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Abstract: Much attention has been paid to the theory of quality management. No shortage of literature exists on the topic. As more companies attempt the transformation, more is learned about the pitfalls which can impede the process. Using V. Daniel Hunt's book which proposes one approach to making the transformation, this paper describes the administration of the process to a software department and describes the results of the survey. It provides analysis and recommendations.

A STUDY ON TOTAL QUALITY ASSESSSMENT

USING HUNT METHODOLOGY

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TABLE OF CONTENTS

INTRODUCTION....1
METHODOLOGY....1
PROBLEM STATEMENT....3
RESEARCH....4
SURVEY ANALYSIS....12
RECOMMENDATIONS....17
CONCLUSIONS....21
REFERENCES....22
APPENDICES....25

INTRODUCTION

Much attention has been paid to the theory of quality management. There is certainly no shortage of literature available, as well as stirring testimonials to the rewards of transforming an organization from existing management practices to those recommended by the quality leaders. As more companies attempt the transformation, more is learned about pitfalls which impede the process. V. Daniel Hunt has written an excellent book which proposes an approach to making the transformation.[11]

A key feature of Hunt's approach is assessment of where your organization stands today. To enable this assessment, Hunt has provided a detailed questionnaire.

This paper describes the administration of part of Hunt's questionnaire to a software department. We describe the results of the survey, and we provide analysis and recommendations.

METHODOLOGY

The questionnaire in Hunt's book contains two hundred and fifteen questions which cover the following four attributes of an organization:

- Climate -- People's perceptions about their organization and/or work units
- Processes -- The organization's or work unit's policies, practices, and procedures
- Management Tools -- The specific techniques used to promote quality improvements throughout the organization or work units
- Organizational Outcomes -- Mission accomplishment

We chose to assess the climate of our target organization. Climate is measured by the first seventy questions of Hunt's questionnaire. We limited our assessment for two reasons. The seventy question climate assessment section felt like an appropriate size for our team to tackle in the allotted time, and we believe that narrowing the assessment focus enabled us to do deeper

research and to learn more from the project. Additionally, we believe that the full questionnaire would intimidate our target organization, and we would not get a high enough response to draw meaningful conclusions. There was no reason for the organization to fill out and return the questionnaire beyond just being helpful to our team, so we decided that seventy questions was an appropriate size for the survey.

The climate section of the questionnaire is further divided into five areas. In order to analyze the questionnaire result, we did extensive research into the field of quality management, focusing on the five areas we were going to assess with Hunt's questionnaire. The five areas within the climate section are:

- Strategic Focus
- Leadership
- Communications
- Work Force
- Customer

The questions are included at the end of this report in the appendix. Each question is actually a statement which requires an answer on a scale from one to six, with one meaning that you strongly disagree with the statement and six meaning that you strongly agree. Hunt suggests that for assessment purposes an average of less than three and one-half on any question indicates a problem area, and this is the basis for our primary analysis and recommendations for action. There are a number of other interesting ways to analyze the results. We considered each of the following:

- questions with five or more ones
- questions with five or more twos
- questions with a wide deviation of result
- questions for which average management result and average worker result differed significantly

Our target organization is a software department of twenty-two people. Five of the people are software managers, group, or project leaders, and seventeen of the people are software engineers. We marked the questionnaires so we could distinguish manager's

responses from those of the individual contributor engineers. We received sixteen responses, including three from managers. We consider our project fortunate to get a seventy-two percent response.

PROBLEM STATEMENT

So you want to transform your organization from the management policies and practices in use today to the policies and practices recommended by famous quality leaders such as W. Edwards Deming? Every business journal you pick up has another success story, and you want your organization to start reaping all of the benefits that a quality management system can deliver.

The question is where should you begin? What are the steps necessary to begin what Dennis Sowards refers to as the total quality management (TQM) journey?[23]

V.Daniel Hunt has written a book, "Quality in America", which proposes a method.[11]

The first step in the journey is to assess where you are. The quality leaders have a lot to say about where you should be, but your first problem will be to determine where you are in order for you to chart a proper course.

We have chosen to use Hunt's questionnaire to assess where our selected software department is with respect to organizational climate. Once this state is reliably understood, then a course of action can be planned which will transform the organizational climate in the direction recommended by quality leaders.

This might not be intuitive. You might ask why assessment is required. If you know where you want to go, then what difference does it make where you are? A quality organizational climate is not a static destination, however, but is more of a continuous process. The problem is to identify how far along your department is already, before attempting to change anything.

Additionally, Hunt recommends that the questionnaire be used as a metric. The organization can be measured at regular intervals to make sure the continuous process of quality management is

perceived to be intact. According to Patricia Panchak, I.B.M, Xerox, and Federal Express, winners of the Malcolm Baldrige award, all agree that self-assessment is a key to sustaining a TQM initiative.[16]

RESEARCH

As mentioned above, we researched the area of quality management with special focus on the five areas assessed by our questionnaire -- strategic focus, leadership, communications, work force, and the customer. Our goal was to develop sufficient expertise to do a competent analysis of our survey results. The following is a summary of what we learned through our study of what the leaders and researchers in the field of quality management have to say about the concepts assessed in our survey questionnaire.

Strategic Focus

The company mission must be clear and well communicated to everyone. This enables folks to understand what their job is in relation to customers. This motivates employees because it enables them to understand the value of their contribution. Motivated employees who know their job represent the most important step towards customer satisfaction.[8] [25] It will be clear to customers that the company cares about them when customers see evidence that each employee they deal with understands and cares about real customer satisfaction.

It is important for a company to plan ahead. Employees must believe that there is a future. This is constancy of purpose which is the first of Deming's famous fourteen points.[6] Every policy change must be made with consideration for impact on the mission. Technology changes must be similarly linked to the mission. Planning must be done regularly, with continuous improvement of the planning process. Mobility of managers and employees can be detrimental to constancy of purpose.[11] Employees must understand their obligation to the mission, even if they are moving

on. Creativity and risk-taking must be encouraged. It is not enough to continuously improve. A successful company must innovate.

A company must have a high regard for quality. Everyone must know what quality is with respect to their job, and must take responsibility for the quality of their processes and output.

Employees must trust one another. Doing a good job must be culturally enforced. No contract will spell out quality in sufficient detail. Each employee must insist on continuous improvement and quality.

Leadership

Total Quality Management (TQM) requires top management involvement from the very beginning of the process. The involvement is much more than just getting commitment. It means becoming educated about quality.[23] A statement from the CEO delivered to all employees that the company is committed to quality improvement without a specific plan for implementation is absolutely insufficient. As Dr. W. Edwards Deming says, "mere talk about quality accomplishes little, it is necessary to go into action".[6] Management must let employees know management is serious about TQM.

Real leadership is critical to the success of the quality improvement process. There is a need for leaders who do not just talk quality, but also live, eat, and breathe it.[23] The involvement and commitment of top management and good leadership play a very important role in the success of keeping the mission for quality going.

A manager who manages by numerical goals, such as work standards, meeting specifications, or a manager who focuses on outcomes such as reports on quality or failures, is attempting to manage without knowledge of what to do.[6] An effective manager will properly diagnose performance problems, initiate actions to enhance individual worker's abilities, and strengthen the motivational aspect of the work environment. Quality management is not supervision,. Quality management is leadership. Management

must work on sources of improvement, the intent of quality of product and service, and on the translation of that intent into design and actual product.[6] He or she needs to lead and champion the effort of making the quality improvement a success for the organization.

Many quality improvement efforts age prematurely because the principle executives do not adhere to the strategic process long enough to make it work.[3] Also, lack of management commitment to the principles of TQM, and ineffective leadership of the improvement process are the main reasons which cause the failure of a company's adoption of TQM.[6]

Inadequate planning for quality, incorrect use of statistical process control techniques, and lack of understanding of the purpose of TQM are results of lack of dedication of management commitment to training and education.[13]

The leaders of a TQM organization need to engage in more activities such as regular review of the quality of work produced by subordinates. Good leadership requires investigation into possible causes.[6] If the quality of work is on the good side, recognition should be used to reinforce good performance. The rewards should be done in a timely manner. As Whelton and Cameron say, "effective rewards are spontaneous rewards".[27] On the other hand, if the quality of work is on the bad side, the causes could be lack of ability, personal problems, job dissatisfaction, or bad equipment. In this case, understanding the causes, and then coaching or counseling the worker is appropriate. It is usually inappropriate to blame the worker. Asking people about ways to improve the work is another method which encourages participation and creativity from people. However, managers must be ready to take action on suggestions.

