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EFFECTIVENESS OF EMPLOYEE PARTICIPATION GROUPS
IN A MANUFACTURING COMPANY

by

John F. Blamy

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
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EFFECTIVENESS OF EMPLOYEE PARTICIPATION GROUPS IN A MANUFACTURING COMPANY

John F. Blamy, Ed.D.

Western Michigan University, 1988

This case study investigated the short term effectiveness of Quality of Work Life participation groups in a Midwest manufacturing division of a major worldwide automotive corporation. Six traditional procedural measures were used to evaluate performance. These measures of performance were: employee attendance, written grievances, scrap produced, quality audits, customer complaints, and productivity.

Six hypotheses were formulated for this study:

1. Employees in departments with employee participation groups will improve their attendance more than employees in departments that do not have employee participation groups.
2. Employees in departments with employee participation groups will decrease the number of formal grievances more than employees in departments that do not have employee participation groups.
3. Employees will reduce scrap more in departments with employee participation groups than employees in departments without employee participation groups.
4. Quality audits will improve more in departments with employee participation groups than in departments without employee participation groups.

5. Customer complaints about products produced in departments with employee participation groups will be reduced more than in departments without employee participation groups.

6. Employees in departments with employee participation groups will improve productivity more than employees in departments without employee participation groups.

A conclusion of the study was that employee involvement in employee participation groups may not improve procedural measures of performance. Short term effectiveness may be influenced by other organizational programs and goals used by the company to make cultural changes in operating philosophy.

Many companies are using employee involvement to improve organizational effectiveness. Employee participation groups are a forum for employees to make positive change in their workplace. The Quality of Work Life method is not specifically defined for each environment. The appropriateness of an employee involvement program is dependent on desired organizational outcome. Procedural measures used in this study may not measure the desired outcome that an organization wants when employee involvement programs are instituted.

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Dedicated to my wife

Delinda L. Blamy

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John F. Blamy

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CHAPTER I

INTRODUCTION

Is employee involvement under Quality of Work Life the quick answer that American industry is looking for to suppress the increasing competitive pressures from foreign competition? The purpose of this study was to investigate the short term effectiveness of Quality of Work Life participation groups in a manufacturing organization by examination of six traditional procedural measures of performance. These measures of performance are: employee attendance, written grievances, scrap produced, quality audit, customer complaints, and productivity.

Six hypotheses were formulated for this study based on a review of selected literature on Quality of Work Life participation groups.

1. Employees in departments that establish employee participation groups will improve employee attendance more than employees in departments that do not have employee participation groups.

2. Employees in departments with employee participation groups will write fewer formal grievances than employees in departments without employee participation groups.

3. Scrap will be reduced in departments with employee participation groups more than in departments without employee participation groups.

4. Quality audits will improve more in departments with employee participation groups than in departments without employee groups.

5. Customer complaints about products produced in departments with employee participation groups will be reduced more than in departments without employee participation groups.

6. Employees in departments with employee participation groups will improve productivity more than employees in departments without employee participation groups.

Statement of the Problem

The United States Department of Labor (cited in Richardson, 1983) reported in 1982 that between 1977 and 1981 gains in worker output for American industries had declined to 4.5%. The United States fell behind other large industrial nations in improving productivity in manufacturing facilities. During the same years, Japan had improved worker output by 29%, France 14%, Britain 14%, and West Germany 13% (Richardson, 1983). Bureau of Labor Statistics (cited in Hoerr & Pollock, 1986) economists estimated that productivity will increase at an average annual rate of 1.7%, largely because of new technology. The decline in productivity is attributed in part to top managers, large staffs, emphasis on short-term financial results, and a decline in the work ethic that characterized American society during its first two centuries.

Technology is a determinant of productivity when work is highly controlled by machine cycle. In technological organizations most

significant productivity increases may be achieved by changing technologies. In other organizations the major gains in productivity are achieved through changing worker performance. These two principal determinants of productivity are often intertwined (Guzzo, 1983). Many companies are adapting innovative work practices to get the most out of their technologies and people by implementing Quality of Work Life programs.

Need and Rationale for the Study

Many company managers have been moving in the direction of co-operation with the unions since the beginning of the Quality of Work Life movement in the 1970s. American managers tend to view their organizations as economic entities which serve the profit motives of their stockholders (Chung & Gray, 1982). There is a need to measure the success of any company program for value toward the established company mission.

Many Quality of Work Life programs have been publicized as successful based only on perceptual measures of performance. Companies also publicized program success on the number of involved people. Individual attitudes and behavior are not necessarily followed by improvements in group and organization performance (Nicholas, 1982). There has been relatively little investigation of the impact of Quality of Work Life programs using procedural measures of performance. This study models general strategies used as performance evaluation for Quality of Work Life programs.

Limitations of the Study

Quality of Work Life programs are established for different reasons. Specific business climates necessitate alterations of a process to fit the company's mission. This study was a case study of a single manufacturing facility. The Quality of Work Life process has been modified to fit specific needs of the employees in an attempt to also meet business needs. The procedural measures of employee attendance, employee grievances, scrap produced, product quality, customer satisfaction, and productivity were traditional measures of performance used in this case study. These measures are associated with the purpose of establishing a Quality of Work Life program at the case company. Findings of this study should add information used to evaluate Quality of Work Life interventions.

Organization of the Study

An introduction to this study, statement of the problem, need and significance of the study, limitations of the study, and organization of the study have been presented in Chapter I. A review of selected literature on Quality of Work Life and uses of Quality of Work Life programs are examined as a basis for formulation of research hypotheses and presented in Chapter II. In Chapter III the research hypotheses are presented and procedures followed to conduct this study. Included in this chapter is a background description of the case company used in this study.

The data and findings for each stated hypothesis are presented in Chapter IV. Conclusions and recommendations are presented in Chapter V.

• • •

CHAPTER II

REVIEW OF THE SELECTED LITERATURE

The purpose of this study was to investigate the short-term effectiveness of Quality of Work Life participation groups in a manufacturing organization by examination of six traditional procedural measures of performance. This chapter is a review of selected literature relative to Quality of Work Life participation groups and their effectiveness in the manufacturing environment. The review of literature is divided into six sections: (a) organizational pressures, (b) employee pressures, (c) Quality of Work Life, (d) employee participation groups, (e) the case company, and (f) criteria measures.

Organizational Pressures

Beginning in the 1970s American manufacturers experienced increasing pressures to change their methods of operation. The United States had a history of "guarding its gates" against the goods of others. The gates had been breached, which raised a question about U.S. competitiveness that extended beyond industry complaints of unfair foreign trade practices, distorted exchange rates, and cheap offshore labor. There were rises in consumerism, union activity, and government regulation. During this period of time American industries experienced diminishing productivity; at the same time world

attention focused on Japanese advances in productivity and quality (Blonston, 1986).

Many successful companies are those whose employees ally their own best interests with those of their company. The challenge for organizations is to extract the mental and physical talents from their people. One approach to this challenge would be to restructure operating environments in a manner that requires personnel to share and apply available information in ways which benefit both the organization and its people.

Use of sociotechnical systems that revolutionize the way work is organized and managed is an immensely important trend. According to one observer, this new model of job design and work relations will shape the workplace into the 21st century (Hoerr & Pollock, 1986).

Employee Pressures

Many people believe the decline in productivity is a result of a decline in the work ethic that characterized American society during its first two centuries. Taylor (cited in Mills, 1978) and other management scientists recommended the division of labor into finite tasks. Human labor was perceived as the output of human backs, arms, and hands. Workers were looked upon as essentially lazy, greedy, and demanding of discipline. The employees were perceived as badge numbered, anonymous "labor capital" commodities in a rigidly economic mechanism.

During the latter half of the 20th century, dramatic changes occurred in the composition of the American labor force: The average

age of the employees increased, the educational levels increased, and the number of women entering the labor force increased (Cox & Brown, 1982). The affluent industrial society provided educated, demanding, and questioning individuals. There was a decline in the degree in which employees viewed the organizational goals as being their goals. Employees wanted interesting work, a chance to develop new skills and abilities, and a chance to participate in decisions regarding their jobs and their future (Scobel, 1980).

People who build products in industries were often overlooked as resources to improve the competitive position of organizations. Workers wanted to make improvements and have opportunities to control decisions about their jobs. Workers described their work environments as places where they have insufficient authority, insufficient support from their supervisors, and insufficient challenges or rewards to use their skills and intelligence (Simmons & Mares, 1985).

Workers in American industries in the latter part of the 20th century have a number of expectations. They are concerned about changes that could improve their company's competitiveness in the world market. They are enthusiastic about doing a good job and would work harder doing a better job for their company if involved in decisions affecting their work (Weisz, 1982).

Involvement of individuals as people and members of groups becomes increasingly important as a strategy for corporate survival. In an era of rapid social, technological, and environmental change, employees need to be involved in workplace democracy. Employees are motivated when given challenging work in which they can assume

responsibility (Herzberg, 1968). New approaches are providing employees opportunities to participate in decision-making processes that influence their work life.

Quality of Work Life

Organizational and employee pressures are creating a need to change the culture within the manufacturing environment. The recommended purpose of Quality of Work Life (QWL) is a process by which people strive to create an organization that simultaneously meets business, human, and social objectives. Unfortunately QWL has become a phrase that has been applied to many different kinds of programs and activities (Osley & Ball, 1982). QWL processes emphasize employee participation in decision making and problem solving at the workplace. This can lead to new levels of responsibility and challenge. As a result, workers often report feelings of dignity, fulfillment, and self-respect (Walton, 1979).

QWL groups have gained recognition in many companies due to reported successful accomplishments. The success of individual groups has been recorded and praised while little mention has been made about those groups which have been less successful. There are three reasons that this occurs. First, people view such efforts from emotional perspectives. Second, the media treats dramatic successes to be newsworthy. Third, because expectations are high, people judge any deficiencies as a failure to the entire effort (Walton, 1979).

QWL is synonymous with many other terms, e.g., employee participation groups, team concept, employee involvement, workplace

innovations, and workplace or industrial democracy. The American Society for Training and Development (cited in Skrovan, 1980) defined QWL:

Quality of Work Life (QWL) is a process for work organizations which enables its members at all levels to actively participate in sharing the organization's environment, methods, and outcomes. The value-based process is aimed toward meeting the twin goals of enhanced effectiveness of the organization and improve the quality of life at work for employees. (p. 29)

The QWL method is not specifically defined for each environment. Every organization must work out its own action plan to create culture change (Callahan, 1984). The premise of QWL is that when people make meaningful contributions to an organization they obtain new levels of satisfaction, pride in accomplishment, feelings of dignity, fulfillment, and self-respect.

