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What are the Effects of Work Restructuring on Employee Well-Being and Firm Performance? Evidence from Telecommunications Services

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Abstract
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Keywords
human, resource, organization, staff, manager, work, employ, firm, performance, service, telecommunication, restructuring

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Executive Summary

Effects of Work Restructuring On Employee Well-Being and Firm Performance: Evidence from Telecommunications Services

The purpose of this study was to assess whether there are benefits to employees and firms associated with new forms of work organization and human resource and industrial relations practices. I examine a series of interrelated questions that may be summarized as follows. First, does participation in either total quality improvement teams or self-directed teams have benefits for workers, managers, and firms? If benefits exist, are they undermined by the negative effects of understaffing and job insecurity associated with downsizing? And finally, is there a coherent set of work organization, human resource, and industrial relations practices that provides mutual gains to employees and firms alike? The study utilizes a unique multi-level survey of 1,200 workers and managers in network and customer services from a regional Bell operating company to answer these questions.

The central findings of this study may be summarized as follows.

Participation in total quality has the effect of increasing employee satisfaction with participation in joint decision-making. Beyond this, it has a minimal effect on the job characteristics, other work-related attitudes, and individual performance of employees in this study. In multivariate equations, it has no significant effect on job satisfaction, organizational commitment, or performance. This does not mean that the total quality program is unsuccessful or that it has not produced cost savings or innovations across the company. It means that the benefits from offline participation do not occur through improvements in these attitudes or in the performance measures used here. The cumulative effect of participation in QWL, other problem-solving, and total quality programs does, however, have significant positive effects on job satisfaction and overall satisfaction for both management and non-management employees.

In contrast to offline participation, the self-directed team (SDT) program in this case is associated with significant differences in workers' job characteristics, work responsibilities, absorption of supervisory tasks, incorporation of quality control, internal group learning, and cross-functional problem-solving.

For workers these differences translate into positive benefits, in terms of their greater autonomy, greater on-the-job learning, use of skills, and sense of satisfaction with their jobs and

pride in their work. Seventy-five percent of those not in teams would volunteer, while less than 10 percent currently in teams would choose to abandon them.

The differences between self-directed and traditional work groups are considerably stronger and more consistent in network than in customer services. Technological and organizational constraints limit the extent to which service workers may gain decision-making autonomy and create boundaries around work for which they are solely responsible. Despite these constraints, service workers also report significant benefits from teams associated with more autonomy, learning, cooperative group behavior, and measures of satisfaction and organizational commitment.

The major change for managers associated with the adoption of self-directed teams is an increased span of control. First line supervisors, but not middle managers, are significantly negatively affected by self-directed teams in terms of job satisfaction; but surprisingly, their involvement with SDTs is a significant predictor of commitment to the organization. On average, they appear to signal their commitment by participating in an innovation that they do not view as enhancing their job satisfaction, but that they perceive as necessary for competitiveness.

By contrast, the understaffing and loss of job security associated with downsizing have significant negative effects on job satisfaction and overall satisfaction and commitment to the company. These effects contradict the positive incentives provided through job enhancing strategies.

Over and above the effects of these work innovations, there is strong evidence that employee satisfaction and commitment are enhanced by a coherent set of human resource and industrial relations strategies that provide a supportive work environment. These include advancement opportunities, pay satisfaction and positive co-worker and labor management relations. The understaffing associated with downsizing, however, has a significant negative effect on satisfaction and organizational commitment, which in turn affect some measures of performance. This suggests that while the direct effect of downsizing has a stronger negative effect on employees, it is not just employee satisfaction, but firm performance that is likely to suffer as a result of the organizational upheaval associated with downsizing.

Firms appear to benefit from the adoption of teams, both through better performance and cost savings. In multivariate analysis, team membership is a significant predictor of work processes such as quality monitoring, internal group learning and cross-functional problem solving that should lead to improved quality and customer service. Teams also have a significant positive effect on self-reported work group quality and quality improvement.

A surprising result is that the objective performance effects of teams are more robust for customer services than network. On average, members of self-directed teams in customer services have 15.4% higher sales revenues per month -- $5,784 versus $5,011 per month. Multivariate analyses that control for variation in workplace and demographic characteristics show that being a member of a self-directed group increases monthly sales revenues by between roughly $925 and $975 per month, or 18-20 percent over sales in traditional groups.