In order to ensure the success of the quality improvement process, management must address the following areas:

- policy of quality
- education and training program
- participation of all levels of the organization

A concise policy on quality needs to be stated to ensure that all employees understand what behaviors are expected of them by

top management.[23] The best way to communicate this policy of quality is for top executives to meet personally with groups of employees to explain the policy. Also, the quality policies will be absorbed into every corner of the organization by the means of continuous training.[8]

The goals should be specific, consistent, and appropriately challenging.[27] The executive team as well as all other employees should be educated about quality to ensure that they know exactly what it is they are getting involved in. It is crucial to set realistic goals, because nothing can kill the quality process faster than unrealistic goals. Visible commitment to goals should be demonstrated to employees by management's example of quality performance in their day to day activities. Ken Shibilski, president of Stevens Point Brewery, committed to quality to become a survivor from among the dozens of regional breweries by cutting cost without compromising quality.[2]

The fact that people in the work place can turn to their supervisors for advice about how to improve their work, demonstrates the concept of teamwork. As Deming states, "teamwork requires one to compensate with his strength, for someone else's weakness, and for everyone to sharpen each other's wits with questions".[6] It also illustrates the very important fact that management knows the principles of quality, and they are serious about quality and willing to educate themselves. The need to educate all employees about quality must be the next step that management needs to look at. It is best if top management can really teach the principles, answer the hard questions, and demonstrate the desired behaviors.[23] Different methods of training should be applied to different groups of employees depending on their work environment and background. For engineers, the level of quality awareness can be low due to their possible belief that quality improvement means standards and controls which will result in loss of creativity.[28] This is due to the misconception that quality is simply product quality, rather than process quality. It is critical to reassure engineers that continuous improvement applies to the engineering processes, not the creative

aspects of their jobs. Also, if engineers are exposed to the entire product development process, understand how they fit into the overall process, and how the quality of their work has an impact on others, then their awareness of quality will be increased.[28]

Getting employee involvement in the quality improvement process is one of the cornerstones in TQM.[17] The well-known quality circle concept which involves small teams of employees with positive team spirit and high motivation, backed by effective management communication is a good place to start. However, a quality circle can thrive only if management will take actions on the recommendations of the circle. Another concept is the self-managed team which moves beyond employee team to employee management. This concept only works with team members that are familiar with decision making processes. Management still needs to be involved in making decisions, otherwise. John Case describes the problems encountered during a company's move toward employee management.[3]

Another objective of TQM is to have management establish the system, and workers control the system.[18] This means that the structure of the organization should be set up in such a way that it is easy for employees to focus on quality. A simple method called control charting helps employees monitor processes to determine process capability and the level of process variation beyond which action is required.[19]

To keep employee's interest and continue to focus on quality, Craftex Mills Inc. in Blue Bell Pennsylvania, developed a gain sharing system that measures and shares financial gains with employees in the areas of quality, productivity, and on time delivery. In this way, employees learn that they must produce a quality product but not at the expense of productivity, or of on time delivery. Furthermore, they learn that productivity is important to cost control, but not at the expense of quality, and on time delivery is important to customer satisfaction but not if quality is poor.[18]

The way a company does things must be consistent with quality. If a product does not meet specifications, and the customer is waiting for it, and you allow shipment of the poor quality product,

then workers learn your real priorities. This action will send a strong message throughout the company about how serious management is about quality, and no policy document or statement can compensate for the effect of such actions.

Communication

One of the major problems confronting quality professionals today is opening up and maintaining an effective communication link with various levels of management. Walsh says, "the entire structure of communication between quality assurance and management is vital to the success of the quality program".[25]

TQM is a management philosophy that emphasizes the need to meet customer expectations precisely, and TQM emphasizes the importance of doing things right. In order to do things right, managers must look to find problems, remove barriers between employees by having effective communication methods. If managers cannot clearly define the quality control problems which they hope to solve, then it is unlikely that effective solutions can be identified. Shlomo recommends that TQM communications be focused on factual information that can be used to specify the nature of the problems and solutions that a TQM program should be centered on.[22]

Quality awareness activities expose the desire on the part of employees of all levels to have their problems heard. It is best to reach out early and ask to hear the problem, rather than to wait to be approached. Error-cause identification programs, group meetings, and discussions are helpful.

However, Hunt emphasizes teamwork. He says that "skilled employees are crucial to a quality first improvement process, the individual skills they provide may be substantially leveraged when employed in the context of teamwork. Teamwork is essential to the success of the quality first culture in an organization".[11]

There are certain ways to establish effective communication links within a company which will enhance the quality information flow, such as:

- relationship of quality assurance to top management
- reporting techniques
- communication for preventive action

These are based on Walsh's ideology.[25] He also believes that the entire structure of communications between quality assurance and management is vital to the success of the quality program.

So It is the leader's job to improve the quality program in the organization by forming a cross functional team to oversee quality improvement, and by developing a communication structure which will be a key factor in successfully creating a quality first environment.

Work Force

With global competition increasing in every field of engineering products and services, it is imperative to adhere to high quality to maintain leadership and even to continue to exist.[17] Quality has shifted from the QC or QA department to every employee. Study has shown that a quality management approach involves a high level of worker participation and involvement for enhancing quality.[17]

Many organizations have formed quality circle teams, and lured workers as a team to participate in quality improvement and decision making. Management and worker's unions emphasis is more on cooperative relationship, mutual trust, job flexibility, and valued partnerships.[10] Recognition of the other's needs and priorities are respected.

Management, to accelerate this process, has opened channels for two-way communication and suggestions. Employees are involved in the major decision making process,[28], at least in the areas that are related to them. Top management's commitment can be judged by how accessible they are for everyone for constructive and creative ideas. Efforts are constantly put forth to improve organization culture and climate. Empowerment and delegation are no longer uncommon in many organizations.

Workers, to accommodate this process, have started thinking positively. With high morale and sense of involvement, workers have broken their conservative attitude.[17] They understand the organization at close quarters, and contribute towards the mission directly. Useful worker-initiated improvement proposals start coming in. All this contributes in one way or another towards enhancing productivity.

There has been a wide gap noticed between the strong recommendations of books and literature, and practices adopted in reality. The Japanese have successfully practiced the philosophy of worker participation. They brought in innovative philosophies, such as TQM, just in time purchasing, six-sigma quality level, statistical process control, and total customer satisfaction. Many American firms and Japanese American joint ventures are adopting these programs.[26] It is interesting to notice how they vary from other American firms.[7]

Still, there are some gray areas like profit sharing, job security and long term employment, measures to build group cohesiveness, and guaranteed individual rights.[14]

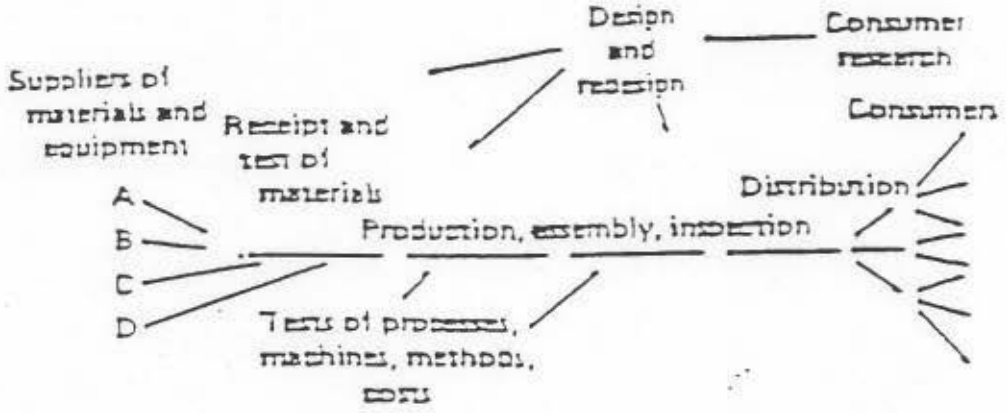
Rapidly advancing organizations and quality oriented organizations invest a large sum of money for training. Training injects confidence and saves the company quality problems. Both management and workers are in support of joint education programs.

Employees are motivated by empowerment and by enhancing their involvement. Two-way communication prevents conflicts and gives a sense of importance. Encouraging teamwork and rewarding team performance strengthens the bindings.

Customer

Every quality leader emphasizes the importance of the customer in the TQM process. W. Edwards Deming is given much credit for the success of Japanese business in the years after World War II. Deming made a number of trips to Japan to meet with business leaders and teach them statistical process control. But Deming maintains that the most valuable thing that he taught them

was an organizational flow chart which identifies the customer as an integral part of the company's production process.[1] Deming taught them how to use statistics to properly conduct a customer survey, and showed them where this information fits into their operations through his famous flow chart.



SURVEY ANALYSIS

As you see from the appendices, the organizational climate in the department we surveyed is perceived as very good overall. There are many high scores that we could analyze. Question eighteen, which tests the belief that everyone must contribute to quality, received a very high score, and that is a positive indicator since one of the key points of quality management is full employee involvement,[17] and this organization agrees that full involvement is necessary.

Of course the most useful aspect of the survey is as a tool to find areas that need attention.

The first phase of analysis consists of searching for answers with an average value of less than three and one half. From appendices A6 through A9, we see that this list includes question six from the strategic focus section, questions twenty-three, twenty-four, twenty-five, twenty-six, twenty-nine, thirty-two, thirty-three, and thirty-four from the leadership and management section, questions fifty-six and sixty-three from the work force section, and question sixty-eight from the customer and communication section.

Question six asks about customer loyalty, and gives an indication of the extent to which employees believe that they satisfy their customers. The low score indicates that employees of this department are not confident that their products and services delight their customers. Quality leaders say that it is not enough to simply meet customer expectations. Companies must delight their customers. to do this, employees must understand their job, and how it relates to customer satisfaction. Employees must develop an understanding of their customers, and know what features, levels of service, and other attributes of their jobs will cause customers to be delighted enough to spread the word. When employees reach this level of knowledge of their customer, then they are likely to give their products and services a higher score on this question.

The leadership and management section of the questionnaire generated the most questions with low scores. Question twenty-three asks about management's level of interest in the quality of products and services. The company can have a strong quality policy, and say a lot of words about the importance of quality, but to score high on this question, the company leaders must show by their actions that they care about quality. This demonstration must be visible to all employees, not bottled up in high level staff meetings. Employees will perceive a relative lack of interest in quality if most management actions they observe have the aim of meeting delivery schedules at all costs. Questions from senior managers like "what will it take to pull that schedule in?", or "how can we solve this problem without missing our schedule?", are natural enough to ask, but can create a culture where quality becomes of secondary importance in spite of published policies to the contrary.