Employee Participation Groups

Employee participation groups (EPG) are only one approach to improving the quality of work life. They are designed to involve employee ideas toward achieving organizational objectives. Simultaneously, employee involvement can make work sufficiently meaningful and rewarding. EPG are formed for specific reasons. An EPG may have different purposes at different times. Differing organizations might use EPG for other strategies or, at times, not use EPG because they do not serve the intended purpose.

Typically an EPG would include 8 to 12 people from the same work area who meet on a regular basis to identify, analyze, and solve problems in their workplace. Training may be provided in areas such

as statistical quality control, problem solving techniques, and group processes. The participants of many groups are allowed to establish their own agenda. Some groups are facilitated to keep the group running smoothly and within the specified parameters. Groups often define and work on problems in areas such as communication, safety, housekeeping, maintenance, quality, and production practices, while others may be given specific tasks with defined parameters. This approach is one way to strengthen product quality and improve the quality of work life.

The Company

The company in this case study is a Midwest division of a major worldwide automotive manufacturing corporation. One function of the company is to machine engine parts. These parts are used in assemblies and sent to a warehouse operation for worldwide distribution. Worldwide competition and employee pressures have created the need to change the sociotechnical culture within the plant.

External Environment

During the 1960s and early 1970s, the company and competitors could not meet customer demand. Production could not keep pace with product demand. Facilities were expanded to meet customer demand. Cost or quality were not major concerns of the customer. Market indicators showed that business would continue to boom and provide a continued demand for the company's products.

In the late 1970s and early 1980s, foreign competition entered the market with better quality and lower costs. The customer became selective, demanding high quality and competitive prices. The market was saturated, profits decreased, and there was an excess capacity in the world market.

The demand for the company's product stabilized. The company needed to improve quality and reduce cost to meet the new demands of the customer.

The Workers

The hourly work force is represented by a major automotive international union. Both the international union and the local shop committee demonstrated concern for the decline in market penetration. The loss of sales was followed by layoffs resulting in decreased union membership. The international union worked with the corporation to instate the QWL processes. In the early 1980s, a joint union-management Quality of Work Life process was established and funded.

Company employees were moved to different work groups as layoffs occurred. Uncertainty about future layoffs and company direction was accompanied by unrest and mistrust within the rank and file. Employees were demanding information and a voice in the decisions about their workplace.

In 1982 a joint Quality of Work Life process was established in the company. Union and management training was conducted to inform employees about the Quality of Work Life process. Joint committees

were established and many activities were managed and accomplished with joint focus. Statistical quality control procedures were also established and implementation plans were given to the operators. Communication meetings were established between management and the work force to review the company's performance.

Intervention Program

The Quality of Work Life process had been established with joint union and management activities. They had provided training and given information to the hourly work force. Trust and respect were being developed among the employees that were directly involved in the joint activities. The union and upper management wanted to extend the Quality of Work Life process to all workers in manufacturing.

Employee participation groups (EPG) were established to use the creative potential of the employees. The process afforded employees an opportunity to participate in decisions related to their job or work assignments. The company was also interested in becoming more competitive in cost, quality, and responsiveness to customer demands. The groups were comprised of volunteer employees who were interdependent and did related tasks. Each group contained the workers, a first line supervisor, and a union representative.

The group was given training on problem solving, group decision making, data gathering, and group dynamics. They met once a week for one hour during the regular work period. Regular work time was allowed to investigate problems that the group wanted to discuss.

Decisions and conclusions were reached by consensus. Twice each year presentations were made to upper management about the group's accomplishments.

Criteria Measures

American companies have a need to show bottom-line results (Cole, 1985). Many companies measure employee participation groups through existing and newly added management information systems. Management uses measurement to publicize successful employee participation groups and to question their utility. No single criterion measure distinguishes itself as the most valid, global indicator of productivity (Guzzo, 1983). Criteria measures for collecting information would depend on which purpose an employee participation group was formed. Organizational change can be assessed in terms of two general classes of criteria: perceptual measures and procedural measures.

Perceptual Measures

Perceptual data measures how people think about a given situation. Data are obtained by interviews, observations, and written instruments. The findings are given as a percentage of responses to a given question or as a scaled value. Individual attitudes and behavior are intervening variables and changes are not necessarily followed by group performance. Perceived changes in performance based on perceptual criteria do not necessarily correspond to actual changes in performance based on procedural criteria. Worker

productivity, in terms of rate or quantity of output, is, at best, weakly related to worker attitudes (Guzzo, 1983).

Procedural Measures

Procedural data are measures of job behaviors and system performance. Data are obtained from records with numerical values assigned. Changes in performance, positive or negative, are generally credited to the influence of management on organizational performance (Nicholas, 1982).

Use of procedural data is not common. In a review of 160 studies of organizational interventions, Porras and Berg (1978) found only 20 studies that had used procedural measures to assess work group change. Guzzo (1983) reviewed 104 experiments, conducted between 1976 and 1981, pertaining to one or more aspects of productivity. Four hundred seventy-eight measures of productivity were used in these experiments; productivity gains were reported for 81% of the procedural measures. Sixty-five empirical intervention studies that had used procedural data to evaluate organization development interventions were reviewed by Nicholas (1982). The six most common procedural measures found in these macro studies were quality, quantity, cost, efficiency, absenteeism, and grievances.

In this case study the intervention program was established to use the creative potential of the employees to seek positive changes for: cost, quality, and responsiveness to customer demands. The procedural measures of attendance, grievances, scrap, quality,

customer satisfaction, and productivity are consistent with the macro studies.

Attendance

Attendance is the comparison of hours worked to the number hours scheduled to work. Unscheduled time spent away from the work area is a significant expense to the company. There are quantifiable costs associated with an employee being absent. Some of the costs are benefits that continue to be paid, extra employees required to fill openings, joint groups for tracking attendance, and counseling. There are hidden costs associated with absences such as on the job training of new employees, the time supervisors spend finding another employee capable of doing the job, supervisor counseling time, work group disruptions, lost productivity, and the loss of quality.

In the case company contractual time off the job is not charged to the work group. This time off is scheduled in advance and includes vacations, jury duty, personal leaves of absence, and union assignments. All other absences are charged to the work group.

Employee participation groups allow employees to share their concerns and develop solutions to in-plant problems that may improve an employee's attendance. In many groups, direction is given to the members that can help solve problems outside the plant environment and as a result improve attendance.

Group members in employee participation groups rely on each other's contributions more than in conventional work situations. A few dominant employees in teams can take over and force the others to

conform to established rules by creating pressures and sanctions for the group. At Cummins Engine plant members of autonomous work teams were likely to be harder on absent members than management according to a former plant manager: They would often appear on a person's doorstep to take that person to work if team members believed the claimed illness did not warrant absence from the job (Kanter, 1983).

Employee involvement groups at Ford Motor Company reduced absenteeism (Savoie, 1982). General Motors's Tarrytown Division decreased absenteeism 2% (Guest, 1979). Harman International absences due to sickness declined 16%; however, minor illnesses rose 71% and the rate of medical leaves increased 19% (Macy, 1980).

Written Grievances

Grievances are employee contractual concerns that are not resolved between employee and supervisor. The shop steward then writes the grievance and pursues a settlement according to the procedures outlined in the contract.

Associated costs of written grievances are a burden to the company. A labor relations department has a number of people assigned with the primary responsibility of investigating issues and negotiating settlements. Conflict may exist within work groups waiting for the settlements.

Employee participation groups are expected to increase employee performance by affecting employee motivation and simultaneously improving work structure requirements of technology and task environment. Studies reviewed by Nicholas (1982) found no significant

reductions in grievances. Fifty percent of the studies reviewed by Guzzo (1983) indicated an improvement in the number of grievances. Grievances at General Motors's Tarrytown plant were reduced from 2,000 to 32 over 7 years (Guest, 1979). Harman International reduced grievances by 51% in 55 months (Macy, 1980). These studies and others indicate that there are specific benefits for employee involvement groups. There is inconclusive evidence that organizational intervention programs reduce grievances.

In this case study, contractual issues are not discussed in employee participation group meetings. Many issues are discussed and resolved in groups that could become contractual issues.

Product Quality

Product quality is defined as conformance to requirements and specifications. Measures of quality include variables such as controllable rejects, error rate, percentage defects, and number of customer complaints. Specific measures of conformance in this case study are quality audits, amount of scrap, and customer complaints.

Organization development interventions involving employees in decisions pertaining to their work area are more likely to increase quality than other variables. Studies reviewed by Nicholas (1982) indicated a 67% increase in quality variables. All studies reviewed by Guzzo (1983) indicated improvement in quality measures.

Parts are removed from the system as scrap that do not conform to requirements and specifications. The labor, burden, and material costs are charged to the department. There are associated costs to

the company in disposing of the scrap parts and rescheduling a casting to be purchased, received, and delivered to the correct department. In some instances, this may result in lost sales to the company.

Quality audits are conducted to verify conformance to requirements and specifications. Demerits are assessed based on the measured characteristics and degree of variance from acceptable limits. A numerical value is given to each department as one measure of part quality.

Customers are the final inspectors for product quality. The machining section has two major customers: the assembly line and the service warehouse. A telephone number has been assigned for customers to call if there are any product concerns. Complaints are given to the appropriate department for resolution. Associated costs are charged back to the department.

Employee participation groups usually have quality issues on their agenda. They work on many issues that could result in improving part conformance to requirements and specifications. Ford Motor Company's employee involvement groups are given credit for reducing scrap and improving product quality by 48% between 1981 and 1983 (Savoie, 1982). General Motors's Tarrytown plant quality performance went from the poorest to the best among 18 plants in their division, based on customer complaints (Guest, 1979). Harman International decreased customer returns by 47% over 55 months (Macy, 1980). These improvements were credited to employee involvement groups.

Productivity

Productivity can be mixed and can vary from department to department, even within the same organization. Participation may not be as large a contributor to productivity as indicated in much of the literature. Other factors, such as improved goal setting or training, account for productivity increases in studies where participation has been offered as the major contributor (Kanter, 1983). Studies reviewed by Guzzo (1983) indicated productivity increases as high as 25%, while other studies indicated slight, statistically nonsignificant increases in productivity.

Department productivity, in this case study, is a measure of the standard time paid for parts manufactured as output compared to the input of labor hours actually used to produce the product. Change in productivity can alter company profitability. Employees are not required to discuss productivity in their meetings. When employees improve tooling, methods, material flow, and related processes, their department productivity will change.

Summary

The procedural measures of performance are the criteria that the case company is trying to improve with Quality of Work Life participation groups. Performance improvement in these measures should help the case company in their quest for world competitive performance in cost, quality, and customer satisfaction. From this review of literature, hypotheses formulated are presented in Chapter III.

CHAPTER III

DESIGN AND METHODOLOGY

The purpose of this study has been to investigate the short-term effectiveness of Quality of Work Life participation groups in a manufacturing organization by examination of six traditional procedural measures of performance. These measures of performance are: employee attendance, written grievances, scrap produced, quality audits, customer complaints, and productivity.