SDT membership in network has a significant positive effect on quality and quality improvement as reported by workers. Network teams engage in more internal group learning and cross-functional problem solving and take more responsibility for quality inspections. These differences, however, do not have a measurable effect on objective company measures of quality or customer service. While performance effects may exist, they are not captured by measures used in this study. Instead the objective effects of network SDTs are found in the analysis of hours worked. On average, SDT network technicians shift approximately 2 hours per month from "productive" work (installation and repair) to "non-productive" work (time in meetings and training). In addition, they work 5.5 more hours per month to absorb supervisory tasks, which they take as overtime. The net result is that network teams do the work previously done by supervisors in 6275% less time, depending on how estimates are calculated.

In sum, the objectively measurable effects of teams in customer services are through increased sales revenues, while network teams appear to absorb more supervisory functions, and this translates into indirect cost savings.

The amount of savings in indirect costs is contingent upon how much the span of control of first fine supervisors is increased. Using conservative estimates of increases in the span of control of supervisors (a twenty-five percent cut in the number of supervisors), a savings of between $113 and $144 million per year is realized; more liberal assumptions (50 percent reduction in supervisors) yield savings estimated at between $225 and $288 million per year in indirect labor costs. These estimates are based on the net value of savings after taking into account the increased work hours of SDT workers in network.

The limits of generalizing from the findings in this study should be recognized. I have argued that the outcomes of work innovations are contingent upon the nature of the work and technology, and this argument is substantiated in the study by the comparison of effects in two occupations - network and customer services -- within the same company. Additionally, the historical and institutional context of this case shapes the outcomes in important ways -- particularly the role of the union. A history of mature bargaining and union participation in negotiating the parameters of employee participation in innovations cannot be underestimated.

The changes introduced by self-directed teams grow out of written agreements between workers and managers in conjunction with union stewards about what new responsibilities workers will adopt. While the labor-management environment is not always characterized by high levels of trust or agreement over issues, particularly in this period of downsizing and job loss, there is mutual respect for mature bargaining institutions that allow employees to participate more freely in work innovations than would otherwise be possible.

The Effects of Work Restructuring on Employee Well-Being and Firm Performance: Evidence from Telecommunications Services

L Introduction

The purpose of this study is to assess whether there are benefits to employees and firms associated with new forms of work organization and human resource and industrial relations practices in the telecommunications services industry. Both the business and academic literature assume that both employees and firms stand to gain from "transformed" or "high performance" work systems -- systems that increase employee participation, decentralize decision-making, invest in training and other human resource practices, and involve the union in strategic planning. Systematic evidence to support this idea, however, is slim, and comes primarily from research in manufacturing settings.

This study assesses the outcomes of work reorganization in telecommunications services -- particularly in the regional Bell operating companies where firms have intensified efforts to restructure in order to compete in deregulated local markets. I examine a series of interrelated questions that may be summarized as follows. First, does participation in either total quality improvement teams or self-directed teams have benefits for workers, managers, and firms? If benefits exist, are they undermined by the negative effects of understaffing and job insecurity associated with downsizing? Finally, is there a coherent set of work organization, human resource, and industrial relations practices that provides mutual gains to employees and firms alike?

This paper summarizes the results of a two-year study that included extensive field research and interviews in several regional Bell companies as well as a detailed quantitative study in one regulated telephone subsidiary. The paper is organized as follows. In Section II, I summarize current organizational strategies designed to improve competitiveness and customer service in regional telephone markets. I contrast market sensitive decentralizing strategies designed to improve customer service through increased employee participation and responsibility with cost-cutting and downsizing strategies associated with increased centralization. I do not include a discussion of reengineering because it had not proceeded far enough in any one company at the time of the study for me to evaluate or measure its effectiveness. In Section III, I briefly describe the content of the survey, how it was developed and administered, and how participants were selected. Section IV summarizes the outcomes of work restructuring for workers and managers. I describe the kinds of changes in jobs and work groups brought about by total quality and self-directed team programs, and the results from the

perspective of workers and managers. Section V presents the performance outcomes of these programs based on employee self-reports and objective company data. Conclusions follow.

