.50580	7.006	3.006	27.269	0.0001
OMD	DRD	FCD	0.52408	0.50478	7.165	3.165	27.162	0.0001
NMD	DRD	FCD	0.51789	0.49834	8.168	4.168	26.497	0.0001
OMD	NMD	DRD	0.50314	0.48299	10.560	6.560	24.978	0.0001
OMD	NUD	FCD	0.42730	0.40408	22.855	18.855	18.404	0.0001
NMD	NUD	FCD	0.42497	0.40166	23.233	19.233	18.203	0.0001

Variables			R-square	Adj.Rsq.	C(p)	¦C(p)-p¦	F	Prob>F
OMD	NMD	FCD	0.38779	0.36297	29.261	25.261	15.625	0.0001
OMD	NMD	NUD	0.35553	0.32940	34.492	30.492	13.608	0.0001
NMD NUD DRD FCD	--	--	0.55569	0.53134	4.040	0.960	22.825	0.0001
OMD NUD DRD FCD	--	--	0.54704	0.52222	5.441	0.441	22.041	0.0001
OMD NMD DRD FCD	--	--	0.53404	0.50851	7.549	2.549	20.916	0.0001
OMD NMD NUD DRD	--	--	0.52806	0.50220	8.519	3.519	20.420	0.0001
OMD NMD NUD FCD	--	--	0.42748	0.39611	24.826	19.826	13.627	0.0001
OMD NMD NUD DRD FCD	--	0.55593	0.52509	6.000	0.000	18.027	0.0001

SAS OUTPUT - Regression models for dependent variable: OSD with 11 independent variables (DE).

Variables			R-square	Adj.Rsq.	C(p)	|C(p)-p|	F	Prob>F
DRD	--	--	0.48232	0.47551	6.398	4.398	70.810	0.0001
NUD	--	--	0.33059	0.32178	29.963	27.963	37.532	0.0001
FCD	--	--	0.29987	0.29066	34.733	32.733	32.552	0.0001
OMD	--	--	0.29725	0.28800	35.140	33.140	32.146	0.0001
NMD	--	--	0.23957	0.22956	44.099	42.099	23.943	0.0001
X9	--	--	0.08030	0.06820	68.834	66.834	6.636	0.0119
X8	--	--	0.00793	-0.00513	80.074	78.074	0.607	0.4383
X10	--	--	0.00754	-0.00551	80.133	78.133	0.578	0.4496
X7	--	--	0.00458	-0.00851	80.593	78.593	0.350	0.5559
X6	--	--	0.00162	-0.01152	81.053	79.053	0.123	0.7265
X11	--	--	0.00146	-0.01168	81.077	79.077	0.111	0.7395
NUD	DRD	--	0.52482	0.51215	1.797	1.203	41.418	0.0001
DRD	FCD	--	0.51726	0.50439	2.972	0.028	40.181	0.0001
DRD	X8	--	0.50428	0.49107	4.987	1.987	38.148	0.0001
OMD	DRD	--	0.49971	0.48637	5.697	2.697	37.457	0.0001
DRD	X9	--	0.49971	0.48636	5.698	2.698	37.456	0.0001
DRD	X11	--	0.48712	0.47344	7.653	4.653	35.616	0.0001
DRD	X10	--	0.48635	0.47265	7.773	4.773	35.506	0.0001
NMD	DRD	--	0.48431	0.47055	8.090	5.090	35.217	0.0001
DRD	X6	--	0.48429	0.47054	8.092	5.092	35.215	0.0001
DRD	X7	--	0.48256	0.46876	8.361	5.361	34.972	0.0001
NUD	FCD	--	0.42463	0.40928	17.358	14.358	27.675	0.0001
NUD	DRD	FCD	0.54537	0.52694	0.606	3.394	29.590	0.0001