Hypotheses

Six hypotheses were formulated for this study based on a review of selected literature on Quality of Work Life participation groups. This study investigated each hypothesis at the case company. The six hypotheses were:

1. Employees in departments with employee participation groups will improve their attendance more than employees in departments that do not have employee participation groups.
2. Employees in departments with employee participation groups will decrease the number of grievances more than employees in departments without employee participation groups.
3. Employees will reduce scrap more in departments with employee participation groups than employees in departments without employee participation groups.

4. Quality audits will improve more in departments with employee participation groups than in departments without employee participation groups.

5. Customer complaints about products produced in departments with employee participation groups will be reduced more than in departments without employee participation groups.

6. Employees in departments with employee participation groups will improve productivity more than employees in departments without employee participation groups.

Management and Union Support

Groups studied in the case company were involved in machining engine components. Eight hundred eleven employees assigned to machining departments were involved in the study. Each department was given the opportunity to have an employee participation group in the Quality of Work Life process. Employees had the opportunity to voluntarily participate as a group member.

The management and union support structure was put in place to give guidance and assistance to the Quality of Work Life process. Quality of Work Life coordinators, six union and three management representatives, were selected in March 1982. Their functions were to learn what was required for the implementation of a Quality of Work Life program, modify their findings to fit the case company, and facilitate implementation of the process. In September 1982, a steering committee was formalized with officials from the union shop committee and members of higher management. The purpose of the

steering committee was to give direction and process support. A leadership team of middle managers and zone committeemen was formed to provide support and consistency to and between the EPG groups. The steering committee and leadership team provided the emphasis that both union and management were supporting the process.

Department Selection

All employees were given a 2-hour presentation explaining the Quality of Work Life process by the Quality of Work Life coordinators. Union and management representatives held a question and answer session to respond to employee concerns. Two days after the presentation employees were asked to sign a petition indicating their interest in starting an employee participation group. The petitions were presented to the steering committee. Selection was based on the percentage of people in a department that wanted an EPG and the total number assigned to the department. Large departments with over 50% of the people in favor of starting an employee participation group were selected first. Two to four groups were started each month.

Training and Employee Participation Group Membership Selection

Employees in selected departments were given one week of training on the recent history of Quality of Work Life, group dynamics, statistical process control, and machining methods. Each management discipline gave a presentation on their organizational functions. A contact person was assigned to provide assistance to the group.

Six to 12 volunteers were selected to form the employee participation group. Seniority employees were selected in large departments with more than 12 volunteers. Employees not selected would have the opportunity to rotate into the group. The department supervisor was required to be part of the group as the management representative. A Quality of Work Life coordinator was assigned to the group as a facilitator.

Certain administrative procedures took place during the first meeting. These included the selection of a chairman, a recording secretary, and the establishment of an agenda. Minutes from each meeting were given to each department employee and distributed to the Quality of Work Life support groups. Further training was provided based on the needs of the group.

Comparison Departments

Departments in the same machining area that did not establish employee participation groups and have over 50% of the employees volunteering were used as comparison groups. Those departments selected remained under traditional activities. They participated in all plant programs and training, excluded only from the employee participation group process.

Exclusions

A department was eliminated from the study if:

1. New machinery ordered prior to the study was installed during the study period.

2. Capital expense was charged to a source other than the group receiving benefits.

3. Labor hour adjustments were provided by external sources that would alter the records.

4. Departments started an employee participation group and abandoned the process within the first year.

Evaluation

Data for this study were collected from 1983 through 1986. Data were collected for 24 months for each department. The first 12 months prior to intervention were classified as prior. These data came from historical records. The last 12 months were classified as after. Data were collected from month end reports. The month that the intervention occurred was not included in the study. In this month employees in treatment departments received employee participation group training. Employees in the comparison departments did not receive this training. Start months for comparison groups were randomly assigned to match the treatment groups. Data were summed and totaled for each 12 month period of time in each category. Collected data were analyzed, using inferential statistics, for each procedural measure to evaluate each stated hypothesis.

The stated hypotheses are:

1. Employees in departments with employee participation groups will improve their attendance more than employees in departments that do not have employee participation groups. Attendance is measured in hours present compared to the number of hours available to work. The

findings will be represented as a percentage.

2. Employees in departments with employee participation groups will decrease the number of formal grievances more than those employees that are in departments without employee participation groups. The frequency of written grievances is the number of grievances written per 1,000 hours worked.

3. Employees will reduce scrap more in departments with employee participation groups than employees in departments without employee participation groups. The amount of scrap is represented in dollars compared to standard hours produced. The findings are represented as dollars per standard hour produced.

4. Quality audits will improve more in departments with employee participation groups than in departments without employee participation groups. The findings of a quality audit is a numerical value from 0 to 145. The values are independent of any other number and are represented as a whole number.

5. Customer complaints about products produced in departments with employee participation groups will be reduced more than in departments without employee participation groups. The frequency of customer complaints called into the line call system is compared to the standard hours produced. The findings are represented as customer complaints per 1,000 hours produced.

6. Employees in departments with employee participation groups will improve productivity more than employees in departments without employee participation groups. Productivity is a comparison of the

total distribution of hours compared to the standard hours produced. The findings are represented as a percentage.

Summary

A comparison of the prior period as a base and the period after intervention should indicate a change from the base period. Comparing these data with the comparison groups allowed acceptance or rejection of the corresponding hypothesis.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Introduction

The purpose of this study has been to investigate the short-term effectiveness of Quality of Work Life participation groups in a manufacturing organization by examination of six traditional procedural measures of performance. These measures of performance were: employee attendance, written grievances, scrap produced, quality audits, customer complaints, and productivity. This chapter contains information and data describing the findings that relate to the study hypotheses. The hypotheses were:

1. Employees in departments with employee participation groups will improve their attendance more than employees in departments that do not have employee participation groups.
2. Employees in departments with employee participation groups will decrease the number of formal grievances more than employees in departments that do not have employee participation groups.
3. Employees will reduce scrap more in departments with employee participation groups than employees in departments without employee participation groups.
4. Quality audits will improve more in departments with employee participation groups than in departments without employee participation groups.

5. Customer complaints about products produced in departments with employee participation groups will be reduced more than in departments without employee participation groups.

6. Employees in departments with employee participation groups will improve productivity more than employees in departments without employee participation groups.

Presentation of Data

Nine departments were used for the treatment group and nine departments were used for the comparison group. These 18 departments were involved in metal cutting activities in the case company that fulfilled all parameters for this study.

Data were collected from historical records for 24 months for each department. The first 12 months before the intervention of employee participation groups were classified as prior. The last 12 months were classified as after.

Data are presented in table form to facilitate summarization of findings. The numbers in each table represent findings of the total group which consists of nine departments for the treatment group and nine departments for the comparison group. Analysis of covariance was used to analyze differences between the treatment group and comparison group for each procedural measure.

Chapter IV is divided into an introduction, presentation of data, and findings for each procedural measure. The introduction and presentation of data describe how the data were collected and the study population. Data are presented for each procedural measure.

Findings

Attendance

Attendance is a comparison of hours worked in the plant to the number of hours available to work. Results are presented as rate of attendance. The study hypothesis for attendance is: Employees in departments with employee participation groups will improve their attendance more than employees in departments that do not have employee participation groups.

Data were gathered and summarized in Tables 13 and 15 for the treatment group and Tables 14 and 16 for the comparison group (see Appendix A). These data were analyzed using analysis of covariance as decision statistics (see Tables 1 and 2). Analysis of covariance was used to analyze the differences between the comparison group and treatment group.

Analysis of covariance was used to analyze differences between the treatment group and comparison group. The F -ratio calculation of 0.33 was less than F critical at the .05 significance level. There was not a statistically significant difference in the rate of attendance between the treatment group and comparison group. The study hypothesis for attendance was not accepted. Employees in departments with employee participation groups did not improve attendance more than employees in departments that did not have employee participation groups.

Table 1
Findings for Attendance

Treatment group			Comparison group		
Dept.	Y Before	X After	Dept.	Y Before	X After
A	.921	.909	J	.936	.937
B	.913	.898	K	.930	.910
C	.861	.881	L	.968	.914
D	.902	.941	M	.955	.980
E	.930	.924	N	.908	.950
F	.925	.928	O	.941	.947
G	.958	.944	P	.933	.961
H	.925	.899	Q	.945	.886
I	.971	.962	R	.974	.952
Totals	8.306	8.286		8.490	8.437
Means	.923	.921		.943	.937
Grand total				16.796	16.723
Grand mean				8.398	8.361

Table 2
Analysis of Covariance Table for Data of Table 1--Attendance

Source of variation	Sum of squares for Y	Sum of cross products for X and Y	Sum of squares for X	Regression coefficient	Amount explained by regression	Adjusted sum of squares for Y	df	Mean square	F ratio
Between columns	0.002	0.002	0.001			0.002	1	0.0002	0.33
Residual or error	0.011	0.005	0.012	0.417	0.002	0.009	15	0.0006	
Total	0.013	0.007	0.013	0.538	0.004	0.009	16		

Note. $F = 0.33$; $F(.05, 1df, 15df = 4.54)$. Not significant at the .05 significance level.

The attendance rate for the treatment group decreased by 0.1%, while the comparison group decreased the attendance rate by 0.7%. Intervening variables of overtime and management programs may have biased the findings.

Since 1980 the case company has attempted to improve attendance. Programs such as employee counseling, bonuses for excellent attendees, and employee release processes have improved attendance from 81% to 91%. The attendance rate at the case company has remained at 91% for the last 4 years. Management at the case company thought that employee participation groups would improve the rate of attendance.

During this study the demand for the company's product increased and many employees were scheduled to work daily overtime and 7 days per week. Employees working overtime for extended periods of time usually take some time off the job for personal reasons which reduces the rate of attendance. Employees in the treatment group worked 28% more hours after employee participation groups were formed and employees in the comparison group worked 25% more hours after the randomly assigned date.

Findings of this study are consistent with the macro studies of Nicholas (1982) and Guzzo (1983). Thirty-six percent of the studies reviewed by Nicholas indicated no improvement in attendance. Forty-seven percent of the studies reviewed by Guzzo indicated no improvement in attendance. In this case study there was not a statistically significant improvement in attendance between the treatment group and comparison group. The study hypothesis was not accepted.

Written Grievances

Written grievances are employee contractual concerns that are not resolved between employee and supervisor. Frequency of written grievances is the number of written grievances per 1,000 hours worked in the plant. The study hypothesis for written grievances is: Employees in departments with employee participation groups will decrease the number of written grievances more than employees in departments without employee participation groups.