Question twenty-four seeks to determine the perceived level of management interest in employee suggestions on how to improve products and services. Employee involvement is a key concept in quality management. According to Petersen, the success of Ford's Taurus project in the eighties was due in large part to employee involvement, and Ford has made employee involvement a key program in their transformation towards quality management.[17]

Question twenty-five determines the degree of follow-through on suggestions that management demonstrates. A low score on this question as well as on the previous question indicates that employees do not consider their ideas important to management at all. Company leaders are not interested in the ideas, and when they hear ideas they seldom do anything about them.

Question twenty-six asks if leaders set examples of quality performance. Deming, Juran, and Crosby all emphasize the importance of leadership by example.[4] [6] [13] Quality leaders agree that a transformation to quality management requires commitment from a company's leaders. Deming will not consult with a company unless he has access to the highest levels of the company, and he insists that exhortations and policies are not enough.[17] [6]

Question twenty-nine gives an indication of the degree to which managers are coaches, not just supervisors. Managers who focus on results are not conducive to the continuous improvement which the quality leaders recommend.[12] If there is an emphasis on continuous process improvement, then asking for advice on how to improve will be a natural and regular event, but if the focus is strictly on delivering the product, then questions about the process will seem to be out of place. This question also provides an indicator of the amount of fear in an organization, since asking your manager for advice on how to do your job could be considered an admission of weakness or low competence. One of Deming's fourteen points is to drive out fear, and this is one of the reasons. When people are afraid to ask questions, or think small improvements are not important to the company, then continuous improvement is hampered.[12]

Question thirty-two directly asks about the priority given to continuous improvement. Continuous improvement is neglected when the focus is on result.[5] An organization needs to commit to continuous improvement in order to move toward quality management. Donald Petersen says that Detroit and Japan were about even in automobile quality in nineteen seventy. There was no dramatic innovation in the seventies, but by nineteen eighty Japan

was way ahead primarily due to small, steady, relentless improvement.[17]

Question thirty-three seeks to determine the amount of customer feedback solicited by management. Without customer feedback, employees cannot really know their job, according to Deming.[6] Quality cannot be properly defined without customer input according to both Deming and Juran.[6] [13]

Question thirty-four asks if the department is organized to enable focus on quality. This is another example where observed management action is the key. It would be easy to give this question a high score if every reorganization contained a quality emphasis or a quality component. As Shannon indicates, when new reporting structures are established, the motivation for the new arrangement is communicated either formally or informally,[21] and this question is an indicator of employee perception of the importance quality plays in these decisions

Two questions from the work force section received low average scores. Question fifty-six asks about time allowed to complete work. This is an indicator of management focus. If the result, or job completion is of primary importance, then employees will feel pressured to take time-saving steps even if those compromises introduce the risk of decreasing quality.

Question sixty-three asks if people are punished for low performance. The idea is that if lackluster performance goes unpunished, then motivation for high performance is diminished. This is a controversial measure among quality leaders. Deming states that ninety-four percent of problems are due to the system, not the worker, so penalties must be carefully administered. If an employee is executing a process that is not in a state of control, then no result of that process can be considered to be worker error. Similarly, if the process varies widely, then a wide range of results are equally good.[6] [19]

Only one question from the customer and communication section received an average score of under three and one half. Question sixty-eight asks if formal communication is sufficient to provide the information employees need. A low score indicates that

people are not being kept up to date by management. Information is either hidden, or not delivered in a timely enough manner. This is a distraction from the job of satisfying customers, and reduces employee trust in management. An active rumor mill is also an indicator of the amount of fear in an organization.

The second phase of analysis is aimed at those questions where the software engineer's answers differed from manager's answers. This can be seen in appendices A2 through A5. We analyzed questions which one group rated below three and one-half, and the other group rated above three and one-half. This consists of question nine from the strategic focus area; twenty-three, twenty-five, and twenty-six from the leadership and management section; forty-five, forty-six, and sixty-three from the work force section; and sixty-seven from the communications section.

Since we have sufficient information from phase one analysis to recommend an action plan, we will focus phase two on only the most logically interesting questions which meet our definition of interest numerically. We believe the additional areas for analysis that we identified in the methodology section above will become useful if the survey process is used as an ongoing metric, since if our recommendations are effective, then more detailed analysis will become necessary to develop new recommendations. Questions forty-five, forty-six, and sixty-seven are close enough to an overall good result to not be logically interesting.

Question nine asks about perceived cooperation among people in the organization in planning for the future. Leaders scored the organization low, while engineers scored the organization high. This might indicate perception of cooperation at the peer level. The engineers believe engineers cooperate on planning while at the management level, there is perception of a problem with cooperation of managers for planning. The difference is probably not an issue. Cooperation on planning is critical at all management levels, however, so the average score given by managers could indicate a serious problem. Managers must cooperate in planning for quality.[13]

Questions twenty-three, twenty-five, and twenty-six indicate an interesting difference of opinion. Managers rate the organization high in review of quality work, follow up on suggestions, and quality performance by example, while the engineers disagree. These questions all received low overall average scores and were analyzed in the phase one section above, but the difference in perception will be useful in our recommendation section below.

Question sixty-three was analyzed in phase one above. Managers believe there are penalties for people while engineers do not. the difference in perception will guide our recommendation below.

RECOMMENDATIONS

Management of this organization should take action to address the concerns identified by the questions with average answers of less that three and one-half.

The low score on question six is best remedied by providing the department with more direct information about their customers. This would provide the data base of information which employees could use to understand their job, and how it relates to customer satisfaction. The department needs to have a process for understanding customers, and a process for learning what features, levels of service, and other attributes of work will cause customers to be delighted enough to spread the word. Direct contact is a good method. Canon has what they call antenna stores where engineers take turns being salespeople.[1] There are no retail outlets for the products of the organization that we surveyed, but engineers could make regular visits to customers, accompanying sales teams..

Most actions should be aimed at raising employee confidence in leadership and management, since that section of the questionnaire generated the most questions with low scores. Management needs to take actions which demonstrate interest in the quality of products and services. Management needs to be observed living the company's strong quality policy. Employees will perceive an interest in quality if observable management actions demonstrate the aim of meeting

quality objectives. Instead of asking, "what will it take to pull that schedule in?", or "how can we solve this problem without missing our schedule?", leaders need to ask questions with the flavor of "how can you deliver the product that fast and still meet our quality goals?".

The poor score on questions twenty-four and twenty-five are easy to remedy. Company leaders need to ask all employees for help. Company leaders should immediately begin a formal solicitation of suggestions for improvements, and take quick action on each and every suggestion. Action does not imply that the suggestion must be adopted, but the person who makes the suggestion should understand what the fate of the suggestion is to be, and why. the effectiveness of this sort of attention is described particularly well by Imai.[12]

Managers should communicate the importance of continuous process improvement and take an active, leadership role in making this kind of improvement a priority. this would help remove the low score on questions twenty-six and twenty-nine. Eliminating the tendency to focus on results is a hard thing to do, as described by John Case.[3] But if the emphasis shifts to continuous process improvement, then asking for advice on how to improve can become a natural and regular event. Management would also do well to eliminate sources of fear in the organization which might deter the free flow of ideas, questions, and suggestions. Deming suggests that ranking and rating of employees is a bad idea, and should be stopped.[6] This theory is supported by Nancy Mann and by Rafael Aguayo who demonstrate the fallacies and shortcomings of the annual performance review process.[15] [1] This aspect of quality management is very controversial, and a cultural impossibility at the company we surveyed, but seems to be gaining a following elsewhere. For example, Ford has revamped their performance review process from management judgement of performance to a peer review system under the guidance of Deming.[17]

With respect to questions thirty-two, thirty-three, and thirty-four, the leaders of this company need to develop and then continuously improve processes to get customer feedback into the hands of employees. the leaders should learn the benefits of

continuous improvement through formal training. They should read Imai's book on the subject.[12] Careful attention needs to be paid to the structure of this organization, since employees don't see any emphasis on quality in the reporting structure. Whenever a change to the reporting structure takes place, the company leaders need to explain the expected impact on the quality of products and services.

As described in the analysis section, from question fifty-six we get an indication that the workers feel rushed to get product out the door. Time to market is always an important consideration, but management needs to make sure that management actions never give the indication that the company will ship poor products just to hit a deadline. People know that you will pay now or pay later, and the quality leaders make a strong case that through attention to continuous process improvement an organization can increase process capability. The quality leaders assert that this is the most reliable way to cut development time without loss of quality.[4] [6] No policy or exhortation will change this perception of priority. Leaders must demonstrate commitment though their day to day actions and decisions.

As mentioned in the analysis section above, question sixty-three is a controversial measure, but assuming that the processes in this department are in a state of control,[6] [19] if a team member's results are outside of the system on the low side, then management needs to take observable action. Since managers believe there are penalties, the problem here seems to be that penalties are not observed. This reminds us of an interesting irony in the merit raise system which Deming says is not good.[6] The irony is that merit raises are defended as motivational, and yet, salary actions are confidential. Only managers know the details of merit raise disparity, so how can the disparity motivate? It is possible that this irony explains the disagreement over this question between managers and engineers. It is also true that managers are more aware of general punitive measures, which tend to happen in private, and this fact could also explain the difference in perception. Possible observable actions could include additional training for the employee, or a change of jobs. Another action that might be called

for is training in statistical techniques for all employees of this department. That would help to remove the focus from worker mistakes, and provide deeper understanding of how to optimize operations as an overall system.[5]

Question sixty-eight indicates that this department has a robust flow of information through the grapevine, or rumor mill. This is a normal function of any department's informal organization,[21] and is not a problem as long as there is no indication of management hiding information, or lying about situations. But a low score might indicate that people believe that they are not being kept up to date by management, especially given the wording of this question. The action that management needs to take is to step up the flow of information, and make sure the content of this information meets the employee's needs.

