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THE EMPIRICAL TEST OF TOTAL QUALITY MANAGEMENT; AN APPLICATION OF TQM AT CHEVRON AND ITS IMPACT ON PRODUCTIVITY

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THE EMPIRICAL TEST OF TOTAL QUALITY MANAGEMENT; APPLICATION OF TOTAL QUALITY MANAGEMENT AT CHEVRON CORPORATION AND ITS IMPACT ON PRODUCTIVITY.

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ABSTRACT

This dissertation investigates the effects of successful implementation of Total Quality Management (TQM) philosophy in a corporation. The major objective of this research is to measure and explain the effect of TQM on productivity. The study utilizes Chevron's TQM program to proxy for successful implementation of TQM philosophy.

In order to accomplish these objectives, several studies were undertaken including exploratory research, scale development, conceptual framing, model building, hypothesis development and testing.

To investigate the impact of TQM on productivity, this dissertation utilized several research tools and methods. Some of these are:

- The Likert questionnaire survey format.
- Corporate performance appraisals.

The Likert questionnaire survey format, which is a measure of attitude, was administered in 1991 and readministered in 1993 to selected Chevron employees in five of their facilities located in the Bay Area of California. Chevron's worldwide operations include Petroleum, Chemical, Coal, Minerals and other Corporate units. Each of these operations and facilities has representatives in the selected five facilities used in the study. Likert questionnaire survey format was chosen because it uses series of statements which subjects indicate agreement or disagreement. The survey responses were

assigned weights that were summed to indicate the respondents' attitudes. Frequencies of some questions were tested for significance against certain uncontrollable variables.

Through the use of corporate performance appraisals, and leadership styles, employee performance were measured and compared before and after Chevron's implementation of it's Total Quality Management program. Comparism were also made between Chevron divisions, so as to measure varying impact. Personal interviews were utilized for designing research methodologies, interpreting empirical data and analysis of variance. Every attempt was made to sort out the variety of factors that can affect corporate performance over a given period of time.

The study measured and quantified the effect of TQM on productivity by applying a "Four Dimensions of Results" model. This model defined and quantified the following:

- Products and Services delivered to the Users and Customers.
- Financial Returns for Stockholders.
- Job Satisfaction for Employees.
- Social Impact on the Community.

In summary, this study tested the application and viability of TQM to a corporate environment and found why such programs succeed or fail. As a result, a conclusion emerged that supports the statement that "If TQM principles are successfully implemented, not only will better productivity lower unit costs, but customers will respond to better quality which will increase corporate market share, create more jobs and maintain a higher return on investment."

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Chapter one

INTRODUCTION:

Corporate Leaders in America have had to face the challenge of change in increasing numbers since the late 1970s. Prior to that time period, the United States of America was clearly the world leader in productivity (Dobbyns and Crawford-Mason, 1991).

A comprehensive analysis by the Massachusetts Institute of Technology Commission on productivity (Dertouzes, 1989), found that following World War II, "American workers were more skilled than their counterparts in other countries" and that "American managers were the best in the world". Then the rest of the world, led by Japan, began to catch up. Quality replaced productivity as the key to commercial success in an increasing competitive global economy (Ebrahimpour & Lee, 1988; Fama & French, 1992). As Board of directors, corporate and organizational leaders watched their market share decline, they began to look for reasons and solutions, ranging from high labor costs to government policies (Buzzell & Wiersema, 1981a, 1981b in press-a, in press-b; Craig & Douglas, 1982).

In a study by one of the quality leaders, Deming (1986) found that 85 percent of all the quality problems associated with Corporate American industries are the fault of management. Only 15 percent he said, is due to the unknowledgable worker. Since Deming had such influence in stimulating Japanese quality efforts, his

statement could not be ignored. As corporate American leaders listened to Deming, and other quality leaders like Philip B. Crosby (1979), Joseph M. Juran (1989), and Armand V. Feigenbaum (1956), they began to reexamine their assumptions and practices and started incorporating the concept of Total Quality Management (TQM) into their management philosophy.

An interesting development in management is the growing acceptance of TQM as a way of corporate life. TQM measurement of success is customer satisfaction and the way to achieve this process is through continuous improvement (Desatnick & Detzel, 1993; M. K. Hart & R. Hart, 1989).

The objective of this dissertation is to measure the impact of Total Quality Management process (Deming, 1986 fourteen principles) on corporations and how it affects leadership and productivity. Since Chevron is used as a proxy for this research, the study focused on Deming's interpretation of TQM (Deming, 1982, 1986) and measured the effect of TQM principles, before and after the implementation of the program at Chevron Corporation. In addition, the study determined what cross sectional effects TQM philosophy had between respective strategic business units and groups within the corporate entity. The study tested and identified the cause of variances among groups and found what conditions were favorable or unfavorable to each.

Total Quality Management (TQM) also called Quality Improvement (QI) or Continuous Quality Improvement (CQI) is a continuous process improvement involving all persons within the organization in a completely integrated effort towards improving performance of each process at every level of operation (Feigenbaum, 1956, 1983). The primary focus of each process improvement is to increase customer satisfaction. Deming and other advocates of TQM contend that, when quality is enhanced by improving processes, productivity increases (Crosby, 1979, 1984, 1988; Deming, 1975, p.1-15, 1986). As a result, there is lower unit costs of production, which lowers overall prices to consumers, and motivates customers to respond to better quality. This will increase corporate market share and keep corporations in business thereby creating more jobs and improved financial performance (Deming, 1975, 1986; Crosby, 1984, 1988).

To gain a more complete understanding of the TQM principles in terms of the relationship between corporate leadership, job performance and productivity in a TQM work environment, this research focused on key variables that impacts corporate leadership styles and productivity. In doing so, this research explored what is termed "the customer, the customer expectations, the work process, valid requirements" etc.

This dissertation is divided into these categories:

(1) The exploration of Total Quality Management Theories and

the impact of TQM practices on productivity; and investigate if there is a "fit" between Corporate Quality Leadership and TQM. (Chapter 1)

(2) Review of Chevron's past and current management philosophies and problems that the corporation has encountered (Chapter 2)

(3) Review of current literature on Total Quality Management; its developments and refinements/application. Compare and analyze TQM practices in different corporations. (Chapter 3)

(4) Develop a conceptual methodology for analyzing the impact of Total Quality Management on productivity; to determine how changes in some variables such as factors that contribute to job satisfaction (Motivator - achievement, recognition, responsibility, advancement, growth); and factors that contribute to job dissatisfaction such as (Hygiene/maintenance factors - company policy, supervision, relationship with supervisor, salary, status, security), affect productivity (Chapter 4).

(5) Results of analyses. (Chapter 5)

(6) Summary and Conclusions. (Chapter 6)

TQM involves applying quantitative methods and utilizing all employees within the organization to improve the quality of its processes, products and services (Feigenbaum, 1956; Ginnodo, 1991).

The implementation of TQM must begin with the commitment of top management and involve everyone in the process for it to be effective. Many companies have found that TQM increases the need for teamwork. Crosby (1989) stresses that TQM does not occur by chance. All employees must be exposed to the TQM principles and trained so that the program would be successful in their organizations. TQM implementation is the primary way that many companies/agencies are involving their employees in productive teamwork to improve quality and increase employee job satisfaction (H. Gitlow & S. Gitlow, 1987; Vaill, 1989; Walton, 1986, 1990).

TQM aims to enhance the creativity of every employee and to continuously improve the quality of processes, products and services. The ultimate goal of TQM is to satisfy the needs of the customer (Hagan, 1984, p. 21; Harrington, 1988; Ishikawa, 1987). This research did highlight who the customer is and what constituted "satisfying the needs of the customer".

1.1 QUESTIONS TO BE ANSWERED:

A) What is Corporate Quality leadership?

B) How to measure job performance?

C) What is Continuous Quality Improvement?

D) Who constitutes a customer?

E) Within a TQM environment, are employees and management

considered as customers?

F) What are customer expectations and how do to meet and exceed customer expectations?

G) What is the work process?

H) What are valid requirements?

Corporate Quality Leadership (CQL) style is an integral component of TQM philosophy (Juran 1989). In Corporate Quality Leadership, management decisions are based on data, not guesswork (Mann, 1987). Corporate Quality Leadership is a new way corporate leaders think about organizations and how employees should relate and work. This style of leadership applies the scientific approach which becomes standard procedure for all work process. Deming (1986) stated that the focus on corporate leadership is on improving products and services. This is achieved by improving how work gets done (the methods) instead of what is done (the result). The effect of all these changes is that the relationship between employees and management are restructured (MacFarland, 1990; Mann, 1987). A manager's duty becomes that of helping employees do the best job possible, by foreseeing and eliminating barriers that prevent employees from making quality products all the time. Employees learn how to use the knowledge and insight they've gained from being on the line or working with customers day after day. This is what Deming (1986) called TQM.

Corporations in America are finding they have to do things differently to survive in today's marketplace (Dertouzos, 1989; Ouchi, 1982). The reason being that world competition stimulated by a new, smarter management style, has never been so intense. We can see today that the American economy is transforming before our eyes as industry after industry is restructured, reshaped, and reformed so as to keep up with the competition (Pierce, 1987, p. 109-116). Corporate leaders are learning new ways to manage their organizations and incorporating long-term strategic plans, so as to remain very competitive (Hunt, 1992). Employees are learning how to contribute their knowledge to improving processes. Everyone is listening to the customers more effectively to make certain their products continue to be useful and valuable (Phillips, Chang & Buzzell (1983). The concern is that if management does not listen to customers (both internal or external), their competitors will. This style of management is called Corporate Quality Leadership (Deming 1986) and is incorporated into TQM. It is a new approach to management that allows corporations keep up or even stay ahead of rapid changes (Price & Frank, 1990).

Corporate Quality Leadership is practiced by most Japanese companies that has successfully invaded key American industries over the past three decades (Imai, 1986). Corporate Quality Leadership is a new world view that shifts the emphasis from profits to quality. By understanding how to monitor, control, and

constantly improve production systems, corporations are better able to provide customers with what they want, when and how they want it. This corporate leadership style of doing business leads to better decisions for both the customer and the organization, the employee and the boss alike (Deming 1986; Crosby 1984).

1.2 WHO IS THE CUSTOMER?

According to Deming (1982), the customer is whoever that receives the organization's output or uses its services. There is a **primary** and a **secondary** customer. **Primary customer** is person/group for whom output of a process is principally intended. **Secondary customer** is person/group whose expectations must be met in order to satisfy the primary customer or it could be person/group beyond the primary customer, who depends on the output of the primary customer. A customer could also be **external** or **internal** (Deming, 1982 & Walter, 1986).

1.2.1 External Customers:

These are groups or individuals external to the organization who receive or are affected by the organization products and services. They could include not only those who buy the organizations' products and services, but governmental regulators and consumers who use the organizations' products and reside in the communities where the organization conduct business (Deming 1986;

Crosby, 1979 & Ishikawa, 1987). External customers are of two types:

- Direct External Customers
- Indirect External Customers.

Direct External Customers directly receive the organizations' products or services. However, the Indirect External Customers do not directly receive the organization's products or services, but are affected by them. This group include neighbors, U.S. Citizens, regulatory agencies, etc (Deming 1982; Crosby, 1979; Juran 1988).

1.3 Internal Customers:

These are groups or individuals whose ability to perform their job is impacted by the quality of what their respective organizations provide them (Juran, 1990). Within a TQM work environment, managers, supervisor, section leads are customers to their respective subordinates and vice versa (Desatnick & Detzel, 1993; Federal Quality Institute, 1991). It all depends on the work process. Each worker, is a customer of preceding workers and each has customer, which are the people to whom the worker passed on his or her work. Determination on who the customer is based on who receives or provide input to the job (Zemke & Schaaf, 1989). In the work place, employees have often used the phrase "the next process is the customer" to describe the interaction and mutual

dependence employees have on one another. This next process is anyone who receives or uses the other employees output: These could include: (1) Other departments or work groups.

(2) Other employees.

(3) Managers, Supervisors, Foremen, section leads.

(4) Suppliers, Subcontractors.

1.3 The work process:

The work process is in effect, a chain of suppliers and receivers, each of whom contributes in some way to the product or service which is provided to the external customer. Unless employees and management work together cooperatively and productively, with shared goals and open communication, organizations will not be able to satisfy the needs of the external customer. In order to improve the quality of products and services that go to the external customer, organizations need to improve the products and services that go to their internal customers (Crosby, 1979; Juran 1988; & Vaill, 1989).

1.4 Valid Requirements:

Customers, both internal and external, have needs and expectations (Weaver & Looper, 1992). Organizations can easily identify **needs** by asking its customers what they **want.** Customer **expectations** are so basic that customers do not think to mention

what their expectations are until organizations fail to deliver. Vendors and customers must negotiate needs and expectations to arrive at valid requirements for the process output. Valid requirements are the needs and expectations of the customer that the vendor agrees to provide and the customer agrees would be satisfying (Imai, 1986).

1.5 Continuous Quality Improvement:

According to Juran (1989), Continuous Improvement, a foundation principle of quality improvement system, is a never-ending cycle. It begins with a **plan** for improvement in customer satisfaction, continuous when organizations **do** what it did **plan** or put the **plan** into operations, **check** to see how well it has done and if organizational goals have been met, and **act** on what was learnt.

This cycle is referred to as the **PLAN, DO, CHECK, ACT** or Deming Cycle, named after Dr. W. Edwards Deming, one of the fathers of Total Quality Management (Deming, 1986).

CHAPTER 2

CHEVRON CORPORATION'S TOTAL QUALITY MANAGEMENT PROGRAM

This chapter will be reviewing Chevron Corporations' traditional management philosophy and operations. It will also be pointing out the problems associated with this style of management and the respective factors necessary for implementing the new Deming management philosophy called Total Quality Management.

According to Deming (1986), a successful implementation of Total Quality Management philosophy will increase the operating efficiency of an organization. Efficiency is interpreted as profit. To put it simply, better quality means better profitability and market share. According to Garvin (1988), this relationship was established by the Strategic Planning Institute of Cambridge, Massachusetts, who analyzed performance data from over 3000 strategic business units. The conclusion: "One factor above all others - quality - drives market share.

When superior quality and large market share are both present, profitability is virtually guaranteed (Ishikawa, 1985, 1986; Ishikawa & Lu., 1985). The cause and effect relationship may be demonstrated by these additional benefits of superior quality:

- Customer satisfaction that results in customer loyalty and repeat business
- Lower cost of production and higher productivity
- Improved cash flow and return on investment

- Ability to charge a higher price
- Reduced service calls
- Higher stock price

2.1 CHEVRON CORPORATION:

In the early 1990's, CEO Ken Derr of Chevron Corporation embarked on a vision of "Better than the Best". What he meant by the "vision" is: How the corporation will adopt strategies so as to deliver a superior return to stockholders. Chevron current objective, said Derr (1990), is to outperform its strongest competitor and to achieve a sustained average annual total return to stockholders of 15 percent or more over the period 1989 through 1993. Derr's vision was:

> "By 1995, we will be Better than the Best. At every level, we will add value as partners dedicated to achieving our company's goals, and committed to a customer driven process of continuous improvement."

Chevron management designed six corporate wide decision-making strategies to accomplish its corporate vision. These include:

- Improved financial results
- Foster team spirit and employee involvement
- Meet competitive challenges
- Focus on customers
- Decentralize decision making and accountability

- Give priority to environmental and public concerns

Derr said "The company's success depends heavily on its people", and he emphasized management's responsibility to tap everyone's full potential.

> "I'm challenging managers to create an atmosphere that enables everyone to get involved in the business objectives of the company and to do their best work." he said (Derr 1990).

Problems that continued to confront Chevron Corporation during the late 80's and early 90's included but not limited to some of the following:

- Lack of responsiveness by management and employees to innovation
- High turnover of employees
- Chevron not being more cost effective
- Needs for better customer focus
- Too many irritants/wasteful paperwork
- Too much lip service/inconsistency with policy
- Poor financial performance
- Poor management philosophy

Chevron's competitive financial results had been unsatisfactory over an extended period of time. Employee contribution to corporate performance had been limited by current management practices; practices that had restricted the contribution of

employees and limited employee ability to fully integrate their skills and expertise into the conduct of the corporation' business (Blue Top Internal Memorandum 1992). The result had been perpetuation of inefficient work processes within the corporation and missed opportunities to "add value" working with corporate operating partners.

The Corporation in the past had sought stability and dependability (Annual Report 1990). Management was too centralized and had been trying to reduce its hierarchy. According to Derr (1990), there was no time to send messages up through many layers of a hierarchy to get a decision. Customers wanted responses right away. Deming (1986) and Juran (1987) stressed that organizations that get their products to the marketplace first, have the best chance to capture the market. Chevron needed flexibility and as a result, departmental lines had to be overcome or eliminated. Chevron had in the past, been an organization that embarked on the traditional management style. This was a management philosophy with the following Characteristics (Deming 1986):

- An organizational structure that is hierarchical and has rigid lines of authority and responsibility.
- An organizational structure where workers perceive supervisors as bosses or cops.
- An organizational structure where supervisor-subordinate relationships are characterized by dependency, fear and

control.

- An organizational structure where the focus of employee effort is on individual effort; workers view themselves as competitors.
- An organizational structure where management perceives labor and training as costs.
- An organizational structure where management determines what quality is and whether it is being provided.
- An organizational structure where the primary basis for decision is "gut feeling" or instinct.

Inorder to correct the declining image and poor competitive position of Chevron compared to it peers within the industry, management in 1989 requested suggestions from employees on how to eliminate the obstacles and problems confronting the organization. Below in (Exhibit 2.1) is a January 5, 1990 open memorandum letter which a manager at Chevron Corporate Tax Department wrote to a senior executive of Chevron Corporation who is on the committee that was formed to develop solutions on how to correct Chevron's poor and declining competitive position among its peers in the industry. Mr "X" wrote:"

San Francisco, CA

January 5, 1990

SUBJECT: CHEVRON FINANCE: "BETTER THAN THE BEST"

Sir:
"You asked for our comments on Marty Klitter's November 30 letter asking "What are some of the obstacles that we have created for ourselves.... What can we do better? How should we change?"

While obviously these are broad questions, my comments below are generally addressed to issues of progress and style, since I firmly believe that how management behaves is just as important, if not the most important, a determinant of results as are goals management sets for employees.

1. In my opinion, Chevron's internal management style is clearly one of paternalism, mixed with a large dose of autocracy. We give lots of lip service to empowering employees, delegating authority, involving employees in decision-making, and generating suggestions from employees on how things can be done better. Supervisors are exhorted to place trust in their employees because employees know the job best and, if given the trust, can be relied on to act in concert with the company's interest. But when employees make a suggestion like, say, flextime, the reaction of management is a horrified "Are you crazy? They cannot be trusted! Only we know what's best for the company!" Management circulates to employees articles on productivity improvement which cites approvingly the practice in many Japanese companies that as long as an employee's suggestion is not detrimental to the company, even if its effect is neutral, the suggestion should be implemented-but employee suggestions here have to be exhaustively analyzed and proven to be beneficial before they might be adopted.

   The result of this "only we know what's best", everything-has-to- be-approved-at-top,-don't trust the employee attitude is to convince the employee that there's no reason to take personal responsibility and initiative-just do what you are told, because after all, "they know best-and tell us so, repeatedly.

2. One of the many examples of the "we don't trust employees" include the ridiculous system of controls we place on job descriptions, placement and manpower. Clearly, local/functional managers cannot be trusted by the organization-they have to be second-guessed and hamstrung at every step in the process. This destroys morale and responsibility at the middle management ranks, as well as being woefully unproductive.

Moreover, we are told how quickly our environment is changing and how critical it is to change along with it--but then we are saddled with a process that makes such change almost impossible.

3. Open communication is clearly critical-and here again we give the idea lots of lip service, but then do something different in practice. So much at Chevron is needlessly done on a "need to know" basis and behind closed doors- many people hold information closely as a power trip.

   Much information on business conditions, organizational changes, etc. can and should be pushed much further down in the organization-all the way to the mail clerks.

   This problem is compounded by the amount of "fluff" in the corporate "party line". For years now, all the company publications, announcements, speeches etc. have talked about how wonderful everything the company does. Such as-projects, employees, assets etc., etc. Basic honesty has been (obviously) lacking-which breeds cynicism, smacks of paternalism, and works against employee "buy-in" and feelings of Ownership. Recent critical articles, analysts' report and the Pennzoil actions have now told employees what management should have been telling them along, doing you-can-imagine-what to management credibility; but management seems to feel that, as long as management knows the truth about the problems, they can dissemble to employees.

4. Openness to new ideas is fairly minimal-very little latitude for people to try doing things a different way. Very often managers are told that they cannot treat one group any different than another--so no change can be implemented on a trial basis in one small area, and any change has to be made for the whole organization if it is to be changed at all. As a result, supervisor/managers/organizations are not encouraged to be innovative; instead we end up with "lower common denominator" management, where the most conservative, recalcitrant, inertial manager sets the pace.

   After all the effort in PMP (PERFORMANCE MANAGEMENT PROCESS) to talk up changing paradigms and encourage employees to challenge existing paradigms, most of the organization still seems completely resistant to changing the ways they do business.

5. The way we trust employees in many ways demeans them and

create a "time-server" mentality. The whole notion of exempt and non-exempt, for instance, strike me as counter-productive. Job titles are also a problem--hiring a college graduate from a top-ranked school and then calling them an "Accounting Assistant". Our refusal to give low-ranked employees business cards--as if we are ashamed that they work for the company! Our totally Neanderthal attitude about leaves of absence/maternity leaves etc. Resistance to flexible work schedules. And the list goes on.

6. Top management needs to get out more and mingle with the troops-get out of the ivory tower. If necessary, delegate more to open up time to "manage by walking around." Top management needs to work harder at dispelling their image as the aloof blue bloods of Chevron.

   Also--going back to open communication--management has to be open to and encourage constructive criticism from employees. Top management has to be willing to be told they are wrong at times. As Harry Truman said, "Every president needs someone on his staff whose job it is to say "Aw, that's bullshit, Mr. President".

   Currently, employees are expected to behave as if they're home, home on the range--where never is heard a discouraging word.

7. PMP (Performance Management Process) must be implemented uniformly and by all areas and supervisors. Does Mr. Derr have PMP sessions with his direct reports? He should! Too many cynicle, doubting-Thomas managers are allowed to avoid implementing PMP. As a result, we are wasting huge amounts of the resources that went into the program.

   The salary program must be integrated with the PMP appraisal program; as it is, PMP seems somewhat irrelevant without being tied to the salary action.

8. We should fire more people-at all levels.

9. We shouldn't promote the best analysts to managers--we should promote the person who will make the best manager. This company gives very little weight to supervisory abilities--which burdens the company tremendously with bright, incompetent managers, is a tremendous demotivator, and hinders the development of the other employees.

10. PC'S (personal computers) should be viewed as a tool--as

merely an expensive calculator. The amount of controls we have on PC acquisition and usage is ridiculous. Once again, the "organization" doesn't trust the individual employee/manager to make the right decision.

11. We should accept the idea of relatively efficient markets, and stop trying to beat the market by playing the interest rate, exchange rate, and commodities futures game except on a pure hedge basis. Just the analytical time saved alone would be tremendous.

12. We need to increase our focus on and commitment to recruiting. My own personal experience, the academic studies I have seen, and the examples of other companies convinces me that the way to have a motivated, productive workforce is to work very hard, and to hire motivated, productive people. In personnel, you very rarely can make a silk purse out of a sow's ear. We need to make a much greater effort to attract the right kind of potential hires rather than taking the seconds after other firms have had their pick (which we clearly do in accounting). In part, this could be achieved by improving recruiting; but it also requires treating people better once they are aboard (See #5 above).

I am happy to discuss at your convenience."

Mr."X"

cc

Exhibit 2.1

From the memorandum in Exhibit 2.1, it can be assumed that Chevron was on a downslide. In order for the organization to be "Better Than The Best" by 1995, Chevron executive began developing a long term strategy for improving its internal and external customer base. The key management concern is to improve corporate wide productivity, and as a result, Chevron sought W. Edward Deming's Total Quality Management ideologies. The corporation embarked on the implementation of the Total Quality Management

philosophies. These efforts resulted in Chevron corporate-wide philosophy which states that Chevron will create an environment that:

- Promotes integrity, ethics, and pride in the conduct of its business.
- Value and actively use diversity as a source of enrichment and opportunity.
- Encourages creativity and risk-taking and , for each employee, the belief that "I can make a difference".
- Fosters job satisfaction through corporate commitment to open communication, involvement, personal development, and recognition.
- Empowers all employees with greater responsibility and freedom, and emphasizes leadership and facilitation, rather than control.

Chevron management believed that Quality Improvement (QI) is a discipline, an ongoing process that will help the corporation achieve its vision (Chevron Newsletter 1992). The process according to management was:

- Setting a Clear Direction (Vision, Mission, Goals)
- Aligning Systems and people ("Doing the Right Things")
- Empowering People (Doing the Right Things Right")
- Satisfying Customers and Shareholders

- Continuous Improvement

Derr said, "by 1995, we will be Better Than The Best, and at every level, we will add value as partners dedicated to achieving our company's goals and committed to a customer-driven process of continuous improvement." This is the interpretation of Derr's "Better Than the Best" acronym for Chevron's stakeholder:

- Shareholders - superior return on their investment
- Employees - satisfying, rewarding jobs
- Customers - products/services of superior value
- Public - responsible Corporate citizen in communities in which we operate.

According to Deming (1982), Total Quality Management is a continuous process improvement involving all persons within an organization in a completely integrated effort towards improving performance of each process at every level of operation. The primary focus of each process improvement is to increase customer satisfaction (Ginnodo, 1991). Deming and other advocates of TQM contend that when quality is enhanced by improving processes, productivity increases. Also that better productivity lowers unit costs, which lower prices. As a result, customers, respond to better quality and lower prices, thereby increasing corporate's market share. Corporations stay in business and even create more jobs and financial performance show greater return on investment.

The purpose of this research is to show that the implementation of TQM principles into a corporation such as Chevron, will improve productivity and increase customer satisfaction. Chevron wants to replace Exxon and other leaders in the industry.

There have been problems associated with the implementation of TQM principles within American corporations (Kaplan, 1991). Total Quality Management advocates have been stressing that better quality means better profitability and market share. This relationship has been established by the Strategic Planning Institute of Cambridge, Massachusetts (Garvin, 1988), who analyzed performance data from over 3000 strategic business units. In its findings, it concluded that quality drives market share and that when quality and large market share are both present, profitability is virtually guaranteed (Juran, 1985; Kaolan, 1991).

This study utilizes Chevron's Total Quality Improvement Program as a proxy for the successful implementation of a TQM philosophy. TQM or CQL was introduced to Chevron Corporation with the objective of improving the company's productivity.

Analyses utilizing accounting and market based financial performance matrix shows that Quality Improvement companies outperform their competitors (Peter, 1982; Pritchard et al. 1990).

Opponents of Total Quality Management argue that this contradicts the principles of TQM and that, many corporations implementing TQM programs, start with a rational objective and end with an irrational conclusions (Schmidt & Finnigan, 1992). As a result, TQM has gotten a bad reputation due to poor results. These critics have been stressing that Total Quality Management (TQM) is not customer driven and therefore, wastes resources. However, this study using Chevron Corporation for proxy, has tested the premise that quality drives market share. According to Deming (1989), when superior quality and large market share are both present, profitability is virtually quaranteed. This study will show that if TQM principles are successfully implemented, Employee Morales will be improved. This will lead to improved productivity which will not only effect lower unit production costs and prices; but customers will respond positively to better quality and lower prices in effect resulting in increase corporate market share, creation of more jobs and increased return on investments. These findings will hopefully benefit corporate leaders.

Chapter 3

REVIEW OF THE LITERATURE

This chapter briefly reviews the importance of quality and points out the respective views of the pioneers of Total Quality Management philosophies.

It has taken a long time for the concept of total quality management (TQM) to develop in the United States, although that is where it began (Senge, 1990; Shapiro, Jack & Cosenza, 1987). Historically, its roots go back at least as far as the 1900s and a great pioneer of the TQM program; Walter A. Shewhart.