Data were gathered and summarized in Tables 15 and 27 for the treatment group and Tables 16 and 28 for the comparison group (see Appendix A). These data were analyzed using analysis of covariance as decision statistics (see Tables 3 and 4). Analysis of covariance was used to analyze the differences between the comparison group and treatment group.

Analysis of covariance was used to analyze differences between the treatment group and comparison group. The F -ratio calculation of .803 is less than the F critical at the .05 significance level. There was not a statistically significant difference in the rate of written grievances between the treatment group and comparison group. The study hypothesis for written grievances was not accepted. Employees in departments with employee participation groups did not decrease the number of written grievances more than employees in departments without employee participation groups.

The number of written grievances for the treatment group decreased by 2%, while the comparison group decreased written

Table 3
Findings for Written Grievances

Treatment group			Comparison group		
Dept.	Y Before	X After	Dept.	Y Before	X After
A	0.10	0.06	J	0.12	0.13
B	0.21	0.47	K	0.07	0.09
C	0.18	0.48	L	0.53	0.33
D	0.65	0.24	M	0.07	0.12
E	0.20	0.25	N	0.00	0.00
F	0.20	0.02	O	0.15	0.03
G	0.09	0.13	P	0.10	0.03
H	1.02	0.16	Q	0.10	0.07
I	0.00	0.00	R	0.00	0.04
Totals	2.65	1.81		1.14	0.84
Means	0.294	0.201		0.127	0.093
Grand total				3.79	2.65
Grand mean				1.895	1.325

Table 4
Analysis of Covariance Table for Data of Table 3--Written Grievances

Source of variation	Sum of squares for Y	Sum of cross products for X and Y	Sum of squares for X	Regression coefficient	Amount explained by regression	Adjusted sum of squares for Y	df	Mean square	F ratio
Between columns	0.127	0.081	0.052			0.053	1	0.053	0.803
Residual or error	1.060	0.157	0.332	0.473	0.074	0.986	15	0.066	
Total	1.187	0.238	0.384	0.620	0.148	1.039	16		

Note. $F = 0.803$; $F(.05, 1df, 15df = 4.54)$. Not significant at the .05 significance level.

grievances by 1.9%. The case company's management has maintained open communication with the hourly employees for several years and responded to employee concerns before they were reduced to writing. The total number of grievances for the treatment group and comparison group, during the 2 years of the study, were less than 100 per year.

Findings of this study for written grievances are consistent with findings in the macro studies of Nicholas (1982) and Guzzo (1983). Nicholas found no significant reductions in grievances in any of the studies reviewed. Fifty percent of the studies reviewed by Guzzo indicated no improvement in the number of grievances. In this study there was not a statistically significant improvement in the number of written grievances between the treatment group and comparison group. The study hypothesis was not accepted.

Scrap Produced

Scrap parts are removed from the system that do not conform to requirements and specifications. Scrap is measured in scrap dollars compared to standard hours produced. Findings are presented as dollars per standard hour produced. The study hypothesis for scrap is: Employees will reduce scrap in departments with employee participation groups more than employees in departments without employee participation groups.

Data were gathered and summarized in Tables 19 and 21 for the treatment group and Tables 20 and 22 for the comparison group (see Appendix A). These data were analyzed using analysis of covariance as decision statistics (see Tables 5 and 6). Analysis of covariance

Table 5
Findings for Scrap

Treatment group			Comparison group		
Dept.	Y Before	X After	Dept.	Y Before	X After
A	1.38	0.83	J	0.92	1.78
B	0.79	0.83	K	0.92	2.45
C	4.22	3.48	L	6.04	3.98
D	1.23	0.98	M	1.44	0.82
E	0.40	0.36	N	4.40	1.05
F	0.93	0.59	O	2.04	0.91
G	0.37	0.34	P	0.71	1.12
H	1.16	0.57	Q	0.47	0.05
I	0.45	0.69	R	0.62	0.47
Totals	10.93	8.67		17.56	12.63
Means	1.214	0.963		1.951	1.403
Grand total				28.49	21.30
Grand mean				14.245	10.650

Table 6
Analysis of Covariance Table for Data of Table 5--Scrap

Source of variation	Sum of squares for Y	Sum of cross products for X and Y	Sum of squares for X	Regression coefficient	Amount explained by regression	Adjusted sum of squares for Y	df	Mean square	F ratio
Between columns	2.44	1.459	0.871			0.255	1	0.255	0.207
Residual or error	41.35	21.008	18.859	1.114	23.403	18.500	15	1.233	
Total	44.35	22.467	19.730	1.139	25.590	18.755	16		

Note. $F = 0.207$; $F(.05, 1df, 15df = 4.54)$. Not significant at the .05 significance level.

was used to analyze differences between the comparison group and treatment group.

Analysis of covariance was used to analyze differences between the treatment group and comparison group. The F -ratio calculation of .207 was less than F critical at the .05 significance level. There was not a significant difference in the rate of scrap between the treatment group and comparison group. The study hypothesis for scrap produced was not accepted. Employees in departments with employee participation groups did not reduce scrap more than employees in departments that did not have employee participation groups.

At the case company, a need for producing quality products has been emphasized as an operating philosophy since 1980. Goals have been established for each department to reduce scrap, improve quality audits, and reduce customer complaints. The statistically significant improvements in the procedural measures related to quality for both the treatment group and comparison group may have been influenced by organizational variables.

Procedural measures of quality at the case company include variables such as scrap dollars, quality audits, and customer complaints. Employees in the treatment group improved scrap dollars by 20%. The treatment group improved scrap dollars by 17%.

Findings of this study are consistent with the macro study of Nicholas (1982) and not consistent with the macro study of Guzzo (1983). Studies reviewed by Nicholas indicated a 67% increase in quality variables. All studies reviewed by Guzzo indicated improvement in quality measures. Findings of this study did not indicate

statistically significant improvements in scrap dollars, quality audits, or customer complaints between the treatment group and comparison group. The study hypotheses for scrap produced was not accepted.

Quality Audits

Quality audits are sample checks of parts leaving a department for conformance to specifications. A numerical value from 0 to 145 is given based on the findings of the audit. The study hypothesis for quality audits is: Quality audits will improve in departments with employee participation groups more than in departments without employee participation groups.

Data were gathered and summarized in Table 23 for the treatment group and Table 24 for the comparison group (see Appendix A). Analysis of covariance was used as decision statistics (see Tables 7 and 8) to analyze the differences between the comparison group and treatment group.

Analysis of covariance was used to analyze differences between the treatment group and comparison group. The F -ratio calculation of 0.003 was less than F critical at the .05 significance level. There was not a significant difference in the improvement of quality audits between the treatment group and comparison group. The study hypothesis for quality audits was not accepted.

Goals were established for each department and supervisors held accountable for improving the audit scores. Statistical process control was established as a process for monitoring conformance to

Table 7
Findings for Quality Audits

Treatment group			Comparison group		
Dept.	Y Before	X After	Dept.	Y Before	X After
A	129	137	J	110	142
B	131	142	K	120	132
C	120	139	L	113	113
D	96	139	M	110	114
E	131	136	N	100	124
F	132	136	O	134	142
G	145	145	P	139	144
H	135	143	Q	135	142
I	126	139	R	136	142
Totals	1,145	1,256		1,097	1,195
Means	127.222	139.556		121.889	132.778
Grand total				2,242	2,451
Grand mean				1,121.000	1,225.500

Table 8
Analysis of Covariance Table for Data of Table 7--Quality Audits

Source of variation	Sum of squares for Y	Sum of cross products for X and Y	Sum of squares for X	Regression coefficient	Amount explained by regression	Adjusted sum of squares for Y	df	Mean square	F ratio
Between columns	128.00	162.67	206.72			0.4	1	0.4	0.003
Residual or error	3,114.44	1,157.67	1,367.78	0.846	979.39	2,135.0	15	142.3	
Total	3,242.44	1,320.33	1,574.50	0.839	1,107.76	2,134.6	16		

Note. $F = 0.003$; $F(.05, 1df, 15df = 4.54)$. Not significant at the .05 significance level.

specifications. Problem-solving training was also provided to identify root cause analysis. These programs may have influenced improvements of the rating scores.

Customer Complaints

Customer complaints are concerns of product quality phoned into the manufacturing line call system. Customer complaints are presented as complaints per 1,000 standard hours produced. Results are presented as frequency of customer complaints. The study hypothesis for customer complaints is: Customer complaints about products produced in departments with employee participation groups will be reduced more than in departments without employee participation groups.

Data were gathered and summarized in Tables 19 and 25 for the treatment group and Tables 20 and 26 for the comparison group (see Appendix A). These data were analyzed using analysis of covariance as decision statistics (see Tables 9 and 10). Analysis of covariance was used to analyze the differences between the comparison group and treatment group.

Analysis of covariance was used to analyze differences between the treatment group and comparison group. The F -ratio calculation of 0.260 was less than F critical at the .05 significance level. There was not a significant difference in the rate of customer complaints between the treatment group and comparison group. The study hypothesis for customer complaints about products produced was not accepted. Employees in departments with employee participation groups did not

Table 9
Findings for Customer Complaints

Treatment group			Comparison group		
Dept.	Y Before	X After	Dept.	Y Before	X After
A	1.83	1.45	J	0.36	0.08
B	1.05	0.68	K	2.54	2.25
C	1.70	0.63	L	1.65	0.44
D	0.66	0.32	M	0.70	0.07
E	1.80	1.17	N	4.14	0.57
F	2.07	2.55	O	1.30	0.25
G	0.20	0.16	P	0.89	0.79
H	2.15	0.57	Q	0.17	0.00
I	0.78	1.43	R	0.05	0.58
Totals	12.24	8.96		11.80	5.03
Means	1.360	0.996		1.311	0.559
Grand total				24.04	13.99
Grand mean				12.020	6.995

Table 10
Analysis of Covariance Table for Data of Table 9--Customer Complaints

Source of variation	Sum of squares for Y	Sum of cross products for X and Y	Sum of squares for X	Regression coefficient	Amount explained by regression	Adjusted sum of squares for Y	df	Mean square	F ratio
Between columns	0.011	0.096	0.858			0.245	1	2.450	0.260
Residual or error	17.902	5.562	8.215	0.677	3.765	14.137	15	0.942	
Total	17.913	5.658	9.073	0.624	3.531	14.382	16		

Note. $F = 0.260$; $F(.05, 1df, 15df = 4.54)$. Not significant at the .05 significance level.

reduce customer complaints more than employees in departments that did not have employee participation groups.

A five-phase resolution process was developed at the same time the manufacturing line call system was implemented. Each call required proper action to the process and reports were generated with distribution throughout the organization. Permanent problem resolution was required to complete the five-phase process.

Productivity

Productivity is a measure of the standard hours paid for parts manufactured as output, compared to the input of labor hours actually worked in the department to produce a product. The results are presented as a rate of productivity. The study hypothesis for productivity is: Employees in departments with employee participation groups will improve productivity more than employees in departments without employee participation groups.