II. Work Restructuring in Regional Telecommunications Services

The legacy of the regulated monopoly structure of AT&T was a highly centralized bureaucracy that is incompatible with competing successfully against leaner and more flexible new low-cost entrants in deregulated markets. Unlike large manufacturing firms that have focused on work reorganization to eliminate the worst excesses of mass production, the former Bell System companies have defined their central competitive disadvantage as the problem of bureaucracy. To reduce bureaucracy and shift to an "enterprise" organization, these firms have undertaken two competing approaches to organizational reform. I refer to the first as "market-sensitive decentralization" and the second as "remote service centralization."

The strategic argument for market-sensitive decentralization in services is as follows. Decentralized management systems view skilled employees as the key strategic asset of the firm. High levels of quality and innovation come from employees who have the appropriate skills, the autonomy to make operational decisions, and the incentives to volunteer their effort and commitment to make the firm successful. In service industries, customer-contact employees are viewed as the core group in the workforce who play this role because they can build loyal customers. Firms improve competitiveness and build market share by building and retaining a loyal clientele. Customer contact employees who have on-going relationships with clients contribute to firm competitiveness in at least two ways: first, through long-term relations, they build the kind of trust and personalized service that helps retain customers as well as customized service that responds to the particular needs of customers; second, these employees can provide continual information and feedback to the company on what new services customers are demanding, thereby contributing to service product innovation. Downsizing is likely to accompany this strategy, but as a consequence of a job enhancing reorganization strategy. Moreover, because frontline workers are considered the strategic core workforce, it is also likely to affect corporate staff and management employees more than frontline workers.

The second approach attempts to reduce costs and improve customer service by taking advantage of the lower costs and service benefits associated with new software technologies. These technologies allow firms to consolidate customer service and network installation and repair functions into large, remote units that cover large geographic areas -- essentially physically distancing service employees from customers. This approach focuses on realizing scale economies and cutting costs through consolidations, new applications of technology,

reengineering, and downsizing. It begins at the macro organizational level and relies on top management, consultants, and engineers to develop system-wide innovations. This approach relies on centralized decision-making rather than decentralized discretion. Because changes in the design of jobs and human resource practices flow as a consequence of new technologies and organizational restructuring, companies do not make prior commitments to job enhancement or employment security. This approach is likely to entail more radical downsizing than the first approach because it capitalizes on office consolidations and allocative efficiencies resulting from reengineering. It also has a larger effect on lower skilled and frontline employees whose jobs are eliminated through consolidations and reengineering.

While both strategies may coexist in theory, I argue that they create opposing organizational structures and incentive systems for employees so that the anticipated benefits from reform efforts are unlikely to be realized. This may occur in a number of ways. First, continued centralization of decision-making is likely to undermine lower-level managers and employees' attempts to utilize their discretion in responding to customers -- that is, to take advantage of market-sensitive decentralized decision-making. Second, downsizing undermines the employment security that theorists believe is required for successful implementation of participatory or self-directed work systems. For employees, the quid prod quo of participation is assurance that employee suggestions for improvement will not result in their own loss of employment. Employees are unlikely to volunteer performance-enhancing suggestions if they believe the ideas will contribute to job loss. Third, to the extent that downsizing has the effect of spreading the same amount of work over fewer people, (that is, it is not accompanied by work process improvements), downsizing is likely to result in understaffing and may, in fact, lead to a reductions in customer service for firms and increased workload and stress levels for employees. Downsizing to date in this industry has largely been across-the-board and has not been preceded by detailed analyses of the work process. More importantly, firms have found that process reengineering has proven to be much more complicated to implement than leading theorists and management consultants believed it would be so that failures have resulted in several instances. Finally, the probable effect of job insecurity is to reduce employee morale and undermine commitment and effort. This effect may be offset by greater employee effort driven by fear -- at least in the short run -- so that the net effect is uncertain.