Scholars of management literatures published in the 1980s must have the impression that writers were suggesting Americans adopt the Japanese style of management in order to compete with Asian and European counterparts (The Global giants, 1990; Thurow, 1992). However, the question still remains: how can America retain its cultural values and still be able to compete successfully in the international market place? This Chapter will provide an overview of the basic quality concepts and the scholars who, not only developed them , but advocated their adaptation.

TQM proponents contend that adopting their management approach yields sustainable excess returns (Fama & French, 1992; Federal Quality Institute, 1991)). They present simplified explanations of general management philosophy and offer anecdotal evidence of the benefits to corporations implementing the program (Fama & French;

Ebrahimpour & Lee, 1988). Within the financial economic framework, it becomes obvious that there are two specific agendas associated with a TQM approach. These are:

- The issue surrounding efficiency gains to corporations that successfully implemented a TQM approach. That is, do corporations that succeed in implementing TQM philosophies improve their operating efficiency as the proponents suggest?
- Does these efficiency gains result in improved financial performance, that is, does successful implementation of TQM principles create value or add value to the work process?

Empirical studies on the relationship between quality and market share have indicated a positive direct correlation between the two (Desatnick & Detzel, 1993; Fama & French, 1992). This is one of the issues that prompted Chevron to implement the TQM program at its facility (Chevron Newsletter, March 1992). Buzzel and Wiersema (1981a, 1981b) have found that among companies achieving substantial market share gains (5% or higher annual increases), almost half reported moderate improvements in relative quality. Douglas and Craig (1982) studied the association between market share and various marketing mix variables such as pricing, quality of product, promotion and distribution/place expenditures. Results of their findings revealed that product quality was the most important variable yielding the largest contribution in past

analysis. Other findings obtained by Phillips, Buzzell and Chang (1983) supported the idea that product quality influences ROI (Return On Investment) via its effect on market position.

3.1 PIONEERS OF THE TOTAL QUALITY MANAGEMENT MOVEMENT:

Total quality management (TQM) development as a management system began in the United States at the turn of the century (Dertouzos, Lester & Solow, 1989; Fama & French, 1992). Several individuals played key roles in the development, implementation, and dissemination of this important new approach to managing an organization. The predominant contributions to the seminal literature on quality improvement programs of prominent scholars such as Frederick Taylor (1856-1915), Edward Deming (1900-1993), Joseph Duran (1900-present), Philip Crosby, and Armand Feigenbaum, draw significantly from the work of Shewhart (1931) for their statistical methods, but have become broader, to include program implementation guidelines that emphasize the importance of the human resource aspects of quality improvement programs. While the above mentioned scholars have received little recognition for their contributions, since 1980 their involvement in Total Quality Management has become appreciated throughout the world.

3.1.1 FREDERICK TAYLOR:

One of the early contributors Frederick Taylor (1947) is

credited with being one of the first to attempt to use new approaches to improve the work of unskilled workers in industrial organizations. Taylor, a chief engineer, developed a series of concepts that laid a foundation for improvement during this century. Taylor (1947) earned the title of "father of scientific management" because of his design and implementation of the system approach of analysis and the application of some basic concepts to manual work.

Taylor, in his book The Principles of Scientific Management (1947), reveals few elements of his management theory:

- A daily Task---each person in the organization should have a clearly defined, large task which should take one day to complete.
- Standard Conditions---the worker should have standard tools and conditions to complete the task.
- High pay for Success---significant rewards should be paid for the successful completion of the task.
- High Loss for Failure---failure for completing the task should be personally costly.
- Tasks in large, sophisticated organizations should be made difficult so as to require skilled, accomplished workers.

Taylor was, for the first time , able to demonstrate that the economic pie could be increased not only by application of capital and labor but by the application of knowledge to work. Taylor also

created a monumental problem that was to become apparent later. He separated planning from work improvement and thereby isolated the worker from responsibility for improving work. According to another scholar, J. Juran, (Leadership for Quality, 1989), "the result is that Taylor delivered a devastating blow to craftsmanship." Juran (1989) stated that the division of responsibility, resulted in the creation of a separate department of inspectors to monitor the quality of the output and, in effect, diffused the responsibility for quality within the organization. This group of inspectors, reporting to a chief inspector, became known as the quality assurance department.

3.1.2 WALTER SHEWHART:

Walter Shewhart (1891-1967), a statistician was employed by Bell Labs during the 1920s and 1930s. One of his books The Economic Control of Quality of Manufactured Products was considered by statisticians as a landmark contribution to the effort to improve the quality of manufactured goods. Galvin (1988) wrote that Shewhart's techniques taught that work processes could be brought under control by defining when a process should be left alone and when intervention is necessary. Shewhart was able to define the limits of random variation that occur in completing any task and that intervention should occur only when these limits have been exceeded. Shewhart developed "control charts" to track

performance over time, thereby providing workers with the ability to monitor their work and predict when they were about to exceed limits and possibly produce scrap (Shewart, 1986; Galvin, 1988).

3.1.3 EDWARDS DEMING:

Deming, a statistician, trained Japanese engineers in the 1950s and was credited by the Japanese with significantly assisting in their remarkable recovery from the devastation of World War II. Deming was attracted to TQM by Shewhart's work in sampling and control charts. Born in 1900 and educated at the University of Wyoming and Yale (Ph.D., 1927), Deming taught and used statistics in his work. His most recent comprehensive work is Out of the Crisis (1986). In this book, he stressed on the cost of implementing a quality improvement program, and also emphasized on the need for well-educated and trained employees. Deming provided an Organizational Chart that places a leader of statistical methods on par with the chief executive of the organization. He emphasized on corporations, providing education for all employees, from senior managers to production line workers. Deming (1986) argues the importance of providing every employee with the tools and the knowledge necessary to recognize and perform quality work. In other words, he advocated that a substantial investment be made by corporate America in employee training and education (Mann, 1987).

Although throughout his book, only a small portion was devoted

to statistical methodologies, the issue of quality remained at the heart of Deming's quality improvement programs. Deming (1986), divided process variation into two components: common cause and special cause variations. He argued that common cause variation is the variation in output caused by factors controlled by management, whereas special cause variation is production machine or operator-specific variation. Having an extensive experience developing and implementing quality improvement programs in Japan and the United States of America, Deming finds that over 80% of all process variation is common cause variation. Based on this findings, he concludes that:

- Production workers should not be blamed for poor quality work arising from common cause variation over which they do not have control over.
- Team problem solving approach is vital to the organization because managers must learn what common causes are driving process variation and production line employees are the only people who can provide this information.

According to Deming (1986), quality is primarily the result of senior management actions and decisions and not the result of actions taken by workers. He stressed that it is the "system" of work that determines how work is performed and only managers can create the system. Only managers can allocate resources, providing training to workers, select the equipment and tools that workers

use, and provide the plant and the environment necessary to achieve quality. Senior managers alone can determine the market in which the corporate America can participate and what products or services can be offered to the public (Deming, 1986; Ishikawa & Kaoru, 1987).

Deming, further stressed that the worker is responsible for the resolution of those special problems caused by actions or events directly under his or her control. In his opinion, production workers often have the best solutions to those problems directly under their control. The key to discovering their solutions is to make them part of the problem-solving process through the team approach which is an integral part of TQM. Deming (1986) further emphasized that making use of data gathered by a Statistical Process Control (SPC) to make fact-based decisions about solutions to both common and special cause variation is critical to the success and implementation of the team problem solving approach.

According to Deming, success stories and the descriptions of returns from successfully implementation of TQM philosophy within a corporation are summarized in the following flow diagram:

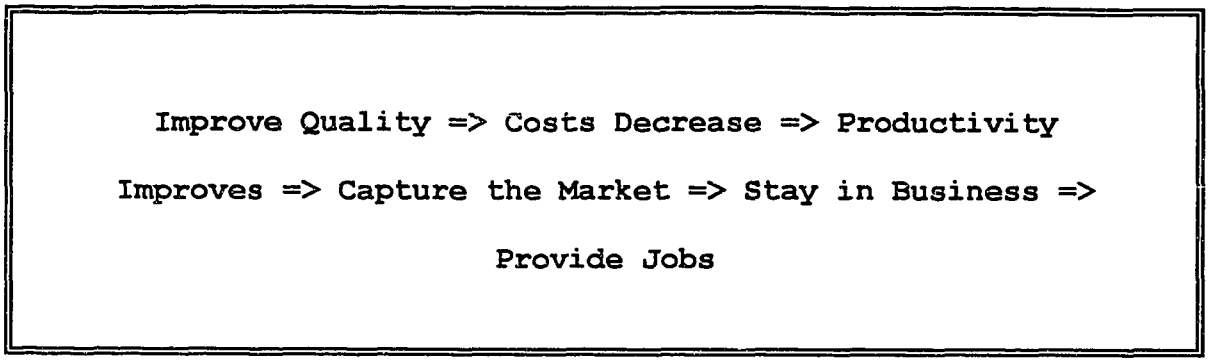

Figure 3.1

Deming's book contains numerous descriptive examples of success stories of corporations that have implemented quality improvement programs that is consistent with his ideas. However, when it comes to measuring the financial contributions attributable to quality improvement programs, Deming appears somewhat skeptical:

> "He that expects to quantify in dollars term the gains that will accrue to a company year by year for a program for improvement of quality by principles expounded in this book will suffer delusion. He should know before he starts that he will be able to quantify only a trivial part of the gain.".

Deming (1986) goes on, though, to reassure TQM readers of the necessity of stable production process:

> "A process that is stable, in statistical control, presents a number of advantages over instability.
>
> In statistical control:

- Production and dimensions and other quality characteristics ... remain nearly constant.
- Costs are predicable.
- Regularity of output is an important by-product of statistical control.
- Productivity is a maximum (costs are at a minimum) under the present system
- Relationships with the vendor who delivers material that is in statistical control are greatly simplified. Costs diminish or quality improves.
- The effects of changes on the system (management's responsibility) can be made with greater speed and reliability". (p. 340)

Deming stressed that these advantages imply that both short-term and long term returns are expected from successful implementation of a TQM philosophy (Scherkenbach, 1988). In the short run, corporate returns arise from achieving a state of stability in costs and maximizing employee productivity under the present production system. According to Deming (1986), as continuous improvement process evolves, the entire production system improves, resulting in increased returns over a longer period of time.

Deming's overall ideas and philosophy is summarized in his famous fourteen points and seven deadly diseases (see Figure 2) summarized in Walton (1986). These views summarize his philosophy of the most important issues for the successful implementation of a quality improvement program.

DEMING'S MANAGEMENT PRINCIPLES

CORPORATE SEVEN DEADLY DISEASES

- Lack of constancy of purpose
- Emphasis on short-term profits
- Evaluation of performance, merit rating, or annual review
- Mobility of management
- Management by use of visible figures
- Excessive medical costs
- Excessive costs of liability

Figure 3.2

The seven corporate deadly diseases is part of the old traditional management style.

Demystifying Organizational Alignment

- ❑ **Too often people focus on the past and present, instead of the future.**

  TRUTH: What we want in the future directs what we get in the present.

- ❑ **Too often people focus on problems out of their control, rather than in their control.**

  TRUTH: We can change that which we can control.

- ❑ **Too often people allow generic excuses to influence their belief systems:**
  - **— Not enough time**
  - **— Not enough money**
  - **— Not enough resources**
  - **— Not enough staff**

  TRUTH: Generic excuses are obstacles to our creativity. They get in the way of getting the job done.

- ❑ **Too often people blame others rather than take the responsibility of owning their problems.**

  TRUTH: Owning our problems is the first step to eliminating them.

- ❑ **Too often people think culture change involves what they know more than what they do.**

  TRUTH: To change culture requires changing actions.

- ❑ **Too often people avoid the truth.**

  TRUTH: Facing the truth means committing to do something about it. It's easier to talk than to do something.

Source: 1991; Leadership Dynamics/Benchmark Communications, Inc.

BELOW IS DEMING'S NEW MANAGEMENT PHILOSOPHY OF TQM.

FOURTEEN CORPORATE QUALITY IMPROVEMENT POINTS
• CREATE AND PUBLISH TO ALL EMPLOYEES A STATEMENT OF THE AIMS AND PURPOSES OF THE COMPANY OR OTHER ORGANIZATION. THE MANAGEMENT MUST DEMONSTRATE CONSTANTLY THEIR COMMITMENT TO THIS STATEMENT.
• LEARN THE NEW PHILOSOPHY, TOP MANAGEMENT AND EVERYBODY.
• UNDERSTAND THE PURPOSE OF INSPECTION, FOR IMPROVEMENT OF PROCESSES AND REDUCTION OF COST.
• END THE PRACTICE OF AWARDING BUSINESS ON THE BASIS OF PRICE TAG ALONE.
• IMPROVE CONSTANTLY AND FOREVER THE SYSTEM OF PRODUCTION AND SERVICES.
• INSTITUTE TRAINING (FOR SKILLS).
• TEACH AND INSTITUTE LEADERSHIP.
• DRIVE OUT FEAR. CREATE TRUST. CREATE A CLIMATE FOR INNOVATION.
• OPTIMIZE TOWARD THE AIMS AND PURPOSES OF THE COMPANY THE EFFECTS OF TEAMS, GROUPS, STAFF AREAS, TOO.
• ELIMINATE EXHORTATIONS FOR THE WORKPLACE.
• (A) ELIMINATE NUMERICAL QUOTAS FOR PRODUCTION. INSTEAD, LEARN AND INSTITUTE METHODS FOR IMPROVEMENT. (B) ELIMINATE M.B.O. (MANAGEMENT BY OBJECTIVES). INSTEAD, LEARN CAPABILITIES OF PROCESSES, AND HOW TO IMPROVE THEM.
• REMOVE BARRIERS THAT ROB PEOPLE OF PRIDE OF WORKMANSHIP
• ENCOURAGE EDUCATION AND SELF-IMPROVEMENT FOR EVERYONE
• TAKE ACTION TO ACCOMPLISH THE TRANSFORMATION.

FIGURE 3.3

3.1.4 JOSEPH DURAN:

Joseph Juran who was born in 1900 in an area that is now called Romania came to the United States in 1912 and settled in Minnesota. As the author of Quality Control Handbook (1988), he addressed in several of his chapters details of how to implement the quality improvement programs. In one Chapter, he discussed developing an organizational structure conducive to quality improvement. He cites an increasing trend toward assigning responsibility for quality management to lower levels in the organizational hierarchy as critical to the success of a quality improvement program. Duran (1988) emphasized that this must be preceded by proper training for employees in each organizational unit.

According to Juran, the training and education provided employees is of two categories:

- Common subject matter
- Specialized subject matter

Common subject matter is the broad-based education provided to employees at all organizational levels and encompasses overall goals, objectives, and plans for the quality improvement program.

Specialized subject matter varies across functional areas and depends on specific tasks and the contributions of employees to the overall quality improvement process (Juran, 1985). Duran stressed on the need for quality leaders and a new

management philosophy to help insure the success of the quality improvement program. Juran (1988) had documented three fundamental managerial processes that were originally used to manage the finances of an organization. They are:

- Financial Planning
- Financial Control
- Financial Improvement

He has applied this approach to the task of managing quality. However, the three elements of the Juran Trilogy (1989) are as follows:

- Quality planning: This is a process that identifies the customers, their requirements, the product and the service features the customers expect, and the processes that will deliver those products and services with the correct attributes and then facilitates the transfer of this knowledge to the producing arm of the organization.
- Quality control: This is a process in which the product is actually examined and evaluated against the original requirements expressed by the customer. Any problems detected are then corrected.
- Quality improvement: This is a process in which the sustaining mechanisms are put in place so that quality can be achieved on a continuous basis. Quality improvement includes allocating resources, assigning people to quality

projects, training those involved in purposing projects, and in general establishing a permanent structure to purpose quality and maintain the gains secured.

Juran (1989) argued that the approach to implement quality is to identify team "projects" that can be targeted and scheduled for improvement. He stressed that this focus is required for corporations to concentrate their attention on quality improvement. As one of the leaders in TQM, Juran (1985) indicates that project teams, on average, return about $100,000 in savings. That is, if a corporation agrees with the notion of the "cost of quality" (see figure 3.3) and accepts that the costs of imperfection can equal 30 percent of corporate revenues, then dividing that value by $100,000 gives one an idea of the number of projects that must be underway in order to effectively reduce the cost of poor quality.

QUALITY COSTS: THE GOOD, THE BAD, AND THE UGLY			
Good Prevention	Costs associated with prevention activities, such as planning, training, design, and analysis.		
Bad Detection	Costs associated with appraisal and inspection, such as inspection of incoming work, auditing, verifying, checking, and final inspection.		
• Ugly	• Quality not provided.	• Internal Failure. • External Failure. • Exceeding Requirements. • Lost Opportunity.	• Rework and repair prior to delivery to customers. • Repair, replace, refund after delivery to customers. • Costs incurred by providing product and services characteristics not valued by customers. • Lost revenue resulting from customers' purchasing from your competitors.

Exhibit 3.4

(Source: Adopted from Xerox Corporation, Leadership through Quality,1983).

3.1.5 PHILIP CROSBY:

Philip B. Crosby's book Quality is Free, contains several chapters addressing the details of how to accomplish a "zero defect " quality improvement program. Crosby (1979) was eminently successful in reducing the manufacturing defects in the production of "Missiles" by embarking on a "zero-defects" program, which later became a government policy. Crosby's (1979) philosophy on quality is also summarized in fourteen steps - Quality Improvement Process (see table 2.4). However his ideas built around four fundamental ideologies which he calls "Quality Absolute" is sub-grouped into "Conventional Wisdom and Reality".

Quality Absolutes			Quality Improvement Process
	Conventional Wisdom	Reality	
1.	Definition	Goodness	Conformance to Requirements
2.	System	Appraisal	Prevention
3.	Standard	That's Close Enough	Zero Defects
4.	Measure	Indices	Price of Non conformance

1) Management Commitment
2) Quality Improvement Team
3) Measurement
4(Cost of Quality
5) Quality Awareness
6) Corrective Action
7) Zero Defects Planning
8) Employee Education
9) Zero Defects Day
10) Goal Setting
11) Error Cause Removal
12) Recognition
13) Quality Councils
14) Do It All Over Again

EXHIBIT 3.5

Crosby (1979, 1984, 1989), defines quality as " Conformance

to requirement". This definition is different from conventional definition of quality, because it does not refer to the manner in which the item is constructed or the method by which a service is provided. However, it focused on understanding the full array of expectations that a customer has and what organizations have to do to meet these expectations.

The author concludes that this external view of quality is energizing, because it sets goals that may be far more demanding and realistic than those established internally.

In order to do things right the first time (prevention, not inspection), the quality system for suppliers is attempting to meet customer's requirement (Crosby 1979). The idea attempts to correct the problem created by Taylor (in his book Scientific Management, 63-64, 1947), by ensuring that the worker manufacturing the product or providing the service does not pass defective work. The author concluded that there will be few, if any, inspectors in a quality organization, since everyone has the responsibility for his or her own work.

Crosby (1979), stressed that performance standard should be zero defects. He advocated that zero errors can and should be used as a target. This will improve the work process and improve quality in the long run.

Crosby concludes his theory by taking the position that costs of imperfection, if corrected, will have an immediate beneficial effect on bottom-line performance as well as on customer relations. Organizational Investments should be made in training of their employees and other supporting activities so as to eliminate errors and recover the costs of waste (Crosby 1979). The author cites the cost of quality as equal to 20 percent to 40 percent of an organization's revenue.

Critics of Crosby have noted that two of Crosby's absolutes, zero defects and cost of quality, have been particularly difficult to implement and many organizations have failed to successfully apply them (Schmidt & Finnigan). However, these failures may not reflect the validity of the concepts; instead, they may reflect failures on the part of senior management to implement these approaches correctly.

3.2 EMPIRICAL LITERATURE: SUCCESSFUL COMPANIES THAT EMBRACED THE TOTAL QUALITY MANAGEMENT PHILOSOPHY:

One of the tenets of Total Quality Management is the idea of learning from organizations that successfully implemented the TQM concepts (MacFarland, 1990; Mann, 1987). World class companies such as Corning, Federal Express and Marlow Industries have all been winners of the Malcolm Baldrige National Quality Awards for their successes in the implementation of TQM programs at their companies (Thomas & Waterman, 1982). According to these world class companies (Corning, Federal Express, Marlow and Xerox companies' Annual Reports 1993), one question every Malcolm Baldrige National Award winner hears too often is: "How do I get my company's leaders involved in the quality improvement process?" People want to know because they must return to a company where quality improvement is not a priority. Corporate leadership holds the key to the door of continuous improvement (Garvin, 1988; Juran, 1985). But without clear, consistent leadership, the company will never be a leader, its management system will never be sound and efficient, and its improvement efforts will eventually be replaced by an intriguing new management fad. Malcolm Baldrige National Quality Award winners such as Corning, Federal Express and Marlow Industries are driven by the quality zealousness of their senior executives. These leaders meet with their employees frequently to inspire and

recognize their best efforts (Mann, 1987). Also they visit with their customers regularly to find out what they need and expect, and track quality improvement religiously (Mizuno, 1988; Naval, 1989; Naylor, 1980). These leaders teach quality courses, demand excellence (100% customer satisfaction 100% of the time), and preach quality to every audience that will listen (Harrington, 1987, 1998, 1991). Quality leaders lead the quality improvement process because they are responsible for the making of the company to be more competitive and profitable (Gitlow, 1987). The only way to achieve the quality objective consistently is through continuous improvement of the entire system. Juran (1989), says that" quality leaders have the faith of the true believers," a faith they got by "witnessing the miracles."

3.2.1 MODELS OF EXCELLENCE:

Corning (1993) is an international corporation operating in four broad market sectors: Specialty materials, consumer housewares, telecommunications, and laboratory services. Corning chairman Jamie Houghton is regularly featured in business magazines and newspapers as a TQM advocate.

Federal Express (1993) created the overnight air express business in 1973. Ten years later, it was the first U.S company to top $1 billion in revenues in its first decade. Federal Express became the first service company to win the Baldrige

Award. CEO Frederick Smith chaired National Quality Month in 1992.

Marlow Industries (1993) manufactures customized thermoelectric coolers - small solid-state electronic devices that heat, cool, or stabilize the temperature of electronic equipment for commercial and defense applications. Marlow Industries won the Malcolm Baldrige National Quality Award in 1991. CEO and president Ray Marlow initiated a systematic quality improvement process in 1987 so as to meet or exceed their customers expectation.

Xerox corporation was best in an industry whose products were synonymous with its name. Xerox corporation (1993) built it leadership strategy on these three elements: Quality, Management actions and behaviours and Quality tools. According to Kearns & Doyle (1988), Xerox was the only American company that had lost market share to Japaness competition and reversed the trend without government assistance. Xerox corporation won the Malcolm Baldrige National Quality Award in 1989. Kearns (1992) stressed that the award was a symbol of Xerox dedication to customer satisfaction.

Jamie Houghton, Fred Smith, Ray Marlow, David Kearns and their executive staffs (Corning, Federal, Marlow and Xerox Annual

Reports 1993) created their companies' visions, studied their customers and their competition, assessed their own companies' strengths, and pinned down exactly what their companies stood for and aspired to achieve.

Active participation of employees in decision making is one of the key strategies used by Corning, Federal Express, Marlow and Xerox Industries.

3.2.2 CORNING CORPORATION

Corning corporation another Malcolm Baldrige National Quality Award winner started its quality initiative in 1983. Its four principles are focused on this philosophy: (See Exhibit 3.6)

1. Meet the customer's requirement. This defines quality and drives the entire system.
2. Error-free work. This sets the standard for meeting the requirements: the first time, every time.
3. Manage by prevention. This defines the method of work and dictates that processes be designed with errors anticipated and designed out.
4. Measure by the cost of quality. This states that the cost of not doing things right the first can be measured.

EXHIBIT 3.8

Also, Corning (1993), based it quality program on commitment, teams, education, measure and display, cost of quality, commission, corrective action, recognition,event and goals. However, Corning (Annual Report 1993)built on this foundation by offering training in quality awareness and tools and has performed Baldrige assessments and established key results indicators to measure and improve the elements that contribute to its quality value.

According to Deming (1986), what make Total Quality Organizations successful is their standard operating procedure

which is to keep doing better. As long as things are not perfect, there is room for improvement: new products can get to the market faster, new adjustments in processes can cut down on time and cost, and the environment for work can be more satisfying (Gitlow, Hertz, 1983; Hradesky, 1988; Kaplan, 1991).

3.2.3 FEDERAL EXPRESS CORPORATION

At Federal Express, Fred Smith (1993) was directly involved in the development of every major quality process and system the company has implemented. The company was founded with the belief that customers would value a time-definite express service, then use on-time delivery as the company's primary measure of performance. During the late 1980s, Smith (1993) helped to develop a more comprehensive, proactive, customer-oriented measure of customer satisfaction and service quality called the Service Quality Indicator (SQI). SQI measures 12 indicators that Federal Express has determined are most important for customer satisfaction and service quality (SEE TABLE 2-4). According to Smith, "We believe that service quality must be mathematically measured". Federal Express tracks these 12 indicators daily across its entire system, individually and in total. Each indicator is weighted ; the greater the weight, the greater the impact on customer satisfaction.

FEDERAL EXPRESS SERVICE QUALITY INDICATOR

Indicator	Weight
Damaged packages	10
Lost packages	10
Missed pickups	10
Complaints reopened	5
Overgoods (lost and found)	5
Wrong-day late deliveries	5
Abandoned calls	1
International	1
Invoice adjustments requested	1
Missing proofs of delivery	1
Right-day late deliveries	1
Traces	1

EXHIBIT 3.6

Attributes of Federal express company as a quality leader can be traced to one of its service goals which is to reduce the SQI every year. According to Smith (1993), service is one of the company's three overall corporate objectives: people-service-profit. Management at Federal Express understand the company's quality objectives, its customers' needs, and the potential effectiveness of SQI as a measure and motivator. Every employee

at the company is solely involved in quality because quality leaders reinforce customer focus by investing their own time in improving customer relationships. That is called active participation in the quality improvement process.
Corning, Federal Express, Xerox, Marlow Industries and other quality leaders built their quality improvement processes on clear and precise quality values.

Federal Express Chief Executive Officer Frederick Smith summarizes, "When people are placed first, they will provide the highest possible service, and profits will follow." Federal Express corporate goals (people-service-profit) are translated into measurable objectives throughout the corporation. Progress on the people goal is determined by leadership Index, a statistical measurement of subordinates' opinions of management's performance. Service is based on the Service Quality Indicator. The profit goal is a percentage of pretax margin determined by the previous year's financial results (Annual Report 1993). Federal Express success in meeting the objectives for each area determines the annual bonuses for management and professionals and as a result could count for up to 40% of their total compensation.
Federal Express has two primary corporate quality objectives:
1. 100% customer satisfaction after every interaction and transaction

2. 100% service performance on every package handled.

Smith (Annual Report 1993) acknowledged that 100% achievability is not realistic, "but that doesn't keep us from striving to achieve it. We have to be wary of being satisfied with 99% performance because the large numbers catches up with us. When you're handling millions of packages a day, a 1% failure rate is totally unacceptable. We believe the road toward 100% is worth the effort."

3.2.4 MARLOW INDUSTRIES

Marlow Industries business philosophy (Annual Report 1993) is expressed in its quality policy: "For every product or service we provide, we will meet or exceed the customers' requirements, without exception. Our standard of performance is: Do It Right Today, Better Tomorrow."

According to the CEO of Marlow Industries Mr Marlow (1993), the industry quality pledge is each employee's personal commitment to quality: " I pledge to make a constant, conscious effort to do my job right today, better tomorrow, recognizing that my individual contribution is critical to the success of Marlow Industries."

MARLOW INDUSTRIES QUALITY VALUES

1. Senior executives must be the leaders.
2. Employees have the authority to make decisions and take actions on their own.
3. Honesty with our customers, employees, and supplies.
4. Meeting the customers' requirement.
5. Quality comes from prevention.
6. Anticipate problems and take appropriate action before the problem happens.
7. Do it right the first time.
8. Continuous improvements toward customer satisfaction.