Data were gathered and summarized in Tables 17 and 19 for the treatment group and Tables 18 and 20 for the comparison group (see Appendix A). These data were analyzed using analysis of covariance as decision statistics (see Tables 11 and 12). Analysis of covariance was used to analyze the differences between the comparison group and treatment group.

Analysis of covariance was used to analyze differences between the treatment group and comparison group. The F -ratio calculation of 1.30 was less than F critical at the .05 significance level. There was not a significant difference in the rate of productivity between

Table 11
Findings for Productivity

Treatment group			Comparison group		
Dept.	Y Before	X After	Dept.	Y Before	X After
A	0.738	0.842	J	0.840	0.797
B	0.848	0.687	K	0.974	0.749
C	0.791	0.724	L	0.776	0.874
D	0.994	0.943	M	0.993	0.891
E	0.917	0.937	N	0.535	1.144
F	1.002	0.960	O	0.993	1.081
G	1.022	1.040	P	0.985	0.706
H	1.821	1.049	Q	0.974	0.999
I	1.013	0.808	R	0.971	1.042
Totals	9.146	7.99		8.041	8.283
Means	1.016	0.888		0.893	0.920
Grand total				17.187	16.273
Grand mean				8.594	8.136

Table 12
Analysis of Covariance Table for Data of Table 11--Productivity

Source of variation	Sum of squares for Y	Sum of cross products for X and Y	Sum of squares for X	Regression coefficient	Amount explained by regression	Adjusted sum of squares for Y	df	Mean square	F ratio
Between columns	0.068	0.018	0.005			0.082	1	0.082	1.30
Residual or error	1.007	0.134	0.326	4.110	0.055	0.952	15	0.063	
Total	1.075	0.116	0.331	0.350	0.041	1.034	16		

Note. $F = 1.300$; $F(.05, 1df, 15df = 4.54)$. Not significant at the .05 significance level.

the treatment group and comparison group. The study hypothesis for productivity was not accepted. Employees in departments with employee participation groups did not improve productivity more than employees in departments that did not have employee participation groups.

Productivity in the treatment group decreased by 5.1% and 2.3% for the comparison group. The case company has decreased emphasis on worker productivity and concentrated on improving product quality. Change in organizational goals may have influenced the statistically significant decrease in productivity for both the treatment group and comparison group.

Productivity can be mixed and vary from department to department, even within the same organization. Participation may not be as large a contributor to productivity as indicated in much of the literature. Studies reviewed by Guzzo (1983) indicate productivity increases as high as 15%, while other studies indicate nonsignificant increases or decreases.

The employees involved in employee participation group activities spent 17,000 hours in nonproductive activities, Table 29 (see Appendix A). These hours reduce productivity for the treatment department.

Findings for productivity in this case study are consistent with the findings of Guzzo (1983). There was not a statistically significant improvement between the treatment group and comparison group. The study hypothesis was not accepted.

Summary

Findings have been offered supporting the purpose of the study which was to investigate the short-term effectiveness of Quality of Work Life employee participation groups in a manufacturing organization. Six traditional procedural measures of performance were investigated. These measures of performance were: employee attendance, written grievances, scrap produced, quality audits, customer complaints, and productivity. Study hypotheses for these procedural measures were:

1. Employees in departments with employee participation groups will improve their attendance more than employees in departments that do not have employee participation groups.
2. Employees in departments with employee participation groups will decrease the number of formal grievances more than employees in departments that do not have employee participation groups.
3. Employees will reduce scrap more in departments with employee participation groups than employees in departments without employee participation groups.
4. Quality audits will improve more in departments with employee participation groups than in departments without employee participation groups.
5. Customer complaints about products produced in departments with employee participation groups will be reduced more than in departments without employee participation groups.

6. Employees in departments with employee participation groups will improve productivity more than employees in departments without employee participation groups.

All six study hypotheses were rejected based on statistical analysis of data. There was not a statistically significant change in performance between the treatment group and comparison group. Employees in departments with employee participation groups did not improve performance more than employees in departments without employee participation groups.

In Chapter V a discussion concerning the conclusions drawn from the data analysis presented in this chapter is provided. Additionally, recommendations are made for forming and evaluating employee participation groups in a manufacturing environment.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

This study has been conducted for the purpose of determining the short-term effectiveness of Quality of Work Life participation groups in a manufacturing organization by examination of six traditional procedural measures of performance. The measures of performance were: employee attendance, written grievances, scrap produced, quality audits, customer complaints, and productivity. This chapter contains conclusions and recommendations about the findings and analysis of data relative to the study hypotheses. The hypotheses were:

1. Employees in departments with employee participation groups will improve their attendance more than employees in departments that do not have employee participation groups.

2. Employees in departments with employee participation groups will decrease the number of written grievances more than employees in departments that do not have employee participation groups.

3. Employees will reduce scrap more in departments with employee participation groups than employees in departments without employee participation groups.

4. Quality audits will improve more in departments with employee participation groups than in departments without employee participation groups.

5. Customer complaints about products produced in departments with employee participation groups will be reduced more than in departments without employee participation groups.

6. Employees in departments with employee participation groups will improve productivity more than employees in departments without employee participation groups.

Conclusions

Performance change between the treatment group and comparison group was not significant at the .05 significance level for any of the six hypotheses. The six study hypotheses were rejected. Employees in departments with employee participation groups did not improve any of the procedural performance measures more than employees in departments without employee participation groups.

Procedural measures used in this study did not indicate short-term effectiveness by employees involved in employee participation groups when compared to employees not involved in employee participation groups. Performance changes for five procedural measures were similar for both the treatment group and comparison group. In both groups attendance decreased, scrap dollars decreased, quality audits improved, customer complaints decreased, and productivity decreased. The number of written grievances for the treatment group decreased and increased for the comparison group. These changes for the procedural measure of written grievances were not statistically significant.

Intervening variables may have influenced change in performance of the procedural measures. Several programs were started under the Quality of Work Life umbrella to reduce cost, improve quality, and create customer satisfaction. The employee participation group activity was one of many programs involving employees in operating decisions at the case company.

Recommendations

This case study reported findings that lead to the following recommendations:

1. The employee participation group intervention used in this study is not recommended for a manufacturing environment based on the study findings at the case company. Quality of Work Life programs may be influenced by the maturity of an organization. Each organization needs to create a culture change consistent with the organization's environment.
2. Define specific operating parameters for employee participation that are consistent with the purpose for starting employee participation groups.
3. Provide goals and expectations for employee participation groups that are consistent with organizational objectives. Measure progress and provide feedback to the group at regular intervals.
4. Educate the total organization on the Quality of Work Life process. Many tasks undertaken by employee participation groups require interaction and support from other employees in the organization.

5. Study the relationship between perceptual measures and procedural measures of performance. Perceptual measures may have a relationship to certain procedural measures that could help determine change in performance.

6. Study individuals within groups and individual groups. Performance of one or two individuals may influence the findings of the employee participation group. The maturity level of a group may change performance measures at different rates.

Case studies are needed to provide organizations with information where employee involvement has improved procedural measures of performance. This information may guide other organizations toward successful employee involvement programs. Alteration to the Quality of Work Life process should be made if desired outcomes are not achieved.

Summary

Employee involvement is important to the success of any organization. Findings of this study did not indicate short-term improvement in the procedural measures of attendance, written grievances, scrap, quality audits, customer complaints, or productivity between the treatment group with employee participation groups and the comparison group without employee participation groups. Findings of this study should add information used to evaluate Quality of Work Life interventions. Cultural changes in an organization take many years to evolve. Gains may not be recognized in a short time period. Organizational commitment, with goals and programs to support

employee participation groups, may contribute to the overall success of employee involvement programs.

There is a need for all employees to have input into decisions that influence their workplace if American companies are to become competitors in a world market. Employee participation groups are a forum for employees to make positive change in their workplace. The Quality of Work Life method is not specifically defined for each environment. Each organization needs to create a culture change consistent with the organization's environment.

Changes in performance of procedural measures may not be influenced by employee involvement in employee participation groups. Similarities of performance change between the treatment group and the comparison group may indicate organizational influences other than employee participation groups that caused performance change. Organizational direction, goal setting, and other employee involvement programs may have been intervening variables that influenced performance change as much as the intervention of employee participation groups.

APPENDIX

Appendix A

Department Support Tables

Table 13
Available Hours for Employees to Work--Departments With Employee Participation Groups

Months prior to employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	2,860	2,366	2,315	2,887	3,168	3,043	3,471	4,142	4,725	5,118	4,045	4,524	42,664
B	2,331	2,645	2,899	3,924	3,334	4,234	3,845	3,320	2,783	3,436	4,669	4,675	42,095
C	5,627	4,387	3,531	3,682	3,020	3,529	3,817	4,676	6,317	5,831	6,548	6,227	57,192
D	2,479	2,365	2,522	2,808	1,902	1,285	1,399	1,690	1,484	1,390	1,982	2,518	23,824
E	1,103	1,155	1,385	1,614	2,271	2,099	3,182	3,106	2,535	2,533	2,973	3,117	27,073
F	4,361	3,075	2,922	2,251	3,119	3,100	4,038	3,166	2,979	3,159	2,709	2,529	37,408
G	2,539	2,060	3,137	2,508	2,642	2,949	2,643	2,484	2,884	3,612	3,608	3,343	34,409
H	1,314	1,467	1,320	1,604	1,697	1,886	1,538	1,482	1,859	1,714	1,552	1,694	19,127
I	968	889	983	1,060	758	896	609	965	1,223	1,018	1,049	1,034	11,452
Group total	23,582	20,409	21,014	22,338	21,911	23,021	24,542	25,031	26,789	27,811	29,135	29,661	295,244
Months after employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	3,825	3,466	3,576	3,284	3,444	2,714	1,758	2,510	2,482	3,000	2,786	3,108	35,953
B	4,448	5,311	6,617	6,872	5,635	6,159	5,476	4,507	4,274	3,906	4,389	3,913	61,507
C	5,723	5,960	6,306	6,386	5,631	5,349	7,009	7,367	7,802	6,689	7,571	6,993	78,786
D	2,772	2,079	2,565	2,783	2,207	1,989	2,605	2,624	2,536	2,501	2,990	3,622	31,273
E	2,612	2,778	3,552	3,805	3,680	3,173	3,903	3,497	2,815	2,973	2,731	3,402	38,921
F	3,241	3,562	3,585	3,777	4,445	4,972	7,302	6,201	6,095	5,428	5,553	5,753	59,914
G	4,274	4,939	4,515	3,831	4,375	4,051	3,898	4,283	3,934	4,316	3,046	2,177	47,639
H	1,964	1,091	822	821	857	1,057	1,157	1,406	1,304	1,243	1,332	1,271	14,325
I	1,093	982	1,129	1,063	1,000	1,270	1,200	1,343	545	439	444	735	11,243
Group total	29,952	30,168	32,667	32,622	31,274	30,734	34,308	33,738	31,787	30,495	30,842	30,974	379,561