An active rumor mill is also an indicator of the amount of fear in an organization. This might explain the perceived stilted flow of information. Management could have numerous communication meetings where the floor opens up for questions about any issue, but if there is a lot of fear in the organization, then the open floor will not serve its purpose. People will not feel free to ask the tough questions that are really on their mind, and they will pursue their curiosity informally through the grapevine. Deming's proposed method for driving out fear is to do away with ranking and rating, and annual performance reviews. He also believes that management by objective as practiced by most companies is a bad policy. His objection derives from observing objectives such as "cut costs by twenty percent", or "increase production by fifteen percent", or increase sales by fifty percent". He refers to these as numerical goals without a method, and further refers to them as nonsense.[6] [9] His standard reply to "cut costs by twenty percent" is "why not thirty percent?" Deming tries to show that such a goal ignores the reality of process capability, and avoids the hard problems of organizational leadership.

In summary, our recommended action plan for this organization is the following:

- Establish process of regular customer contact for engineers to acquire more customer feedback
- Management demonstration of commitment to quality through formal training and day to day actions
- Management to ask everyone for help through a formal suggestion program with closure on each suggestion and emphasis on process improvement suggestions
- Make quality a priority over time to market
- Identify people who are outside of the system and train or remove them
- Train everyone on statistical process control
- Communicate important information before the rumor mill does
- Make sure each numerical goal includes a method

CONCLUSIONS

The rich theory of quality management is difficult to apply in practice.[3] Change is always difficult, and as we noted, some of the recommendations made by the quality leaders represent controversial change. We have demonstrated that assessment and development of an action plan can be done using the methodology described in V. Daniel Hunt's book.[11] The cost of assessment is small. The questionnaire took about five minutes for each responder to fill out, and our five person team was able to complete the analysis within the confines of a school quarter. The harder part of course is implementing the actions that the analysis suggests, but if company leaders are serious about quality, then our project indicates that Hunt's survey approach is a practical way to begin.

Based on our research, we have confidence that the recommended actions would help this organization move closer to quality management.

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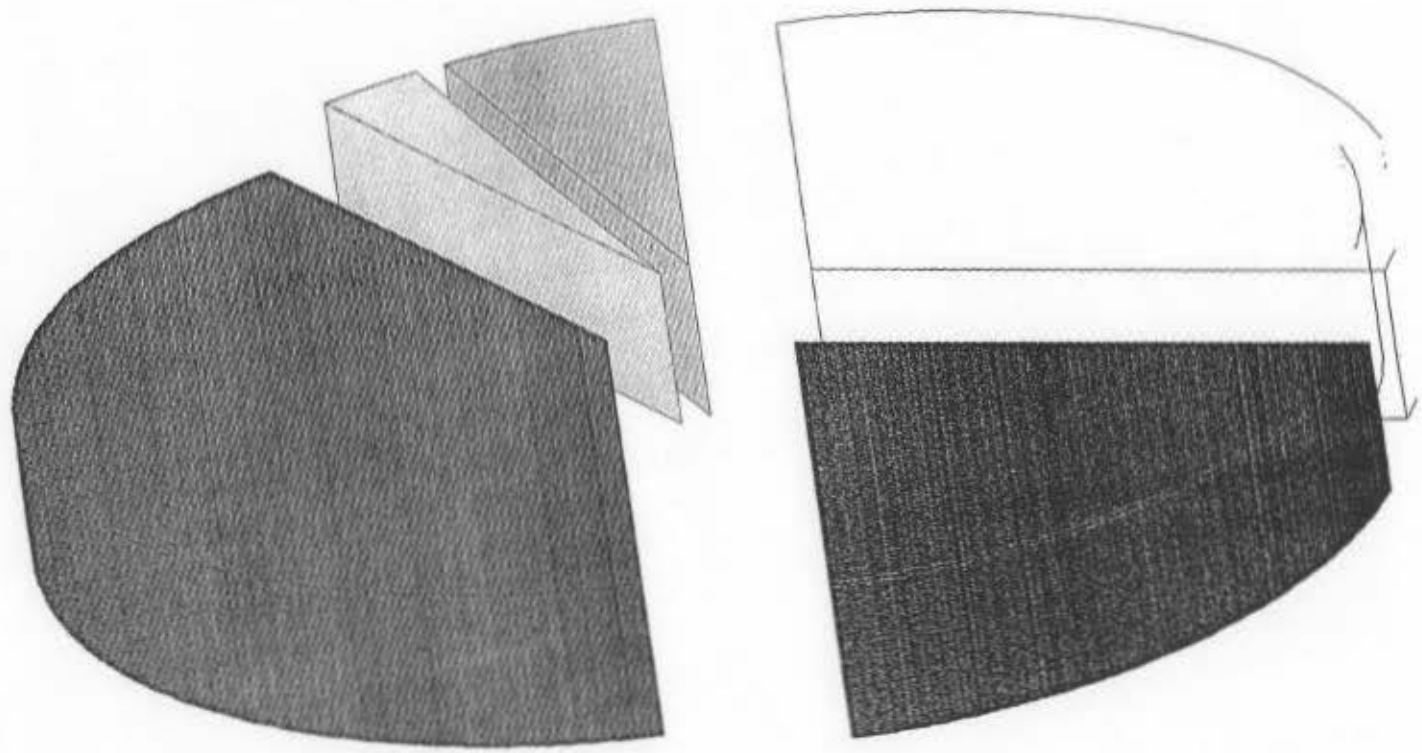
APPENDICES

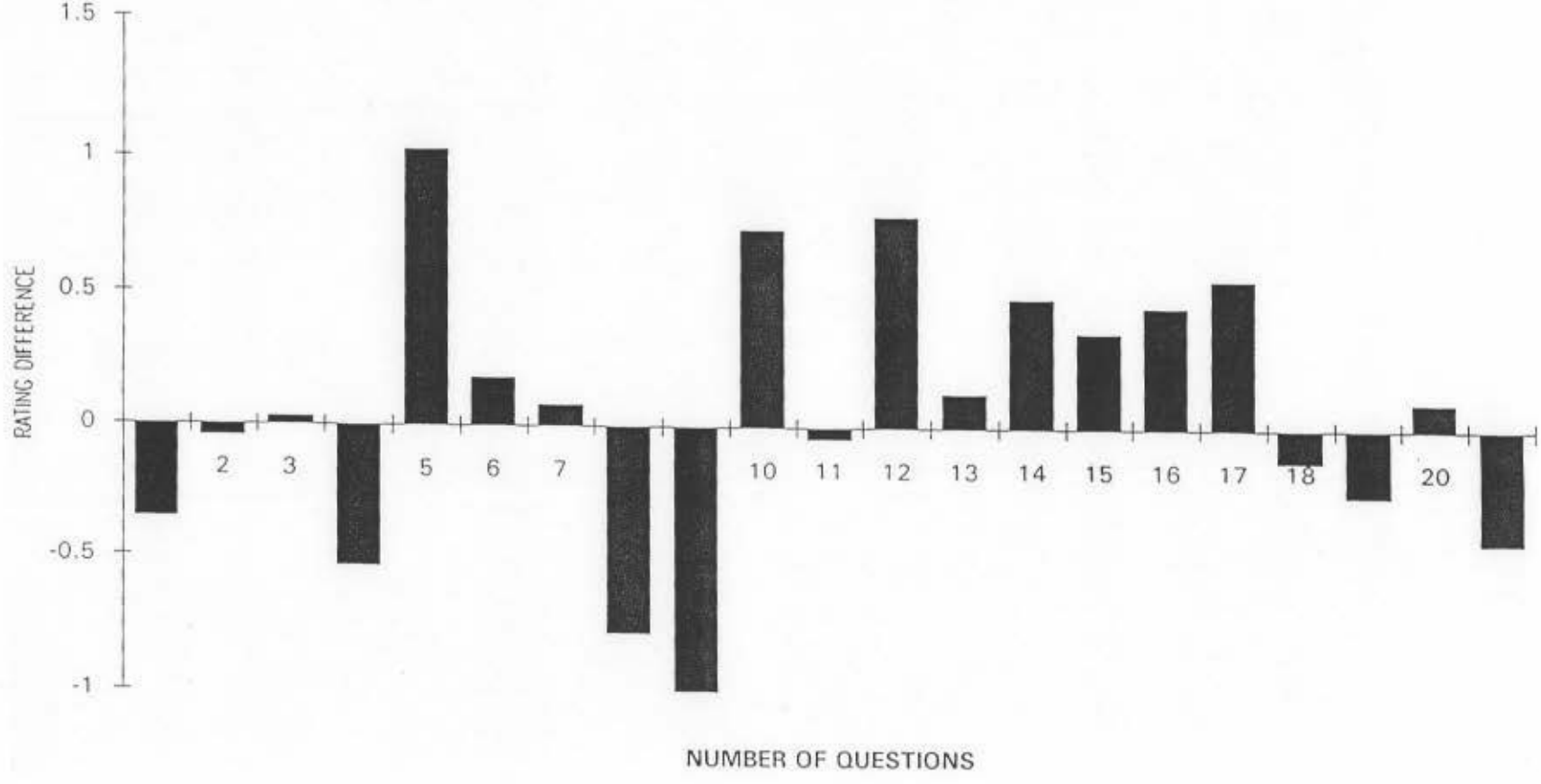
A1	Distribution of Questions
A2 - A5	Management and Employee Differences
A6 - A9	Average Results by Question
B1	Survey Data
B2	Survey Analysis
B3	Distribution Under Each Question
C	Survey Questions