EXHIBIT 3.7

3.2.5 XEROX CORPORATION

At Xerox Corporation, CEO David Kearns, told his colleagues, "Quality is a race without a finish line. A focus on quality has made Xerox a stronger company, but we know we'll never be as good as we can be, because we'll always try to be better. We are on a mission of continuous quality improvement"(Kearns, 1988, 1992). Xerox is a quality corporation. Quality is the basic business

principle for Xerox. Quality means providing external and internal customers with innovative products and services that fully satisfy their requirements. Quality improvement is the job of every Xerox employee (Kearns, 1988, 1992).

Xerox corporation, in search for excellence, was faced with the decision on how to manage an explosive growth. Corporate sales grew from $40 million in 1960 by a work-force of twenty-eight hundred employees to $1,7 billion in 1970 by a work-force of sixty thousand employees. Although competition from two of America's premier corporations, IBM and Kodak, was enough to get the attention of Xerox senior management, another problem occurred in the late 1970s that shoke the confidence of management. The exportation into the U.S. market by the Japanese, of a low-volume markets desktop copiers that were selling below market value, threathened Xerox control of that market. The result was that Xerox began to lose its shares of the low-volume market desk copiers to the Japanese and also its share of the high-volume markets to IBM and Kodak. Xerox management had to change the way the company was managed so as to remain competitive.

Task forces were formed, recommendations were made and some changes were implemented. Employee involvement and quality circles were started in 1978. In 1979, a new concept of benchmarking internal practices against external sources was

launched. Still market shares continued to slide. Responding to these problems, Xerox launched a "business effectiveness" strategy in which individuals were designated in each division and operating company to identify ways to increase the effectiveness and efficiency of their respective units. The result was the introduction and implementation of the Total Quality Control (TQC) concepts of operations to Xerox. The corporation was able to regain leadership within the copier market.

Xerox leadership through Quality strategy was built on three elements:

- Quality principles
- Management actions and behaviors
- Quality tools

Sam Culbert and Jack McDonough in their insightful book, RADICAL MANAGEMENT (1985, p.17) wrote "The single most powerful tool of management is trust". Where trust is high, ideas and communications flow easily. Whereas where trust is low, everything becomes more complicated. Employees hesitate to point out problems, suggest new ideas, or take responsibility for mistakes (Rummler, 1991). People go to the great lengths to create a paper trail to protect their position just in case things go wrong (Lamb, 1959; Weaver, 1976). Many organizations have learnt the hard way about the wasted energy that goes into

unproductive memos, superfluous copies, and defensive conversations (Livingston, 1969).

In organizations such as Corning, Xerox, Federal express etc, that have successfully implemented the TQM concepts, trust is a high priority and is nurtured in a variety of ways. It begins with the communication of organizational goals (Wendell & Bell, 1990). Every employee knows what the targets are and how they are being met. Barriers between divisions and departments are minimized. More work is done in teams, many of which are interdepartmental and cross functional. Errors and problems are viewed as opportunities for learning, rather than as blunders to be punished.

Total Quality managed corporations recognize and reward teams participation of responsibilities, rather than just individuals. When a team solves a problem, every member of the team is recognized (Hagan, 1984; Hunt, 1992; Imai, 1986). When a group achieves some goal, everyone celebrates. There is little doubt that the exhilaration that comes from being part of a successful team is different from the satisfaction that comes from individual achievement.

3.3 The Just In Time (JIT) Philosophy:

This is a management practice of TQM that reflects its title (Ansari, 1887, 1990). Most firms use the JIT philosophy to

improve quality. According to Schonberger (1983), materials are purchased or produced in small lot sizes in exact quantities just when needed. The author stresses that small lot sizes lowers storage costs, decreases inventory, and exposes quality problems sooner.

Another JIT feature, which encourages supplier loyalty and long term agreement, is repeat business with few suppliers (Ansari, 1986, 1987, 1990). This process decreases the risk of supply interruptions, which lowers buyers bidding costs and thereby improves quality at the source (Schonberger and Gilbert, 1983).

When suppliers are involved in the design process itself, it can lead to lower costs due to cheaper redesigns or looser tolerances on the design parameters since the greater the input of the supplier, the less likely that problem will occur later in the development stage (Newman, 1988).

Ansari and Modarress (1987), in a cross sectional survey, to identify the potential benefits of JIT purchasing for U.S. manufacturers, revealed that the greatest degree of improvement was in product quality followed by increased productivity.

In another survey by Ansari (1986), on American companies implementing the JIT philosophy, the findings revealed that purchasing in small lot sizes, and establishing long term

relationships with suppliers were critical JIT factors that contributed to improving quality.

Also at Omrak Industries of Portland, Oregon, productivity improved approximately 27% to 43% when their production line was converted from traditional "Just In Case" system to the "JIT" system. Another scholar Warne (1985), based this successful improvement in productivity to easier detection of non-conformities, elimination of work-in-progress inventories, and lower lead times from suppliers.

Two other scholars of Quality Ebrahimpour and Lee (1988), performed a detailed study of quality improvement programs in electronic manufacturing firms in the U.S. Their findings revealed that all firms surveyed selected their vendor based on price and on their ability to deliver quality and timely materials with the objective of exceeding their customers expectations.

Chapter 4

METHODOLOGY

This Chapter describes the steps that were used to operationalize Deming's fourteen factor principles with Juran and Crosby in order to demonstrate the impact of Total Quality Management philosopy on productivity.

4.1 Conceptual Basis for Questionnaire Development:

A comprehensive literature review was conducted to define each of Deming's fourteen factors principles focusing on the writings of Crosby (1979), Juran (1989), Deming (1986), Aguayo (1990), Gabor (1990), Gitlow (1990) and Walton (1986). These respective authors focused their writings specifically on explaining and interpreting Deming's fourteen factors principles, and are representative of the literature on Deming philosophy. Deming's fourteen factor principles summarizes Chevron's independent variables which plays a key role at Chevron's Management successful implementation of its TQM program.

4.2 Pilot Testing:

Some employees of Chevron Pipeline (CPL), Chevron Overseas Petroleum Inc. (COPI) and Chevron Information Technology (CITC), which are Chevron's subsidiaries located in San Ramon, California, participated in the Pilot testing. The test is

necessary because it is an integral part of the survey questionnaire construction since it provides feedback on ease of completion and clarity. Thus, the questionnaire was exposed to various segments of Chevron employees to test its clarity and completeness. Ambiguous questions were accordingly changed to improve their wordings.

4.3 Survey Development and Measures:

This section describes the measures that were used to operationalize Deming's principles, improved productivity and the covariates (ie., the Independent Variables) hypothesized to affect productivity. The questionnaire along with the response scales used to measure the items are contained in Appendix A. (the questionnaire survey).

4.4 KEY AREAS OF CONCERN:

This study focused on several elements such as:

(1) The manipulation of the independent variables

(2) Selection and measurement of dependent variables

(3) Selection and assignment of test units

(4) Control over extraneous variables (i.e. any variable other than the treatments that affects the response of the test unit to the treatment). According to Ellingstad and Heimstra (1974), extraneous variables are difficult to

eliminate. As a result, the study strived to have all subjects in the experimental group exposed to situations that is exactly similar except for the differing conditions on the independent variable.

4.5 HYPOTHESIS:

The study focused on two sets of Hypothesis: The first was the effect of TQM on the morales or attitude of workers at Chevron Corporation. The second is on the effect of TQM on the Earnings by major Areas of Operations. The study utilized one Dependent variable and several Independent variables on each of the categories.

4.5.1 INDEPENDENT VARIABLES:

These are variables that can be manipulated or changed and are independent of the overall outcome of the survey. They include:

A. Planning and Organizing

B. Supervisory Integrity/Fairness

C. Quality Improvement

D. Communication

E. Job Knowledge and problem solving

F. Teamwork

G. Leadership

H. Creativity/Innovation/Managing performance/Company programs

Through the use of survey, information on these variables were gathered at two times from respondents working in different divisions of Chevron.

4.5.2 DEPENDENT VARIABLE:

This variable operates as a function of the independent variables. In this study, the dependent variable is Improved employee morale.

4.5.3 GENERALIZED STATEMENT:

If Total Quality Management principles are successfully implemented, Employee Morale will be improved. This will lead to improved productivity which will not only effect lower unit production costs; but customers will respond positively to better quality in effect resulting in increase corporate market share, creating more jobs and increased return on investment.

4.5.4 HYPOTHESIS #1

4.5.4.1 NULL HYPOTHESIS #1:

Changes in the following (Independent variables); managing performance, leadership, teamwork, creativity, innovation, problem-solving, communication, planning, organizing, job knowledge, quality improvement, supervisory integrity and fairness will have no significant effect on Employee Morale. (dependent variable). i.e., (Ho: $\mu_B - \mu_A = 0$)

4.5.4.2 ALTERNATE HYPOTHESIS #1:

Changes in the following (Independent variables); managing performance, leadership, teamwork, creativity, innovation, communication, planning, organizing, job knowledge, problem-solving, quality improvement, supervisory integrity and fairness, will have a significant effect on Employee Morales (dependent variable). i.e., (Ha: $\mu_B - \mu_A \neq 0$)

4.5.5 HYPOTHESIS #2

4.5.5.1 NULL HYPOTHESIS #2:

If TQM is successfully implemented, there will be no effect on Corporate Earnings of major areas of operations.

4.5.6.2. ALTERNATE HYPOTHESIS #2:

If TQM is successfully implemented, there will be an effect on Corporate Earnings on major areas of corporate operations

4.6 METHODOLOGY:

4.6.1 RESEARCH DESIGN:

To investigate the impact of TQM/CQI on corporate Leadership, Performance and Earnings, this dissertation utilized several research tools and methods.

First, was the Likert scale questionnaire survey format, a

measure of attitude which was administered in 1991 and readministered in 1993 to selected employees located in five Chevron facilities in the Bay Area of California. The Likert format questionnaire survey was chosen because it uses series of statements for which subjects indicate agreement or disagreement. There were one hundred questions that were sub-grouped into eight categories. Responses from the questionnaire were assigned weight that are summed to indicate the respondents' attitudes. Frequencies of some questions was tested for significance against certain uncontrollable variables such as age, location and job classification.

Second, through the use of corporate performance appraisals and other data, leadership styles and employee performance were measured and compared before and after Chevron's implementation of the Total Quality Management concepts and, between Chevron's major areas of operations so as to measure varying impact.

Chevron's major areas of operations include Petroleum Operations, Chemicals, Coal and Other Minerals and Corporate units.

Further analysis indicated that the Petroleum Operations comprise of the following:

- Exploration and Production which are sub-categorized as United States Upstream and International Upstream.
- Refining and Marketing which are also sub-categorized as

United States Downstream and International Downstream.

Personal interviews were utilized both for designing research methodologies, interpreting empirical data and analysis of variance. Every attempt was made to sort out the variety of factors that can affect corporate performance over a given period of time.

This study tested if demography was a factor in the success or failure of Total Quality Management programs. Such demographic factors included, age, sex, ethnic groups, classifications or job rankings, supervision, length of time with corporation, and location.

Several criteria were considered for establishing the sample size of this study so that the sample mean were representative of the population target.

- The first criterion was the variance or heterogeneity of the population target in study.
- The second was the magnitude of error or the confidence level of 95%. At this level, the study found the sample mean lies within the region of reject and concluded that the alternate hypothesis is true.
- The study applied a "Standard Two-Sample T-test" for hypothesis #1 testing. The effect is to measure

Employee/customer satisfaction. Example of issues the study measured include specific needs and values defined by Chevron employees (see table 5.1).

4.6.1.1 HYPOTHESIS TESTING:

The hypothesis-testing and confidence interval procedures were based on a one-tail experiments as indicated below:

ONE-TAILED TEST

Ho: $(\mu_B - \mu_A) = D_0$

i.e., $(\mu_D = D_0)$

Ha: $(\mu_B - \mu_A) < D_0$

i.e., $(\mu_D < D_0)$

$$\text{Test statistic: } t = \frac{X_D - D_0}{S_D/\sqrt{n_D}}$$

where:

X_D = Sample mean of difference

S_D = Sampled standard deviation of differences

n_D = Number of differences

Assumptions:

- The population of differences of survey respondents is approximately normally distributed.
- The sample differences are randomly selected from a

population of differences.

Rejection region:

(One Tail Test)

If: $t < -t_{\alpha}$

or $t > t_{\alpha}$

Note: when Ha: $(\mu_B - \mu_A) > D_0$

where t_{α} has $(n_D - 1)$ degree of freedom

Assumptions:

- The relative frequency distribution of the population of difference is normal.
- The differences are randomly selected from the population of differences.

4.6.1.2. NONPARAMETRIC STATISTICS: WILCOXON SIGNED RANK TEST FOR THE PAIRED DIFFERENCE EXPERIMENT:

For the purpose of testing the second hypothesis, the nonparametric **T** and **F** tests were used to compare the probability distributions of Earnings in 1993 as against 1991.
The study analysed a five year Earnings between the periods of 1989 through 1993, and inferred that the distribution for Earning in 1993 lies above (to the right) of the other years (1989, 1990, 1991, 1992). Such as inference led to the decision that 1993

Earning was excessively good. To statistically make the inferrence, the study applied the Relative Ranks of the sample of observations called the Wilcoxon rank sum test, on Chevrons' yearly Earnings (excluding special items), in comparism to each other (1989-1993).

In applying the Wilcoxon rank sum test, the study first ranked sampled observations as though they were drawn from the same population. That is, pooling the measurements from the sample years and rank the measurements from the smallest (a rank of 1) to the largest (a rank of 5). The test statistic is based on the totals of the ranks for each of the two samples- that is, on the rank sums.

The **Null Hypothesis** says that, if the rank sums are nearly equal, the implication is that there is no evidence that the probability distributions from which the samples were drawn are different.

The **Alternate Hypothesis** says that, if the rank sums are very different, the implication is that the samples may come from different populations.

In the application of this test, these criteria was considered:

WILCOXON RANK SUM TEST: INDEPENDENT SAMPLES

ONE - TAILED TEST

H_o: Two sampled populations have identical probability distributions.

H_a: The probability distribution for the population **A** is shifted to the right of that for **B**.

Test statistics: The rank sum, **T**, associated with fewer measurements, (if sample sizes are equal, either rank sum can be used).

Rejection region: Assuming the smaller sample size is associated with distribution **A** (or, if sample sizes are equal, the study will use the rank sum T_A), and reject H_o if $T_A > T_U$, where T_U is the upper value of the chosen one-tail σ value.

Note: If the one-sided alternative is that the probability distribution for A is shifted to the Left of B (and T_A is the test statistic), the study will reject H_o if $T_A < T_L$

ASSUMPTIONS:

- The samples are random and independent
- The probability distributions from which the samples are drawn are continuous.

TIES: The study will assign tied measurements; the average of the

ranks they would receive, if they were unequal but occurred in successive order. An example will be, if the third-ranked and fourth-ranked measurements are ties, the study will assign each a rank of (3 + 4)/2 = 3.5

The study also considered the application of **Wilcoxon Rank** Sum Test: **Large Independent Samples**

ONE TAILED TEST

H_0: Two samples populations have identical probability distributions.

H_a: The probability distribution for population **A** is shifted to the right of that for **B**

TEST STATISTICS

$$T_A - \frac{n_1(n_1 + n_2 + 1)}{2}$$

$$Z = \frac{}{\sqrt{\frac{n_1 n_2 (n_1 + n_2 + 1)}{12}}}$$

Rejection region: $z > z_\alpha$

Assumptions: $n_1 > 10$ and $n_2 > 10$

This research reviewed literature on Total Quality Management and compared Chevron's progress and results to other studies. Literature reviews on selected corporations included, factors that contributed to the success or failure of the Total Quality Management Program, leadership styles, customer focus, strategic planning, management, employee involvement, training, reward and recognition, employee focus, process management, supply quality, data collection and analyses, and human resources and etc.

4.6.2 SAMPLING METHODOLOGY:

Survey questionnaires were used for this study. These survey questions was administered in two parts. First was in 1991 before the TQM program was introduces to Chevron management and employees. The second was in 1993, after all employees have completed the Total Quality Management training and the program have been implemented. The survey items were developed to measure Deming's fourteen point factors. These include the following variables:

A. Planning and Organizing

B. Issues affecting supervisory integrity and fairness

C. Issues on Quality and Continuous Quality Improvement

D. Issues on Communication

E. Issues on job knowledge and problem solving.

F. Issues about Team-Work

G. Issues on Corporate Leadership

H. Issues on creativity/innovation/managing performance/company programs.

This research applied the following designs in the analysis:

The factorial experimental design which was administered to investigate the interaction of two or more independent variables on a dependent variable.

The summated rating method, which was designed in the form of questionnaires, and developed by Rensis Likert, was used for measuring attitudes of employees. This method is the simplest to administer.

4.6.3 SAMPLE SIZE:

To allow Chevron employees respond to the survey, a ranked interval scale was used. These ranged from strongly agree to strongly disagree. With such questionnaires, respondents indicated their attitudes by checking how strongly they agree or disagree with carefully constructed statements that range from very positive to very negative towards the attitudinal object.

Respondents generally chose from five alternatives; strongly agree, agree, uncertain, disagree and strongly disagree. A survey questionnaire for approximately 800 employees located in five Chevron facilities in the Bay area of California, were mailed to respective Chevron locations. Of this number, 440 employees responded and provided the data base for this study. Chevron Corporation has approximately 47,576 employees (Chevron-10k) all over the world as of the December, 1993. Its headquarter is based in San Francisco. Each of Chevron worldwide operating areas have representation in each of its California Bay area facilities. These facilities include San Francisco, Concord, San Ramon, Richmond Refinery and Walnut Creek.

This survey is a descriptive research study that has the objective of measuring awareness, knowledge, behavior, opinions or the likes. Reliability has been tested using test re-test method. The issue of validity was proven by establishing content and criterion validity. Using the hypothesis that were tested and empirically demonstrated in this study, the study derived logical conclusions about the impact of Total Quality Management on Productivity. Three components of attitudes that were considered in this study are the **affective** (emotions of feelings involved), the **cognitive** (awareness of knowledge), and the **behavioral** (predisposition to action).

In the last decade, volumes of material have been published about Total Quality Management. Many writers have written on the successes and failures of the program and its impact on corporate performance. This dissertation reports on the specifics of Chevron Corporation's approach with the intent of "adding value" to the application of TQM.

4.6.4 CHEVRON'S FINANCIAL PERFORMANCE MODEL FOR PRODUCTIVITY:

Deming (1986) stressed that Quality starts with the customer. An organizational goal in a Total Quality Management environment, is to meet and exceed customers' expectation and to give lasting value to the customers. Since members of Total Quality Management organizations recognize both External customers (those who purchase or use the products or service) and Internal Customers (fellow employees whose work depends on the work that precedes them), productivity data will be derived from the Output (External) and Input (Internal) customers.

Productivity is defined as:

Productivity = Outputs/Inputs.

P=Y/N

P = Productivity

Y = Output

N = Inputs

- **Output** is defined as **Total Sales + Other Operating Earnings** since total sales is related to the **External Customers.**
- **Input** is related to the **Internal Customers** and is derived

using **the total Number of Employees** per year

$$\frac{\text{Total Sales + Other Operating Revenues}}{\text{Total number of Employees per year}} = \text{Employee Productivity}$$

Productivity function in this study provided a relation between the quantity of factor inputs, such as the amount of labor used (Internal Customer), and the maximum quantity of output (External Customer) that can be produced using the inputs.

$$Y = F(N, \ldots)$$

- **Y** = Real Output or External Customers
- **N** = labor Input - as a result of the Internal Customer
- ... the dots denote other cooperating factors (capital, for example) that are in short-run fixed supply.

A five year productivity data from 1989 - 1993 were analyzed to project trends and deviations.

FIVE - YEAR TOTAL SALES/EMPLOYEES DATA (Millions of dollars)

YEAR	1993	1992	1991	1990	1989
Net Sales/ Employees	760,699	775,957	693,055	766,310	582,130

EXHIBIT 4.1

(Source: Chevron Annual Report 1993)

NOTE: Q = QUARTERS OF THE YEAR

Q1 = FIRST QUARTERS OF THE YEAR

Q2 = SECOND QUARTER OF THE YEAR

Q3 = THIRD QUARTER OF THE YEAR

Q4 = FOURTH QUARTER OF THE YEAR

Y = PRODUCTIVITY (MILLIONS OF DOLLARS)

Y1 = PRODUCTIVITY DOLLARS IN THE FIRST QUARTER OF SAME YEAR

Y2 = PRODUCTIVITY DOLLARS IN THE SECOND QUARTER OF SAME YEAR

Y3 = PRODUCTIVITY DOLLARS IN THE THIRD QUARTER OF SAME YEAR

Y4 = PRODUCTIVITY DOLLARS IN THE FOURTH QUARTER OF SAME YEAR

QUARTER	YEAR = 1993	YEAR = 1991
Q4 - Y4	$184,505	$178,066
Q3 - Y3	$191,210	$168,548
Q2 - Y2	$197,852	$164,246
Q1 - Y1	$187,132	$182,195
TOTAL PER YEAR	$760,699	$693,055

EXHIBIT 4.2

(Source: Chevron Annual Report 1993)

In conclusion, this study tested the application and viability of Total Quality Management to a Corporate environment using Chevron Corporation as a proxy and found why such programs succeed or fail. The findings lend initial support for the "value" creating potential of TQM practices as a component of corporate strategy and could be a

valuable lesson for other companies. However, much additional work remains using different samples and data before a broad-based endorsement of the TQM philosophy is warranted.

Chapter 5

Results

This chapter analyses the findings of the study. The survey and its results are on appendix 1 and 2.

Deming, in his book, Out of the Crisis, says "In God we trust. All others bring data" meaning that Total Quality Management is based on data and not on opinions alone. Deming stresses that, improved customer satisfaction (both internal and external customers) improves morale, which leads to increase sales, profits and productivity (Deming 1986, Crosby 1989). If this statement is true, then this study will measure the effect of employee/customer satisfaction on productivity by analysing the effect of TQM on the financial performance of Chevron.

5.1 HYPOTHESIS #1

5.1.1 NULL HYPOTHESIS:

Changes in the following (Independent variables); managing performance, leadership, teamwork, creativity, innovation, problem-solving, communication, planning, organizing, job knowledge, quality improvement, supervisory integrity and fairness will have no significant effect on Employee Morales. (dependent variable). i.e., (Ho: $\mu_B - \mu_A = 0$)

5.1.2. ALTERNATE HYPOTHESIS:

Changes in the following (Independent variables); managing

performance, leadership, teamwork, creativity, innovation, communication, planning, organizing, job knowledge, problem-solving, quality improvement, supervisory integrity and fairness, will have a significant effect on Employee Morales (dependent variable). i.e., (Ha: $\mu_B - \mu_A \neq 0$)

Total Quality Management can be measured by the application of a "two-part frame-model" (Shewhart, 1986; Tuttle, 1993). The model are discussed below:

5.2. TWO PART MODEL FOR MEASURING THE EFFECT OF TQM:

The first part establishes three levels of measures:

- Controlling operations within the process
- Measuring the outputs delivered
- Quantifying the outcomes

The second part defines four dimensions of results:

- Products and services delivered to the users and customers
- Financial Return for shareholders
- Job satisfaction for employees
- Social impact on the community

However, this study measured and quantified the effect of TQM on productivity by applying the second part which specified the "dimensions of results". **The** procedures the study applied for analysing Chevron's financial performance, are shown in table 5.1

MEASUREMENT MODEL FOR TOTAL QUALITY MANAGEMENT

DIMENSION	FOCUS	EXAMPLE MEASURED
Job/customer Satisfaction	Employees	• Specific needs and value defined by Chevron employees through surveys; Employee satisfaction; Factors contributing to job satisfaction.
Financial Analysis/ Return	Shareholder	• Costs; sales volume; productivity, cost of quality; capital utilization, Return on investment; earnings, waste; energy efficiency
Social Impact	Community	• Regulatory compliance; atmospheric emissions; grants and contribution; presentation and contributions, taxes and fines
Actual Product or Services	End user or customer (Internal or external)	• Specific features/characteristics and attributes defined by customers

SOURCE (DEMING - OUT OF THE CRISIS, 1986)

Table 5.1

5.3 JOB SATISFACTION METRICS:

The "Job Satisfaction Matrix", examined the following: Chevron's knowledge of employees (internal customers), Chevron's overall customer-service systems, Chevron responsiveness to issues, and Chevron's ability to meet requirements and expectations of its customers. In designing the survey questionnaire for this study, Deming's fourteen TQM concepts were grouped into nine categories. The nine categories are:

- Planning and Organizing
- Supervisory Integrity and Fairness
- Quality and Continuous Improvement
- Communication
- Job knowledge and Problem solving
- Teamwork
- Leadership
- Managing Performance
- Creativity and Innovation

The above nine categories contained the "One-hundred" questionnaires that the study administered to randomly selected Chevron Employees in 1991 and repeated in 1993, so as to find, if TQM have any effect on the morales of the workforce. The results are as follows:

5.3.1. CATEGORY 1: PLANNING AND ORGANIZING:

This section contained survey questionnaire # 1-16 (see Appendix 1).

A statistical "Standard Two-Sample t-Test" was applied to all nine categories of the survey, to test for the Null and Alternate hypothesis. Results of the findings are as follows:

data: before [category, 1] and after [category, 1]

before (B) = Survey results of 1991

after (A) = Survey results of 1993

t = 27.4504, df = 818, p-value = 0

alternative hypothesis: true difference in means is not equal to Zero.

95 percent confidence interval:

0.6090882 0.7029035

sample estimates:

mean of A = 2.756818

and mean of B = 2.100822

Results from category 1, (Planning and Organizing) in its self, is strong evidence to indicate that μ_B (the mean of "Before" test) differ from μ_A (the mean of the "After" test).

Note: Assumptions:

These assumptions were applied to all nine categories. They are:

- The population of differences in the Before and After is approximately normally distributed.
- The sample differences are randomly selected from a population of differences.

The study found the rejection region by choosing $\alpha = .05$ or a 95% confidence level. The Null Hypothesis (Ho) will be rejected if test result indicate $t < -t_{\alpha/2}$ or $t > t_{\alpha/2}$

where $t_{\alpha/2}$ is based on $(n_D - 1)$ degree of freedom.

The result shows t-value corresponding to $t_{\alpha/2}$ and $n_D - 1 = 818$ to be 27.4504. P - value = 0

Thus, the Null hypothesis is rejected because $t > 27.4504$. The computed t value falls within the rejection region which leads the study to conclude that the mean of the" Before test" and "After test" differs from zero, therefore the study accepted the alternate hypothesis (Ha).

The result above indicated that Chevron's management and employees have accepted the acronym "Quality First" as a new way for the organization to do business. Chevron's management and employees' recognition of the need for improvement and the willingness to learn more are essential steps towards a sustained improvement on productivity. Successful Implementation of the acronym "Quality First", requires not only the vision, planning, and active involved leadership of top management, it also requires practical support such as providing the resources

for the implementation of the TQM program. These resources include; the time, money, and personnel (Vaill, 1989; Zemke, 1989).

"Quality First" means that Chevron is meeting its customers' expectations. The test result indicated that the expectations of the customers, who could be co-workers (internal customers) or end users (external customers) of Chevron's products or services, are met. Management documented its plan for "Quality First" adoption at Chevron, by creating a living plan that reflected the continuous improvement of it operations. This living plan is displayed at the entrance of every Chevron facilities to assure its customers that corporate goals and approaches are communicated throughout the organization (Chevron Annual Report, 1993).

Chevron management improved its planning and organizing process by starting at the plan step of the Plan-Do-Check-Act (PDCA) cycle (see table 5.2) and going clockwise around the wheel. Deming (1986) says that, Quality improvement is a never ending cycle of turning the wheel, so to speak, on business processes. The Plan-Do-Check-Act Cycle, an adoptation of the work of Shewart, links the seven diseases, the fourteen points, and the statistical techniques into a continuous process, without a starting or ending point (Shewart, Deming, 1986).

A total quality management system is a structured process that concurrently turns the wheel on business processes to improve their standards while conducting business at the current standard. The survey result indicated that Chevron applied the PDCA cycle to attain and retain a superior quality management process during the implementation phrase of its quality improvement process.