Table 14
Available Hours for Employees to Work--Departments Without Employee Participation Groups

Months prior to random assigned date													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	2,411	1,702	1,640	2,150	2,437	2,302	1,853	2,507	2,439	3,053	2,514	2,647	27,655
K	1,094	1,062	1,130	847	957	1,216	1,092	931	1,350	1,637	1,751	1,617	14,684
L	744	967	1,003	1,397	1,343	1,616	1,664	1,484	1,525	1,890	1,871	2,040	17,544
M	872	852	946	828	928	1,016	1,616	1,726	1,781	1,943	1,702	1,346	15,556
N	581	530	503	546	568	848	910	808	887	662	655	786	8,284
O	1,622	1,643	1,069	2,151	1,782	3,085	3,087	2,492	2,711	2,974	2,604	2,365	27,585
P	2,461	2,136	2,932	2,690	2,383	2,103	2,715	2,757	2,876	2,573	3,182	3,909	32,717
Q	775	673	831	764	1,081	1,046	939	976	647	821	1,084	1,146	10,783
R	2,411	1,886	2,309	2,742	2,577	2,094	2,475	2,753	2,811	2,758	3,394	3,479	31,689
Group total	12,971	11,451	12,363	14,115	14,056	15,326	16,351	16,434	17,027	18,311	18,757	19,335	186,497
Months after random assigned date													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	2,667	2,339	2,586	2,098	1,819	1,877	1,576	2,133	1,794	1,822	1,549	1,697	23,957
K	2,060	2,052	2,306	1,938	2,013	2,011	2,128	1,959	1,811	1,972	1,710	1,504	23,464
L	2,237	2,745	3,297	4,042	3,575	3,431	3,425	3,156	2,893	2,864	2,474	2,205	36,344
M	1,769	1,654	1,851	1,625	2,138	2,428	2,648	2,392	2,396	2,301	1,947	2,227	25,376
N	681	623	451	685	867	906	576	952	1,022	1,091	1,165	1,111	10,130
O	2,142	3,547	3,103	2,375	3,593	3,594	3,236	3,222	2,628	2,580	2,695	3,299	36,014
P	4,322	3,911	3,605	3,410	3,241	3,553	2,844	3,144	2,264	1,658	2,471	2,201	36,624
Q	875	1,024	1,405	1,513	1,622	1,377	1,556	1,439	1,233	1,464	1,242	1,626	16,376
R	2,907	2,902	2,807	2,596	2,076	2,483	2,117	2,016	1,738	1,129	1,769	1,555	26,095
Group total	19,660	20,797	21,411	20,282	20,944	21,660	20,106	20,413	17,779	16,881	17,022	17,425	234,380

Table 15
Hours Worked in the Plant--Departments With Employee Participation Groups

Months prior to employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	2,605	2,098	2,052	2,546	2,967	2,762	3,197	3,927	4,416	4,649	3,752	4,316	39,287
B	2,135	2,525	2,729	3,518	3,022	3,494	3,393	2,889	2,622	3,326	4,382	4,411	38,446
C	4,510	3,699	3,045	2,955	2,383	2,749	3,431	4,260	5,766	5,246	5,520	5,683	49,247
D	2,377	2,198	2,256	2,588	1,677	1,158	1,180	1,467	1,297	1,173	1,804	2,307	21,482
E	970	1,058	1,346	1,495	2,144	1,965	2,899	2,848	2,349	2,372	2,806	2,919	25,171
F	4,031	2,883	2,711	2,164	3,067	3,011	3,861	2,884	2,618	2,762	2,362	2,263	34,617
G	2,291	2,000	2,997	2,386	2,453	2,855	2,545	2,364	2,756	3,534	3,528	3,265	32,974
H	1,238	1,415	1,245	1,598	1,621	1,869	1,433	1,316	1,621	1,556	1,380	1,394	17,686
I	950	855	937	1,041	734	885	605	901	1,215	979	1,030	986	11,118
Group total	21,107	18,731	19,318	20,291	20,068	20,748	22,544	22,856	24,660	25,597	26,564	27,544	270,028
Months after employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	3,655	3,181	3,330	2,924	3,149	2,373	1,479	2,204	2,197	2,814	2,575	2,791	32,672
B	4,053	4,994	6,179	6,425	4,813	5,695	4,905	3,817	3,747	3,354	3,803	3,441	55,226
C	4,986	5,302	5,791	5,692	5,195	4,433	6,590	6,680	6,853	5,514	6,485	5,853	69,374
D	2,688	1,977	2,344	2,532	1,978	1,839	2,468	2,368	2,501	2,313	2,903	3,532	29,443
E	2,432	2,550	3,386	3,694	3,414	2,927	3,656	3,062	2,432	2,784	2,517	3,112	35,966
F	3,008	3,174	3,319	3,537	4,165	4,558	6,908	5,714	5,554	5,107	5,232	5,352	55,628
G	4,216	4,838	4,413	3,703	4,166	3,896	3,709	4,072	3,509	3,802	2,599	2,029	44,952
H	1,686	965	679	747	674	913	1,089	1,307	1,202	1,175	1,260	1,183	12,880
I	1,080	909	1,112	1,026	902	1,227	1,183	1,315	521	408	416	716	10,815
Group total	27,804	27,890	30,553	30,280	28,456	27,861	31,987	30,539	28,516	27,271	27,790	28,009	346,956

Table 16

Hours Worked in the Plant--Departments Without Employee Participation Groups

Months prior to random assigned date													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	2,183	1,516	1,423	1,983	2,341	2,194	1,796	2,328	2,367	2,792	2,436	2,532	25,891
K	1,002	993	1,053	809	877	1,182	965	872	1,215	1,538	1,647	1,504	13,657
L	656	951	987	1,335	1,319	1,595	1,621	1,442	1,457	1,863	1,843	1,922	16,991
M	808	786	874	780	903	994	1,597	1,672	1,643	1,905	1,600	1,301	14,863
N	504	422	376	543	568	824	788	658	809	626	629	777	7,526
O	1,469	1,467	947	2,025	1,721	2,947	3,001	2,400	2,450	2,824	2,431	2,279	25,961
P	1,990	1,776	2,496	2,539	2,243	2,058	2,603	2,628	2,758	2,518	3,123	3,790	30,516
Q	737	649	804	604	1,041	1,046	939	976	647	821	887	1,035	10,186
R	2,248	1,848	2,270	2,710	2,479	2,013	2,429	2,645	2,745	2,695	3,331	3,452	30,865
Group total	11,597	10,408	11,230	13,328	13,492	14,853	15,739	15,621	16,091	17,578	17,927	18,592	176,456
Months after random assigned date													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	2,464	2,106	2,405	1,971	1,750	1,673	1,490	2,061	1,700	1,734	1,478	1,621	22,453
K	1,980	1,925	2,183	1,727	1,860	1,848	1,854	1,749	1,682	1,793	1,562	1,200	21,363
L	2,108	2,605	3,182	3,738	3,254	3,153	3,157	2,788	2,526	2,415	2,230	2,066	33,222
M	1,752	1,629	1,843	1,598	2,104	2,407	2,571	2,322	2,345	2,239	1,866	2,194	24,870
N	657	596	440	677	818	825	550	924	995	1,064	1,029	1,052	9,627
O	2,124	3,352	3,025	2,255	3,487	3,527	3,092	3,077	2,567	2,247	2,362	2,985	34,100
P	4,281	3,677	3,388	3,193	3,175	3,502	2,779	2,981	2,060	1,615	2,419	2,137	35,207
Q	875	902	1,342	1,400	1,487	1,235	1,376	1,284	1,078	1,369	961	1,193	14,502
R	2,858	2,873	2,756	2,538	2,018	2,416	2,067	1,818	1,511	807	1,692	1,499	24,853
Group total	19,099	19,665	20,564	19,097	19,953	20,586	18,936	19,004	16,464	15,283	15,599	15,947	220,197

Table 17

Actual Hours Worked in Department--Departments With Employee Participation Groups

Months prior to employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	1,908	1,338	1,349	1,581	2,167	2,372	2,634	2,601	4,115	3,934	2,720	2,864	29,583
B	1,789	1,833	2,070	3,065	2,014	2,495	2,113	1,451	1,732	2,258	2,979	4,245	28,044
C	2,959	2,635	2,224	2,327	1,878	2,151	2,536	3,534	3,941	3,475	3,724	4,420	35,804
D	2,435	1,843	1,475	1,961	919	541	773	900	838	675	1,364	1,620	15,344
E	775	926	1,269	1,417	2,002	1,365	2,249	1,808	1,291	1,489	2,041	2,097	18,729
F	2,593	1,859	1,494	1,316	2,172	2,482	3,457	2,146	1,800	2,078	1,910	1,315	24,622
G	1,810	1,668	2,708	2,300	2,193	2,515	2,698	2,036	2,147	3,319	3,200	3,053	29,647
H	339	353	229	347	521	648	424	716	549	636	576	797	6,135
I	819	725	862	620	423	372	358	414	953	738	572	781	7,637
Group total	15,427	13,180	13,680	14,934	14,289	14,941	17,242	15,606	17,365	18,602	19,086	21,192	195,545
Months after employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	2,045	1,468	2,724	1,965	2,421	1,526	851	1,563	1,738	2,516	2,476	2,548	23,841
B	3,308	4,537	5,725	4,444	3,741	4,286	3,393	3,376	3,408	3,296	3,937	3,440	46,891
C	3,778	4,375	3,978	4,363	4,739	3,743	5,006	5,945	5,798	4,312	4,182	4,299	54,518
D	1,816	1,279	1,475	1,481	1,181	927	1,493	1,586	2,258	1,656	1,923	2,521	19,596
E	1,705	1,837	2,119	2,560	2,495	2,285	3,096	2,291	1,807	2,264	2,209	2,628	27,296
F	1,649	2,546	2,535	2,937	3,666	3,514	4,933	4,039	3,726	3,189	3,151	4,201	40,086
G	3,741	4,623	4,553	3,368	3,442	3,778	3,319	3,540	3,326	3,454	2,610	1,493	41,247
H	676	966	864	988	924	1,690	876	1,092	1,171	1,476	1,239	1,442	13,404
I	561	703	824	824	663	858	852	893	300	352	323	626	7,779
Group total	19,279	22,334	24,797	22,930	23,272	22,607	23,819	24,325	23,532	22,515	22,050	23,198	274,658

Table 18
Actual Hours Worked in Department--Departments Without Employee Participation Groups