Chart 1

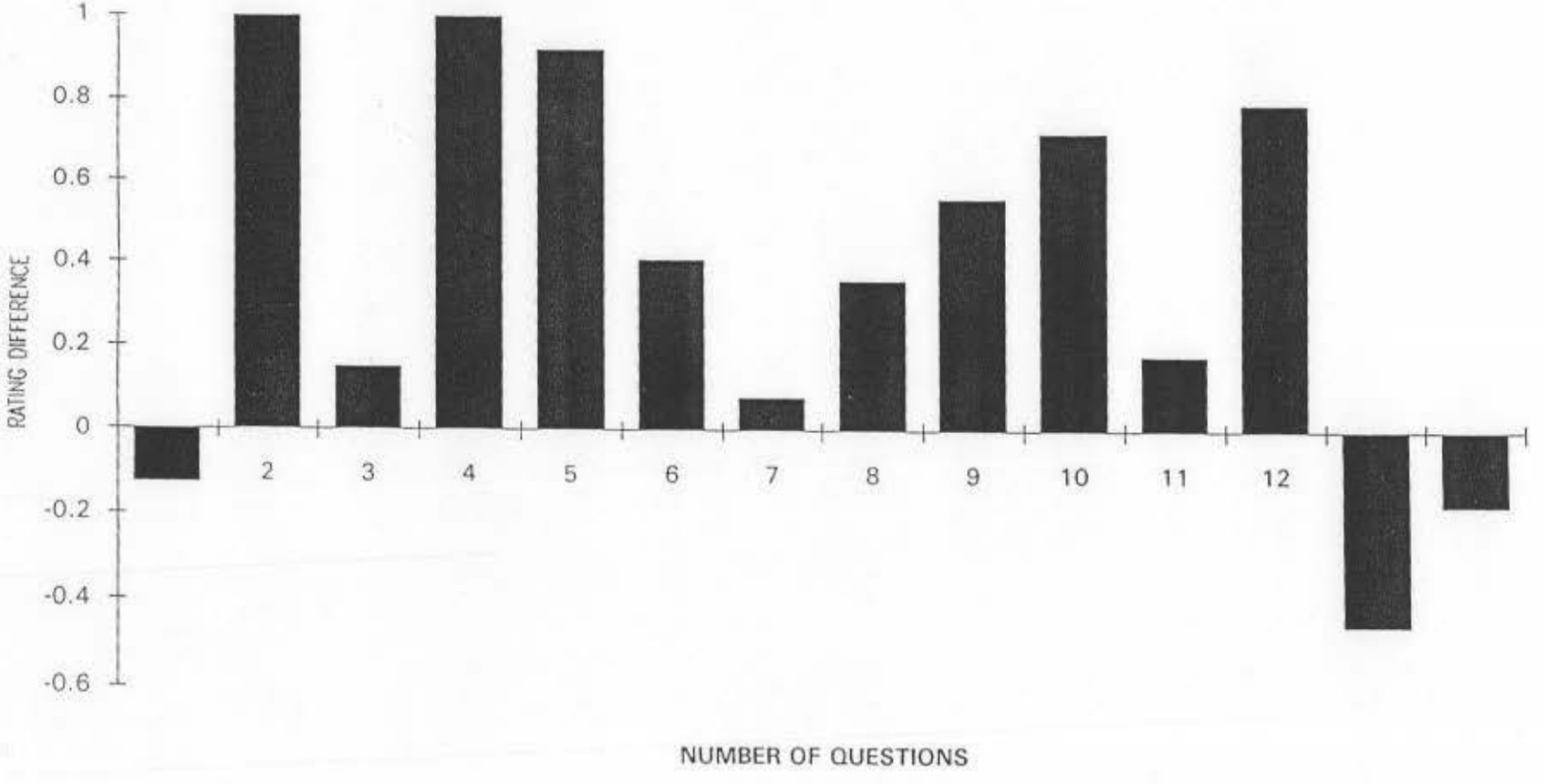
QUESTION DISTRIBUTION



STRATEGIC FOCUS



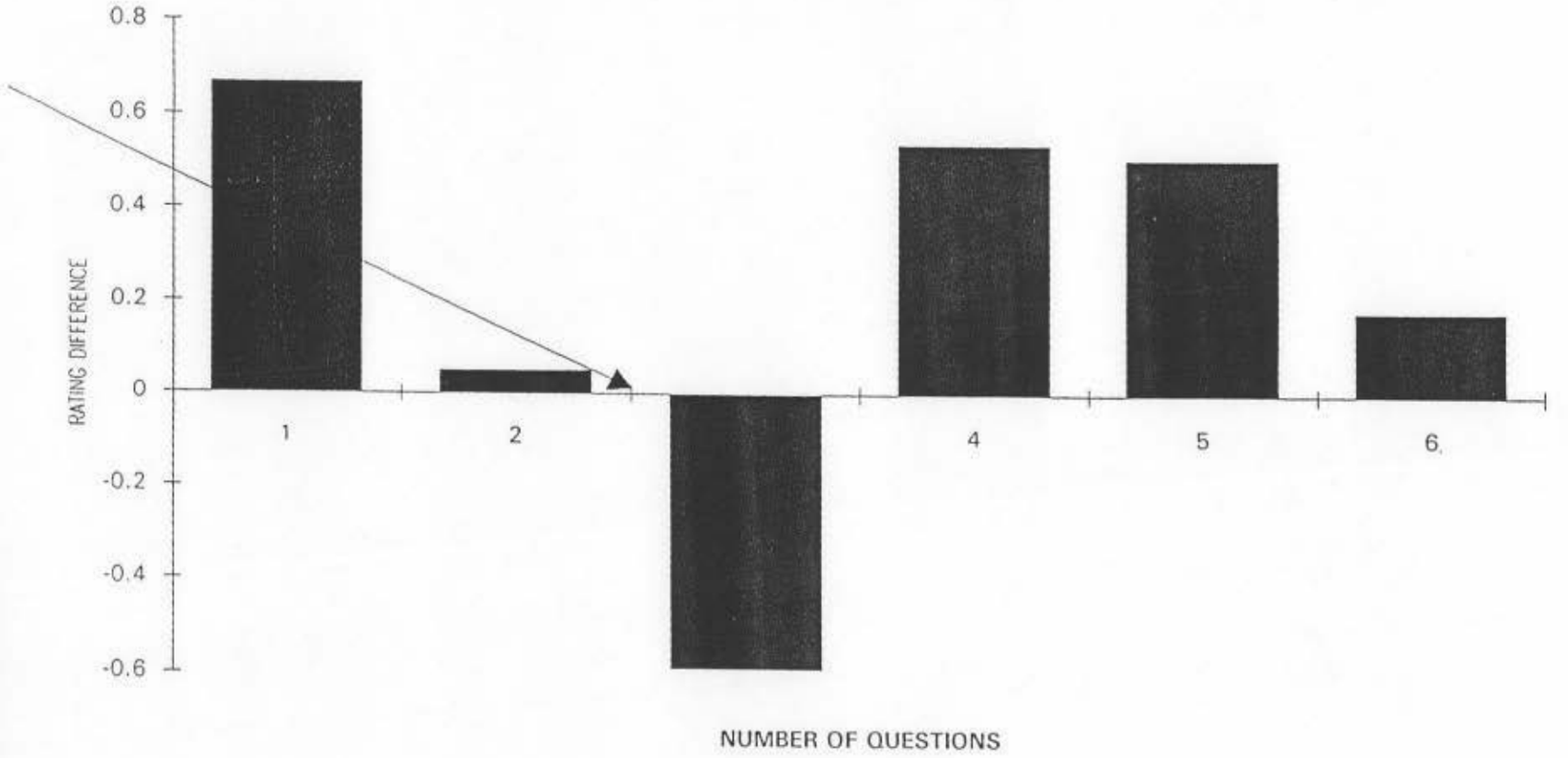
LEADERSHIP & MANAGEMENT



WORK FORCE


1.5
1
0.5
0
-0.5
-1
-1.5
RATING DIFFERENCE