I explore these issues through a detailed quantitative case study of one of the regional Bell operating companies. I selected the company because it is representative of the others in terms of the range of its reform strategies, including the adoption of a regional corporate structure; a divisionalized market organization; decentralized approaches to customer service; and

organizational consolidation, downsizing, and reengineering. In other words, it embraces the contradictory approaches to organizational restructuring which I have discussed above. In addition, it is also more advanced than others in terms of its decentralization efforts. That is, it has more extensively implemented decentralized management systems, both by shifting more human resource decisions to middle managers and by shifting more customer service decisions to self-directed teams. While it would be inaccurate to call this a "best practice" case in all respects, it does represent the higher end of the spectrum in terms of implementing decentralized management systems. If decentralized systems are to succeed in this industry, we would expect them to do so in this setting. Alternatively, if they do not succeed in this case, they are unlikely to do so in other settings.

The case also offers the unique opportunity to address a major issue in the debate over employee participation: the relative effectiveness of different approaches to participation. In this case, the company experimented with two approaches: participatory management through a Total Quality Management (TQM) Program, and self-management, through a "Self-Directed Team" (SDT) Program. TQM is a leading example of a participatory system and borrows from Japanese Lean Production Systems. Self-directed teams (teams) are the leading example of attempts to introduce self-management, and are inspired by the socio-technical systems (STS) movement. Differences in the two centers on the extent to which firms decentralize decision-making to middle and lower level managers versus frontline workers to achieve enhanced competitiveness in customer service delivery. Under participatory systems, lower and middle level managers retain decision-making authority with respect to customer service; they play an important role in marketing and are often directly in contact with customers, particularly large or business customers. They collaborate with workers in "off-line" problem-solving meetings in which they learn from employees and incorporate their ideas into strategies for improving service. Both managers and employees are likely to undergo training designed to improve their technical, problem-solving, and interpersonal skills. By contrast, under self-management or self-directed systems, firms eliminate larger numbers of lower and middle-level managers, and shift some of their responsibilities to frontline employees. In theory, teams of customer-contact employees then have more authority to directly respond to customer requests and make arrangements with customers that would have been handled by supervisors.

In the case presented here, both programs are voluntary in nature so that there is wide variation across the company in the levels of implementation of each, and this variation provides the research opportunity to assess the relative outcomes of different approaches. Both the Total Quality and Self-Directed Team programs in this case represent a serious corporate-wide effort

to help build a decentralized market-sensitive strategy to improve customer service. The company and union have developed an elaborate multi-tiered structure or "parallel" organization that involves regular meetings between middle managers and local union presidents as well as middle and lower level managers and frontline employees. At the middle management or "District" level, managers and local union presidents form a "Quality Steering Committee" that meets on a monthly basis. The Steering Committee, in turn, charters quality action teams or "off-line" problem-solving committees to find ways to reduce costs and improve customer service. These adhoc subcommittees or teams involve small groups of managers and workers and meet until they reach a recommendation to solve the identified problem. Currently there are 255 teams operating throughout the regulated phone company. There is roughly one company-trained quality facilitator/trainer for every 150 employees. Eighty-five percent of employees have received at least 2 days of training in total quality; some have received more. According to the survey sample, 12 percent of employees have participated in a quality action team or other problem-solving team.

The self-directed team program has a very different thrust. The company expects to benefit from teams through reductions in indirect labor costs and through greater employee motivation and sense of ownership assumed to result from autonomous teams that resemble a small business concept. Currently, roughly five percent of the workforce in network and customer services are participating in teams.

A central feature of the program is that the union and the company negotiated the overall parameters for participation in self-directed team experiments. No teams can be formed without the approval of local union presidents. Workers and managers who wish to set up teams do so by arriving at an agreed upon set of responsibilities for workers to adopt, and workers vote on whether they want to go "self-directed" or not. Where some workers do not want to participate, local management and union representatives may resolve the issue either by not going forward with the change or by having the worker(s) who do not want to participate report separately to a supervisor. Workers do not get extra pay for assuming supervisory tasks; in fact they do not get the additional pay that workers in traditional groups get if they are asked to take on supervisory duties.

Workers and the union generally support the concept because it frees workers from the historic problem of over-supervision in the industry. Among workers surveyed for this study, over 75 percent who are currently in traditional work groups say they would volunteer for teams if given the opportunity. By contrast, less than 10 percent who are now in teams say they would like to return to traditional supervision.