Months prior to random assigned date													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	1,426	868	647	1,375	1,633	1,746	1,061	1,565	1,500	1,580	1,396	1,534	16,331
K	819	499	631	375	443	561	391	328	568	922	1,517	1,046	8,100
L	207	389	629	813	717	855	669	911	947	1,545	987	1,489	10,158
M	471	351	391	494	489	754	1,156	897	1,148	1,029	821	624	8,625
N	559	259	439	355	598	1,260	862	694	1,049	611	401	584	7,671
O	1,134	1,019	322	1,267	736	1,325	2,238	1,312	1,679	1,714	1,702	1,759	16,207
P	1,359	1,117	1,544	1,662	1,388	1,171	1,531	1,739	1,902	1,814	2,063	3,148	20,438
Q	502	430	450	422	785	532	525	645	231	515	453	619	6,109
R	1,278	1,280	1,635	1,925	1,874	1,349	1,430	1,751	1,940	1,518	1,903	2,373	20,256
Group total	7,755	6,212	6,688	8,688	8,663	9,553	9,863	9,842	10,964	11,248	11,243	13,176	113,895
Months after random assigned date													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	1,719	1,418	1,588	1,329	1,369	1,069	695	1,340	1,256	1,609	1,235	1,685	16,312
K	1,144	1,225	1,894	1,271	1,106	1,238	1,278	1,138	1,314	1,391	1,544	885	15,428
L	1,490	1,469	2,084	1,271	1,097	1,416	1,372	960	506	1,679	1,179	1,039	15,562
M	1,063	916	1,514	697	1,415	1,794	1,675	1,552	1,367	1,309	1,228	1,494	16,024
N	344	438	369	602	951	783	597	618	944	576	674	804	7,700
O	843	1,996	2,373	1,163	2,283	2,651	1,864	1,496	2,283	1,656	1,764	2,113	22,485
P	3,742	3,133	2,146	2,489	2,904	3,084	2,508	3,021	1,920	1,414	2,263	1,990	30,614
Q	675	646	884	875	1,064	795	1,033	654	522	821	605	594	9,168
R	1,885	1,449	1,863	1,469	1,062	1,385	1,276	1,112	1,078	603	962	771	14,915
Group total	12,905	12,690	14,715	11,166	13,251	14,215	12,298	11,891	11,190	11,058	11,454	11,375	148,208

Table 19
Standard Hours Produced--Departments With Employee Participation Groups

Months prior to employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	1,239	1,000	971	1,365	1,363	1,702	1,778	2,694	2,435	2,349	2,258	2,677	21,831
B	1,809	1,616	1,763	2,543	1,835	2,340	1,811	1,338	1,480	1,652	2,551	3,056	23,794
C	2,059	2,744	2,105	1,601	1,380	1,506	2,001	2,567	2,757	3,264	2,742	3,591	28,317
D	2,434	1,756	1,463	1,942	881	710	718	885	867	671	1,240	1,680	15,247
E	758	943	1,232	1,386	1,571	1,299	2,034	1,786	1,275	1,497	1,918	1,482	17,181
F	2,116	1,739	1,448	1,561	2,242	1,906	3,520	2,175	2,243	2,101	2,011	1,605	24,667
G	1,765	1,665	2,793	2,344	2,304	2,367	2,890	2,069	2,199	3,502	3,127	3,271	30,296
H	667	980	888	985	926	1,219	840	858	1,067	967	874	901	11,172
I	710	669	872	771	422	377	334	436	930	707	695	815	7,738
Group total	13,557	13,112	13,535	14,498	12,924	13,426	15,926	14,808	15,253	16,710	17,416	19,078	180,243
Months after employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	1,820	1,419	2,002	1,565	1,544	1,569	830	1,316	1,290	2,006	2,179	2,528	20,068
B	2,287	2,653	3,926	4,202	2,720	3,163	2,865	1,955	2,235	1,937	2,263	2,031	32,237
C	2,764	2,570	2,037	2,477	3,086	2,458	3,904	3,766	4,848	3,972	3,856	3,743	39,481
D	1,706	1,221	1,400	1,435	982	957	1,311	1,565	1,728	1,661	2,086	2,427	18,479
E	1,690	1,889	2,329	2,489	2,463	2,041	2,585	1,960	1,563	2,647	1,797	2,110	25,563
F	1,515	2,332	2,495	2,800	3,334	3,640	4,798	3,650	3,959	2,910	2,815	4,245	38,493
G	3,991	4,835	4,901	3,496	3,620	3,724	3,321	3,429	3,647	3,415	2,763	1,740	42,882
H	857	301	189	356	537	1,536	1,438	1,928	1,991	1,588	1,768	1,566	14,055
I	514	733	793	772	468	846	715	408	161	299	161	412	6,282
Group total	17,144	17,953	20,072	19,592	18,754	19,934	21,767	19,977	21,422	20,435	19,688	20,802	237,540

Table 20
Standard Hours Produced--Departments Without Employee Participation Groups

Months prior to random assigned date													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	1,322	808	633	955	1,223	1,153	1,047	1,249	1,277	1,528	1,158	1,358	13,711
K	709	625	646	403	447	571	408	361	582	879	1,160	1,095	7,886
L	165	435	580	727	720	757	705	746	318	773	1,065	893	7,884
M	488	331	408	509	473	722	1,092	909	1,061	1,063	879	631	8,566
N	209	189	260	228	273	525	433	295	480	309	452	450	4,103
O	1,041	943	320	989	715	1,415	1,632	1,527	1,868	1,762	1,728	2,152	16,092
P	1,940	1,136	1,589	1,628	1,371	1,133	1,446	1,720	1,858	1,670	2,110	2,521	20,122
Q	491	443	425	458	701	527	431	639	224	588	466	559	5,952
R	1,260	1,289	1,330	1,887	1,865	1,408	1,501	1,638	1,452	1,738	1,945	2,353	19,666
Group total	7,625	6,199	6,191	7,784	7,788	8,211	8,695	9,084	9,120	10,310	10,963	12,012	103,982
Months after random assigned date													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	1,523	1,228	1,507	1,335	1,132	873	681	1,075	769	961	916	1,004	13,004
K	1,265	1,239	1,148	567	1,054	1,056	1,156	949	905	870	864	490	11,563
L	955	1,054	1,527	1,353	1,231	1,127	1,312	1,165	1,137	1,025	860	849	13,595
M	713	951	995	906	1,232	1,616	1,673	1,189	1,361	1,125	1,064	1,459	14,284
N	319	460	435	402	759	934	711	818	1,014	1,119	951	884	8,806
O	779	2,041	2,445	1,319	2,502	2,709	2,024	1,995	2,331	1,595	2,139	2,418	24,297
P	2,757	2,111	1,805	1,906	1,947	2,140	1,498	2,224	1,445	891	1,429	1,457	21,610
Q	677	640	915	876	1,032	663	999	632	612	828	633	652	9,159
R	1,973	1,414	1,902	1,650	1,081	1,487	1,246	1,124	1,068	684	1,050	865	15,544
Group total	10,961	11,138	12,679	10,314	11,970	12,605	11,300	11,171	10,642	9,098	9,906	10,078	131,862

Table 21
Scrap Dollars--Departments With Employee Participation Groups

Months prior to employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	1,525	1,758	1,696	2,063	818	4,691	1,888	3,681	4,611	4,613	1,622	1,144	30,110
B	683	1,391	6	3,705	649	1,669	1,198	488	4,378	1,043	1,289	2,190	18,689
C	14,926	8,353	4,451	6,157	5,562	4,854	9,756	10,957	17,467	13,966	16,577	6,447	119,473
D	2,020	2,000	2,628	1,006	1,517	2,315	667	957	2,652	1,129	610	1,208	18,709
E	26	233	416	28	875	423	1,045	1,798	318	908	466	255	6,791
F	117	4,301	4,353	0	0	3,836	2,286	2,447	136	0	3,311	1,043	22,830
G	647	1,170	799	614	905	930	1,664	2,010	882	1,082	478	0	11,181
H	0	215	947	2,161	2,215	1,433	1,287	288	477	588	1,815	1,586	13,012
I	0	0	344	945	791	693	0	0	0	360	0	330	3,463
Group total	19,944	19,421	15,640	16,679	13,332	20,844	19,791	22,626	30,921	23,689	26,168	14,203	244,258
Months after employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	2,972	2,161	2,136	663	1,119	611	905	823	214	610	1,461	2,904	16,579
B	1,474	2,375	3,385	3,301	2,638	2,967	6,736	1,209	150	496	494	1,628	26,853
C	15,740	17,073	2,126	16,205	10,338	8,516	11,696	11,619	16,076	12,322	8,546	7,131	137,388
D	1,012	935	1,563	2,790	3,089	960	660	966	836	958	3,310	1,053	18,132
E	330	240	1,037	1,477	734	776	1,211	902	1,179	804	0	515	9,205
F	873	138	273	0	2,484	2,637	2,328	2,149	0	2,220	3,239	6,182	22,523
G	1,363	1,748	766	1,227	1,220	3,020	0	1,917	0	968	1,090	1,219	14,538
H	140	976	409	1,342	247	141	0	775	999	1,173	1,007	766	7,975
I	476	27	627	263	46	440	190	543	316	280	289	819	4,316
Group total	24,380	25,673	12,322	27,268	21,915	20,068	23,726	20,903	19,770	19,831	19,436	22,217	257,509

Table 22
Scrap Dollars--Departments Without Employee Participation Groups

Months prior to random assigned date													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	0	2,030	2,936	489	0	0	2,120	0	1,973	0	711	2,296	12,555
K	179	135	0	221	1,260	122	907	388	389	1,101	1,526	1,008	7,236
L	0	88	1,942	2,063	3,516	2,484	1,222	4,228	18,808	7,643	4,704	951	47,649
M	0	0	0	3,965	444	0	0	2,245	850	369	2,793	1,710	12,376
N	287	952	1,958	1,416	2,024	5,386	0	1,635	1,948	1,149	667	625	18,047
O	3,302	3,220	314	2,867	1,188	3,519	4,902	3,196	4,984	1,445	1,676	2,183	32,796
P	1,350	1,192	1,420	1,128	1,575	1,543	118	1,691	806	1,022	1,115	1,244	14,204
Q	0	75	0	0	0	1,187	0	0	1,533	11	0	0	2,806
R	1,857	931	59	1,507	1,622	389	1,076	0	1,060	2,025	837	907	12,270
Group total	6,975	8,623	8,629	13,656	11,629	14,630	10,345	13,383	32,351	14,765	14,029	10,924	159,939
Months after random assigned date													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	1,604	0	7,894	1,072	5,601	27	1,612	274	363	2,204	1,606	922	23,179
K	3,548	1,484	1,866	1,059	636	5,170	2,250	3,863	1,496	989	6,021	0	28,382
L	4,695	4,599	5,830	12,984	7,183	93	8,055	2,179	4,017	1,948	1,607	947	54,137
M	462	0	1,086	919	0	2,023	1,720	422	1,068	2,417	0	1,571	11,688
N	480	382	1,246	1,313	565	664	255	417	322	0	2,083	1,492	9,219
O	286	0	139	2,645	0	2,860	0	2,915	2,948	4,603	2,173	3,477	22,046
P	1,664	3,173	1,447	2,268	2,968	3,469	1,145	4,956	926	759	556	897	24,228
Q	0	0	126	114	0	0	111	0	0	150	0	0	501
R	1,757	560	0	1,085	426	865	366	0	229	1,004	1,003	0	7,295
Group total	14,496	10,198	19,634	23,459	17,379	15,171	15,514	15,026	11,369	14,074	15,049	9,306	180,675