1 2 4 5 7 13 14 16 17 18 19 20 21 22 23 25 26 27 28 29
NUMBER OF QUESTIONS

CUSTOMER & COMMUNICATION



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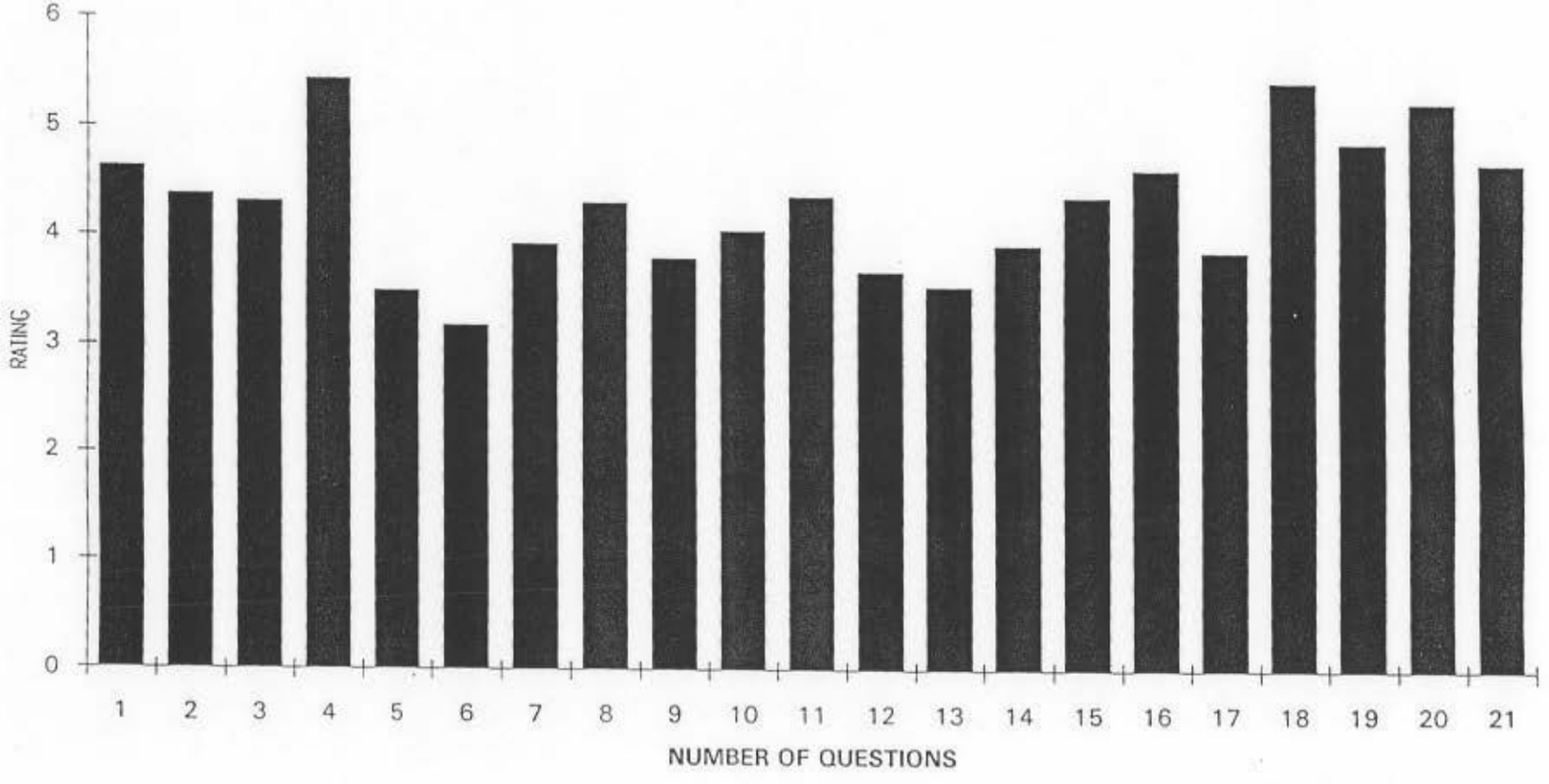
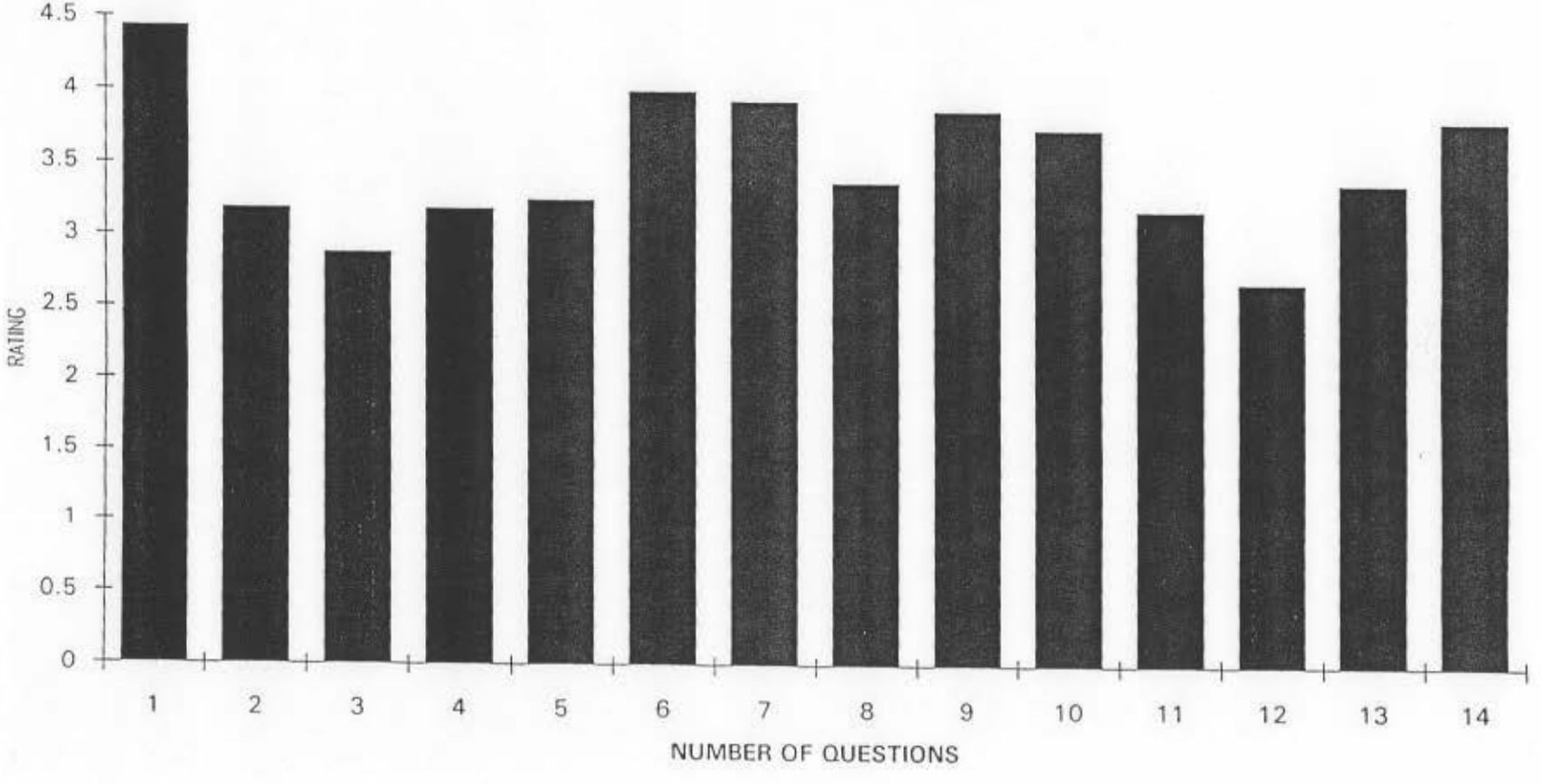