Variables	R-square	Adj.Rsq.	C(p)	|C(p)-p|	F	Prob>F
NUD DRD X9	0.53918	0.52050	1.567	2.433	28.861	0.0001
DRD FCD X8	0.53555	0.51672	2.131	1.869	28.443	0.0001
NUD DRD X8	0.53352	0.51461	2.447	1.553	28.212	0.0001
NUD DRD X11	0.53109	0.51208	2.824	1.176	27.938	0.0001
DRD FCD X9	0.53109	0.51208	2.824	1.176	27.937	0.0001
NMD NUD DRD	0.52775	0.50860	3.343	0.657	27.565	0.0001
NUD DRD X10	0.52588	0.50665	3.634	0.366	27.359	0.0001
NUD DRD X7	0.52546	0.50622	3.698	0.302	27.314	0.0001
OMD NUD DRD	0.52506	0.50580	3.761	0.239	27.269	0.0001
NUD DRD X6	0.52487	0.50561	3.790	0.210	27.249	0.0001
NUD DRD FCD X9 -- --	0.55759	<u>0.53335</u>	0.708	4.292	23.002	0.0001
NMD NUD DRD FCD -- --	0.55569	0.53134	1.004	3.996	22.825	0.0001
NUD DRD FCD X8 -- --	0.55391	0.52947	1.280	3.720	22.661	0.0001
NUD DRD FCD X10 -- --	0.54765	0.52286	2.253	2.747	22.095	0.0001
NUD DRD FCD X11 -- --	0.54716	0.52234	2.329	2.671	22.051	0.0001
OMD NUD DRD FCD -- --	0.54704	0.52222	2.346	2.654	22.041	0.0001
DRD FCD X8 X9 -- --	0.54692	0.52210	2.365	2.635	22.030	0.0001
NUD DRD X8 X9 -- --	0.54632	0.52146	2.458	2.542	21.977	0.0001
NUD DRD FCD X7 -- --	0.54608	0.52121	2.496	2.504	21.955	0.0001
NUD DRD FCD X6 -- --	0.54591	0.52102	2.523	2.477	21.940	0.0001

Variables			R-square	Adj.Rsq.	C(p)	|C(p)-p|	F	Prob>F
NUD DRD X9 X11	--	--	0.54407	0.51909	2.808	2.192	21.778	0.0001
NMD NUD DRD FCD X9	--		0.56597	<u>0.53583</u>	1.407	4.593	18.777	0.0001
NUD DRD FCD X8 X9	--		0.56471	0.53448	1.602	4.398	18.681	0.0001
NMD NUD DRD FCD X8	--		0.56263	0.53225	1.926	4.074	18.524	0.0001
NUD DRD FCD X9 X11	--		0.55884	0.52820	2.515	3.485	18.241	0.0001
NUD DRD FCD X7 X9	--		0.55882	0.52819	2.517	3.483	18.240	0.0001
OMD NUD DRD FCD X9	--		0.55872	0.52807	2.533	3.467	18.232	0.0001
NMD NUD DRD FCD X10	--		0.55834	0.52767	2.592	3.408	18.204	0.0001
NUD DRD FCD X9 X10	--		0.55790	0.52720	2.661	3.339	18.172	0.0001
NUD DRD FCD X6 X9	--		0.55772	0.52701	2.688	3.312	18.159	0.0001
NMD NUD DRD FCD X11	--		0.55641	0.52560	2.892	3.108	18.062	0.0001
NMD NUD DRD FCD X7	--		0.55618	0.52536	2.927	3.073	18.046	0.0001
NMD NUD DRD FCD X8	X9		0.57186	<u>0.53568</u>	2.493	4.507	15.805	0.0001
NMD NUD DRD FCD X7	X8		0.56690	0.53030	3.263	3.737	15.489	0.0001
NMD NUD DRD FCD X9	X10		0.56652	0.52989	3.321	3.679	15.465	0.0001
NUD DRD FCD X7 X8	X9		0.56649	0.52985	3.327	3.673	15.463	0.0001
NMD NUD DRD FCD X9	X11		0.56645	0.52981	3.333	3.667	15.460	0.0001