Table 23

Quality Audit--Departments With Employee Participation Groups

Months prior to employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Average
A	145	140	109	109	114	134	117	145	114	133	145	145	129
B	127	131	118	118	127	118	118	145	145	145	145	131	131
C	72	119	112	94	143	137	111	125	133	142	135	120	120
D	136	116	83	12	136	12	83	99	104	116	136	122	96
E	90	103	124	145	140	120	135	145	145	140	140	145	131
F	134	103	145	143	134	97	145	130	128	143	145	141	132
G	145	145	145	145	143	145	145	145	145	145	145	145	145
H	145	138	116	104	145	127	139	134	145	143	143	140	135
I	120	141	141	145	124	106	106	129	111	126	129	129	126
Group average	124	126	121	113	134	111	122	133	130	137	140	135	127
Months after employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Average
A	123	129	129	129	143	137	133	145	145	145	140	145	137
B	135	123	145	145	145	145	145	145	145	145	145	145	142
C	135	141	129	144	142	129	143	143	137	143	141	141	139
D	145	127	145	145	127	145	145	138	120	145	145	145	139
E	110	145	145	130	135	145	145	125	128	145	135	145	136
F	145	121	140	99	133	143	145	140	145	138	136	143	136
G	145	145	145	145	145	145	145	145	145	145	145	145	145
H	122	145	145	145	145	145	145	145	132	155	143	145	143
I	145	141	127	145	129	145	129	137	145	135	141	145	139
Group average	134	135	139	136	138	142	142	140	138	144	141	144	140

Table 24

Quality Audit--Departments Without Employee Participation Groups

Months prior to random assigned dates													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Average
J	23	145	114	110	93	132	37	133	124	136	125	145	110
K	145	139	101	101	145	145	138	108	111	98	111	98	120
L	120	118	132	103	143	132	70	121	141	83	96	95	113
M	53	135	130	145	145	71	113	124	107	107	74	114	110
N	117	112	75	118	23	139	81	76	133	111	81	139	100
O	142	137	145	101	145	121	137	141	145	112	145	145	135
P	111	118	145	145	145	145	145	140	145	143	145	145	139
Q	145	145	102	129	145	123	114	145	145	145	140	145	135
R	138	138	138	141	141	145	101	138	130	145	141	137	136
Group average	110	132	120	121	125	128	104	125	131	120	118	129	122
Months after random assigned dates													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Average
J	145	145	145	145	122	145	132	145	145	145	145	145	142
K	145	142	145	111	111	145	145	145	95	129	129	145	132
L	109	68	133	111	137	122	112	124	124	85	108	128	113
M	66	145	145	137	113	61	140	88	128	140	105	101	114
N	139	145	112	145	77	145	145	102	109	145	122	99	124
O	137	145	145	145	145	141	145	145	145	127	145	145	143
P	145	140	145	143	145	145	145	145	145	145	145	135	144
Q	145	145	145	145	145	143	145	145	137	145	130	128	142
R	145	141	145	145	145	145	126	145	145	145	137	145	142
Group average	131	135	140	136	127	132	137	132	130	134	130	130	133

Table 25

Customer Complaints--Departments With Employee Participation Groups

Months prior to employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	2	2	4	1	4	4	2	8	1	4	6	2	40
B	2	1	2	3	2	2	1	2	2	1	5	2	25
C	6	5	6	9	11	1	1	2	4	0	1	2	48
D	2	1	3	0	0	3	0	0	0	1	0	0	10
E	3	3	1	0	2	3	2	3	5	2	1	6	31
F	2	2	3	3	4	0	5	6	5	9	8	4	51
G	1	1	0	0	0	0	1	0	0	1	2	0	6
H	7	7	1	0	3	1	1	2	2	0	0	0	24
I	0	0	0	3	0	0	0	1	0	2	0	0	6
Group total	25	22	20	19	26	14	13	24	19	20	23	16	241
Months after employee participation groups													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
A	4	4	2	0	0	1	4	2	2	5	3	2	29
B	1	0	1	1	2	2	1	2	7	0	2	3	22
C	1	4	4	1	3	3	3	0	2	3	1	0	25
D	1	1	0	1	0	0	0	1	0	0	2	0	6
E	2	1	0	1	9	2	6	1	4	2	1	1	30
F	15	7	4	6	6	9	10	7	8	10	9	7	98
G	0	0	1	1	3	1	1	0	0	0	0	0	7
H	0	1	1	0	1	1	0	0	3	1	0	0	8
I	2	0	0	0	0	1	0	2	0	3	0	1	9
Group total	26	18	13	11	24	20	25	15	26	24	18	14	234

Table 26

Customer Complaints--Departments Without Employee Participation Groups

Months prior to random assigned dates													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	1	0	0	1	0	0	1	1	0	0	0	1	5
K	1	3	2	1	2	1	0	3	1	1	3	2	20
L	0	0	5	2	0	5	0	0	0	0	1	0	13
M	2	1	0	0	0	0	0	0	1	2	0	0	6
N	5	0	2	1	0	2	0	1	3	1	2	0	17
O	1	2	4	1	1	3	1	2	0	0	2	4	21
P	6	1	0	1	0	2	3	0	2	1	1	1	18
Q	0	0	0	0	0	0	0	0	0	0	0	1	1
R	0	0	0	0	0	0	0	0	0	0	1	0	1
Group total	16	7	13	7	3	13	5	7	7	5	10	9	102
Months after random assigned dates													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	0	1	0	0	0	0	0	0	0	0	0	0	1
K	2	2	3	2	3	1	4	3	0	3	2	1	26
L	0	1	1	1	0	0	0	2	0	0	0	1	6
M	0	0	1	0	0	0	0	0	0	0	0	0	1
N	1	1	0	1	1	0	0	0	0	0	1	0	5
O	1	0	0	2	0	0	0	1	1	0	1	0	6
P	5	4	1	1	1	3	1	0	0	0	1	0	17
Q	0	0	0	0	0	0	0	0	0	0	0	0	0
R	1	0	0	2	2	0	0	0	0	1	1	2	9
Group total	10	9	6	9	7	4	5	6	1	4	6	4	71

Table 27

Employee Written Grievances--Departments With Employee Participation Groups

Dept.	Months prior to employee participation groups												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
A	0	0	0	0	0	1	0	0	1	0	2	0	4
B	0	0	0	0	0	2	1	0	0	0	5	0	8
C	0	1	0	0	0	0	1	4	3	0	0	0	9
D	3	0	2	0	0	2	5	1	0	1	0	0	14
E	0	0	0	2	1	0	0	1	0	0	1	0	5
F	0	0	0	0	0	0	6	0	1	0	0	0	7
G	0	0	2	0	1	0	0	0	0	0	0	0	3
H	1	2	0	2	6	0	5	2	0	0	0	0	18
I	0	0	0	0	0	0	0	0	0	0	0	0	0
Group total	4	3	4	4	8	5	18	8	5	1	8	0	68

Dept.	Months after employee participation groups												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
A	0	1	0	0	0	0	0	1	0	0	0	0	2
B	0	5	3	3	4	5	0	3	1	1	1	0	26
C	5	6	1	0	1	0	7	6	1	2	3	1	33
D	0	0	0	0	0	0	0	1	0	1	2	3	7
E	0	0	0	1	4	4	0	0	0	0	0	0	9
F	0	0	0	0	0	0	0	0	0	0	0	1	1
G	0	1	0	0	0	1	0	0	1	2	1	0	6
H	0	1	0	1	0	0	0	0	0	0	0	0	2
I	0	0	0	0	0	0	0	0	0	0	0	0	0
Group total	5	14	4	5	9	10	7	11	3	6	7	5	86

Table 28

Employee Written Grievances--Departments Without
Employee Participation Groups

Months prior to random assigned dates													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	0	1	0	0	0	0	0	0	1	1	0	0	3
K	0	0	0	0	0	0	0	0	0	1	0	0	1
L	0	0	0	1	0	0	2	1	3	0	2	0	9
M	0	0	0	0	0	0	0	0	1	0	0	0	1
N	0	0	0	0	0	0	0	0	0	0	0	0	0
O	1	0	0	0	0	1	2	0	0	0	0	0	4
P	2	0	1	0	0	0	0	0	0	0	0	0	3
Q	0	0	0	1	0	0	0	0	0	0	0	0	1
R	0	0	0	0	0	0	0	0	0	0	0	0	0
Group total	3	1	1	2	0	1	4	1	5	2	2	0	22
Months after random assigned dates													
Dept.	1	2	3	4	5	6	7	8	9	10	11	12	Total
J	0	0	2	0	0	1	0	0	0	0	0	0	3
K	0	0	0	0	0	0	1	0	1	0	0	0	2
L	0	1	0	0	0	1	3	1	1	2	0	2	11
M	0	0	0	0	2	0	1	0	0	0	0	0	3
N	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	1	0	0	0	0	0	1
P	1	0	0	0	0	0	0	0	0	0	0	0	1
Q	1	0	0	0	0	0	0	0	0	0	0	0	1
R	1	0	0	0	0	0	0	0	0	0	0	0	1
Group total	3	1	2	0	2	2	6	1	2	2	0	2	23

Table 29

Training Hours--Departments With Employee Participation Groups

Dept.	Months after employee participation groups												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
A	422	122	117	112	158	71	122	138	155	125	136	119	1,797
B	160	232	70	230	413	488	387	182	231	71	80	80	2,624
C	354	66	428	379	390	496	208	120	120	192	496	470	3,719
D	164	44	150	85	58	39	82	154	72	50	84	86	1,068
E	202	60	184	83	182	176	372	300	135	91	87	72	1,944
F	378	272	155	165	196	200	216	285	483	421	295	300	3,366
G	324	44	76	186	168	95	95	42	62	22	18	97	1,229
H	129	67	185	78	55	50	58	51	53	48	52	55	881
I	110	53	115	74	37	51	50	39	66	51	72	59	777
Group total	2,243	960	1,480	1,392	1,657	1,666	1,590	1,311	1,377	1,071	1,320	1,338	17,405

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