LEADERSHIP & MANAGEMENT



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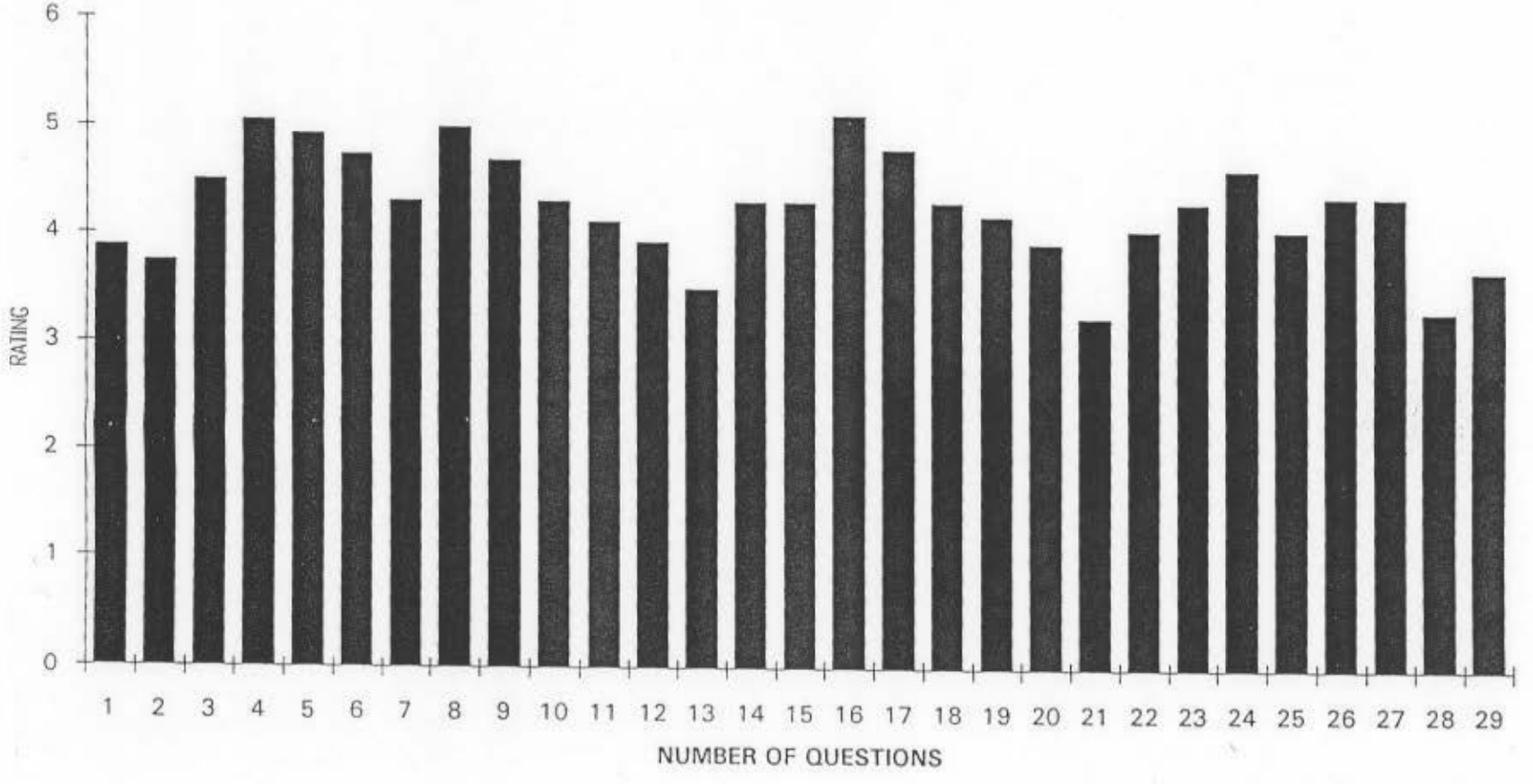
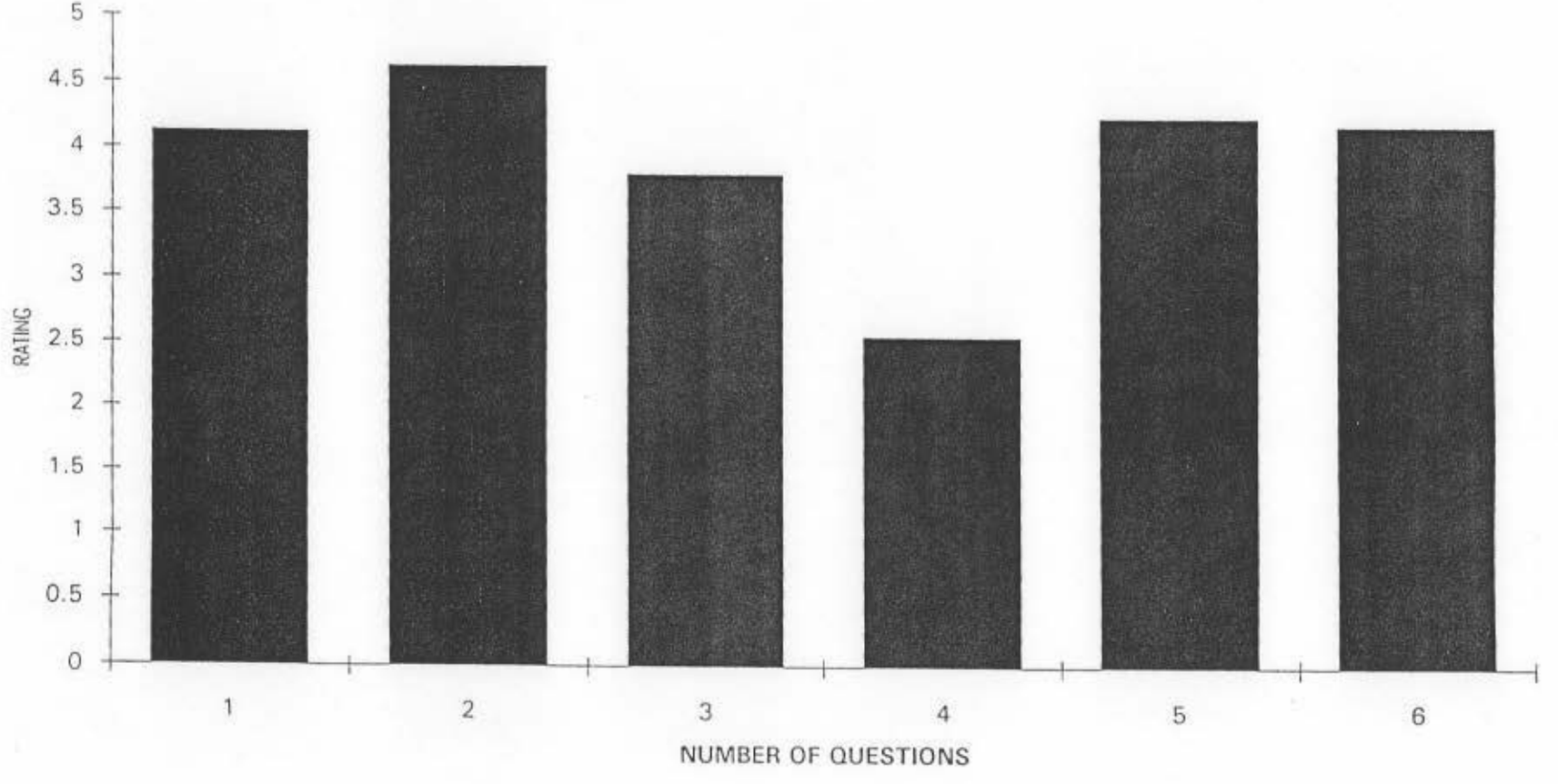

RATING
0
1
2
3
4
5
6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
NUMBER OF QUESTIONS

CUSTOMER & COMMUNICATION



ASSESSMETNT OF ORGANIZATION CLIMATE
SURVEY DATA

RES-> / QUES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
								STRATEGIC FOCUS								
	AWARENESS OF STRATEGIC CHALLENGE															
1	5	4	4	4	5	5	5	5	5	6	4	4	4	4	4	6
2	4	4	5	5	4	3	5	5	5	5	5	4	3	4	4	5
3	5	5	3	5	4	5	5	3	4	5	4	3	3	5	4	6
4	5	5	5	3	6	6	6	6	5	6	6	6	6	6	5	5
5	4	5	4	4	3	4	2	5	4	5	2	4	4	2	3	1
6	4	3	3	5	3	3	1	4	3	4	3	4	4	3	3	1
	VISION FOR THE FUTURE															
7	4	4	4	4	4	5	6	2	3	5	4	4	2	2	5	5
8	5	3	3	5	5	4	6	2	5	6	4	4	4	4	4	5
9	4	3	2	6	4	4	6	2	4	3	4	4	3	4	3	5
10	5	5	4	4	4	2	6	5	2	4	4	4	3	4	4	5
11	4	5	4	6	3	4	5	5	5	5	4	4	4	5	3	4
	INNOVATION															
12	4	4	5	3	3	4	4	3	2	4	3	4	4	4	3	5
13	3	4	4	2	2	4	3	3	3	5	3	4	4	4	4	5
	QUALITY POLICY / PHILOSOPHY															
14	4	4	5	6	2	4	5	3	2	4	4	4	4	4	5	3
15	4	5	5	4	4	4	5	5	5	5	3	4	4	5	5	3
16	4	5	6	5	4	6	5	5	4	5	5	5	4	4	4	3
17	5	4	4	4	1	4	4	5	4	3	4	3	3	4	5	5
18	5	5	6	5	6	6	5	6	5	5	6	6	6	5	5	5
	VALUE SYSTEMS / ETHICS															
19	5	4	5	5	5	5	4	5	4	6	5	5	5	5	5	5
20	5	5	6	5	5	5	6	5	4	6	5	5	6	6	5	5
21	4	4	5	5	3	5	5	5	4	5	5	4	5	5	5	6
								LEADERSHIP AND MANAGEMENT								
	TOP MANAGEMENT INVOLVEMENT															
22	4	5	4	3	4	5	4	5	4	5	5	5	4	5	4	5
23	4	5	3	2	3	3	2	3	4	3	4	4	2	3	3	3
24	3	4	2	2	1	3	4	1	3	4	4	4	3	3	3	2
25	5	4	3	3	3	3	2	1	3	5	4	4	3	3	3	2

	TASK CHARACTERISTICS												
53	5	4	4	2	4	5	4	3	4	6	4	5	4
54	4	4	5	3	4	5	4	3	4	5	4	5	4
55	5	4	4	1	6	5	2	4	3	5	5	5	4
56	4	3	3	2	4	4	1	3	2	5	4	5	3
57	5	4	3	3	5	5	4	4	2	5	4	4	4
	CONSEQUENTIAL CONSTRAINTS												
58	5	4	4	4	3	5	4	4	4	5	5	4	5
59	4	4	5	5	5	5	4	5	4	5	5	4	5
60	5	4	3	5	1	5	3	5	2	5	5	4	5
61	4	5	4	5	4	5	3	5	2	5	5	4	5
62	5	5	5	4	3	4	4	5	2	5	5	5	5
63	3	3	5	5	4	4	2	2	2	3	4	4	3
64	4	4	5	4	2	3	4	3	3	3	5	4	4
	CUSTOMER ORIENTATION												
65	5	5	4	5	3	4	3	3	4	5	4	5	4
66	4	4	6	4	5	3	5	5	5	5	5	5	4
	COMMUNICATION												
67	4	4	2	5	3	3	4	4	2	5	5	4	4
68	3	4	2	2	2	2	3	2	1	4	2	3	3
69	5	5	4	5	4	4	4	2	1	6	4	5	3
70	4	4	5	4	3	5	4	3	3	5	4	5	4
	DEVIATION IN ASSESSMENT												
MAX	5	5	6	6	6	6	6	6	5	6	6	6	6
MIN	3	3	2	1	1	2	1	1	1	2	2	2	2