Variables			R-square	Adj.Rsq.	C(p)	|C(p)-p|	F	Prob>F
OMD	NMD	NUD						
DRD	FCD	X9	0.56628	0.52963	3.359	3.641	15.450	0.0001
NMD	NUD	DRD						
FCD	X6	X9	0.56597	0.52930	3.406	3.594	15.431	0.0001
NUD	DRD	FCD						
X8	X9	X11	0.56596	0.52928	3.409	3.591	15.430	0.0001
OMD	NUD	DRD						
FCD	X8	X9	0.56592	0.52924	3.415	3.585	15.427	0.0001
NUD	DRD	FCD						
X6	X8	X9	0.56509	0.52833	3.544	3.456	15.375	0.0001
NUD	DRD	FCD						
X8	X9	X10	0.56490	0.52813	3.573	3.427	15.363	0.0001
NMD	NUD	DRD						
FCD	X7	X8						
X9	--	--	0.57325	<u>0.53057</u>	4.277	3.723	13.433	0.0001
NMD	NUD	DRD						
FCD	X7	X9						
X11	--	--	0.57238	0.52962	4.411	3.589	13.385	0.0001
NMD	NUD	DRD						
FCD	X8	X9						
X10	--	--	0.57224	0.52947	4.432	3.568	13.378	0.0001
OMD	NMD	NUD						
DRD	FCD	X8						
X9	--	--	0.57201	0.52921	4.469	3.531	13.365	0.0001
NMD	NUD	DRD						
FCD	X6	X8						
X9	--	--	0.57196	0.52916	4.476	3.524	13.362	0.0001
NUD	DRD	FCD						
X7	X8	X9						
X11	--	--	0.56784	0.52462	5.117	2.883	13.139	0.0001
NMD	NUD	DRD						
FCD	X7	X9						
X10	--	--	0.56748	0.52423	5.172	2.828	13.121	0.0001
NMD	NUD	DRD						
FCD	X7	X9						
X11	--	--	0.56743	0.52417	5.180	2.820	13.118	0.0001

Variables			R-square	Adj.Rsq.	C(p)	¦C(p)-p¦	F	Prob>F
OMD	NUD	DRD						
FCD	X7	X8						
X9	--	--	0.56738	0.52412	5.187	2.813	13.115	0.0001
OMD	NMD	NUD						
DRD	FCD	X7						
X9	--	--	0.56734	0.52408	5.194	2.806	13.113	0.0001
NMD	NUD	DRD						
FCD	X9	X10						
X11	--	--	0.56728	0.52401	5.203	2.797	13.110	0.0001
NMD	NUD	DRD						
FCD	X7	X8						
X9	X11	--	0.57385	<u>0.52444</u>	6.184	2.816	11.614	0.0001
NMD	NUD	DRD						
FCD	X7	X8						
X9	X10	--	0.57366	0.52423	6.213	2.787	11.605	0.0001
OMD	NMD	NUD						
DRD	FCD	X7						
X8	X9	--	0.57351	0.52406	6.236	2.764	11.598	0.0001
NMD	NUD	DRD						
FCD	X6	X7						
X8	X9	--	0.57325	0.52377	6.277	2.723	11.586	0.0001
NMD	NUD	DRD						
FCD	X8	X9						
X10	X11	--	0.57301	0.52351	6.313	2.687	11.575	0.0001
OMD	NMD	NUD						
DRD	FCD	X8						
X9	X11	--	0.57264	0.52309	6.371	2.629	11.557	0.0001
NMD	NUD	DRD						
FCD	X6	X8						
X9	X11	--	0.57245	0.52288	6.400	2.600	11.548	0.0001
NMD	NUD	DRD						
FCD	X6	X8						
X9	X10	--	0.57242	0.52285	6.404	2.596	11.547	0.0001
OMD	NMD	NUD						
DRD	FCD	X8						
X9	X10	--	0.57240	0.52282	6.408	2.592	11.546	0.0001