THE PLAN-DO-CHECK-ACT (PDCA) CYCLE

1. PLAN	2. DO
3. CHECK	4. ACT

TABLE 5.2

5.3.2. CATEGORY 2: SUPERVISORY INTEGRITY/FAIRNESS

This section contains survey questionnaire # 17-28 (see appendix 1). Statistical results are follows:

data: before [category 2] and after [category 2]

t = -48.4705, df = 818, p-value = 0

alternative hypothesis: true difference in means is not equal to zero.

95 percent confidence interval:

-1.498876 -1.382204

Sample estimates:

mean of A = 2.020644

mean of B = 3.461184

Results from category 2, (Supervisory Integrity and Fairness) in its self, is another strong evidence to indicate that μ_B (the mean of "Before" test) differ from μ_A (the mean of the "After" test).

The study found the rejection region by choosing $\alpha = .05$ or a 95% confidence interval. The Null Hypothesis (Ho) will be rejected if test result indicate $t < -t_{\alpha/2}$ or $t > t_{\alpha/2}$ where $t_{\alpha/2}$ is based on $(n_D - 1)$ degree of freedom.

The result shows t value corresponding to $t_{\alpha/2}$ and $n_D - 1 = 818$ to

be - 48.4705. P - value = 0

Thus, the Null hypothesis will be rejected because t > - 48.4705. The computed t-value falls within the rejection region which leads the study to conclude that the mean of the" Before test" and "After test" differs from zero. Therefore, the study accepted the alternate hypothesis (Ha).

Chevron Management believed that a key part of its internal strength is in its workers (Chevron Annual Report 1993), and that Chevron workers were the company's internal customers. Management has committed its vision to be: "Better than the Best" (Chevron Annual Report 1991), which meant:

- Employees are proud of their success as a team
- Customers, suppliers and governments prefer Chevron
- Competitors respect Chevron
- Communities welcome Chevron
- Investors are eager to invest in Chevron

Employees survey response taken in 1993, after the implementation of Quality Improvement Program at Chevron, netted major improvements in some key areas of Chevron's operations. The results of the survey indicated a positive change on how employees felt about supervisory integrity and fairness in 1993 as against 1991. The positive financial returns in 1993 indicated that customers reaped the benefits of TQM efforts. Both

the internal (the person with whom each employee interacted), and the external customer (the buyer of the product or service), benefitted.

5.3.3. CATEGORY 3: QUALITY AND CONTINUOUS IMPROVEMENT

This section contained survey questionnaires # 29-41 (see appendix 1).

Also, a statistical "Standard Two-Sample t-Test" was applied to test for the Null and Alternate hypothesis. Results of the findings as are follows:

data: before [category 3] and after [category 3]
t = -7.601, df = 818, p-value = 0
alternative hypothesis: true difference in means is not equal to zero.
95 percent confidence interval:
-0.2304028 -0.1358281
Sample estimates:
mean of A = 2.591783
mean of B = 2.774898

Results from category 3, (Quality and Continuous Improvement) in its self, is good evidence to indicate that μ_B (the mean of "Before" test) differ from μ_A (the mean of the "After" test).

The study found the rejection region by choosing $\alpha = .05$ or a 95% confidence interval. The Null Hypothesis (Ho) will be

rejected if test result indicate $t < -t_{\alpha/2}$ or $t > t_{\alpha/2}$

where $t_{\alpha/2}$ is based on $(n_D - 1)$ degree of freedom.

The result shows t-value corresponding to $t_{\alpha/2}$ and $n_D - 1 = 818$ to be - 7.601. P - value = 0

Thus, the Null hypothesis will be rejected because $t > - 7.601$. The computed t-value falls within the rejection region which leads the study to conclude that the mean of the" Before test" and "After test" differs from zero, and accepted.

Chevron management has accepted the fact that, Total Quality Management (TQM) means integrating quality principles into all aspects of its work (Chevron Annual Report 1993). These include:

- Strategy
- Process
- Behavioral

According to Deming (1986) development of the capability of employees to their fullest potential is the key to total quality. Deming says, "Improving the capability of people is a prerequisite to improving the capability of processes and systems, which in turn is a prerequisite to improving products and services". The survey results indicated that employees and management as a whole agree that Quality and Continuous Improvement, positively changed the way Chevron does business. The work process is streamlined and unit cost of operation is constantly on a downwards trend. Employees are finding new ways

of doing their jobs, and error rate or duplication of the work processes is down (Chevron Annual Report, 1993). Chevron's vision metrix which is part of the company's TQM process, continued to guide Chevron's continuous quality improvement programs as a key business drivers.

5.3.4. CATEGORY 4: COMMUNICATION

This section contains survey questionnaire # 42-51 (see appendix 1).

A statistical "Standard Two-Sample t-Test" was applied in this category to also test for the Null and Alternate hypothesis.

Results of the findings are as follows;

data: before = B of [category 4] and after = A of [category 4]
t = -24.1263, df = 818, p-value = 0
alternative hypothesis: true difference in means is not equal to zero.
95 percent confidence interval:
-0.8318566 -0.7066841
Sample estimates:
mean of B = 2.217045
mean of A = 2.986316

Results from category 4, (Communication) in its self, is another strong evidence to indicate that μ_B (the mean of "Before" test) differ from μ_A (the mean of the "After" test).

The study found the rejection region by choosing $\alpha = .05$ or a 95% confidence interval. The Null Hypothesis (Ho) will be rejected if test result indicate $t < -t_{\alpha/2}$ or $t > t_{\alpha/2}$ where $t_{\alpha/2}$ is based on $(n_D - 1)$ degree of freedom.

The result shows t-value corresponding to $t_{\alpha/2}$ and $n_D - 1 = 818$ to be - 24.1263. P - value = 0

Thus, the Null hypothesis will be rejected because t > - 24.1263. The computed t-value falls within the rejection region which leads the study to conclude that the mean of the" Before test" and "After test" differs from zero. The study accepted the Alternate hypothesis (Ha).

Employees at Chevron welcomed the new communication process since the implementation of TQM in the workplace. The survey result show that employee accept the open, honest and effective communication system now in place. Job designs are now clear and employees understand what is expected of them. As management begin to build awareness throughout Chevron corporation, lines of communication are continuously established both horizontally and vertically. As a result of TQM, management was able to create a " Quality First" environment. The effect of this environmental factor, is that as employees talk to one another, they are able to work through problems, overcome barriers, find encouragements and support others who are involved in quality efforts.

5.3.5. CATEGORY 5: JOB KNOWLEDGE AND PROBLEM SOLVING

Category Five contains the survey questionnaires #52-64 (see Appendix 1).

A statistical "Standard Two-Sample t-Test", was applied in this category. The results of the findings from the survey are as follows:

Data: before = B [category 5] and after = A [category 5]

t = -26.232, df = 818, p-value = 0

alternative hypothesis: true difference in means is not equal to zero.

95 percent confidence interval:

-0.6297356 -0.5420539

Sample estimates:

mean of B = 2.806818

mean of A = 3.392713

Results from category 4, (Job Knowledge and Problem Solving) in its self, is strong evidence to indicate that μ_B (the mean of "Before" test) differ from μ_A (the mean of the "After" test).

The study found the rejection region by choosing $\alpha = .05$ or a 95% confidence interval. The Null Hypothesis (Ho) will be rejected if test result indicate $t < -t_{\alpha/2}$ or $t > t_{\alpha/2}$ where $t_{\alpha/2}$ is based on $(n_D - 1)$ degree of freedom.

The result shows a t-value corresponding to $t_{\alpha/2}$ and $n_D - 1 = 818$ to be - 26.232 P - value = 0

Thus, the Null hypothesis will be rejected because t > - 26.232. The computed t-value falls within the rejection region which leads the study to conclude that the mean of the" Before test" and "After test" differs from zero and accept the alternate hypothesis.

The survey result indicated that Job knowledge and problem solving techniques positively improved the work process in 1993 as against 1991. The implementation of TQM concept facilitated the achievement of (QI) quality improvement through preventive and systematic improvement of key processes rather than through "fire fighting" and focusing on near-term results (Juran 1989).

In 1993, Chevron's management and employees focused on key processes which in the past cut across functional boundaries and received less attention than deserved. These improved key processes helped streamline the company's work-flow and reduced lost and wasted time.

Chevron management, not only focusing on results, but also on the conditions and processes that lead to results, designed a framework that were used by respective operating units within the organization to tailor their systems and processes towards an ever-improving quality performance (Chevron annual report, 1993).

5.3.6. CATEGORY 6: TEAMWORK

Survey questionnaires # 65-77 (see Appendix 1) are included within this category. A statistical "Standard Two-Sample t-Test" was applied and the results are as follows:

Data: before = B [category 6] and after A [category 6]

t = -90.4371, df = 818, p-value = 0

Alternative hypothesis: true difference in means is not equal to zero.

95 percent confidence interval:

-1.944529 -1.861913

Sample estimates:

Mean of B = 1.367832

Mean of A = 3.271053

Results from category 6, (Teamwork) in its self, is strong evidence to indicate that μ_B (the mean of "Before" test) differ from μ_A (the mean of the "After" test).

The study found the rejection region by choosing $\alpha = .05$ or a 95% confidence interval. The Null Hypothesis (Ho) will be rejected if test result indicate $t < -t_{\alpha/2}$ or $t > t_{\alpha/2}$ where $t_{\alpha/2}$ is based on $(n_D - 1)$ degree of freedom.

The result shows a t-value corresponding to $t_{\alpha/2}$ and $n_D - 1$

= 818 to be - 90.4371 P - value = 0

Thus, the Null hypothesis will be rejected because t > - 90.4371. The computed t-value falls within the rejection region which leads the study to conclude that the mean of the" Before test" and "After test" differs from zero.

Chevron management is committed to teamwork. This is true by the results of the survey of 1993. Chevron employees working together as teams are the key to some 1993 improved financial performance as against 1991 figures.

The goal of management involving employees in team environment, is to increase market share, to boast customer satisfaction, and to improve overall performance through cooperation and collaboration. Teamwork is at first a sharing of responsibility and eventually a sharing of decision making that impacts the entire organization. Collaboration and teamwork build a new level of capability, a new strength that the organization can harness to increase its customers' satisfaction (Deming 1986). Chevron management recognize that not every group will become a high performing, autonomous work team. However, the survey results indicate that, group teams at Chevron make valuable contributions as they progress through the stages of forming, storming and norming.

Chevron management is committed to the following values: Honesty and integrity, trust, diversity, communication,

recognition, achievement; partnership, and alignment (Chevron annual Report 1993). Chevron management says:

> "We have evolved our committed Team Vision into this statement of values. These values will serve to guide our decisions and behavior in all of our dealings with each other. By living these values, we will become a worldwide team of employees committed to Chevron's and our own success".

Teamwork is the catalyst that drives many improvement efforts (Mizuno, 1989; McGregor, 1960). Creating teams within operating units, allowed Chevron to apply its diverse skills and experience to processes and problem solving. As a result of TQM, the newly created teams provided underlying basis of experince and history for the corporation and stimulated a "participative management style" within the workforce. The result was improved employee morale. Employees feel that their contributions are important and are eager to be more productive (Chevron Annual Report, 1993).

5.3.7. CATEGORY 7: LEADERSHIP

This section of the survey contain questionnaires #78 - 85 as indicated in appendix 1.

Also, a statistical "Standard Two-Sample t-Test", was applied to test for the null and alternate hypothesis. Results are as follows:

Data: before = B [category 7] and after = A [category 7]

t = -2.9279, df = 818, p-value = 0.0035

Alternative hypothesis: true difference in means is not equal to zero.

95 percent confidence interval:

-0.15390295 -0.03036739

Sample estimates:

Mean of B = 2.696023

Mean of A = 2.788158

Results from category 7, (Leadership) in its self, is strong evidence to indicate that μ_B (the mean of "Before" test) differ from μ_A (the mean of the "After" test).

The study found the rejection region by choosing $\alpha = .05$ or a 95% confidence interval. The Null Hypothesis (Ho) will be

where $t_{\alpha/2}$ is based on $(n_D - 1)$ degree of freedom.
The result shows t-value corresponding to $t_{\alpha/2}$ and $n_D - 1 = 818$ to be - 2.9279. P - value = 0

Thus, the Null hypothesis will be rejected because $t > -2.9279$. The computed t-value falls within the rejection region which leads the study to conclude that the mean of the" Before test" and "After test" differs from zero, therefore accepted the Alternate hypothesis.

Chevron's management embraced the TQM concepts by, understanding the principles of Total Quality Management, their implications and benefits. The survey results indicated that, there was a change towards the left and that TQM is very viable. In 1993, Chevron Senior Executives were proud to be judged as:" a dedicated symbolic commitment to quality and active day to day leadership styles". Senior Executives now talk to customers (both internal and external), meet with employees and lead quality teams. The study finds that as a result of TQM, management spent about 50% of their time interacting with customers and finding out how to meet or exceed their expectations.

Chevron management are now, both supportive and motivating. Management gives clear direction on goals, and are now receptive to new ideas. Management maintain positive attitude while encouraging teamwork and intelligent risk taking by employees.

Employees are treated as professionals and are now empowered with appropriate levels of authority. Supervisors and Managers work to develop an environment where accomplishments are recognized and rewarded through the Performance Management Program (PMP) and the Research and Award Program (R&A).

The effect of TQM is also illustrated by the role exhibited by corporate managers within Worldclass TQM organizations (Crosby, 1988). This can be illustrated by the aggressiveness shown by Chevron management, in pursuit of leadership positions in several industry agencies and associations. Some examples of the leadership strategies include the following:

- Participation in the industry guideline groups pursuing technology advances (e.g., Electronic Data Invoicing, and Imaging).
- Participate with industry groups in the development of Electronic Fund Transfer (EFT) to Royalty Owners.
- Working with partners to educate and interact with the regulatory agencies and Royalty Owner Associations that impact the development of new requirements.
- Increasing Chevron's presence in the COPAS (Council of Petroleum Accountants Societies), which sets the accounting standards for petroleum industry joint ventures.

By establishing a leadership role in the above groups and

applying the Deming's leadership concepts, Chevron was able influence industry and regulatory procedures impacting its future work (Chevron Annual Report, 1993).

5.3.8. CATEGORY 8: MANAGING PERFORMANCE

Category 8 contains survey questionnaires # 86-96, as indicated by appendix 1.

A statistical "Standard Two-Sample t-Test" was also applied to test for hypothesis. Results are as follows:

Data: before = B [category 8] and after = A [category 8]

t = -18.0577, df = 818, p-value = 0

alternative hypothesis: true difference in means is not equal to zero.

95 percent confidence interval:

-0.7332183 -0.5894452

Sample estimates:

mean of B = 2.454545

mean of A = 3.115877

Results from category 8, (Managing Performance) in its-self, is strong evidence to indicate that μ_B (the mean of "Before" test) differ from μ_A (the mean of the "After" test).

The study found the rejection region by choosing $\alpha = .05$ or a 95% confidence interval. The Null Hypothesis (Ho) will be rejected if test result indicate $t < -t_{\alpha/2}$ or $t > t_{\alpha/2}$ where $t_{\alpha/2}$ is based on $(n_D - 1)$ degree of freedom.

The result shows a t-value corresponding to $t_{\alpha/2}$ and $n_D - 1 =$

818 to be - 18.0577. P - value = 0

Thus, the Null hypothesis will be rejected because t > - 18.0577 The computed t-value falls within the rejection region which leads the study to conclude that the mean of the" Before test" and "After test" differs from zero, therefore accepting the alternate hypothesis.

As part of the process that Chevron management used to improve its financial performance, management integrated the quality improvement concepts into strategic and operational planning. Senior management leadership teams organized and directed the quality improvement process and also developed a cycle for evaluating and improving the procedure. Another reason why TQM program was successfully implemented in 1992, was because management worked very hard at involving Chevron employees both individually and in teams.

5.3.9. CATEGORY 9: CREATIVITY AND INNOVATION

This section contained survey questionnaires # 92-100, as idicated in appendix 1.

A statistical "Standard Two-Sample t-Test" was applied to test for the Null and Alternate hypothesis. Results of the findings are as follows;

Data: before = B [category 9] and after = A [category, 9]

t = 3.416, df = 818, p-value = 7e-04

Alternative hypothesis: true difference in means is not equal to zero.

95 percent confidence interval:

0.04142538 0.15333858

Sample estimates:

Mean of B = 2.607323

Mean of A = 2.509941

Results from category 9, (Creativity and Innovation) in itself, is also an evidence to indicate that μ_B (the mean of "Before" test) differ from μ_A (the mean of the "After" test).

The study found the rejection region by choosing $\alpha = .05$ or a 95% confidence interval. The Null Hypothesis (Ho) will be rejected if test result indicate $t < -t_{\alpha/2}$ or $t > t_{\alpha/2}$ where $t_{\alpha/2}$ is based on $(n_D - 1)$ degree of freedom.

The result shows t-value corresponding to $t_{\alpha/2}$ and $n_D - 1 = 818$ to be 3.416. P - value = 7e-04

Note: The p - value is very insignificant. P - value says = How often would we see such a big difference when the Null is true? The P - value is $7 * 10^{-4}$. This value is smaller than .05 which is $5 * 10^{-2}$.

Thus, the Null hypothesis will be rejected because $t > 3.416$. The computed t-value falls within the rejection region which leads the study to conclude that the mean of the" Before test" and "After test" differs from zero, therefore accepting the Alternate hypothesis.

The survey results indicated that employees are now having the opportunities to be creative and innovative as a result of the TQM program. Innovations are now widely viewed by top management, as a key to maintaining business competitiveness. Chevron (QI) quality improvement process is geared towards the spirit of innovation among its workforce. This issue can be attributed to Chevron's high performance record in 1993 as against 1991 figures. With the TQM concepts, Chevron management adopted the following innovative concepts:

- All creative suggestions for quality improvement were recognized and rewarded. This improved employee morale and boasted empowerment

- Financial and technical support to help employees follow up on partially developed ideas was provided.
- Chevron employees were encouraged by management to spend time away from their regular duties, thinking about new ideas and opportunities.

In all nine categories, the T-test rejected the Null Hypothesis. The interpretation is that the implementation of TQM in 1993 created a positive work environment, improved employee morale and increase productivity.

5.4 FINANCIAL PERFORMANCE MATRIX:

Next, the study quantified the effect of Total Quality Management on key financial performance results of Chevron and compared the results of 1993 figures against 1991 figures. External environmental factors such as, Oil crisis, International Monetary crisis and reforms, Monetary and Fiscal policies, Inflation and Economics policies, conditions of Financial Markets, The OPEC, etc, did not have a significant effect on the financial performance of Chevron during the period 1991 through 1993 (Chevron annual Report, 1993).

Some ratios and matrix analysis of key financial performance areas of Chevron were analyzed so as to see, if Total Quality Management had any significant effect on the major operating areas of the corporation. In performing the matrix analysis, the following financial indicators were considered; they are:

Financial Indicator # 1: Earnings by Major areas of Operation, Excluding Special Items for a five years' period (Millions of Dollars) Matrix.

Financial Indicator # 2: Operating Expenses Matrix.

Financial Indicator # 3: Total Sales per Employee Matrix.

Financial Indicator # 4: Industrial Portfolio analysis on adjusted Operating Expences/Barrels, Excluding Own Use Fuel Matrix.

Financial Indicator # 5: Energy Efficiency Matrix.

Financial Indicator # 6: Average Stockholders' Matrix.

Financial Indicator # 7: Return on Average Capital Employed, Excluding Special Items Matrix.

Financial Indicator # 8: Return on Sales Matrix.

Financial Indicator # 9: Toatl Stockholders' Return Matrix.

Results from the analyses indicate the following:

5.4.1. FINANCIAL INDICATOR #1:

Earnings by Major Areas of Operation, Excluding Special Items for a five year period (Millions of Dollars).

	1993	1992	1991	1990	1989
Petroleum Operations:					
U.S. Upstream*	702	630	331	864	384
International Upstream	641	580	579	643	435
Total Upstream	**1,353**	**1,210**	**910**	**1,507**	**819**
U.S. Downstream*	555	350	182	491	270
International Downstream	251	114	353	182	227
Total Downstream	**806**	**464**	**535**	**673**	**497**
Total Petroleum Operations	**2,149**	**1,674**	**1,445**	**2,180**	**1,316**
Chemicals	31	36	117	192	375
Coal and Other Minerals	44	39	11	41	36
Corporate and Other*	(76)	(190)	(214)	(277)	(266)
Total Worldwide Earnings, Excluding Special Items	**2,148**	**1,559**	**1,359**	**2,136**	**1,461**

* Note: "Corporate and Other" include interest expense, interest income on cash and marketable securities, other corporate items, and real estate and insurance activities (Supplement to Chevron Corporation 1993 Annual Report).

* Upstream Operations include: Exploration and Production.

* Downstream Operations include: Refining and Marketing.

The study applied the Rank Sum Test which is a good measure of differences to test the hypothesis $\mu_B = \mu_A$. This test was accomplished by comparing the "before/after" earnings of (1993 vs 1991), so as to find out if 1993 was really an exceptional year as a result of Total Quality Management.

NULL HYPOTHESIS #2:

The Null hypothesis Indicates that, if TQM is successfully implemented, there will be no effect on Corporate Earnings of major areas of operations.

i.e., (Ho: $\mu_B - \mu_A = 0$)

ALTERNATE HYPOTHESIS #2:

The Alternate hypothesis indicates that, if TQM is successfully implemented, there will be positive effect on Corporate Earnings of major areas of operations.

i.e., (Ha: $\mu_B - \mu_A \neq 0$)

The Rank Sum Test

==========

Application of the Wilcoxon Rank Sum Test for Independent Samples to test hypothesis #2 are as follows:

Ranking of Earnings by Major Areas of Operation, Excluding Special Items

Ranks:	1993	1992	1991	1990	1989
U.S. Up	2	3	5	1	4
U.S. Down	2	3	4	1	5
Int. Up	1	3	5	2	4
Int. Down	2	5	1	4	3
Chemicals	5	4	3	2	1
Coal etc.	1	3	5	2	4
Corporate	1	2	3	4	5

The study ranked each department's (U.S. Upstream, International Upstream, U.S Downstream, International Downstream, Chemicals, Coal and Corporate.) earnings from highest to lowest for each of the five years 1989-1993. For example, U.S. Upstream's ranks are 2, 3, 5, 1, 4, because 1993 had the second-highest earnings among the five years, '92 the third-highest, '91 the fifth-highest,

and so on. This gives the study a list of seven ranks for 1993 (i.e. one for each major operating area).

The sum of these ranks was calculated to be 14. The study says that if every year were like every other year, then, the expectation will be to get 1's, 2's, etc. equally often. That is, the expectation, would be that, the average department ranking would be 3, and therefore that the total ranking for the seven departments would be 7 * 3 = 21.

The null hypothesis says that: the earnings for all the years are alike, and therefore that the department rankings ought to be just like numbers chosen at random from the set {1,2,3,4,5}. If the sum (14 for 1993) is unusually small compared to 21, this will be evidence that 1993 was an unusually good year.

The set {1,2,3,4,5} has an average of 3 and a (population) variance of 2. Therefore the sum of seven numbers chosen at random with replacement from this set has an expected value of 7*3 = 21 and a variance of 7 * 2 = 14, which gives a standard error of squared (14) = 3.74.

NOTE:

- The expected value is 21
- and the standard deviation is 3.74.

Next, the study finds the probability on how likely is it to get 12 or less in five samples from this set using the normal approximation methodology.

The logic is to find what proportion of the Normal curve whose average is 21 and whose (SD) Standard Deviation of 3.74 lies to the left of 12?

The answer: using the z-test; $z = (12 - 21)/3.74 = -2.41$ and the area -- that is, the probability of getting 12 or less in a random sample of size 5 from this set -- is .008.

** P-value = .008 ***

That is, the null hypothesis says that the ranks for 1993 ought to be just like drawing seven times at random from the set {1,2,3,4,5}. But if the null hypothesis were true, the study would see such a small sum of (12) only about 8 times out of one thousand. The analysis is to reject the null hypothesis and conclude that 1993 was a good year in terms of earnings (excluding special Items).

5.4.2. FINANCIAL INDICATOR #2: CHEVRON OPERATIONAL EXPENSES

The effect of TQM (Deming 1986) has enabled Chevron improve its processes as seen in the operating costs of the organization. Chevron was able to absorb about $250 million in inflation and

still reduce absolute expenses by $150 million. The company's operating expenses per barrel is broken down into these categories:

	1991	1992	1993	% CHANGE 1991 Vs 1993
Employee	$2.24	$2.20	$2.18	3% down
Fuel & utilities	$1.31	$1.20	$1.11	18% down
Materials	$0.74	$0.71	$0.65	14% down
Transportation	$1.46	$1.36	$1.39	5% down
Other	$1.70	$1.44	$1.18	44% down
Total Operating Expenses	$7.45	$6.91	$6.51	14% down
Equivalent MBD		3,458	3,507	3,488

EXHIBIT 5.3

NOTE: With Continuous improvement, Chevron is targeting a $6.26 operating expense target by 1994 year end.

In 1993, employees were able to coordinate their activities better, set goals and priorities in order to complete their tasks timely, with minimal overtime. An internal management report from Chevron, indicated that the corporation exceeded all expectations in the following areas:

- Reliability - there was an annual average rate for its operating areas by 12.3 %. Reliability of Chevron products and services refers to corporate freedom from errors and breakdowns while in use by the customers. Reliability was measured by the number of claims files or recalls on an annual basis or by some other indicators unique to some particular operating area of the corporation (Chevron Annual report, 1993).
- Timeliness of deliver was another factor management recorded as a contributing factor to 1993 improved operating expenditures. Chevron recorded a high percentage (95%) rate of on time delivery. Timeliness of delivery is defined as the percentage of on-time delivery. Chevron annual average improvement for on-time delivery was 4.9 percent.
- Processing time was also reduced, fewer errors or defects were detected.

Operating expences in the following categories were down.

They are:

- Salary (Labor)
- Fuel and Utilities
- Material and Transportation

Employee salary was down by 3% comparing 1993 figures against 1991 figures. Fuel and utilities was down by 18% while Materials and transportation were all down. Total operating expenses were down by 14 percent between 1993 and 1991.

Chevron Operational Expense Report mapping:

Chevron Operational Expenses are sub-grouped into these components:

- Employee Costs: These include wages, burden, overtime and 67% of other employee expenses (79% for CUSA)
- Fuel Costs: These include Fuel - (owned and bareboat) and Fuel - Time Charters
- Materials and Supplies: These include replacement parts, operating stores and M&R materials.
- Transportation Costs: These include total expenses less casualty losses and voyage incharters.
- Services and Fees Costs: These include periodic overhauls, alterations and abandonment, contract labor, voyage repairs, materials handling, overhead, port (O&BB and T/C), canal (O&BB and T/C), 23% of other employee expenses not included

in the above category (6% for Chevron Production and Product company).

- Other costs: these including feeding, time charter expense, insurance, casualty losses, miscellaneous expenses, spot charters, 10% of other employee expenses (15% for Chevron Production and Product company).

5.4.3. FINANCIAL INDICATOR #3: TOTAL SALES/EMPLOYEE DATA

1993/1991 TOTAL SALES/EMPLOYEE DATA (Millions of dollars)

YEAR	1993	1991	% Change (1993 Vs 1991)
Net Sales/ Employees	760,699	693,055	.09

(Source: Chevron Annual Report 1993)

EXHIBIT 5.4

Deming (1986) states that "Quality starts with the customer". When a corporation meets and exceeds the expectations of its customers, sales and productivity increases. The result in the data above indicate that there was a 9% increase in productivity figures per employee in 1993. The increase confirmed that effect of TQM (Crosby, 1989).

Chevron has been rated top in customer satisfaction among its retail gasoline customer in the West of the United States and is currently rated #2 among its peers in the industry in the East. All these accomplishments are greatly attributed to the result of the effects of Total Quality Management concepts (Chevron Annual Report, 1993).

Productivity figures could also be analyzed per quarter.

NOTE: Q1 = FIRST QUARTER OF THE YEAR Q3 = THIRD QUARTER

Q2 = SECOND QUARTER OF THE YEAR Q4 = FOURTH QUARTER

PRODUCTIVITY (MILLIONS OF DOLLARS)

QUARTER	YEAR - 1993	YEAR - 1991	% Change 1993 Vs 1991
Q4	$184,505	$178,066	.03
Q3	$191,210	$168,548	.12
Q2	$197,852	$164,246	.17
Q1	$187,132	$182,195	.03
TOTAL PER YEAR	$760,699	$693,055	.09

EXHIBIT 5.5

(Source: Chevron Annual Report 1993)

Results by the quarter indicate that the first quarter of 1993, had an increase of 3 percent over 1991 figures. The second quarter was even better with an increase of 17 percent over same period in 1991.