SURVEY ANALYSIS

APPENDIX "B" - Part II

RES-> QUES	TOTAL AVG	MGMT AVG	EMPL AVG	DIF	AVG	MGMT AVG	EMPL AVG	DIF	MIN	MAX	STD
	AWARENESS OF STRATEGIC CHALLENGE										
1	74 4.63	4.33	4.69	-0.36					4	6	0.69
2	70 4.38	4.33	4.38	-0.05					3	5	0.69
3	69 4.31	4.33	4.31	0.03					3	6	0.91
4	87 5.44	5.00	5.54	-0.54					3	6	0.78
5	56 3.50	4.33	3.31	1.03					1	5	1.17
6	51 3.19	3.33	3.15	0.18					1	5	1.01
					4.24	4.28	4.23	0.05			
	VISION FOR THE FUTURE										
7	63 3.94	4.00	3.92	0.08					2	6	1.14
8	69 4.31	3.67	4.46	-0.79					2	6	1.04
9	61 3.81	3.00	4.00	-1.00					2	6	1.13
10	65 4.06	4.67	3.92	0.74					2	6	1.02
11	70 4.38	4.33	4.38	-0.05					3	6	0.78
					4.10	3.93	4.14	-0.21			
	INNOVATION										
12	59 3.69	4.33	3.54	0.79					2	5	0.76
13	57 3.56	3.67	3.54	0.13					2	5	0.86
					3.63	4.00	3.54	0.46			
	QUALITY POLICY/PHILOSOPHY										
14	63 3.94	4.33	3.85	0.49					2	6	1.02
15	70 4.38	4.67	4.31	0.36					3	5	0.69
16	74 4.63	5.00	4.54	0.46					3	6	0.78
17	62 3.88	4.33	3.77	0.56					1	5	0.99
18	87 5.44	5.33	5.46	-0.13					5	6	0.49
					4.45	4.73	4.38	0.35			
	VALUE SYSTEMS / ETHICS										
19	78 4.88	4.67	4.92	-0.26					4	6	0.48
20	84 5.25	5.33	5.23	0.10					4	6	0.55
21	75 4.69	4.33	4.77	-0.44					3	6	0.68
					4.94	4.78	4.97	-0.20			
	STRATEGIC FOCUS				4.27	4.34	4.25	0.09			

ASSESSMETNT OF ORGANIZATION CLIMATE

ASSESSMETNT OF ORGANIZATION CLIMATE
SURVEY ANALYSIS

RES-> QUES	TOTAL	AVG	MGMT AVG	EMPL AVG	DIF	AVG	MGMT AVG	EMPL AVG	DIF	MIN	MAX	STD
	AWARENESS OF QUALITY ISSUES											
36	62	3.88	4.33	3.77	0.56					2	6	1.16
37	60	3.75	4.67	3.54	1.13					2	5	1.03
						3.81	4.50	3.65	0.85			
	ATTITUDE AND MORALE											
38	72	4.50	4.33	4.54	-0.21					3	6	0.70
39	81	5.06	5.33	5.00	0.33					2	6	0.89
40	79	4.94	5.00	4.92	0.08					2	6	0.82
41	76	4.75	4.33	4.85	-0.51					2	6	1.03
						4.81	4.75	4.83	-0.08			
	COOPERATION											
42	69	4.31	4.33	4.31	0.03					2	6	0.91
43	80	5.00	4.67	5.08	-0.41					4	6	0.70
44	75	4.69	4.33	4.77	-0.44					3	6	0.76
45	69	4.31	3.33	4.54	-1.21					2	6	1.04
						4.58	4.17	4.67	-0.51			
	INVOLVEMENT											
46	66	4.13	3.33	4.31	-0.97					2	5	0.78
47	63	3.94	3.67	4.00	-0.33					2	5	0.82
						4.03	3.50	4.15	-0.65			
	PERCEPTIONS OF WORK ENVIRONMENT											
48	56	3.50	4.33	3.31	1.03					1	5	1.54
49	69	4.31	4.33	4.31	0.03					2	5	0.76
50	69	4.31	4.00	4.38	-0.38					2	5	0.84
						4.04	4.22	4.00	0.22			

ASSESSMETNT OF ORGANIZATION CLIMATE
SURVEY ANALYSIS

RES-> QUES	TOTAL	AVG	MGMT AVG	EMPL AVG	DIF	AVG	MGMT AVG	EMPL AVG	DIF	MIN	MAX	STD
	CUSTOMER ORIENTATION											
65	66	4.13	4.67	4.00	0.67					3	5	0.78
66	74	4.63	4.67	4.62	0.05					3	6	0.78
						4.38	4.67	4.31	0.36			
	COMMUNICATION											
67	61	3.81	3.33	3.92	-0.59					2	5	1.07
68	41	2.56	3.00	2.46	0.54					1	4	0.86
69	68	4.25	4.67	4.15	0.51					1	6	1.29
70	67	4.19	4.33	4.15	0.18					3	5	0.72
						3.70	3.83	3.67	0.16			

QUESTIONS		1	2	3	4	5	6	7	8	9	10	11	12
DISAG	1	0	0	0	0	1	2	0	0	0	0	0	0
	2	0	0	0	0	3	0	3	1	2	2	0	1
	3	0	2	4	1	2	8	1	2	4	1	2	5
	4	8	6	4	0	7	5	7	6	7	8	7	8
	5	6	8	7	6	3	1	4	5	1	4	6	2
AGREE	6	2	0	1	9	0	0	1	2	2	1	1	0
AVG		4.63	4.38	4.31	5.44	3.50	3.19	3.94	4.31	3.81	4.06	4.38	3.69

QUESTIONS		13	14	15	16	17	18	19	20	21	22	23	24
DISAG	1	0	0	0	0	1	0	0	0	0	0	0	2
	2	2	2	0	0	0	0	0	0	0	0	3	3
	3	5	2	2	1	3	0	0	0	1	1	8	6
	4	7	8	6	6	8	0	3	1	4	7	4	5
	5	2	3	8	7	4	9	12	10	10	8	1	0
AGREE	6	0	1	0	2	0	7	1	5	1	0	0	0
AVG		3.56	3.94	4.38	4.63	3.88	5.44	4.88	5.25	4.69	4.44	3.19	2.88

QUESTIONS		25	26	27	28	29	30	31	32	33	34	35	36
DISAG	1	1	1	0	0	1	1	1	0	0	1	0	0
	2	2	3	1	1	3	1	2	6	8	2	2	3
	3	8	3	2	3	4	2	2	2	5	4	2	2
	4	3	9	9	8	5	7	7	7	3	8	9	6
	5	2	0	4	4	3	5	3	1	0	1	3	4
AGREE	6	0	0	0	0	0	0	1	0	0	0	0	1
AVG		3.19	3.25	4.00	3.94	3.38	3.88	3.75	3.19	2.69	3.38	3.81	3.88

QUESTIONS		37	38	39	40	41	42	43	44	45	46	47	48
DISAG	1	0	0	0	0	0	0	0	0	0	0	0	3
	2	3	0	1	1	1	1	0	0	1	1	1	2
	3	2	1	0	0	1	1	0	2	3	1	3	1
	4	7	7	0	0	2	7	4	2	3	9	8	4
	5	4	7	11	13	9	6	8	11	8	5	4	6
AGREE	6	0	1	4	2	3	1	4	1	1	0	0	0
AVG		3.75	4.50	5.06	4.94	4.75	4.31	5.00	4.69	4.31	4.13	3.94	3.50

QUESTIONS		49	50	51	52	53	54	55	56	57	58	59	60
DISAG	1	0	0	0	0	0	0	1	1	0	0	0	1
	2	1	1	0	0	1	0	2	3	1	0	0	1
	3	0	1	0	1	1	2	2	5	2	1	0	2
	4	8	6	3	4	7	9	4	5	8	9	6	4
	5	7	8	8	8	6	5	6	2	5	6	10	8
AGREE	6	0	0	5	3	1	0	1	0	0	0	0	0
AVG		4.31	4.31	5.13	4.81	4.31	4.19	3.94	3.25	4.06	4.31	4.63	4.06

QUESTIONS		61	62	63	64	65	66	67	68	69	70
DISAG	1	0	0	0	0	0	0	0	1	1	0
	2	1	1	4	1	0	0	3	8	1	0
	3	1	1	5	6	4	1	2	4	1	3
	4	6	5	5	6	6	6	6	3	5	7
	5	7	9	2	3	6	7	5	0	6	6
AGREE	6	1	0	0	0	0	2	0	0	2	0
AVG		4.38	4.38	3.31	3.69	4.13	4.63	3.81	2.56	4.25	4.19

ASSESSMENT OF ORGANIZATION CLIMATE

The following list of statements is presented for your evaluation and ranking. There are no wrong answers. Circle the number 1, 2, 3, 4, 5, or 6 that you feel best indicates the extent of your agreement with the statement. The legend for the questionnaire is (1) strongly disagree, (2) disagree, (3) somewhat disagree, (4) somewhat agree, (5) agree, and (6) strongly agree.

	Strongly Disagree					Agree
1. People in this organization are aware of its overall mission.	1	2	3	4	5	6
2. In general, this organization's customers believe that we care about what they think.	1	2	3	4	5	6
3. People in this organization are aware of how their jobs contribute to the organization's mission.	1	2	3	4	5	6
4. It's in everyone's best interests that this organization be successful.	1	2	3	4	5	6
5. People in this organization are aware of how the organization's mission contributes to higher-level missions and objectives.	1	2	3	4	5	6
6. In general, this organization's customers would not go elsewhere even if it were possible.	1	2	3	4	5	6
People in this organization:						
7. try to plan ahead for changes (such as in policy) that might impact our mission performance.	1	2	3	4	5	6
8. try to plan ahead for technological changes (such as new development in computer software) that might impact our mission performance.	1	2	3	4	5	6
9. regularly work together to plan for the future.	1	2	3	4	5	6
10. see continuing improvement as essential.	1	2	3	4	5	6
11. care about what will happen to the organization after they are reassigned.	1	2	3	4	5	6
12. Creativity is actively encouraged in this organization.	1	2	3	4	5	6