Variables			R-square	Adj.Rsq.	C(p)	|C(p)-p|	F	Prob>F
OMD NMD NUD DRD FCD X6 X8 X9 --			0.57216	0.52256	6.445	2.555	11.534	0.0001
NUD DRD FCD X7 X8 X9 X10 X11 --			0.56838	0.51834	7.032	1.968	11.358	0.0001
NMD NUD DRD FCD X7 X8 X9 X10 X11			0.57453	<u>0.51822</u>	8.077	1.923	10.203	0.0001
OMD NMD NUD DRD FCD X7 X8 X9 X11			0.57427	0.51793	8.117	1.883	10.192	0.0001
OMD NMD NUD DRD FCD X7 X8 X9 X10			0.57393	0.51754	8.170	1.830	10.178	0.0001
NMD NUD DRD FCD X6 X7 X8 X9 X11			0.57386	0.51746	8.181	1.819	10.175	0.0001
NMD NUD DRD FCD X6 X7 X8 X9 X10			0.57366	0.51724	8.212	1.788	10.166	0.0001
OMD NMD NUD DRD FCD X6 X7 X8 X9			0.57351	0.51706	8.236	1.764	10.160	0.0001
OMD NMD NUD DRD FCD X8 X9 X10 X11			0.57332	0.51685	8.266	1.734	10.152	0.0001
NMD NUD DRD FCD X6 X8 X9 X10 X11			0.57316	0.51667	8.290	1.710	10.146	0.0001
OMD NMD NUD DRD FCD X6 X8 X9 X11			0.57277	0.51622	8.351	1.649	10.129	0.0001
OMD NMD NUD DRD FCD X6 X8 X9 X10			0.57265	0.51609	8.370	1.630	10.124	0.0001

Variables			R-square	Adj.Rsq.	C(p)	|C(p)-p|	F	Prob>F
OMD	NMD	NUD						
DRD	FCD	X7						
X9	X10	X11	0.56905	0.51202	8.928	1.072	9.977	0.0001
OMD	NMD	NUD						
DRD	FCD	X7						
X8	X9	X10						
X11	--	--	0.57502	0.51159	10.001	0.999	9.065	0.0001
NMD	NUD	DRD						
FCD	X6	X7						
X8	X9	X10						
X11	--	--	0.57453	0.51103	10.077	0.923	9.047	0.0001
OMD	NMD	NUD						
DRD	FCD	X6						
X7	X8	X9						
X10	--	--	0.57427	0.51073	10.117	0.883	9.038	0.0001
OMD	NMD	NUD						
DRD	FCD	X6						
X7	X8	X9						
X11	--	--	0.57395	0.51036	10.168	0.832	9.026	0.0001
OMD	NMD	NUD						
DRD	FCD	X6						
X8	X9	X10						
X11	--	--	0.57355	0.50990	10.230	0.770	9.011	0.0001
OMD	NMD	NUD						
DRD	FCD	X6						
X7	X9	X10						
X11	--	--	0.56906	0.50474	10.927	0.073	8.847	0.0001
OMD	NUD	DRD						
FCD	X6	X7						
X8	X9	X10						
X11	--	--	0.56886	0.50451	10.958	0.042	8.840	0.0001
OMD	NMD	NUD						
DRD	FCD	X6						
X7	X8	X10						
X11	--	--	0.56801	0.50354	11.090	0.090	8.810	0.0001
OMD	NMD	DRD						
FCD	X6	X7						
X8	X9	X10						
X11	--	--	0.56340	0.49823	11.807	0.807	8.646	0.0001

Variables			R-square	Adj.Rsq.	C(p)	¦C(p)-p¦	F	Prob>F
OMD	NMD	NUD						
DRD	X6	X7						
X8	X9	X10						
X11	--	--	0.55556	0.48922	13.024	2.024	8.375	0.0001
OMD	NMD	NUD						
FCD	X6	X7						
X8	X9	X10						
X11	--	--	0.45607	0.37489	28.475	17.475	5.618	0.0001
OMD	NMD	NUD						
DRD	FCD	X6						
X7	X8	X9						
X10	X11	--	0.57503	0.50420	12.000	0.000	8.119	0.0001

SAS OUTPUT – Correlation matrix for dependent variable: OSI with 5 independent variables (IE).

CORRELATION ANALYSIS

6 'VAR' Variables: OSI   OMI   NMI   NUI   DRI   FCI

Variable	N	Mean	Std Dev	Sum
OSI	396	3.56709	0.71686	1409.00000
OMI	396	3.44979	0.76732	1363.00000
NMI	396	3.46835	0.78945	1370.00000
NUI	396	3.61435	0.77726	1428.00000
DRI	396	3.63122	0.80107	1434.00000
FCI	396	3.61418	0.70704	1428.00000

Simple Statistics

Variable	Minimum	Maximum
OSI	1.50000	5.00000
OMI	1.00000	5.00000
NMI	1.00000	5.00000
NUI	1.00000	5.00000
DRI	1.00000	5.00000
FCI	1.00000	5.00000