The third quarter had an increase of 12 percent while the fourth had an increase of 3% over same period in 1991. These findings indicate further effect of TQM on productivity at Chevron.

5.4.4. FINANCIAL INDICATORS #4: INDUSTRIAL PORTFOLIO ANALYSIS

INDUSTRIAL PORTFOLIO ANALYSIS ON ADJUSTED OPERATING EXPENSES/BARREL, EXCLUDING OWN USE FUEL

PEERS	1991	1993	% CHANGE	1991 RANKING	1993 RANKING
EXXON	$6.67	$5.88	0.1% down	1 st	2 nd
CHEVRON	$6.45	$5.71	0.1% down	2 nd	3 rd
AMOCO	$6.34	$5.70	0.1% down	3 rd	4 th
TEXACO	$5.94	$5.89	0.1% down	4 th	1 st
AAA	$5.76	$5.26	0.1% down	5 th	5 th
BBB	$5.03	$5.04	0.1% down	6 th	6 th

EXHIBIT 5.6

An analysis of an industrial portfolio on adjusted operating

expense/barrel, excluding own use fuel, indicated that the operating expenses/barrel for these peers in the oil industry; (Exxon, Chevron, Amoco, Texaco, AAA, BBB), are all sliding down. Chevron operating expenses in 1993 went down by 1 percent over 1991 figures. Chevron was ranked 2nd in 1991 as one of top high operating expense corporation. However, as a result TQM concepts, Chevron was able to move to the 3rd position in 1993.

Although Chevron's peers in the Industry have embarked in some type of Quality Improvement (QI), the table above focused on the extent, at which Chevron has focused on the TQM concepts. An analysis of the table , showed that competitor portfolios have been adjusted to Chevron's portfolio to create as best possible an apples to apples comparion. Key findings by the study indicated that all the competitors are undertaking cost reduction programs, and as a result, competitors costs are converging.

It should be noted that Mobil which is also a key competitor was excluded from the analysis because the company did not segregate their operating expense on their consolidated income statement. That is, Mobil operating expences was not segregated on a toat cost basis. For the period 1991 through 1993, Mobil reduced its operating expences by 7.5% (Mobil Annual Report, 1991, 1992, 1993). Chevron's reduction for thesame period was 9.9% (Chevron Annual Report, 1991, 1992, 1993).

NOTE: The study created phantom companies within the industry to

represent low cost segments. These are the **"AAA"** and **"BBB"**.

- **AAA** represents low cost segments of the (upper tier) for majors oil companies such as the Domestic Upstream of Texaco and Domestic Downstream of Exxon.
- **BBB** includes second tier and independents. These include Domestic Upstream of Phillips Oil company and Domestic Downstream of Diamond Shamrock.

The study found that Chevron drastically improved its competitive position as other major competitors are drastically narrowing the gap. The study did find that the low - cost phantom companies that have not implemented the TQM concept, relatively are not able to stay competitive.

5.4.5. FINANCIAL INDICATOR #5: ENERGY EFFICIENCY MATRIX

CHEVRONS' ENERGY EFFICIENCY MATRIX

	1991	1992	1993	% Change 1991 Vs 1993
Energy Efficiency	$1.61 billion	$1.51 billion	$1.38 billion	17% down and good

EXHIBIT 5.7

The study also found that there was a 17% efficiency rate change in energy efficiency between 1991 and 1993. This was as a result of managements' alignment and measurement of progress towards Chevrons' vision. Implementation of TQM philosophies, improved customer focus, both internally and externally and the better integration of quality principles into the way the organization manages its businesses, enabled Chevron to net a reduction of $230 million between 1991 through 1993. Half of the amount was due to corporate efficiency and CQI improvement concepts (Chevron 1993 Annual Report).

5.4.6. **FINANCIAL INDICATOR #6:** RETURN ON AVERAGE STOCKHOLDERS' EQUITY.

CHEVRON RETURN ON AVERAGE STOCKHOLDERS' EQUITY MATRIX

	1993	1991	% Change 1993 Vs 1991
Return on Average Stockholders' Equity	9.1%	8.7%	0.4% up

EXHIBIT 5.8

The return on average stockholders' equity matrix indicates a 40 percent increase over 1991 figures. The improved employee relations, improved operating procedures, greater customer satisfaction and increased financial performance, contributed to Chevrons' high return on its average stockholders' equity (Chevron Annual Report, 1993). Chevron was number one among its peers in the industry, in Shareholder Return through 1993. By applying the TQM principles to its operations, Chevron improved its processes and streamlined respective operations within its portfolio. Chevron's goal is to repeat and sustain its

leadership position throughout the period 1994 through 1998.

5.4.7. FINANCIAL INDICATOR #7: RETURN ON AVERAGE CAPITAL EMPLOYED.

RETURN ON AVERAGE CAPITAL EMPLOYED, EXCLUDING SPECIAL ITEMS

	1993	1992	1991	% Change 1993 Vs 1991
Return on Capital Employed, Excluding Special items	10.9%	8.4%	7.7%	3.2% up

EXHIBIT 5.9

The higher return on average capital employed, excluding special items was attributed to these three factors:

- The implementation of TQM at Chevron. The TQM concept improved the quality of products and services, thereby reducing the direct costs associated with poor quality such as inspection costs, rework costs, warranties costs etc.
- Improvement in quality led to increases in productivity.
- The combination of improved quality and increased productivity leads to increases in market share.
- Increases in market share led to increase in average capital

employed.

The result shows that there was a 3.2% increase on the average return of capital employed in 1993 Vs 1991. This shows that TQM concepts paid-off in Chevron's cost reduction program.

5.4.8. FINANCIAL INDICATOR #8: RETURN ON SALES

RETURN ON SALES

	1993	1991	% Change 1993 Vs 1991
Return on Sales	3.9%	3.8%	0.1% up

EXHIBIT 5.10

Results on return of sales indicate that Chevron customers were very satisfied. Return on sales figures rose by .1% between 1993 Vs 1991. This shows that Chevron focused on its customers and met or exceeded their expectations.

TQM concepts was the driver behind Chevrons' improved financial performance on Sales figures for the period of 1993 as against 1991. Improvement were focused in these areas:

- Reliability
- Improved Timeliness of delivery
- Reduction of Order-processing time
- Shortening of Product lead time
- Reduced production error or defects
- Improved rapid inventory turnover

- High cost savings as customers needs are met or exceeded
- Quality costs (The cost of quality are essentially the cost of quality failures or defects such as lost profits, rework, and scrap, or the cost of trying to avoid them -inspection, training and testing).

5.4.9. **FINANCIAL INDICATOR #9:** TOTAL STOCKHOLDERS' RETURN

TOTAL STOCKHOLDERS' RETURN

	1993	1992	1991	% Change 1993 Vs 1991
Total Stockholder's Return	30.6%	5.6%	(0.5)%	30.1% and good

EXHIBIT 5.11

Deming (1986), Juran (1989), Crosby (1979), stressed on four key measurable areas of corporate operations that could demonstrate the impact of TQM practices on corporate performance. These areas include:

- Employee relations
- Operating procedures
- Customer satisfaction
- Financial performance

Chevron management recognizes that quality is defined by the customer and that the corporation must focus on meeting customer needs and expectations. Chevron defined its customers satisfaction in terms of the following:

- Overall satisfaction
- Fewer complaints

- Higher customer retention

The effect of the above analysis can be seen in the 30.1% increase in total stockholders return in 1993 Vs 1991 figures.

As a result of the effect of TQM concepts on the annual percentage improvement in some financial performance of Chevron, the study attributed the 30.1% increase to the following indicators:

Financial performance indicators	1993	1991	Changes in 1993 Vs 1991 data
Return on average stockholders' Equity	9.1%	8.7%	.40%
Return on sales	3.9%	3.8%	.10%
Stockholder's Equity - Year End	87.1	69	29.1
Average Sales Per Employee ($ Thousands)	664	630	34

EXHIBIT 5.12

A look at the effect of TQM on Total Stockholder's Return in 1993 Vs 1991, indicated the following results:

- Return on the average stockholder's equity was up by .4%.
- Also the return on Sale was up by .1%. Stock Market price at year-end grew by $29.10.
- Average sales per employee was up by $34,000.00.

Chevrons' primary objective is to exceed the financial performance of its strongest competitors. The effect of this objective can be seen in the above financial indicators, of Chevron's financial performance metrics as results improved between 1991 and 1993 figures. With the implementation of TQM in 1992, Chevron's goal is to be #1 among its competitors in Total Stockholder Return over the period 1994 - 1998. The company is striving towards that goal. Chevron maintained the lead in Total Stockholder Returns in 1993. Management applied the scientific method for solving problems and improving processes (Chevron Annual Report 1993). Due to the implementation of TQM in 1992 to Chevron work environment, all recommendations, decisions, and plans were supported by the appropriate analysis.

5.5. SOCIAL IMPACT MATRIX:

Chevron's management believed that TQM and Continuous Quality Improvement (CQI) were the ways to achieve its vision. Derr (Chairman and CEO of Chevron), said that :

" CQI has been a key factor in our efforts to reduce costs and improve the way we work".

The effect of TQM has also enhanced Chevron's position as a socially responsible corporation. Management has placed environmental responsibility as a top priority, a value which has been deeply ingrained in the corporation and its people. Streamlining work process and instituting Quality of Work-Life (QWL) programs (Deming 1986) by enforcing the five core concepts of quality (Total Involvement, Process thinking, Customer focus, Measurements and Continuous Improvement) into the work environment, positioned Chevron as a benchmark corporation on environmental issues.

As a socially responsible corporation, the practices and standards articulated in Chevron's far-reaching Health, Environmental and Safety Policy, met or exceeded those called for by law and by Petroleum and Chemical Industry Association programs (Chevron Annual Report 1993).

In 1993, Chevron's total worldwide environmental capital and operational expenditures were nearly $1.5 billion. This amount

included Chevron's investment of about $675 million needed to comply with increasing stringent government regulations affecting air and water emissions, new fuel formulations and waste handling.

The effect of TQM concepts were also felt in Chevron's Shipping company. In 1993, Chevron ships and charters, spilled less than four barrels of crude oil, while transporting nearly 625 million barrels of oil and petroleum products (Chevron Annual Report 1993).

CHEVRON SHIPPING SAFETY RECORDS

	1991	1993
Barrel of spills	10	4

EXHIBIT 5.13

Among major competitors, Chevron Shipping had the best overall safety record in 1993 compared to same period in 1991 (Annual Report, 1993).

TQM also enhanced the audit and review procedures at Chevron which ensured that standards were followed. Resulting Audits procedures strengthened regulatory compliance which were factors that impacted on society.

As a result, 23 intensive environmental audits of respective facilities were performed in 1993 in ten States and five International locations as compared to 19 audits in 1991.

Also, as a result of the corporation implementing the (QI) Quality Improvement and streamlining of work-processes, Chevron employees now devote their non-working hours to wide variety of civic, social and environmental projects. Time employees spent during working hours on over-time, re-doing work or engaging in inefficient work practices were eliminated.

Further, Chevron Production Company (a subsidiary of Chevron Corporation and also formerly known as Chevron U.S.A. Inc.) received four Safe Awards from the U.S. Mineral Management Services in 1993. Three of the awards were received for operations in the Gulf of Mexico and one other award was for operations in the Platform Gail Offshore located in Southern California. These Safe Award Programs were designated to recognize exceptional performance of offshore oil operators and to make the public aware that such complex operations can be conducted in a safe and pollution-free manner (Chevron Annual Report 1993).

5.6. ACTUAL PRODUCT OR SERVICES MATRIX:

Total Quality Management (TQM) provides the best current example of a comprehensive management improvement philosophy as noted by benchmark companies such as Corning, Federal Express, Malow Industry and Xerox.

As the result of this survey indicated, the effect of TQM on the financial performance of Chevron, showed that TQM concepts could be very viable to corporate America.

What TQM efforts have as underlying principles are, continuous improvement, total involvement and customer focus.

Total Involvement means involvement from the CEO to the newest employee which is very essential to the concept of Customer focus. The intent here is, that each worker at each level assume the responsibility to do the work right the first time. Work is never passed over and all employees strive to make improvement based on the data received (or data generated by themselves) that affect the work process. Chevron emphasises on Continuous Improvement (CI) which concept are, team-centered and team-driven.

Chevron's overarching goal of continuous improvement is customer satisfaction. The study illustrated this concept by applying the Customer Satisfaction Matrix. This matrix shows a slight improvement in the Returns On Sale (ROS) of 3.9% in 1993 as compared to 3.8% in 1991, and a 30.1% increase in Total Stockholders' Return in 1993 as compared to 1991 figures (Chevron Annual Report, 1993). When customers are satisfied, productivity

is improved (Deming, 1986). The Study was able to show, using Customer Satisfaction Matrix or the Survey Results, that Chevron customers (internal and external customers) were satisfied and as a result, Return On Sales and Total Stockholders' Returns were up in 1993.

Another improvement in the Work Process of Chevron is management acceptance of the innovative ideas of employees. Chevron corporation refers to these creative ideas as "breakthroughs". According to Chevron's management, these "breakthroughs" dramatically improved the way Chevron does business. An example of the "breakthroughs" is the incorporation of a new computer-based technology into Chevron's accounts payable system. In the past, the procedure used to process and pay invoices were time consuming and costly. To improve the process with the implementation of the TQM concept, the corporation adopted an accounting system known as Electronic Data Interchange (EDI) and Image Processing. This new technology allowed Chevron Finance Department to image scan papers and EDI invoices which resulted in major paperwork reduction. Invoice data are now electronically sent to the field for review and approval. As a result, payments were ready before due dates. Also, management are now able to captures financial data immediately for decision making. This new technology resulted in more than 50 percent reduction in the cost to process an invoice. The financial result of this "breakthrough" is over $3 million

annual savings. In addition, the effect of this "breakthrough", resulted in a tremendous reduction in manhours that were used to sort, review and approve invoices.

Management also applied the TQM concept to streamlined work processes at the Inventory Management Division of Chevron corporation. The results indicate the following (Chevron Annual Report 1993):

- Record from annual report (1993) showed improved inventory utilization by 22% from 59 days sales supply to 46 days during 1991 through 1993.
- Improved benchmark ranking from third to second quartile (Comparism based on key competitors in the industry)
- Streamline of the work process as a result of TQM, reduced cash tied up in inventory, by more than $1.1 billion between 1991 through 1993.
- Chevron management adopted inventory management metric (days supply).

According to Crosby (1979), continuous improvement process should be viewed as an incremental and additive processes, rather than explosive and earth shattering processes.

Chapter 6

6. SUMMARY AND CONCLUSIONS:

This final chapter identifies the contributions of the study, by summarizing the findings, and noting any limitations to interpreting the findings. Each area is addressed separately.

6.1 CONTRIBUTIONS OF THE STUDY:

This study makes some key contributions toward the issues of corporations understanding of the concepts of Total Quality Improvement Programs.

First, the study identifies, both theoretical and empirical literature from industrial psychology and successful World Class organizations that are associated with the Total Quality Management program. Further, it clarifies the role that Total Quality Improvement (TQM) programs can play in improving corporations employee morale, operating and financial performance.

The study finds that the most successful companies are fanatical about Process Improvement. The notion that "If it ain't broke, make it better", must be the battle cry of every employee. Total Involvement from the CEO to the newest employee is essential to ensure Customer Focus and Process Involvement.

Broad-based empirical findings of improvement in earnings, operating expenses and other financial performance indicators goes to show that TQM is very viable to productivity (Zemke & Schaaf, 1989).

According to Juran (1989), " quality sells, quality pays, quality gets results and increases profit". Crosby, in his book "Quality Is Free" defines "Quality" as conformance to requirements. This study did provide some evidence for quantifying the effect of TQM and supporting TQM's proponent's theory, which have not in the past, been empirically verified.

Edward Deming's Total Quality Management philosophy has been accepted by corporate America and Quality experts as the ideal managerial philosophy to creating a quality planning and control environment that encourages teamwork, enhances communication, pride in workmanship, and never-ending improvement process. TQM emphasizes on results by working on methods (Deming 1986).

According to Deming, when TQM principles are practiced in an organization, problems are solved. Management gives customer concerns top priority, by studying and constantly improving every work process, so that the final product or service exceed customer expectations. Deming stresses that, this process can be achieved by building excellence into every aspect of the organization. TQM, therefore, focuses on creating a workplace that encourages everyone to contribute to the goals and objectives of the organization. Everyone in the organization learns to use a scientific approach to solving problems and making improvements.

Deming concludes that, the use of scientific approach becomes pervasive. He further stresses on the fact that as each process is carefully analyzed, problems are identified and the root causes of problems are determined through careful research. Then new error-proof systems are developed. At this stage, each process is brought under a statistical control, while variations if any, are studied, understood and reduced well beyond specifications. The results of these processes are that, with each improvement, processes are executed better and better. Productivity goes up as waste and inefficiency go down. Customers get products and services of increasingly high value at increasingly lower costs.

It could be assumed that anyone who gets high quality at low cost will tell their friends and colleagues, and the demand for those products or services will increase.

Deming summarised this process in what he called the Deming Chain Reaction:

> "With each improvement, processes and systems run better and better. Productivity increases as waste goes down. Customers get better products, which utimately increases market share and provides better return on investments".

Total Quality Management (TQM) is a new concept in management pioneered by Deming, Juran, Crosby and Fiegenbaum. TQM is continuous improvement involving all persons within the organization in a completely integrated effort toward improving

performance of each process at each level of operation. The primary focus of each process improvement is to increase customer satisfaction.

Deming (1986), communicates his theory of quality management practices in terms of his fourteen principles, However, there is little guidance in the literature concerning how to measure or implement such practices.

Experts of Total Quality Management, have described Deming's fourteen factors principles as the primary component of "Total Quality Management" philosophy, yet, no empirical research has studied the inter-relationships among the fourteen factors. For instance, factor 2 (adopting the new philosophy) and factor 14 (taking action to accomplish the transformation) may be conceptually inter-related. This remains to be tested empirically.

Also, this study provided empirical research of the influence of the Deming philosophy on performance measures, such as quality improvement, market share, profitability, productivity, and employee morale.

To further research on Deming's philosophy and to overcome some of the shortcomings that exist in his current literature, this study developed survey instruments that measured the degree of implementation of Deming's principles. These measures can be used by corporate and quality leaders and industrial practitioners to assess the status of quality management so as to design their training needs and direct improvements in the other

quality areas. Further, by identifying and prioritizing specific areas for improvement, top management can allocate its limited resources efficiently, targeting those areas that are in immediate need for improvement.

TQM involves applying quantitative methodologies and utilizing all employees within the organization to improve the quality of its processes, products and services. The implementation of TQM must begin with the commitment of top management and involve everyone in the process for it to be effective. Many companies have found that TQM increases the need for teamwork. TQM does not work by chance. All employees must be trained in the principles of TQM and have to make it work for their organizations. TQM aims to enhance the creativity of every employee and to continuously improve the quality of processes, products and services. The ultimate goal of TQM is to satisfy the needs of the customer.

6.2 SUMMARY OF FINDINGS:

This study utilized Chevron Corporation as a proxy for successful implementation of a TQM philosophy.

Total Quality Management principles were measured and quantified in this study, by the application of the TQM measurement model that defines the Four Dimensions of TQM

measurement. Steps analyzing results of the survey that was adhered to are shown in table 5.1

The effect of TQM on employee morales was analyzed through survey questionnaires administered to Chevron employees in two parts. First was in 1991 before the TQM program was introduced to Chevron management and employees. The second was in 1993, after all Chevron employees have completed the TQM training and the program has been implemented.

A random number of 440 management and employees from all operating area of Chevron (that is, Chevron Upstream, Chevron Downstream, Chevron Chemical, Coal, Corporate and others) were selected for the survey.

Measurement of the effect of TQM on employee morales utilizing a standard two-sample t-Test for all nine categories of the survey (that is: Planning and organization, supervisory integrity, quality and continuous improvement, communication, job knowledge, teamwork, leadership, managing performance, innovation and creativity), support the conclusion that if TQM is successfully implemented, employee morales will be improved.

According to Deming (1986), improvement in employee morals, lead to improved productivity, which will not only effect lower unit production costs; but customers will respond positively to better quality and lower prices, as a result increasing corporate market share, creation of more jobs and increase return on investment. This study rejected the Null Hypothesis and accepted the Alternate Hypothesis.

Further analysis, utilizing accounting and market-based financial performance matrix, shows that the TQM had great effect on the Chevron financial returns. The results of Chevron's financial performance matrix, reinforces the findings that TQM is a significant factor in explaining both the time-series and cross-sectional variation in returns, and that efficiency and performance gains may vary across corporations. However, much additional research is needed, using different samples and dataset, before a broad-based endorsement of the TQM concepts is guaranteed.

6.3 LIMITATIONS AND FUTURE RESEARCH:

One of the limitations of this study is associated with the choice of variables of interest. There could be a "corporate size-effect" on quality. Quality experts and quality literature shows that various financial and management variables (such as the extent of practice of scientific management practices, extent of long-term planning, organizing, extent of research and developmental emphasis, etc), are empirically related to corporate size. It could be argued that "size" may be a major determinant of quality. However, size, was not considered as a covariate in this study.

Another limitation unarguably exists on some "issues about Demingization" effect on quality. That is, the duration of time of which a corporation has been committed to Demingization. This could be a major determinant on quality. Proponents of TQM proposed five to ten years wait period to measure the effect of TQM. In future studies, investigating the association between time, quality and experience varaibles may add to our knowledge of the subject.

Another limitation is on the subject of divisity of the workforce. Recent studies have shown that large percentage of the workforce are composed of female and minority employees. Few of these employees are in supervisory and management positions. In future studies, investigating the effect of TQM on a diverse workforce may also add more knowledge to the subject.

APPENDIX 1

CATEGORY #I - PLANNING AND ORGANIZATION:

The following statements describe issues concerning planning and organizing as it relates to your job in general. Please indicate the extent to which you agree or disagree with each item using the following scales.

Strongly Disagree 0 | Disagree 1 | Slightly Disagree 2 | Slightly Agree 3 | Agree 4 | Strongly Agree 5

1.	The nature of my job made me not to value team	0 1 2 3 4 5
2.	I'm not very committed with my job.....	0 1 2 3 4 5
3.	I have a strong sense of devotion to the person I report to and not my job. . .	0 1 2 3 4 5
4.	The success or failure of my organization really isn't that important to me . .	0 1 2 3 4 5
5.	Chevron brings out the best in how I perform my job	0 1 2 3 4 5
6.	At Chevron, success is mainly a matter of luck. It doesn't matter how hard you work	0 1 2 3 4 5
7.	I do not care more about my work, even if I owned Chevron	0 1 2 3 4 5
8.	Chevron is too bureaucratic	0 1 2 3 4 5
9.	Having to adhere to corporate systems makes work demanding in my organization . .	0 1 2 3 4 5
10.	Chevron's management adjusts policies to meet our organization's unique needs .	0 1 2 3 4 5
11.	Chevron lacks "sense of urgency" in responding to business challenges. .	0 1 2 3 4 5
12.	Our organization has a well developed vision of where it is going	0 1 2 3 4 5
11.	Our organization requires too many approvals that get in the way of my job . . .	0 1 2 3 4 5
15.	Chevron's corporate management's strategies effectively balance short and long term goals.....	0 1 2 3 4 5
16.	Management balances need for financial performance with concern for employees.	0 1 2 3 4 5

CATEGORY #2 - ISSUES AFFECTING SUPERVISORY INTEGRITY AND FAIRNESS

The following statements is about your immediate supervisor--that is, the person to whom you currently report. Please indicate, by using the following scales, the extent to which you agree or disagree with each statement.

Strongly-Disagree	Disagree	Slightly-Disagree	Slightly-agree	Agree	Strongly-Agree
0	1	2	3	4	5

17. Overall, I am happy and satisfied with my supervisor.....0 1 2 3 4 5
18. My supervisor does a wonderful job motivating me to do my best work.....0 1 2 3 4 5
19. At Chevron, my supervisor keeps me well informed.....0 1 2 3 4 5
20. My supervisor shows concern for me as an individual..... 0 1 2 3 4 5
21. My supervisor considers managing people more important than managing projects. 0 1 2 3 4 5
22. My supervisor creates a high degree of team spirit in the group that I work..... 0 1 2 3 4 5
23. My supervisor is interested in participation from employees in my work group.....0 1 2 3 4 5
24. My supervisor inspire me to take acceptable risks..... 0 1 2 3 4 5
25. My supervisor makes articulate what is expected of me.....0 1 2 3 4 5
26 My supervisor has superb "people" skills..... 0 1 2 3 4 5
27. My supervisor is obligated to improving the quality of the way we work..... 0 1 2 3 4 5
28. My supervisor supports training in areas where I need improvement..... 0 1 2 3 4 5

CATEGORY #3 - ISSUES ON QUALITY AND CONTINUOUS QUALITY IMPROVEMENT

This section deals with Quality (QI) and Continuous Quality Improvement (CQI) process in your organization. Please indicate, using the following scales, the extent to which you agree or disagree with each item.

Strongly-Disagree 0 | Disagree 1 | Slightly-Disagree 2 | Slightly-Agree 3 | Agree 4 | Strongly-Agree 5

29.	The Quality (QI) and Continuous Quality Improvement (CQI) process will help me in my job.....	0 1 2 3 4 5
30.	The QI and CQI process will lead to layoffs and downsizing.....	0 1 2 3 4 5
31.	CQI is just this year's corporate vogue.....	0 1 2 3 4 5
32.	Providing quality products/services gets higher priority than meeting deadlines	0 1 2 3 4 5
33.	Chevron's management is making quality a priority in my organization.....	0 1 2 3 4 5
34.	Middle management is supportive when employees attempt to improve quality.....	0 1 2 3 4 5
35.	My organization seems out of touch with what our customers really want.....	0 1 2 3 4 5
36.	Senior management's plans have little relationship to the types of quality problems employees face on a day-to-day basis.....	0 1 2 3 4 5
37.	Quality goals are given a great deal of lip service around here, but we rarely are given sufficient time or resources to achieve them.....	0 1 2 3 4 5
38.	Senior management thinks CQI will somehow "magically" fix our problems.....	0 1 2 3 4 5
39.	Senior management believes that people are the key to good quality.....	0 1 2 3 4 5
40.	Other work groups in my organization are just giving lip service to quality goals.....	0 1 2 3 4 5
41.	I rarely get any feedback about customer satisfaction with the quality of my work.....	0 1 2 3 4 5

CATEGORY #4- ISSUES AFFECTING COMMUNICATIONS:

The following statements relate to both informal and formal communication within your work group, organization and corporation. Please indicate to the extent you agree or disagree with each of these statement using the following response scales:

Strongly-Disagree	Disagree	Slightly-Disagree	Slightly-Agree	Agree	Strongly-Agree
0	1	2	3	4	5

42.	My experience is that the Chevron corporation tells the truth when it communicates.....	0 1 2 3 4 5
43.	I have a good understanding of the Chevron corporation's financial performance.....	0 1 2 3 4 5
44.	Senior management avoids talking about negatives when it communicates to employees.....	0 1 2 3 4 5
45.	Employees are encouraged to question why things happen the way they do.....	0 1 2 3 4 5
46.	Our corporation provides good information about our competition.....	0 1 2 3 4 5
47.	My organization effectively explains the needs of our internal and external customers.....	0 1 2 3 4 5
48.	I feel free to speak my mind about how I feel about my organization.....	0 1 2 3 4 5
49.	I believe the feedback from this survey will be used constructively by senior management.....	0 1 2 3 4 5
50.	I have a clear understanding of my supervisor's goals.....	0 1 2 3 4 5
51.	I feel comfortable talking with my supervisor.....	0 1 2 3 4 5

CATEGORY #5 - JOB KNOWLEDGE AND PROBLEM SOLVING AND TEAMWORK

The following statements are items that are part of any job. Indicate how important each statement relates to you. Use the following response scale.