CORRELATION ANALYSIS

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

	OSI	OMI	NMI	NUI	DRI	FCI
OSI	1.00000	0.67943	0.66068	0.68579	0.70247	0.53643
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
	396	396	396	396	396	396
OMI	0.67943	1.00000	0.51014	0.34031	0.97149	0.96669
	0.0001	0.0	0.1965	0.4095	0.0001	0.0001
	396	396	396	396	396	396
NMI	0.66068	0.51014	1.00000	0.98543	0.60712	0.87023
	0.0001	0.1965	0.0	0.0001	0.1104	0.0049
	396	396	396	396	396	396

CORRELATION ANALYSIS

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

	OSI	OMI	NMI	NUI	DRI	FCI
NUI	0.68579	0.34031	0.98543	1.00000	0.52787	0.68641
	0.0001	0.4095	0.0001	0.0	0.1787	0.0601
	396	396	396	396	396	396
DRI	0.70247	0.97149	0.60712	0.52787	1.00000	0.91650
	0.0001	0.0001	0.1104	0.1787	0.0	0.0014
	396	396	396	396	396	396
FCI	0.53643	0.96669	0.87023	0.68641	0.91650	1.00000
	0.0001	0.0001	0.0049	0.0601	0.0014	0.0
	396	396	396	396	396	396

SAS OUTPUT – Correlation matrix for dependent variable: OSD with 11 independent variables (DE).

CORRELATION ANALYSIS

12 'VAR' Variables: OSD   OMD   NMD   NUD   DRD   FCD
                     X6   X7   X8   X9   X10   X11

Simple Statistics

Variable	N	Mean	Std Dev	Sum
OSD	78	3.55769	0.80171	277.50000
OMD	78	3.46581	0.82413	270.33333
NMD	78	3.44444	0.79983	268.66667
NUD	78	3.63248	0.84017	283.33333
DRD	78	3.67949	0.72562	287.00000
FCD	78	3.65128	0.72680	284.80000
X6	78	0.50000	0.50324	39.00000
X7	78	5.00000	4.66543	390.00000
X8	78	0.62821	0.48641	49.00000
X9	78	3.11538	1.12793	243.00000
X10	78	0.46154	0.63843	36.00000
X11	78	3.26923	1.18072	255.00000

Simple Statistics

Variable	Minimum	Maximum
OSD	1.00000	5.00000
OMD	1.00000	5.00000
NMD	1.66667	5.00000
NUD	1.00000	5.00000
DRD	2.00000	5.00000
FCD	2.00000	5.00000
X6	0.00000	1.00000
X7	1.00000	5.00000
X8	0.00000	1.00000
X9	1.00000	4.00000
X10	0.00000	6.00000
X11	0.01031	0.05388

CORRELATION ANALYSIS

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

	OSD	OMD	NMD	NUD	DRD	FCD
OSD	1.00000	0.54521	0.48945	0.57497	0.69449	0.54761
	0.0	0.0001	0.0001	0.0001	0.0001	0.0001
	78	78	78	78	78	78
OMD	0.54521	1.00000	0.38073	-0.01524	0.75848	0.58378
	0.0001	0.0	0.0664	0.9375	0.0001	0.0011
	78	78	78	78	78	78
NMD	0.48945	0.38073	1.00000	0.37604	0.86271	0.63435
	0.0001	0.0664	0.0	0.0055	0.0001	0.0001
	78	78	78	78	78	78

CORRELATION ANALYSIS

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

	OSD	OMD	NMD	NUD	DRD	FCD
NUD	0.57497	-0.01524	0.37604	1.00000	0.38387	0.82005
	0.0001	0.9375	0.0055	0.0	0.0003	0.0001
	78	78	78	78	78	78
DRD	0.69449	0.75848	0.86271	0.38387	1.00000	0.74054
	0.0001	0.0001	0.0001	0.0003	0.0	0.0001
	78	78	78	78	78	78
FCD	0.54761	0.58378	0.63435	0.82005	0.74054	1.00000
	0.0001	0.0011	0.0001	0.0001	0.0001	0.0
	78	78	78	78	78	78