Not Important	Little Important	Somewhat Important	Very Importance	Extremely Important
0	1	2	3	4

52.	Having an opportunity to be heard by management above your boss.....	0 1 2 3 4
53.	Having constructive conversations with your supervisor about your performance.	0 1 2 3 4
54.	Feeling your work is appreciated.....	0 1 2 3 4
55.	Knowing you won't be penalized for voicing opinions to management	0 1 2 3 4
56.	Having middle management who supports your work group's efforts	0 1 2 3 4
57.	Feeling cooperation between your work group and other groups	0 1 2 3 4
58.	Having opportunities to use your skills and abilities fully	0 1 2 3 4
59.	Being able to understand the goals and vision of your organization	0 1 2 3 4
60.	Being a part of the decisions about what you do on the job	0 1 2 3 4
61.	Having a supervisor with good "people management" skills	0 1 2 3 4
62.	Allowed to take risk by trying new ideas in order to do your job better.....	0 1 2 3 4
63.	Having a supervisor who knows what your job requires	0 1 2 3 4
64.	Having senior management be willing to act on employee suggestions	0 1 2 3 4

CATEGORY #6 ISSUES ABOUT TEAM - WORK:

The following statement indicates how you will evaluate or rate Top Management Perception about you and the job. Indicate how your company is doing on each item. Use the following scale.

Poor	Fair	Good	Very Good	Excellent
0	1	2	3	4

65.	Having an opportunity to be heard by management above your boss.....	0 1 2 3 4
66.	Having constructive conversations with your supervisor about your performance.	0 1 2 3 4
67.	Feeling your work is appreciated.....	0 1 2 3 4
68.	Knowing you won't be penalized for voicing opinions to management	0 1 2 3 4
69.	Having middle management who supports your work group's efforts	0 1 2 3 4
70.	Feeling cooperation between your work group and other groups	0 1 2 3 4
71.	Having opportunities to use your skills and abilities fully	0 1 2 3 4
72.	Being able to understand the goals and vision of your organization	0 1 2 3 4
73.	Being a part of the decisions about what you do on the job	0 1 2 3 4
74.	Having a supervisor with good "people management" skills	0 1 2 3 4
75.	Allowed to take risk by trying new ideas in order to do your job better.....	0 1 2 3 4
76.	Having a supervisor who knows what your job requires	0 1 2 3 4
77.	Having senior management be willing to act on employee suggestions	0 1 2 3 4

CATEGORY #7 - ISSUES ON CORPORATE LEADERSHIP

Below are statements that deals with corporate leadership and how it affects you on and off the job. Please indicate, using the following scales, the extent to which agree or disagree with each item.

Strongly-Disagree	Disagree	Slightly-Disagree	Slightly-Agree	Agree	Strongly-Agree
0	1	2	3	4	5

78.	My organization make efforts to make sure we have a diverse workforce	0 1 2 3 4 5
79.	My organization recognizes that my needs may differ from other employees...	0 1 2 3 4 5
80.	I spend so much time in meetings that it's difficult to get my work done...	0 1 2 3 4 5
81.	I am treated with dignity and respect in my organization	0 1 2 3 4 5
82.	My organization makes me feel like a second class employee	0 1 2 3 4 5
83.	In my work group, I'm limited (not by choice) to contributions I can make..	0 1 2 3 4 5
84.	At the end of the work day, I feel a sense of accomplishment	0 1 2 3 4 5
85.	I feel a sense of belonging, just like I really count	0 1 2 3 4 5

CATEGORY #8 - ISSUES ON MANAGING PERFORMANCE

This section contain information concerning managing performance, your career and future. Please indicate the extent to which you agree or disagree with each item using the following scales:

Strongly-Disagree	Disagree	Slightly-Disagree	Slightly-Agree	Agree	Strongly-Agree
0	1	2	3	4	5

86.	My job teaches me new skills that make me more valuable in the job market..	0 1 2 3 4 5
87.	I received adequate on-the-job training when I started my current job.....	0 1 2 3 4 5
88.	Training programs which I participated in, improved my job performance.....	0 1 2 3 4 5
89.	My supervisor helps me develop plans to meet my career goals.....	0 1 2 3 4 5
90.	My supervisor provides me with the exposure I need to help me advance.....	0 1 2 3 4 5
91.	Promotion in my organization depends more on whom you know and who knows you than on how well you perform.....	0 1 2 3 4 5

CATEGORY #9 - ISSUES ON CREATIVITY, INNOVATION AND COMPANY PROGRAMS

This section deals with how company programs have affected your creativity and innovativeness. Please indicate to the extent you agree or disagree using the following response scales:

Strongly-Disagree	Disagree	Slightly-Disagree	Slightly-Agree	Agree	Strongly-Agree
0	1	2	3	4	5

92.	My supervisor coaches me to be more creative/innovative so that I can better reach my performance goals.....	0 1 2 3 4 5
93.	Performance Management Process (PMP), an organization program, puts individual performance and teamwork in conflict with each other.....	0 1 2 3 4 5
94.	The PMP ranking procedure forces people into categories that have nothing to do with their performance.....	0 1 2 3 4 5
95.	The recognition and Award (R&A) program is administered fairly	0 1 2 3 4 5
96.	The recognition and Award program fosters teamwork.....	0 1 2 3 4 5
97.	Top management is not consistent to R&A because it seems managers believe in the program while other do not.....	0 1 2 3 4 5
98.	Some employees are rewarded for efforts having nothing to do with achieving organizational goals and objectives.....	0 1 2 3 4 5
99.	Supervisors are held accountable for their management of PMP.....	0 1 2 3 4 5
100.	The Organization's PMP and CQI processes are compatible.....	0 1 2 3 4 5

OTHERS - DEMOGRAPHIC INFORMATION ABOUT YOU - ANONYMOUS

This section deals with demographic information about you. Respond as candid as possible. Your anonymous is guaranteed. This is for a Doctoral dissertation purposes.

1. Please indicate your age group.
   Under 25
   25 to 30
   31 to 40
   41 to 50
   51 to 60
   Over 60

2. Please indicate your sex?

   Male Female

3. Please indicate your ethnic group?
   Caucasian
   Black/African
   Asian
   Hispanic
   Other

4. How are you classification?

   Group 1
   Group 2
   Group 3
   Group 4
   Group 5
   Office & Technical
   Operating & Mechanical
   Guide Curve
   Other

5. Do you supervise employees? *(Mark one)*

   Yes, I supervise 1-5 employees
   Yes, I supervise over 6 employees
   No, I do not supervise any employees

6. Indicate your service time period with your organization?

   Less than 1 year
   1 year to less than 5 years
   5 years to less than 15 years
   15 years to less than 25 years
   25 years or more

7. Indicate if you are a:
   U.S. citizen working in the U.S.
   U.S. citizen working in a non-U.S. location
   Non-U.S. citizen working in a non-U.S. location
   Non-U.S. citizen working in a U.S. location

APPENDIX 2

This section contains the results of the survey questionnaires.

X1 = Issues affecting Planning and Organizing
X2 = Issues affecting supervisory integrity and supervision
X3 = Issues on Continuous Quality Improvement
X4 = Issues on Communication
X5 = Issues on Job Knowledge and Problem Solving
X6 = Issues on Teamwork
X7 = Issues on Leadership
X8 = Issues on Managing Performance
X9 = Issues on Creativity, Innovation and Company Programs
P1, P2, P3, etc = Subjects or Employees who were surveyed

1991 SURVEY RESULTS

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p1	3.44	2.58	3.08	1.9	2.92	1.46	2.75	2.50	2.44
p2	2.75	2.08	1.77	2.5	3.23	1.23	2.50	3.67	2.67
p3	2.13	2.75	3.00	2.3	3.00	1.46	1.63	2.67	2.44
p4	2.75	2.50	2.77	2.3	2.85	1.15	2.63	2.83	1.89
p5	2.06	3.08	2.46	1.9	3.23	1.62	2.25	2.33	3.11
p6	3.00	2.42	2.69	2.2	3.38	1.54	2.88	2.33	2.22
p7	2.81	2.75	2.38	2.2	3.15	1.46	1.88	3.83	2.44
p8	3.00	2.50	2.31	2.2	3.46	1.69	3.13	2.33	2.56
p9	2.50	2.75	3.08	2.1	3.08	1.38	1.88	3.00	2.22
p10	2.56	2.67	2.92	2.4	2.92	1.23	3.25	3.00	2.44
p11	2.94	2.75	2.54	1.8	3.15	1.23	2.50	2.00	2.89
p12	2.69	3.17	2.62	2.7	3.00	1.31	2.38	3.33	2.22
p13	2.25	2.58	2.38	1.7	2.54	2.08	2.88	2.67	2.67
p14	2.75	2.75	2.69	2.7	3.15	1.62	2.75	2.50	2.67
p15	2.94	2.58	2.62	2.2	3.23	1.15	2.25	2.83	2.22
p16	2.69	2.42	2.69	2.4	3.31	1.38	2.63	3.83	1.78
p17	1.94	2.33	2.46	1.7	2.92	1.46	2.50	3.33	2.67
p18	3.13	2.83	2.23	2.4	3.31	1.46	2.50	2.17	2.22
p19	2.63	2.00	2.92	2.5	2.92	1.00	2.88	3.00	3.56
p20	2.81	1.92	2.92	2.3	3.00	1.54	3.25	2.17	2.11
p21	3.06	2.00	2.62	2.4	3.08	0.92	2.00	2.67	2.78
p22	2.63	1.92	2.54	2.3	3.46	1.08	3.13	2.33	2.44
p23	3.50	2.67	3.08	2.2	3.15	1.46	2.63	2.83	2.67
p24	2.44	2.17	2.77	2	2.92	1.23	2.75	3.50	2.67
p25	2.81	1.92	2.62	2.6	2.92	1.69	2.75	2.67	1.67
p26	2.75	1.92	2.46	2.1	3.00	1.62	2.00	2.50	2.56
p27	3.19	2.25	2.23	2.2	2.92	1.08	2.75	3.50	3.11
p28	2.56	1.83	2.46	2.2	3.46	0.92	2.75	2.00	2.22
p29	2.56	2.08	3.00	2.4	3.46	1.38	2.63	2.83	2.00
p30	3.19	2.25	2.77	2.1	3.38	1.31	1.75	3.50	2.33
p31	3.19	1.75	2.77	2	3.08	0.77	2.38	2.33	2.67
p32	3.31	2.08	2.77	2.3	2.85	1.00	2.38	3.33	2.78
p33	2.38	1.75	2.77	2.1	3.00	1.38	2.50	2.50	2.67
p34	3.13	2.17	2.77	2.2	3.31	1.31	2.25	2.17	2.56
p35	3.00	1.92	2.85	2.2	3.15	1.08	2.63	2.83	2.67

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p36	2.50	2.75	3.00	2.3	3.23	1.62	2.50	3.17	2.22
p37	3.25	1.58	2.92	1.8	3.23	1.31	2.38	2.83	2.44
p38	3.00	2.08	2.15	2.2	3.00	1.00	2.25	2.00	2.56
p39	2.69	2.00	2.92	2.4	3.31	1.62	2.50	2.50	2.67
p40	2.75	2.17	2.77	2	3.15	1.38	2.75	2.83	2.44
p41	3.06	2.25	2.31	2.3	3.15	1.23	2.63	2.00	2.44
p42	2.88	2.00	3.15	2.4	2.92	1.00	2.25	3.33	2.33
p43	3.25	1.42	2.23	2.3	3.54	1.38	3.00	2.17	3.11
p44	2.625	2.67	2.54	2	2.62	1.85	2.50	2.67	2.56
p45	2.875	2.00	3.00	2.2	3.46	0.85	3.25	2.33	2.11
p46	3.063	2.00	3.23	2.5	3.46	1.54	2.88	1.83	2.89
p47	2.438	2.25	3.00	2.5	3.23	1.31	2.63	2.33	2.56
p48	2.813	2.33	3.00	2	3.54	1.46	2.00	3.50	2.78
p49	2.438	2.08	2.54	2.3	2.85	1.00	3.13	2.00	2.67
p50	2.688	2.58	2.85	2.1	3.31	1.31	2.50	1.67	2.67
p51	3.063	1.58	2.85	1.8	3.31	1.23	2.63	3.00	2.67
p52	3.438	2.17	2.46	2.5	3.38	1.77	3.13	3.17	3.00
p53	2.938	1.75	2.54	2.3	2.92	1.31	3.38	2.67	2.22
p54	2.875	2.33	3.15	2.1	2.85	1.31	2.13	1.83	2.44
p55	2.688	2.33	2.00	2.3	3.08	1.54	2.50	2.50	2.33
p56	2.688	2.50	3.00	2.2	3.15	1.08	3.13	2.83	2.56
p57	2.625	1.75	2.77	2.1	3.08	1.38	2.88	3.00	2.89
p58	3.375	2.33	2.69	1.9	2.85	1.38	2.75	2.00	2.00
p59	2.875	1.92	2.77	2.1	3.31	1.15	2.38	2.50	2.44
p60	2.813	3.50	2.92	2.3	3.46	1.15	2.50	2.50	2.78
p61	2.688	1.58	2.54	2.2	3.23	1.00	2.25	2.00	3.22
p62	2.688	1.92	2.23	2.4	2.62	1.23	2.25	3.17	2.44
p63	2.875	1.92	2.62	2.7	3.31	1.38	2.88	2.33	2.78
p64	2.875	2.83	2.69	2.3	3.08	1.38	3.00	1.67	2.56
p65	3.125	2.00	2.77	2.2	2.92	1.77	2.50	2.67	3.22
p66	2.688	1.83	2.69	2.1	3.38	1.08	2.00	2.33	2.22
p67	3.063	2.50	2.69	2.2	3.23	1.38	2.88	3.17	2.44
p68	3.188	2.50	2.54	2.1	3.15	1.31	3.13	1.83	2.78
p69	2.563	2.25	2.69	2.5	3.38	1.15	2.63	3.33	2.44
p70	2.438	2.42	2.77	2.3	3.00	1.08	2.25	3.00	2.56
p71	3	2.33	2.46	2.3	3.38	1.62	3.00	3.00	2.44
p72	2.563	2.17	2.85	2.3	3.38	1.38	1.63	2.17	2.56
p73	2.938	2.33	2.69	2.4	3.31	1.08	2.13	2.00	2.56
p74	2.938	2.17	2.31	2.2	3.00	1.15	3.13	2.67	2.11
p75	3	2.42	2.85	2.3	3.08	1.54	2.75	2.50	2.44
p76	2.875	2.33	2.92	2.3	2.77	1.00	2.25	2.33	3.22
p77	2.938	2.08	2.00	1.6	3.15	1.77	2.38	3.17	2.33
p78	2.313	2.25	3.00	2.3	3.15	1.08	2.38	2.33	2.33
p79	2.625	2.42	3.00	2.7	3.00	1.15	3.00	3.17	3.22
p80	2.688	1.92	3.00	2.7	2.77	1.15	2.50	2.33	2.89
p81	2.938	1.92	2.77	2.1	3.08	1.54	2.88	2.00	2.67
p82	2.5	2.25	2.92	2.3	2.77	1.62	3.25	2.83	2.11
p83	2.938	2.67	2.62	2.3	3.08	0.92	2.88	2.67	2.89
p84	2.625	2.25	2.92	2.2	3.23	1.23	2.13	1.83	2.78
p85	2.875	2.08	2.08	2.7	2.69	1.31	3.13	2.67	2.78

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p86	2.75	2.00	3.00	2.4	2.92	1.08	2.63	3.33	1.78
p87	2.688	1.92	2.92	2.5	2.69	0.92	3.13	2.83	2.56
p88	2.563	2.67	2.15	2.2	3.31	1.23	3.00	2.50	2.56
p89	2.688	2.58	2.62	2.6	3.38	1.15	2.13	1.83	2.67
p90	2.75	1.92	2.85	2.3	3.00	1.62	3.25	2.83	2.00
p91	2.875	2.08	2.23	2.9	3.15	1.00	2.63	3.67	2.89
p92	2.813	2.33	2.77	2.7	2.92	1.38	3.00	2.67	2.67
p93	2.5	2.17	2.69	2.3	3.31	1.23	2.38	2.33	2.33
p94	2.563	2.00	2.69	2.2	3.08	1.46	2.75	2.33	3.00
p95	2.563	1.50	2.62	2	3.54	1.46	3.63	3.17	2.56
p96	2.938	2.50	2.69	1.7	3.08	1.08	2.75	3.00	2.56
p97	2.313	2.25	2.92	2.2	2.92	1.69	2.63	2.83	2.56
p98	3.375	1.67	2.38	2.4	2.92	1.46	2.25	2.50	3.22
p99	3.188	1.33	2.69	2.1	2.85	1.31	3.63	2.33	2.33
p100	2.313	2.33	2.92	2.2	2.77	0.85	2.63	3.00	2.78
p101	2.25	1.75	2.46	2.1	3.23	1.31	3.25	2.67	2.67
p102	2.563	1.92	2.62	2.2	3.08	1.31	3.25	1.83	3.44
p103	2.5	2.08	2.62	2.1	2.62	1.31	2.88	3.00	2.78
p104	2.75	2.08	2.62	2.4	2.85	1.15	3.00	2.50	1.78
p105	2.5	1.50	2.85	2.6	2.31	0.69	2.88	2.33	2.56
p106	2.875	2.17	2.46	2.4	2.69	1.46	2.88	1.50	3.00
p107	3.063	1.92	2.85	1.9	3.46	1.62	3.00	3.00	2.89
p108	2.875	2.42	2.31	2	3.08	1.15	2.63	3.00	2.33
p109	2.438	1.58	2.31	2.4	2.85	1.46	3.25	1.67	2.33
p110	2.688	2.00	2.38	1.9	2.92	1.15	2.63	1.83	2.78
p111	2.375	2.08	2.15	2	2.85	0.92	3.13	2.33	2.67
p112	2.75	2.00	2.69	2.1	2.46	1.38	3.13	3.67	1.89
p113	2.75	1.92	2.77	2.8	2.85	1.15	3.00	1.33	2.89
p114	2.813	2.42	2.77	2.4	3.00	1.23	2.88	2.00	3.33
p115	2.875	1.42	2.23	1.8	3.08	1.85	2.50	1.67	2.67
p116	2.438	2.50	2.46	2.3	2.69	1.15	2.75	2.00	2.89
p117	2.75	1.67	2.69	2.4	2.23	1.23	2.63	1.83	3.33
p118	3.188	2.33	2.46	2.1	3.23	1.38	2.38	2.67	2.44
p119	2.75	2.33	2.46	2.2	2.62	1.31	2.63	1.50	2.78
p120	2.75	2.50	2.69	2.7	2.77	1.31	2.63	2.33	2.89
p121	3.25	1.42	1.85	1.7	2.46	1.00	2.75	1.33	2.89
p122	3.063	2.50	2.62	2	2.31	1.85	2.38	1.83	2.56
p123	2.75	1.92	2.54	2.3	2.92	1.23	2.63	2.33	2.67
p124	2.75	2.00	2.69	2.5	2.92	1.15	3.50	1.50	3.00
p125	3.25	2.17	2.46	2.8	2.46	1.08	2.50	2.17	3.22
p126	2.438	2.42	2.38	2.6	2.62	1.31	2.63	2.83	2.89
p127	2.938	2.75	2.23	2.3	3.15	1.31	2.75	2.17	2.33
p128	2.938	2.42	2.77	2.4	2.46	1.23	2.88	2.00	2.67
p129	2.688	2.08	2.54	2.6	2.54	1.08	2.88	2.50	2.11
p130	2.5	1.33	2.54	2.1	3.00	0.77	2.38	2.33	3.00
p131	2.75	1.75	1.69	2.6	2.85	1.46	2.88	1.83	2.33
p132	2.563	2.42	2.69	2.1	2.92	1.23	3.38	2.17	2.78
p133	2.25	2.42	2.46	2.3	2.85	1.23	2.88	2.67	2.67
p134	2.813	2.33	2.62	2.3	2.85	1.38	2.50	2.33	2.44
p135	2.75	2.33	2.31	2.3	2.85	1.08	3.75	3.33	2.22

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p136	3.063	1.92	2.23	2.3	2.92	1.08	2.63	1.83	2.67
p137	2.313	2.50	2.54	2.3	2.92	0.85	2.13	1.67	2.78
p138	2.5	2.67	2.46	2.6	1.85	1.08	3.50	1.17	3.11
p139	2.25	1.67	2.85	2	3.08	1.38	2.13	1.50	2.44
p140	3	2.75	2.46	2.2	3.54	1.23	3.38	2.33	2.44
p141	2.5	1.25	2.23	2.5	2.62	1.23	2.50	2.33	2.00
p142	2.813	2.33	2.15	2	2.69	1.23	3.50	1.67	3.33
p143	2.063	2.42	2.31	2.4	2.92	1.15	2.75	2.50	2.78
p144	2.938	2.17	2.46	1.5	3.00	1.00	3.00	1.50	1.78
p145	2.188	1.67	2.62	1.9	2.62	0.85	1.75	2.50	2.56
p146	2.5	1.58	2.46	1.9	2.54	0.85	3.75	2.83	2.89
p147	2.813	3.08	2.31	1.9	3.23	1.23	3.13	3.00	2.33
p148	2.438	1.83	2.38	1.7	2.62	1.46	2.50	1.67	2.56
p149	2.438	1.83	2.38	2	3.00	1.00	3.25	2.50	2.22
p150	3.063	1.67	2.38	2	2.69	0.54	2.38	2.33	2.67
p151	2.375	2.33	2.54	1.9	2.85	1.31	2.75	2.17	3.00
p152	2.5	2.92	2.54	2.2	3.38	1.15	2.50	3.33	1.89
p153	3.5	1.92	2.85	2.1	3.08	1.15	2.13	2.50	2.78
p154	2.438	1.50	2.38	1.8	2.85	1.54	2.63	2.17	2.67
p155	2.5	1.92	2.00	1.9	2.92	1.15	2.63	2.17	2.78
p156	2.688	2.75	2.38	2	2.85	1.23	2.75	2.00	1.56
p157	2.375	2.00	2.85	2	2.77	1.08	2.50	1.83	2.78
p158	2.188	2.42	2.85	2.3	2.85	1.38	2.13	2.67	3.22
p159	2.375	1.67	2.77	2.3	2.85	1.15	2.88	2.00	2.22
p160	2.375	1.83	2.62	2.4	2.62	1.62	2.38	1.67	2.11
p161	2.438	1.08	2.54	1.8	3.38	1.23	2.25	2.83	2.89
p162	2.313	3.08	2.85	2.1	2.85	1.23	2.75	2.50	2.44
p163	2.875	1.42	2.85	2.2	3.08	1.54	2.50	3.00	2.11
p164	2.563	2.33	2.69	2.3	2.54	1.54	3.38	2.17	2.78
p165	2.563	2.08	2.46	2.4	2.62	1.00	2.25	2.17	3.00
p166	2.75	2.00	2.69	2.1	3.62	1.31	2.50	2.67	2.44
p167	2.125	1.50	2.54	2.2	2.77	1.23	2.75	2.67	2.56
p168	2.938	2.75	2.85	1.8	2.77	1.54	1.63	2.17	1.89
p169	2.75	1.92	2.77	1.8	2.46	1.23	3.00	1.83	2.67
p170	2.438	1.83	2.85	2	3.00	1.23	2.38	2.50	2.11
p171	2.625	1.83	2.85	2	2.85	1.46	3.38	2.50	1.89
p172	3	2.42	2.46	1.9	2.85	1.00	2.00	2.50	3.78
p173	2.25	2.17	2.62	2.3	2.54	1.08	2.13	2.00	3.00
p174	2.688	1.50	2.92	1.8	2.62	1.08	3.25	2.83	2.67
p175	2.375	2.25	2.46	1.7	3.00	1.38	2.63	2.33	2.89
p176	2.25	2.00	2.77	1.5	2.77	0.92	3.13	2.67	3.11
p177	2.438	2.50	2.38	2.4	2.69	1.31	1.75	1.67	2.89
p178	3.125	1.92	2.85	1.2	3.38	1.15	3.13	1.50	2.33
p179	2.625	1.67	2.77	1.2	2.69	1.69	2.38	2.50	2.00
p180	2.5	1.50	2.92	1.4	2.54	1.38	2.63	2.33	2.56
p181	2.188	2.67	2.38	1.9	3.00	1.31	2.38	2.33	2.44
p182	2.688	2.50	2.92	1.3	3.23	1.15	2.13	2.33	2.89
p183	2.375	1.67	2.31	2	2.08	1.38	3.38	2.50	2.78
p184	2.875	1.83	2.85	1.3	2.77	1.62	3.00	3.17	2.44
p185	2.688	2.83	2.77	1.9	2.92	1.08	3.00	2.67	2.44

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p186	2.813	1.67	2.38	1.6	2.92	1.46	1.88	2.17	2.56
p187	3	1.58	2.54	1.6	3.23	1.15	2.88	2.17	2.78
p188	2.875	2.17	2.92	2.2	3.00	1.23	3.50	2.33	2.11
p189	2.375	1.83	3.00	1.4	2.85	1.69	2.75	2.67	2.89
p190	2.688	2.25	2.92	1.4	2.77	1.31	2.50	2.33	2.56
p191	2.688	2.08	2.77	1.1	3.31	1.31	3.13	3.00	3.11
p192	2.5	2.17	2.54	1.3	2.62	1.08	2.38	2.00	1.89
p193	3.125	1.83	3.00	1.5	2.92	1.92	3.75	2.83	2.44
p194	2.813	2.00	2.54	1.3	2.23	1.23	3.13	2.50	2.89
p195	2.625	1.17	3.00	1.7	2.85	1.62	3.00	2.67	2.78
p196	3.063	2.67	3.00	1.4	2.77	1.15	3.25	2.33	2.89
p197	1.688	2.67	3.15	1.4	2.54	1.69	2.63	2.17	2.22
p198	2.875	1.67	2.62	1.2	2.77	1.00	2.75	2.67	2.11
p199	2.938	1.33	2.85	1.8	2.62	1.54	3.13	2.33	3.00
p200	2.438	2.75	3.15	1.3	2.54	1.38	3.13	2.33	2.89
p201	2.688	1.58	3.23	1.4	2.46	1.08	2.38	2.17	2.11
p202	3.188	2.25	2.54	1.2	2.85	1.46	3.00	2.33	2.11
p203	2.375	1.67	2.77	2.1	2.77	1.08	2.88	2.33	2.56
p204	2.688	3.00	2.46	1.7	2.77	1.77	2.88	1.83	2.11
p205	2.5	1.67	2.77	1.7	2.15	1.69	2.88	1.83	2.56
p206	3.063	1.92	3.23	1.8	3.15	1.15	2.63	2.00	2.56
p207	2.375	1.67	3.08	1	3.23	1.15	2.38	1.50	2.78
p208	2.5	2.00	2.85	1.6	2.31	1.38	2.75	3.17	3.00
p209	2.25	2.25	3.00	1.3	3.38	1.08	2.50	2.17	3.00
p210	2.813	2.67	2.77	1.4	2.54	1.69	3.25	1.67	2.67
p211	2.75	1.50	3.15	1.7	2.85	1.54	2.38	2.17	3.11
p212	2.813	2.00	2.77	2.5	2.85	2.23	2.88	2.83	2.56
p213	2.438	1.92	2.62	1.5	2.77	0.85	2.50	3.00	3.00
p214	2.875	2.00	2.77	1.4	2.46	1.62	2.38	1.83	2.44
p215	2.688	2.83	2.77	1.7	2.92	1.54	2.00	3.17	3.00
p216	2.188	2.25	3.23	1.9	2.77	1.38	2.50	2.33	2.44
p217	2.375	2.42	2.85	1.2	2.92	1.31	2.13	2.33	2.56
p218	3	1.42	2.85	2.2	3.00	2.00	3.00	2.00	2.67
p219	2.75	1.75	2.23	1.9	2.46	1.31	2.25	3.17	2.33
p220	2.563	1.58	2.92	1.4	2.62	1.23	2.88	2.50	2.78
p221	2.313	2.25	2.92	2	3.00	1.54	2.25	2.17	2.67
p222	2.75	1.42	3.00	1.9	3.08	1.54	2.75	2.83	2.67
p223	2.75	2.17	3.15	2.2	2.23	1.23	2.75	1.83	2.44
p224	2.188	1.75	2.62	1.5	3.00	1.38	2.50	2.50	2.44
p225	2.563	2.00	2.38	1.9	2.23	1.15	2.50	2.33	2.67
p226	2.75	2.00	2.92	1.6	2.92	1.08	2.50	2.33	2.89
p227	2.5	1.67	2.85	2.1	2.54	1.08	2.38	2.17	2.22
p228	2.813	1.83	2.77	1.7	2.92	1.46	3.00	2.00	2.22
p229	2.875	2.83	2.62	2.1	2.85	1.62	2.88	3.33	2.44
p230	2.438	1.75	3.00	1.8	2.62	1.08	2.38	1.67	2.44
p231	2.938	1.83	2.92	2.5	2.92	1.31	1.75	3.00	2.56
p232	2.563	1.75	3.08	2	2.69	1.38	3.00	2.50	2.11
p233	2.438	2.42	2.46	2	2.77	1.62	3.38	2.50	3.00
p234	2.75	2.08	2.62	1.7	3.38	1.23	2.38	2.83	2.44
p235	2.438	1.67	3.00	2.3	2.85	1.15	2.88	1.67	2.00