CORRELATION ANALYSIS

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

	OSD	OMD	NMD	NUD	DRD	FCD
X6	-0.04024	-0.18992	0.68608	0.67403	-0.41545	0.49957
	0.7265	0.5155	0.0004	0.0002	0.0312	0.0110
	78	78	78	78	78	78
X7	0.6771	0.31638	0.87520	0.12622	-0.38074	0.50072
	0.5559	0.2160	0.0001	0.4769	0.0240	0.0030
	78	78	78	78	78	78
X8	0.8902	-0.24870	-0.78229	-0.74459	0.67910	-0.52276
	0.4383	0.2525	0.0001	0.0001	0.0001	0.0001
	78	78	78	78	78	78

CORRELATION ANALYSIS

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

	OSD	OMD	NMD	NUD	DRD	FCD
X9	0.28337	0.07335	0.72157	0.35793	0.06985	0.24555
	0.0119	0.7162	0.0001	0.0034	0.5714	0.0505
	78	78	78	78	78	78
X10	0.08686	0.17167	-0.66130	-0.14800	0.50476	-0.21622
	0.4494	0.5407	0.0002	0.4269	0.0032	0.2511
	78	78	78	78	78	78
X11	0.03826	0.03951	-0.04213	-0.11789	0.49811	-0.57667
	0.7395	0.8888	0.8381	0.5135	0.0027	0.0007
	78	78	78	78	78	78

CORRELATION ANALYSIS

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

	X6	X7	X8	X9	X10	X11
OSD	-0.04024	0.06771	0.08902	0.28337	0.08686	0.03826
	0.7265	0.5559	0.4383	0.0119	0.4496	0.7395
	78	78	78	78	78	78
OMD	-0.18992	0.31638	-0.24870	0.07335	0.17167	0.03951
	0.5155	0.2160	0.2525	0.7162	0.5407	0.8888
	78	78	78	78	78	78
NMD	0.68608	0.87520	-0.78229	0.72157	-0.66130	-0.04213
	0.0004	0.0001	0.0001	0.0001	0.0002	0.8381
	78	78	78	78	78	78

CORRELATION ANALYSIS

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

	X6	X7	X8	X9	X10	X11
NUD	0.67403	0.12622	-0.74459	0.35793	-0.14800	-0.11789
	0.0002	0.4769	0.0001	0.0034	0.4269	0.5135
	78	78	78	78	78	78
DRD	-0.41545	-0.38074	0.67910	0.06985	0.50476	0.49811
	0.0312	0.0240	0.0001	0.5714	0.0032	0.0027
	78	78	78	78	78	78
FCD	0.49957	0.50072	-0.52276	0.24555	-0.21622	-0.57667
	0.0110	0.0030	0.0001	0.0505	0.2511	0.0007
	78	78	78	78	78	78

CORRELATION ANALYSIS

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

	X6	X7	X8	X9	X10	X11
X6	1.00000	0.65642	-0.64572	0.65476	-0.75686	-0.03507
	0.0	0.0108	0.0012	0.0005	0.0017	0.9053
	78	78	78	78	78	78
X7	0.65642	1.00000	-0.86308	0.75489	-0.67737	-0.14908
	0.0108	0.0	0.0001	0.0001	0.0028	0.5549
	78	78	78	78	78	78
X8	-0.64572	-0.86308	1.00000	-0.48246	0.59066	0.44917
	0.0012	0.0001	0.0	0.0006	0.0030	0.0277
	78	78	78	78	78	78

CORRELATION ANALYSIS

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

	X6	X7	X8	X9	X10	X11
X9	0.65476	0.75489	-0.48246	1.00000	-0.71956	-0.01225
	0.0005	0.0001	0.0006	0.0	0.0001	0.9488
	78	78	78	78	78	78
X10	-0.75686	-0.67737	0.59066	-0.71956	1.00000	0.16911
	0.0017	0.0028	0.0030	0.0001	0.0	0.5164
	78	78	78	78	78	78
X11	-0.03507	-0.14908	0.44917	-0.01225	0.16911	1.00000
	0.9053	0.5549	0.0277	0.9488	0.5164	0.0
	78	78	78	78	78	78