DATA222

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p236	2.75	2.00	2.85	2.2	3.00	0.77	2.50	2.17	2.89
p237	2.875	2.25	2.92	2	2.38	1.23	2.88	2.50	2.67
p238	2.875	2.42	2.31	2	2.85	1.23	2.38	2.33	2.33
p239	3	2.25	2.38	1.9	2.85	1.77	2.50	1.67	2.11
p240	2.563	2.25	2.69	2.5	2.62	1.15	2.63	3.33	2.22
p241	3	1.58	2.77	1.9	2.85	1.08	2.63	2.50	3.56
p242	2.125	1.83	2.15	2.5	2.15	1.15	2.13	2.17	2.89
p243	2.375	1.58	2.69	1.9	2.15	1.15	2.50	2.50	2.22
p244	2.938	3.00	1.92	1.7	2.54	1.54	2.63	2.50	2.00
p245	2.875	1.42	2.54	2.4	2.31	1.69	2.50	2.67	2.67
p246	2.563	2.08	2.77	1.8	2.23	0.85	2.25	2.50	2.22
p247	2.938	1.25	2.62	2.1	2.85	1.31	2.50	2.67	2.22
p248	2.938	2.25	2.38	2.5	3.15	1.62	2.88	3.50	2.67
p249	2.313	2.25	3.08	1.8	2.23	1.69	1.88	1.67	3.44
p250	2.5	1.75	2.54	2.8	2.69	1.31	2.88	2.50	1.89
p251	2.5	2.17	2.62	1.7	3.15	1.54	3.00	3.00	2.44
p252	2.688	1.50	2.85	2.1	2.54	1.23	2.50	2.50	2.22
p253	3.188	2.17	2.85	1.7	2.77	1.38	2.50	2.50	2.33
p254	2.875	2.67	2.62	3.1	2.69	1.54	2.75	3.50	2.22
p255	2.813	2.17	2.54	1.8	2.85	1.69	2.25	2.17	2.44
p256	3.063	1.67	2.77	2.2	3.08	1.69	3.25	2.50	2.67
p257	3.063	1.83	2.46	2.4	2.31	1.23	3.13	3.17	2.33
p258	2.938	1.92	2.69	2.5	2.77	1.92	2.50	2.50	2.89
p259	2.75	1.83	2.92	2	2.62	1.54	3.13	2.83	2.33
p260	2.938	2.33	2.85	2.7	2.15	1.62	3.25	2.83	2.33
p261	3.125	1.58	2.62	2.6	2.38	1.54	2.75	2.00	2.67
p262	3.125	1.58	2.77	2.2	2.62	1.23	2.38	2.17	2.56
p263	3	2.50	2.85	2.2	2.85	1.62	3.13	2.50	2.56
p264	3.188	2.08	2.31	2.5	2.15	1.85	3.63	2.67	3.00
p265	2.5	1.17	2.31	2.1	3.31	1.23	2.50	2.50	2.78
p266	2.625	2.75	2.31	2.3	2.85	1.46	2.88	2.83	2.67
p267	2.813	1.75	3.00	3	3.00	1.62	2.75	2.67	2.00
p268	3.125	2.08	2.77	2.4	2.54	1.62	2.63	2.67	2.44
p269	2.688	2.67	2.85	2.7	2.85	1.46	2.00	2.50	1.78
p270	3.125	1.42	2.46	2.2	2.62	1.69	2.88	2.50	2.56
p271	2.25	2.08	2.85	2.7	3.08	1.92	3.13	2.17	2.56
p272	2.625	2.42	2.54	2.5	2.54	1.08	2.75	2.83	1.89
p273	2.813	2.33	2.00	1.8	2.77	1.31	2.88	2.33	1.89
p274	3.188	1.33	2.69	2.8	3.23	1.77	2.50	2.00	2.67
p275	2.813	2.17	3.08	2.7	3.00	1.69	3.13	3.00	2.22
p276	2.75	2.00	2.77	2.3	2.31	2.15	3.00	3.33	2.00
p277	2.938	1.75	2.62	2.5	2.77	1.54	2.00	2.33	2.67
p278	2.688	2.17	2.31	2.2	2.77	1.62	3.25	2.67	2.33
p279	2.813	2.00	2.69	2.8	2.46	1.77	3.25	2.33	2.44
p280	2.375	2.17	2.77	2.2	3.46	1.62	2.13	2.33	2.89
p281	2.938	2.42	2.77	2.6	2.38	1.46	2.00	2.50	2.56
p282	2.813	2.00	2.08	1.9	2.38	2.08	2.88	2.00	2.56
p283	2.875	1.67	2.77	2.5	2.69	1.23	2.75	3.00	3.11
p284	3.313	2.42	2.46	2.5	3.31	1.00	2.50	2.00	2.44
p285	2.938	1.75	2.54	2.2	2.77	1.69	2.75	2.83	2.33

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p286	3	1.92	2.77	2.6	2.77	1.00	1.75	2.00	1.89
p287	2.75	2.25	2.46	2	2.54	2.08	2.88	1.67	2.44
p288	3.188	1.83	2.46	2.4	2.85	1.54	3.63	2.50	2.33
p289	2.813	2.00	3.08	2.7	2.85	1.31	2.38	2.50	1.89
p290	2.688	1.50	2.54	2.2	2.69	1.62	2.75	2.00	2.89
p291	3.188	2.33	2.54	3.2	2.23	1.08	2.38	2.67	2.89
p292	2.375	1.92	2.23	2.1	3.46	1.54	2.88	1.83	2.89
p293	2.688	1.92	1.62	2.9	2.77	1.23	2.75	2.67	1.78
p294	2.875	1.42	2.15	2.5	3.31	1.38	2.00	1.83	3.11
p295	2.75	3.00	2.69	2.2	2.54	1.62	2.38	1.83	2.22
p296	3.063	2.08	2.54	2.5	2.69	1.38	2.13	2.50	2.33
p297	2.75	2.50	2.46	2.6	3.08	1.62	2.50	2.50	2.33
p298	3.125	1.67	2.69	2.4	2.69	1.15	3.38	2.00	1.89
p299	2.625	1.92	2.38	1.9	2.85	1.15	2.13	3.00	2.44
p300	3	1.17	2.46	2	2.62	1.62	2.50	2.50	2.22
p301	3	1.58	2.54	2.1	3.08	1.77	2.50	1.83	2.44
p302	2.813	2.00	2.62	2.4	2.62	1.31	3.00	3.00	2.67
p303	3	1.58	2.23	2.4	3.00	1.46	2.63	2.33	3.11
p304	3.063	1.92	2.92	1.6	2.23	1.62	2.00	2.33	2.00
p305	3.375	0.92	1.85	2.2	3.08	1.31	3.50	3.00	2.11
p306	3.063	1.50	2.77	2.2	2.77	1.31	2.13	2.83	2.33
p307	2.875	1.67	2.69	1.8	2.54	1.38	2.63	2.67	2.44
p308	2.438	2.42	2.46	1.8	2.77	1.31	3.13	2.67	2.67
p309	3.25	1.67	2.46	2.4	3.00	1.77	2.63	3.00	3.11
p310	3	1.75	2.46	2.6	2.54	1.46	2.00	2.67	3.00
p311	3.063	1.08	2.15	1.8	3.00	1.62	2.88	3.00	2.89
p312	2.938	1.50	1.92	1.9	2.38	1.77	2.75	2.33	2.22
p313	2.75	2.25	2.54	2.6	2.69	1.46	2.38	2.67	2.44
p314	3	1.50	2.08	2	2.62	1.38	2.50	3.00	2.67
p315	3.188	1.67	2.62	2.4	2.92	1.23	3.00	2.00	3.33
p316	3.188	2.08	2.46	2	3.00	2.00	3.00	2.00	2.22
p317	3	1.83	2.54	2.9	2.46	1.15	2.63	3.17	2.00
p318	2.938	0.92	2.23	1.9	2.77	1.15	2.00	2.83	3.33
p319	3.313	1.75	2.00	1.9	2.23	1.38	3.38	2.00	2.22
p320	2.625	1.50	2.77	1.6	2.77	1.46	2.38	2.17	2.67
p321	3.063	2.50	2.77	2.8	2.77	1.54	2.63	3.50	2.44
p322	2.5	1.33	1.92	2.2	2.62	1.38	3.13	2.50	2.33
p323	3.563	1.50	2.15	2.1	2.23	1.31	2.25	2.50	2.44
p324	3.25	1.75	2.46	2.1	2.54	1.15	2.88	2.67	2.78
p325	3.125	2.17	2.08	3.2	2.31	1.46	2.63	2.50	3.00
p326	3.375	1.33	2.46	2	1.85	1.31	2.63	2.33	2.89
p327	3.5	1.92	2.31	2.5	3.15	1.77	3.00	2.67	2.67
p328	2.563	1.33	2.38	2.4	2.92	1.08	3.00	1.50	2.22
p329	2.563	1.58	2.77	3.1	2.62	1.23	1.88	2.50	2.89
p330	2.313	1.58	2.62	2.5	2.77	1.08	3.00	2.83	2.44
p331	3.313	2.17	2.69	1.5	2.54	1.31	2.38	2.33	2.67
p332	2.75	1.42	2.62	1.8	2.62	1.31	3.00	1.50	2.44
p333	2.938	1.75	2.08	2.4	2.62	1.62	2.88	2.17	3.00
p334	3.25	2.00	2.69	2	2.31	1.08	3.25	2.50	2.44
p335	3.063	2.17	2.54	2.7	2.92	1.08	2.00	2.50	2.67

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p336	2.938	1.25	2.85	2.1	3.08	1.23	2.88	2.00	2.22
p337	2.75	2.25	2.69	3.2	2.31	1.85	3.38	2.67	2.89
p338	2.938	1.58	2.62	2	2.62	1.69	3.00	2.83	2.33
p339	2.625	1.33	2.85	2.2	2.38	1.46	2.25	2.33	2.44
p340	2.938	1.92	2.54	2	2.15	1.23	2.38	1.83	2.00
p341	3.313	1.83	2.54	2.4	2.38	1.92	2.63	3.33	2.89
p342	3	1.67	2.85	1.6	2.69	1.62	3.13	2.17	2.56
p343	2.938	2.25	2.85	1.9	2.15	1.23	2.38	3.00	2.22
p344	2.75	1.75	2.54	2.8	2.85	1.77	2.88	2.17	2.22
p345	2.438	1.67	2.62	2.2	2.92	1.15	2.88	2.00	3.22
p346	3.938	2.00	2.23	1.9	2.46	1.69	2.63	2.33	3.00
p347	3.563	1.92	2.08	2	2.08	1.31	3.00	2.50	2.67
p348	2.563	1.67	2.15	2.7	2.92	2.15	3.25	1.67	1.89
p349	2.813	2.58	2.31	2.4	2.38	1.08	2.75	2.50	3.00
p350	2.813	1.83	2.15	1.5	2.31	1.31	2.88	1.83	2.78
p351	2.625	2.08	2.46	1.8	2.77	1.15	2.25	2.67	2.33
p352	3.063	1.67	2.46	2.6	2.69	1.08	3.13	2.50	2.89
p353	2.75	2.50	2.54	3.1	2.23	1.46	2.25	2.17	3.00
p354	2.625	1.92	1.92	1.6	2.46	1.46	3.13	1.83	2.67
p355	2.938	2.08	2.31	2.4	2.38	1.54	3.13	2.33	2.89
p356	2.375	2.00	2.69	2.2	2.69	1.23	2.63	2.00	2.11
p357	2.875	2.00	2.31	2.8	2.54	1.38	3.00	2.17	1.89
p358	3	1.75	2.46	2.3	2.46	1.38	2.38	2.00	2.89
p359	2.875	1.58	2.23	2.4	2.69	1.46	3.00	2.50	3.33
p360	2.5	2.17	2.62	2.6	2.38	1.31	2.63	3.17	2.33
p361	2.938	1.75	2.15	2.9	2.85	1.69	3.38	2.00	2.89
p362	2.063	1.92	2.23	2.5	2.23	1.15	2.50	2.00	3.00
p363	2.188	1.58	2.00	2.5	3.15	1.08	2.38	2.33	2.11
p364	2.5	2.08	2.38	2.4	2.77	1.23	2.88	2.00	2.67
p365	2.875	2.42	1.92	2.9	2.69	1.08	2.88	2.00	2.78
p366	2.188	1.67	2.85	2.6	2.54	1.54	1.75	2.67	2.67
p367	2.875	2.00	1.69	2.4	2.31	0.92	3.13	1.83	3.22
p368	2.438	2.83	1.85	2.7	2.77	1.23	2.50	2.00	2.89
p369	2.688	2.25	2.08	2.4	2.62	1.31	3.25	2.00	2.67
p370	3	2.42	1.92	3.1	2.77	1.46	2.50	2.33	2.67
p371	2.938	2.67	2.38	2.5	2.46	1.00	2.38	3.00	2.67
p372	2.688	1.92	2.00	1.7	2.00	1.92	2.75	2.00	2.78
p373	3.313	2.33	2.31	2.9	3.08	1.08	2.63	2.50	2.89
p374	3.125	2.25	1.92	2.8	2.46	1.46	3.13	1.83	2.89
p375	3.25	2.75	1.85	2.6	2.69	1.08	3.00	2.50	2.67
p376	2.688	1.83	2.08	2	2.54	1.23	2.50	2.67	3.56
p377	3.25	2.58	2.46	2.3	2.62	1.00	2.38	2.33	2.89
p378	2.75	2.33	2.23	3.1	3.08	1.92	2.88	2.50	2.89
p379	2.875	1.67	2.46	2.4	2.46	1.31	2.50	2.67	3.11
p380	2.375	2.25	2.62	2.4	2.69	1.31	2.75	3.17	2.56
p381	3	1.92	2.08	1.5	2.46	1.15	3.25	2.17	2.33
p382	2.875	2.50	1.85	2.9	2.46	1.31	1.88	2.17	3.56
p383	2.75	2.00	2.62	2.9	2.85	1.69	2.25	2.17	2.78
p384	2.875	1.17	2.00	2.5	2.62	1.31	2.50	2.17	3.00
p385	2.938	2.08	2.15	1.8	2.85	0.92	3.38	2.67	3.33

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p386	2.5	1.33	2.15	2.9	2.00	1.23	2.88	2.67	2.56
p387	2.625	2.75	2.38	2.8	2.23	1.54	3.25	3.17	2.56
p388	3.375	1.42	2.62	2.7	3.08	1.15	2.25	2.17	2.78
p389	2.438	2.08	2.08	2.2	3.08	1.08	3.00	2.00	3.56
p390	2.563	1.42	1.92	2.4	2.31	1.31	3.25	2.67	3.00
p391	2.75	1.83	2.23	2.8	2.62	1.54	3.00	2.67	2.67
p392	2.688	2.17	2.08	2.5	2.38	1.23	1.88	3.00	3.11
p393	3.313	1.75	2.38	1.8	2.85	1.54	2.13	3.17	2.89
p394	3.063	1.92	2.92	1.9	3.00	1.00	3.13	3.00	3.11
p395	2.063	1.50	2.46	2.9	2.31	1.54	3.25	2.50	3.33
p396	3.313	1.67	2.38	2	2.38	1.15	1.75	2.33	2.89
p397	2.688	2.08	2.15	1.9	2.62	1.62	2.63	3.00	3.00
p398	3.125	2.00	3.23	2.7	2.77	1.15	3.50	2.67	2.00
p399	2.625	1.58	2.38	2.4	2.23	1.54	3.50	2.33	3.00
p400	3	1.50	2.54	3.4	3.00	1.62	2.00	2.00	2.33
p401	2.75	1.92	2.62	2.1	3.08	2.08	3.25	2.50	3.11
p402	2.563	2.33	2.77	2.6	2.38	1.00	2.63	2.00	2.56
p403	2.5	1.42	2.46	2.5	2.31	1.69	2.13	2.17	3.11
p404	2.875	1.25	2.85	2.5	2.46	1.38	2.00	2.67	3.22
p405	2.188	1.83	3.00	2	2.62	1.77	1.75	2.00	2.44
p406	3	2.33	2.54	2.9	2.62	1.54	3.13	2.33	3.00
p407	2.875	2.00	2.69	2.7	3.00	1.38	2.63	2.50	2.89
p408	2.5	1.67	2.54	3.4	1.69	1.62	3.25	3.00	2.67
p409	2.813	1.83	2.69	1.8	3.00	1.46	2.38	2.00	2.56
p410	2.313	2.25	2.46	3.3	2.92	1.46	2.13	2.50	2.44
p411	3.188	1.67	2.62	2.3	2.46	2.08	2.75	2.17	2.11
p412	2.563	1.83	2.46	2.4	2.77	1.46	3.13	1.67	3.44
p413	2.438	1.67	2.85	2.5	2.46	1.54	1.88	2.33	2.56
p414	2.063	1.83	3.23	2.5	2.85	1.62	3.38	3.17	3.00
p415	2.5	1.17	2.54	2.2	2.31	1.46	2.25	2.50	2.56
p416	2.625	1.92	2.77	2.4	2.77	1.92	2.75	2.50	2.56
p417	2.875	1.67	2.85	3	2.38	1.38	3.38	2.67	3.33
p418	2.125	1.50	2.77	2.9	2.62	1.69	2.50	1.50	2.78
p419	2.125	1.83	2.46	1.5	2.85	1.54	3.38	2.33	2.78
p420	3.375	1.67	3.15	2.4	2.62	1.77	2.88	2.33	2.56
p421	2.688	1.42	2.69	2.5	2.38	0.85	2.25	2.50	2.44
p422	2.875	1.83	2.85	3.4	2.46	1.77	2.75	2.33	2.89
p423	2.438	1.92	3.15	2.3	2.77	1.85	3.63	1.83	2.33
p424	2.375	1.50	2.54	2.6	2.54	1.54	2.75	2.67	2.67
p425	2.75	2.00	2.69	2	2.77	1.08	2.63	1.83	2.56
p426	3	1.42	2.46	2.3	2.69	1.54	2.63	2.50	2.78
p427	2.25	2.00	3.08	2.7	2.08	2.38	3.63	2.00	2.67
p428	3	2.00	2.85	3.3	2.77	1.38	3.00	2.50	2.44
p429	2.438	1.67	2.46	2.6	2.77	1.62	2.25	2.50	2.67
p430	2.813	1.83	3.00	3.5	3.00	1.23	2.88	3.00	3.33
p431	2.5	1.67	2.85	2.3	2.62	2.23	3.13	3.17	2.67
p432	2.438	2.25	2.85	2.5	2.38	1.92	3.13	3.00	2.33
p433	2.813	2.00	2.38	2.5	3.08	1.31	2.75	2.50	3.00
p434	2.625	1.42	2.69	3.2	3.08	1.15	2.38	3.17	2.44
p435	2.375	2.00	3.08	2.2	2.77	2.08	3.25	2.83	3.56

DATA222

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p436	2.25	1.50	2.85	3.3	2.62	1.69	2.88	3.00	2.89
p437	3.125	2.17	2.85	2.1	2.92	1.00	2.25	2.83	2.78
p438	2.563	2.17	2.77	3.1	3.00	1.77	3.63	2.83	2.78
p439	2.25	1.50	2.31	2.2	2.77	1.31	2.75	3.00	3.22
p440	2.313	2.92	2.38	2.3	2.85	1.92	2.88	2.33	2.89
	2.757	2.02	2.59	2.22	2.81	1.37	2.70	2.45	2.61

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p1	2.188	3.67	2.54	3.7	3.62	3.77	3.25	3.33	2.56
p2	2.125	3.17	2.92	3.3	3.85	2.85	2.13	4.17	2.44
p3	2.25	3.25	3.08	3.1	3.92	3.69	3.50	3.50	2.78
p4	2.063	3.50	3.54	2.8	3.54	3.15	3.13	3.17	2.67
p5	1.875	3.58	2.31	2.5	3.00	2.85	3.50	3.33	2.33
p6	2.375	3.25	3.08	3.3	3.46	3.69	2.13	3.33	2.67
p7	1.563	3.33	3.08	1.9	3.54	3.38	3.50	4.50	2.56
p8	2.063	3.92	2.31	3.1	3.38	2.85	2.88	2.67	2.56
p9	2	3.17	3.23	2.4	3.46	3.23	3.75	3.33	2.33
p10	1.625	3.58	2.85	2.2	3.54	3.08	3.13	3.17	2.89
p11	1.938	3.33	2.46	2.9	3.46	3.31	2.25	2.83	2.67
p12	2.313	3.67	2.92	3.2	3.23	2.77	2.75	4.00	2.44
p13	1.688	2.92	2.54	2	3.62	3.38	3.88	3.17	2.78
p14	1.75	3.67	2.62	2.7	3.69	2.92	2.50	3.17	3.00
p15	2.813	3.25	3.00	3.4	3.54	3.38	2.63	3.17	2.22
p16	1.875	3.58	2.77	2.4	3.38	3.15	3.00	3.33	2.78
p17	2.125	3.00	2.77	2.1	3.38	3.15	2.50	3.33	2.22
p18	2.563	4.00	2.85	2.6	3.46	3.15	2.75	3.00	2.78
p19	2	3.58	2.38	3.2	3.38	3.69	2.75	3.33	2.67
p20	1.813	3.50	3.15	2.8	3.31	2.85	2.75	4.17	2.56
p21	2.188	2.83	2.62	2.9	3.54	2.92	2.25	3.50	2.33
p22	1.625	3.33	3.15	2.7	3.46	3.08	2.88	2.83	2.22
p23	1.938	3.92	2.77	2.5	3.31	2.69	2.88	3.17	2.56
p24	2.188	3.50	2.69	3.3	3.15	3.69	3.25	3.50	2.11
p25	1.625	3.08	3.31	2.6	3.69	3.08	3.63	3.50	2.89
p26	1.875	3.75	2.54	2.6	3.69	3.54	2.38	3.67	2.44
p27	1.938	3.92	2.15	3.3	3.38	2.85	3.13	3.50	2.22
p28	2.188	2.92	2.85	2.2	3.31	2.85	2.88	3.33	2.44
p29	2	3.25	2.31	2.5	3.38	3.62	3.13	3.33	2.78
p30	1.625	3.58	2.54	3.8	3.54	3.31	2.75	3.17	2.56
p31	1.938	3.83	2.46	2.3	3.62	3.38	2.50	3.33	2.56
p32	2	4.00	2.46	2.6	3.46	3.38	3.50	4.17	2.22
p33	2	2.67	1.92	3.3	3.31	3.15	3.50	3.33	2.00
p34	1.563	4.25	3.31	2.5	3.62	2.92	2.63	3.33	3.33
p35	2.188	3.83	2.31	2.7	3.77	3.31	3.00	4.17	2.56
p36	2	3.50	2.23	3.5	3.38	3.08	2.75	2.33	2.22
p37	1.625	2.92	2.46	2.6	3.38	3.38	2.50	3.00	2.33
p38	2.125	3.92	2.69	3.4	3.31	3.62	3.00	4.50	2.78
p39	1.188	3.92	2.08	2.7	3.62	3.31	2.50	3.33	2.44
p40	2.688	4.00	2.77	3	3.38	2.69	2.75	3.33	2.56

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p41	1.813	2.83	2.54	2.9	3.62	3.54	2.63	4.17	2.56
p42	1.938	3.92	2.54	3	2.77	3.15	3.13	3.50	3.11
p43	1.938	3.75	2.69	3.3	3.69	3.46	2.63	2.67	1.78
p44	1.813	3.83	2.77	2.9	3.46	3.38	2.63	3.67	2.67
p45	2.188	2.75	2.54	2.4	3.69	3.62	2.88	3.50	2.89
p46	2.188	3.17	2.92	3.1	3.46	3.15	2.13	3.33	2.67
p47	1.875	3.67	1.77	3.2	3.77	2.69	3.38	3.17	2.11
p48	1.75	3.67	2.46	3	3.46	3.54	2.88	3.50	2.44
p49	1.938	2.50	2.92	2.5	3.62	3.46	2.38	3.50	3.11
p50	1.5	3.83	2.54	3.2	3.62	3.46	2.38	3.83	2.56
p51	2.375	4.00	2.15	2.8	3.38	3.23	2.25	3.33	2.22
p52	1.563	2.58	3.00	2.9	3.46	3.15	3.13	3.33	2.33
p53	1.875	3.00	2.62	3.4	3.54	3.38	3.00	2.83	3.00
p54	1.313	3.25	3.08	2.6	3.69	3.38	2.25	3.83	3.22
p55	1.813	3.50	2.85	3.3	3.85	3.38	2.38	3.17	2.00
p56	2.438	3.17	2.92	3.3	3.08	3.54	2.88	3.50	2.89
p57	2.063	3.00	1.85	2.4	3.85	2.69	2.63	2.50	3.22
p58	1.563	3.17	3.23	3	3.31	3.00	2.75	3.67	3.11
p59	1.625	4.42	2.38	2.9	3.69	3.62	2.50	3.17	2.11
p60	1.563	3.42	2.69	3.1	3.23	3.77	3.13	3.67	2.56
p61	1.75	2.58	3.38	3.3	3.54	3.23	2.50	4.50	2.67
p62	2.125	2.83	2.62	1.5	3.77	3.15	3.50	3.00	2.78
p63	1.875	4.33	1.77	3.1	3.23	2.92	2.63	3.00	2.11
p64	1.813	3.17	2.46	3.5	3.62	3.15	2.13	4.17	2.89
p65	2.313	3.83	2.92	2.1	3.38	3.62	2.75	3.67	3.00
p66	1.5	3.25	2.54	3.4	3.46	3.38	3.00	3.83	2.78
p67	1.625	2.33	2.62	2.8	3.92	3.15	2.63	3.17	2.33
p68	2.25	3.67	2.62	2.2	3.62	3.08	2.50	3.33	2.67
p69	1.438	3.83	2.38	3.8	3.15	3.62	2.63	3.17	2.67
p70	2.188	2.92	3.23	2.5	3.77	3.00	2.88	3.50	2.67
p71	1.563	3.58	2.31	1.9	3.69	3.23	2.75	2.50	2.00
p72	2	3.75	2.46	3.7	3.77	2.85	2.00	3.50	3.22
p73	1.438	3.25	2.69	2.2	3.38	3.38	2.25	2.33	2.67
p74	2.063	3.00	2.54	2.8	2.77	3.08	2.25	3.33	2.44
p75	2.313	2.92	2.69	3	3.54	3.23	2.88	3.17	1.89
p76	1.75	3.58	3.08	3.1	3.77	3.38	3.25	2.83	3.00
p77	1.875	3.83	2.23	2.7	3.46	3.38	2.75	3.67	2.11
p78	1.938	3.33	2.69	2.6	3.77	3.15	2.25	3.67	3.22
p79	2.188	2.83	3.54	3	3.46	3.00	2.50	2.67	2.11
p80	2.125	3.83	2.31	2.7	3.54	3.15	3.25	4.00	3.00
p81	1.625	3.67	3.00	2.8	3.15	3.62	2.75	3.83	2.00
p82	2.375	3.00	3.08	3.4	3.69	3.46	3.00	3.83	2.78
p83	1.938	3.42	2.62	2.3	3.31	3.15	2.00	3.17	2.44
p84	1.375	3.17	2.69	2.5	3.77	3.15	2.75	3.50	2.89
p85	2.938	3.75	3.15	3	3.08	2.92	2.25	3.50	1.89
p86	2.188	3.50	2.08	3.1	3.46	3.77	2.00	3.67	2.78
p87	1.25	3.42	3.00	2.8	3.77	3.08	2.75	3.50	2.67
p88	2.438	2.92	3.46	3	3.38	3.23	2.38	3.33	2.89
p89	2	3.75	3.00	2.8	3.62	3.46	2.38	2.67	2.78
p90	1.313	3.67	2.08	2.2	3.00	3.69	1.88	4.33	3.00

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p91	2.375	3.67	3.00	2.6	3.54	2.54	3.13	3.83	2.67
p92	2.25	3.58	2.31	3.4	3.23	3.23	2.38	2.83	2.56
p93	2	2.67	3.69	1.9	3.38	3.62	2.50	3.00	2.78
p94	2.625	3.42	3.38	3.6	3.46	3.62	3.13	4.00	2.67
p95	1.438	3.83	2.23	3.2	3.38	2.77	2.00	3.17	2.56
p96	1.313	3.67	2.77	3.1	3.38	3.00	2.38	2.33	2.44
p97	2.188	2.92	3.23	3	3.54	3.15	3.63	3.67	3.00
p98	1.688	2.83	2.15	2.4	3.15	3.62	2.25	2.83	2.67
p99	2.125	3.42	3.08	3	3.15	2.85	2.75	2.83	1.67
p100	2.188	3.17	3.31	2.9	3.31	3.85	2.75	4.17	3.33
p101	2.188	3.42	2.08	3.2	3.77	3.31	2.13	3.83	2.11
p102	1	3.42	2.77	2.6	3.31	2.92	2.38	2.50	2.67
p103	2.25	3.58	3.00	2.1	3.31	3.23	2.25	2.83	1.78
p104	1.813	3.50	2.54	3.5	3.54	3.15	3.38	3.50	3.00
p105	1.5	2.67	2.92	3.5	3.15	3.38	2.25	3.50	2.11
p106	2.438	3.08	2.69	2	3.46	3.62	2.38	3.17	2.56
p107	2.25	3.50	2.69	3.5	3.77	2.77	2.88	3.50	1.11
p108	1.875	3.08	2.92	3.4	3.69	3.08	2.63	3.33	2.78
p109	2.438	3.08	2.92	2.8	3.23	3.54	2.50	3.67	2.89
p110	1.938	3.42	2.38	3	3.62	3.62	1.88	2.33	1.89
p111	1.438	2.92	2.85	2.6	3.46	2.69	3.00	2.67	1.67
p112	2.375	2.33	2.46	3.6	3.46	3.31	3.13	4.00	3.00
p113	2.375	3.75	2.46	2.3	3.92	3.38	3.13	3.67	1.78
p114	2.063	3.50	2.62	2.9	3.54	3.54	3.25	2.50	2.56
p115	2	3.75	2.62	3	3.62	3.31	2.25	3.33	2.22
p116	1.563	3.25	2.15	2.6	3.31	3.38	2.88	2.83	2.22
p117	1.813	2.42	2.77	3.2	3.85	2.92	2.63	3.17	2.67
p118	2.875	3.58	2.54	2.6	3.46	3.00	2.38	3.17	2.44
p119	2.063	2.92	2.54	3.3	3.46	3.23	3.13	3.17	2.00
p120	1.813	3.58	2.54	3.5	3.31	3.23	2.50	2.83	3.33
p121	2.188	3.83	2.85	2.2	3.77	3.15	3.25	3.33	2.44
p122	2.375	2.17	2.31	3.2	3.23	3.23	2.63	3.83	2.00
p123	2.563	3.17	2.46	3.6	3.15	3.15	2.88	3.00	2.22
p124	2.625	3.92	2.77	2.3	3.46	3.38	2.63	2.83	2.78
p125	1.5	3.17	2.00	2.9	3.54	3.54	2.50	2.00	2.00
p126	2.563	3.67	3.15	3.3	3.31	3.77	3.00	3.33	2.67
p127	2.188	3.17	3.00	4.2	3.00	3.38	3.50	3.67	2.78
p128	1.938	3.50	2.08	2.7	3.54	3.00	3.25	2.83	1.44
p129	2.25	3.17	2.31	2.9	3.54	2.85	1.75	2.67	2.78
p130	2.5	3.08	3.31	3.1	3.31	3.77	2.63	3.00	2.22
p131	2.375	2.83	2.23	3.7	3.23	3.62	3.00	3.33	2.67
p132	2.25	3.42	2.46	3.8	3.46	3.62	2.13	3.50	3.00
p133	2.125	3.67	2.85	2.7	3.15	3.38	3.38	2.83	3.00
p134	1.688	2.50	2.38	3.6	3.62	2.77	2.63	2.67	1.67
p135	1.938	3.33	2.31	3.5	3.77	2.77	3.00	2.83	2.56
p136	2.5	3.08	2.62	2.5	3.15	3.38	2.50	3.50	3.22
p137	1.813	3.50	2.23	3.3	3.08	3.69	2.63	2.50	2.11
p138	2.313	2.75	3.08	2.9	3.15	3.69	2.00	2.83	2.00
p139	1.938	3.67	2.31	3.4	3.54	2.85	3.00	2.83	2.78
p140	1.625	3.83	2.54	3	3.00	3.15	2.88	3.17	2.56

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p141	2	2.42	2.62	3.1	3.77	3.23	2.63	3.00	2.11
p142	2.875	2.75	2.92	3.2	3.00	3.08	2.88	3.00	2.11
p143	2	3.42	2.31	3.7	3.23	3.46	2.75	3.67	2.67
p144	1.875	3.92	1.92	3.4	3.54	3.15	1.63	2.50	2.44
p145	2.063	3.25	3.23	2.7	2.77	3.23	3.38	2.33	2.56
p146	2.188	3.58	3.08	3.4	3.69	3.54	2.75	2.33	1.89
p147	2.313	3.25	2.23	3.1	3.69	3.62	3.00	2.67	2.33
p148	2.625	3.75	2.69	3.3	3.31	3.00	3.13	3.00	2.78
p149	1.688	3.33	3.23	2.8	2.77	3.00	3.25	2.50	2.11
p150	2.438	3.00	2.46	3.5	3.46	3.54	3.00	3.17	2.44
p151	2.188	4.50	2.62	3.6	3.62	3.00	3.13	3.50	2.33
p152	1.75	3.33	2.85	2.6	3.31	3.15	2.38	2.67	1.67
p153	2.688	2.83	2.85	2.8	3.46	3.38	2.63	3.00	2.78
p154	2.063	2.83	2.85	3.5	2.69	3.46	2.63	2.50	2.33
p155	1.813	3.83	3.38	3.1	3.15	3.15	3.13	3.00	1.89
p156	2.375	3.58	2.08	2.7	3.23	3.15	2.13	2.67	2.67
p157	1.625	3.00	2.69	2.8	3.62	3.46	3.00	3.17	2.78
p158	1.938	3.25	3.00	3.8	3.31	3.23	2.75	3.00	2.11
p159	2.375	2.75	2.54	3.3	3.54	3.62	3.25	2.50	2.11
p160	1.938	3.33	2.38	2.8	2.85	3.15	3.38	3.50	2.89
p161	2.063	3.92	3.00	2.4	3.85	3.15	3.00	2.67	2.11
p162	1.688	3.42	2.77	3.7	3.54	3.54	2.88	2.83	2.89
p163	2.125	3.25	2.69	3.5	3.38	3.00	2.75	3.50	2.22
p164	2.563	3.83	3.00	3.2	3.54	3.31	2.13	2.67	2.44
p165	2.188	3.08	2.69	3.1	3.38	3.69	3.25	2.17	2.11
p166	2	3.00	3.08	3.1	3.23	3.31	3.38	3.50	2.44
p167	2.875	3.50	2.46	3.4	3.77	3.46	3.00	3.00	2.44
p168	2.188	4.00	2.62	3.2	3.31	3.38	2.50	2.67	2.11
p169	1.875	2.33	3.54	2.1	3.62	3.08	2.25	3.00	3.00
p170	1.813	4.00	2.85	3.8	3.69	3.38	2.63	2.50	2.56
p171	2.375	3.25	2.62	2.8	3.15	2.46	3.50	2.33	1.56
p172	1.938	3.42	2.77	2.4	2.77	3.62	2.38	2.67	2.89
p173	1.938	3.25	3.08	2.9	3.31	3.62	2.50	3.50	3.00
p174	1.938	3.67	2.92	3.4	3.54	3.23	3.00	2.00	2.11
p175	2	3.42	2.92	3	3.00	3.38	2.13	2.83	2.22
p176	2.688	3.75	2.38	3.2	3.54	3.15	3.00	3.33	2.56
p177	2.25	2.83	3.08	3	3.54	3.31	3.13	3.00	3.00
p178	2	3.83	3.38	2.6	3.08	3.54	3.00	3.00	2.33
p179	2.063	3.50	2.38	3.4	3.62	3.08	2.50	2.33	2.56
p180	2	2.92	2.62	3.1	3.85	3.69	2.75	3.00	2.44
p181	2.938	3.08	3.15	2.2	3.08	3.46	3.00	3.00	2.89
p182	2.563	3.67	3.38	4	3.62	3.54	3.25	3.67	2.11
p183	2.063	3.83	2.46	3.5	2.85	3.15	3.38	2.83	2.44
p184	2.188	3.08	3.15	2.4	3.31	3.77	1.63	1.67	2.78
p185	2.25	3.08	2.92	3.1	2.92	3.15	2.88	4.17	3.00
p186	1.813	3.67	2.54	3.8	3.46	3.15	3.25	2.33	1.78
p187	2.688	3.75	2.85	2.2	3.38	3.08	3.50	2.50	2.78
p188	2.688	2.92	3.08	3.5	3.38	3.77	2.75	3.00	2.44
p189	2.063	3.08	3.15	3.5	3.15	3.23	2.88	2.67	2.67
p190	1.938	3.50	3.15	3.3	3.69	3.77	2.50	1.83	2.22

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p191	2.75	3.33	3.08	3.3	3.54	3.62	2.88	3.00	2.22
p192	2.063	3.83	2.15	3.2	3.54	3.31	2.25	3.33	2.11
p193	2.063	3.42	2.62	2.6	3.54	3.15	3.50	2.50	2.67
p194	2.938	2.75	3.08	3.9	3.23	3.31	3.00	2.83	2.22
p195	2	3.75	2.46	3.6	3.15	3.38	3.38	2.83	1.78
p196	1.938	3.67	2.92	2	3.46	3.85	2.88	3.17	2.22
p197	2.313	3.50	3.23	3.6	3.85	3.54	2.50	2.33	3.22
p198	2.5	2.92	2.31	3.3	3.38	2.92	3.00	2.67	2.22
p199	2	3.33	3.00	3.6	2.85	3.54	2.50	3.00	2.22
p200	2.625	3.83	3.38	3.1	3.54	3.00	2.88	3.50	2.56
p201	2.188	2.75	2.85	3.7	3.62	3.23	3.00	3.00	2.78
p202	1.313	3.17	2.31	2.4	3.54	3.69	2.25	2.33	2.44
p203	2.688	3.67	2.92	3.4	3.38	3.08	3.00	2.67	3.00
p204	1.875	3.50	3.15	3	3.77	3.69	3.50	2.50	1.67
p205	2.188	3.67	2.85	2.7	3.15	3.54	2.38	2.67	3.22
p206	2.25	3.33	2.62	3.5	3.77	3.08	3.25	2.83	2.22
p207	2	2.58	2.23	3.8	3.62	3.31	2.38	3.00	2.44
p208	2.125	3.92	2.62	2.3	3.38	3.54	2.88	2.50	2.56
p209	1.875	3.25	3.69	3.5	3.46	3.00	2.88	3.50	2.44
p210	2.438	3.42	2.85	3.4	3.77	3.46	2.75	2.67	2.44
p211	2.125	3.00	2.46	2.7	3.46	3.08	2.75	3.17	2.56
p212	2.125	4.08	2.92	3.2	3.85	3.77	2.75	2.83	2.89
p213	2.063	2.92	3.31	3.4	3.38	3.15	2.50	2.67	2.33
p214	2	4.08	2.69	2.7	3.00	3.62	2.25	2.83	2.44
p215	2.75	3.42	2.77	3.3	3.62	2.54	2.88	2.83	2.33
p216	2.063	3.17	2.85	3.6	3.00	3.62	2.50	2.83	2.22
p217	2.438	3.33	3.23	2.4	2.85	3.15	3.50	3.17	3.11
p218	2.188	4.08	3.00	4	3.38	3.77	2.88	3.17	1.89
p219	2.438	3.50	2.31	3.5	3.62	2.54	2.88	2.17	2.78
p220	1.875	3.58	2.69	2.3	3.62	3.38	2.50	3.50	2.89
p221	2.438	3.25	2.85	4	3.62	3.38	3.38	3.00	2.56
p222	1.438	3.00	2.46	3.7	3.00	3.38	3.38	2.17	2.33
p223	2.188	3.75	3.00	3.1	3.46	2.92	2.88	3.83	1.89
p224	2.063	3.67	2.77	2.3	4.00	3.38	2.38	3.17	3.67
p225	2	3.00	2.69	4.1	3.38	3.31	3.00	2.50	2.11
p226	2.375	3.58	2.62	2.6	3.00	3.62	3.38	2.17	2.22
p227	2.25	4.08	2.85	3	2.77	3.00	2.50	3.17	3.11
p228	1.875	3.08	2.62	3.4	3.62	3.54	3.25	4.00	2.78
p229	1.938	3.50	3.46	3.4	3.77	3.08	2.38	2.83	1.89
p230	1.75	4.42	2.38	3.3	3.46	3.69	3.25	3.33	2.44
p231	2.125	3.75	3.08	3.1	2.92	2.62	3.25	3.50	3.00
p232	2.25	3.42	3.00	3.1	3.38	3.54	4.00	2.33	2.33
p233	1.75	3.25	2.92	2.9	2.92	3.23	2.75	3.83	2.33
p234	1.75	3.83	2.85	3.1	3.15	3.23	3.13	2.83	2.11
p235	1.875	3.67	3.23	3.1	3.38	3.23	3.00	3.67	3.11
p236	1.938	3.75	2.62	3	3.85	3.15	2.25	3.17	2.89
p237	2	3.67	2.54	3.2	3.15	3.69	3.38	4.00	2.00
p238	2.438	3.75	3.00	3.1	2.54	2.69	2.88	3.00	2.44
p239	2.188	3.92	2.38	3.5	3.77	2.85	2.25	3.17	2.89
p240	2.063	3.75	2.85	2.7	3.38	3.46	2.75	2.50	3.11

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p241	2	3.58	3.31	3.4	3.77	3.23	3.13	4.00	1.44
p242	1.5	3.33	2.46	3.1	3.08	3.38	2.50	3.50	3.00
p243	2.063	4.08	2.46	3.1	3.62	3.00	3.38	3.67	3.00
p244	2.188	4.17	2.85	3	3.23	3.38	2.38	2.83	2.89
p245	2	3.58	2.85	3.6	3.77	3.62	2.63	3.83	1.11
p246	2.188	3.33	2.62	3.3	3.08	3.31	2.38	4.17	2.22
p247	1.75	3.58	3.08	2.6	3.69	3.38	2.88	2.17	3.11
p248	2.125	3.58	2.69	3.5	3.62	2.92	3.88	3.33	3.33
p249	2.313	3.50	2.38	2.4	3.31	3.38	2.50	3.17	1.89
p250	1.938	3.83	3.31	2.7	2.92	3.15	3.00	4.50	2.78
p251	1.75	3.50	2.92	3.3	3.46	3.31	2.63	3.33	2.78
p252	2.813	3.50	2.54	3.5	3.77	3.69	3.13	3.50	2.89
p253	1.563	3.67	3.15	2.3	3.85	3.38	2.75	3.00	2.56
p254	2.125	3.33	3.15	2.9	3.15	3.08	2.50	2.83	2.33
p255	2.5	3.33	3.23	3.4	3.54	3.23	2.00	4.50	3.44
p256	1.75	4.17	2.54	2.6	3.38	3.15	3.25	3.50	2.44
p257	2.063	3.42	2.92	2.4	3.38	3.54	2.88	3.00	1.89
p258	2.188	3.92	2.77	3.1	3.54	3.23	2.88	2.83	2.33
p259	1.813	4.08	3.15	3.2	3.54	3.54	2.50	3.50	3.22
p260	1.688	3.42	2.69	2.8	3.69	3.62	2.88	3.83	1.89
p261	2.125	3.00	2.69	3.1	3.69	3.15	2.38	3.50	1.78
p262	2.25	4.08	2.46	3.1	2.85	3.08	3.38	3.67	2.67
p263	2	3.83	2.77	2.5	3.38	3.08	3.75	3.17	2.89
p264	2.188	4.08	2.00	2.8	3.23	3.54	1.50	3.67	2.22
p265	1.813	3.08	3.08	3.7	3.46	3.23	2.88	2.33	2.67
p266	1.688	4.17	2.77	2.7	3.54	3.69	3.13	4.00	2.56
p267	2.625	3.33	2.85	2.7	3.77	3.15	3.25	2.83	3.33
p268	2.563	4.08	2.38	3.4	3.08	2.54	2.63	3.33	2.11
p269	2	3.42	2.62	2.9	3.46	3.38	2.75	2.83	2.00
p270	2.313	3.75	3.54	2.7	3.46	3.15	2.00	4.17	2.78
p271	1.625	3.75	3.08	2.8	3.69	3.46	2.63	4.17	3.22
p272	2.938	3.75	2.54	3.7	3.31	2.85	3.13	2.50	2.67
p273	1.875	3.50	3.08	2.3	3.62	3.31	1.50	3.83	1.78
p274	2.063	3.50	2.85	3.8	3.46	3.23	2.63	3.67	2.22
p275	2.375	3.67	2.69	3.1	3.54	3.54	2.25	2.83	3.44
p276	2	4.00	2.62	3.1	3.15	3.00	3.25	3.33	2.67
p277	1.938	3.33	3.38	3.2	3.77	3.31	2.63	3.33	2.33
p278	2.25	3.58	2.69	3.6	3.00	2.77	2.00	3.50	2.33
p279	1.688	3.83	2.85	2.5	3.46	3.85	3.00	3.83	3.00
p280	2	3.58	2.85	2.9	3.69	2.38	3.13	2.83	3.22
p281	3.125	3.33	2.54	3.3	2.77	3.31	2.63	3.67	2.44
p282	2.688	3.50	2.92	2.7	3.54	3.77	2.38	2.83	2.22
p283	1.625	3.83	2.69	2.8	2.77	3.31	2.63	3.83	3.22
p284	2.25	3.75	2.85	3.2	3.85	3.15	2.63	4.00	2.33
p285	2.063	3.67	3.38	2.6	3.23	3.00	2.63	3.00	2.22
p286	1.875	3.92	2.46	3.2	3.77	3.46	3.50	3.67	2.44
p287	2.063	3.50	2.62	3.6	3.08	3.15	2.63	2.33	2.44
p288	2.688	3.58	2.85	2.9	3.00	3.62	3.25	2.50	1.78
p289	2.063	3.08	2.62	3.1	3.46	2.77	2.88	3.67	3.00
p290	2.688	4.00	2.62	3.3	3.69	3.31	2.75	4.00	2.33

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p291	1.625	3.58	3.31	3.1	3.31	3.54	1.50	3.17	2.11
p292	2	3.42	2.31	3.7	2.69	3.31	3.50	3.33	2.33
p293	2.75	3.58	3.23	1.7	3.92	3.38	3.50	2.67	2.67
p294	2.938	3.75	2.46	3.5	3.38	3.62	2.50	3.33	2.33
p295	1.563	3.50	2.92	3.1	3.08	3.23	1.50	3.67	3.44
p296	1.563	3.67	2.46	2.8	3.46	3.23	3.38	2.00	1.89
p297	2.875	3.17	3.54	2.8	3.46	2.85	2.50	3.33	1.78
p298	2.5	3.83	2.62	3.7	3.31	3.15	3.25	2.50	3.00
p299	1.563	3.92	3.08	3.2	3.08	3.62	2.75	2.83	3.44
p300	2.625	4.33	2.85	2.4	3.77	3.69	2.75	2.50	2.11
p301	2.25	2.83	2.69	3.2	3.69	2.69	3.50	2.67	2.89
p302	1.813	3.25	2.92	2.3	3.08	2.85	2.50	3.67	2.56
p303	2	3.08	3.15	2.6	3.23	3.62	2.88	3.33	3.00
p304	2.563	4.17	2.08	3.6	3.38	3.62	3.00	3.33	2.22
p305	1.813	3.75	3.38	2.2	3.54	3.23	2.38	2.83	2.22
p306	2	2.67	3.15	2.9	3.38	2.77	2.75	2.17	2.56
p307	2.375	3.75	2.15	3.3	3.77	3.00	2.63	2.83	3.22
p308	2.25	4.08	2.54	3.1	3.08	3.46	2.75	3.50	3.44
p309	1.938	3.67	3.23	1.5	2.85	3.54	2.63	3.67	1.89
p310	1.875	3.25	2.62	3.8	3.31	2.85	2.63	3.00	2.11
p311	2.188	3.83	2.69	2.9	3.77	3.38	3.25	3.50	2.89
p312	2.375	3.67	3.00	2.7	3.00	3.77	2.13	3.17	2.89
p313	2.063	3.50	2.92	3.5	3.15	2.85	3.00	2.83	2.33
p314	1.75	3.17	2.62	2.3	3.54	3.15	2.75	2.83	2.33
p315	1.688	3.83	3.08	3	3.23	3.54	3.00	3.00	2.56
p316	2.25	3.25	2.62	3.2	3.08	2.46	2.63	3.50	3.56
p317	2.625	3.83	2.69	2.5	3.08	3.77	3.00	2.33	1.89
p318	1.5	3.17	3.31	2.7	3.08	3.31	2.50	3.17	2.56
p319	2.063	3.17	2.38	3	3.15	3.46	3.25	2.00	2.89
p320	2.438	3.33	2.85	3.1	3.54	3.08	1.63	3.50	3.00
p321	2.063	4.17	2.77	2.7	3.00	3.62	3.63	2.67	2.56
p322	2.563	2.92	2.31	2.4	3.54	3.08	2.63	2.17	2.00
p323	1.938	4.08	2.92	3.4	3.69	3.31	3.25	3.17	2.44
p324	2.25	3.25	2.85	3.4	2.54	2.92	2.63	3.00	2.44
p325	2.25	2.67	2.69	2.9	2.92	4.00	2.13	2.83	2.78
p326	1.5	3.92	2.62	3.1	3.08	3.00	1.88	2.50	2.33
p327	1.75	3.92	3.31	2.7	3.15	3.46	3.00	3.00	1.89
p328	2.5	3.50	2.38	3.4	3.08	2.92	3.63	3.50	3.00
p329	2.563	3.33	2.62	2.7	3.00	3.15	3.00	3.17	2.56
p330	1.938	3.42	2.54	2.6	3.54	3.46	2.88	2.00	2.67
p331	1.75	3.83	2.77	3	3.54	3.31	2.88	3.00	2.00
p332	2.25	3.17	2.46	3.7	2.69	3.69	1.88	2.67	3.11
p333	1.938	3.42	3.15	2.4	3.38	3.31	3.13	3.00	2.33
p334	1.75	3.50	2.08	3.1	3.54	3.08	3.38	2.50	2.00
p335	2.438	3.58	3.08	3.3	3.23	3.69	2.50	2.67	2.33
p336	2.25	3.25	2.77	2.6	2.85	3.00	3.00	3.50	2.44
p337	2.5	3.50	2.54	2.7	3.69	2.38	1.25	3.67	2.78
p338	1.688	4.08	3.15	3.1	3.08	3.54	3.00	1.17	2.44
p339	1.688	2.83	3.08	2.9	3.54	3.23	3.63	3.17	1.89
p340	2.563	2.92	2.46	2.6	3.15	3.38	2.88	3.17	2.44

Subject	x1	x2	x3	x4	x5	x6	x7	x8	x9
p341	2.438	4.33	3.38	2.1	3.23	3.62	2.50	3.50	2.67
p342	1.875	3.17	2.23	3.3	3.54	3.23	2.25	3.50	2.22
p343	1.313	3.50	3.08	3.2	3.00	2.38	3.00	3.50	1.89
p344	2.063	3.58	3.08	2.6	2.46	3.85	3.63	2.83	2.22
p345	2.688	3.17	2.77	2	3.46	3.38	2.88	1.83	2.56
p346	2.5	3.50	2.15	3.7	3.46	3.62	3.25	3.33	2.67
p347	2	3.42	3.69	2.9	2.92	3.54	2.88	2.33	1.67
p348	2.063	3.08	3.23	2.4	3.77	3.23	2.63	2.17	2.11
p349	2.25	4.08	2.00	2.5	3.31	2.92	2.38	3.17	2.22
p350	2.438	2.83	3.08	3.4	3.00	3.54	3.25	3.50	2.78
p351	2.313	3.75	4.08	2.9	3.38	2.85	3.25	2.83	1.89
p352	2.188	3.25	2.23	3	3.62	3.62	2.63	2.50	2.33
p353	2.313	3.92	2.85	2.4	2.77	3.69	3.00	2.20	1.89
p354	2.313	2.92	3.00	2.8	3.38	3.54	3.00	2.83	3.44
p355	2.563	3.50	2.92	4	3.38	2.69	1.88	1.83	1.89
p356	2.625	3.75	2.69	2.8	3.31	3.62	3.00	3.17	2.11
p357	2.25	3.17	3.31	2.1	3.85	2.77	3.13	1.67	2.56
p358	1.938	3.67	2.69	3.3	3.15	2.85	3.38	3.50	3.22
p359	2.5	4.33	3.46	3.1	2.77	3.23	1.88	2.83	2.11
p360	2.25	2.92	2.85	2.6	3.54	3.77	2.25	2.50	2.33
p361	2.75	3.75	2.85	2.6	3.54	3.00	3.63	2.67	2.56
p362	2.5	3.58	2.77	3.3	3.15	3.54	3.13	3.17	3.22
p363	2.188	3.58	3.46	2.9	3.69	2.54	2.25	2.33	2.33
p364	2.375	3.25	3.15	3.1	3.00	2.92	2.38	3.00	2.33
p365	2.625	3.08	2.38	2.1	3.54	3.62	3.25	3.67	2.78
p366	2.188	3.58	3.38	3.1	3.15	3.38	3.13	1.33	3.22
p367	2.75	3.83	3.08	3.3	3.62	3.77	2.88	2.17	2.22
p368	2.688	3.67	2.62	3.1	3.15	2.92	2.88	3.00	2.33
p369	2.438	3.00	2.85	2.1	3.69	3.69	2.50	3.00	1.89
p370	2.188	3.58	3.15	3.2	3.00	2.77	3.25	2.67	2.89
p371	2.063	4.42	2.54	2.4	3.62	3.08	3.88	3.50	2.78
p372	2.813	3.17	3.46	2.3	3.23	3.54	2.88	3.50	2.33
p373	2.688	3.83	3.15	3.6	3.15	2.46	3.38	2.83	2.78
p374	2.625	4.25	2.62	2.5	3.00	3.77	2.00	1.00	2.78
p375	2.25	3.25	3.85	3.6	3.54	3.23	4.13	3.33	3.11
p376	2.75	4.25	3.00	2.7	2.92	2.92	2.88	3.33	2.78
p377	1.938	3.92	2.62	3.5	3.69	3.23	3.00	3.83	2.33
p378	2.188	3.58	3.23	3.4	3.77	3.15	2.63	3.00	2.11
p379	2.563	3.58	3.08	3.1	2.77	3.77	2.50	3.83	3.22
p380	2.063	4.50	2.85	2.8	3.62	2.77	3.25	3.67	2.78
	2.101	3.46	2.77	2.99	3.39	3.27	2.79	3.12	2.51

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