The network crews who are involved in these programs hold highly skilled and autonomous craft jobs that were historically resistant to Taylorism: building and maintaining the network transmission and switching infrastructure required workers to have electro-mechanical skills and knowledge and to complete a whole task -- for example, an installation or a service repair. Geographic dispersion reinforced autonomy. This group continues to hold highly skilled, blue collar, craft jobs; and workers are 90 percent male. Historically, Bell companies hired high school graduates for these jobs, but new recruits are expected to have an associate or technical degree in electro-mechanical, and increasingly digital, skills.

The idea behind self-directed teams in network is that they allow installation and repair (I&R) crews to take responsibility for serving customers in a given "turf' or geographic area, similar to a small business unit concept. In addition to reducing indirect labor costs by doubling or tripling the span of control of first-line supervisors, firms anticipate improved quality and productivity because workers know that only they are responsible for their turf -- a great incentive for preventative maintenance over quick fixes, an historic problem in the industry due to the routine use of purely quantitative performance measures. Productivity is also likely to increase because workers don't have to delay service to check with supervisors about nonroutine problems; instead, they can solve them on the spot or call a fellow team member for help[1]. This advantage, however, may be offset by the time required to absorb supervisory tasks, so that the net productivity effect is uncertain. One manager called self-directed teams, "... the patrol officer model in which each telephone repair team has a 'beat'. It allows local residents to get to know their repairmen.... allows them to ask for help if they see repairmen in neighborhood ...allows teams to handle more than one problem at a time. Under the old system, a customer with a problem called into a dispatcher who notified the foreman who assigned the work to an individual randomly. Now the customer calls the team directly and the team gets right on it. Faster cycle time, better service".

Even in rural areas with traditionally more autonomous work groups, the shift to formal self-directed teams changes the responsibilities of workers who absorb both the internal administrative duties of supervisors and the external duties of interacting with customers as well as other departments to get the job done. This includes ordering supplies, bringing in jobs, negotiating with parties over turf responsibilities, answering customer complaints, and working with engineers in the pre-survey stage. In the language of quality consultants, craft workers'

[1] Historically, telephone companies did not allow I&R workers to "double up" because it was considered inefficient. Workers who couldn't solve a problem had to go back to the office and get their supervisor who then came out and looked at the job before deciding what to do.

interaction with both "internal" and "external" customers has grown. In summary, these teams are already highly skilled, and change primarily by absorbing vertical and horizontal tasks, although deepening of skills in problem solving and quality control also occurs.

Workers in self-directed network crews say they like it better because of the greater autonomy ("no supervisor spying on you"), greater cooperation and informal training between more and less experienced craft workers, greater authority to work directly with engineers and other "subject matter experts," and greater recognition ("now if a job goes well, we get the credit").

In contrast to network crafts, self-directed teams are more difficult to establish in customer services because current technology and office rules more fully constrain employee discretion. Customer service workers take orders (sales representatives) or answer questions (billing and collections representatives), manipulating computer databases to pull up or input customer information. The jobs require at least a high school diploma, but most workers have some college or post-secondary education. The jobs have become increasingly complex and stressful because companies have dramatically expanded the varieties of service they offer and because there is greater pressure to sell. Increased workload and stress, therefore, is generalized, and is not associated with self-directed teams per se. Additionally, new technologies such as automatic call distribution systems have increased constraints by automatically pacing incoming calls. Call-loads are set at the state level so that not even lower or middle level managers have discretion over scheduling breaks and assignments. To give these workers the time away from the board needed to absorb supervisory tasks, supervisors would have to reduce the workload or call-load of the teams; many supervisors are unable or unwilling to do this, either because workloads are already too heavy as a result of downsizing or because giving "special treatment" to self-directed groups will create resentment from other workers. There is less ability for teams to create a "closed system," unless an entire office becomes self-directed; but "mandating" participation may undermine the positive effects of the voluntary program.

As a result of these organizational and technological constraints, experiments in self-management in customer services have been less able to bring about major changes in job characteristics, although team members do report significantly higher levels of autonomy. In general, however, we would expect to see fewer significant differences in survey responses of self-directed and traditionally organized workers in customer services. Yet even in this highly constrained environment, only 6 percent of team members say they would return to traditional supervision, and three quarters of traditional workers would volunteer if given the opportunity.

In customer services' experiments with self-directed teams, service representatives absorb both the administrative tasks for the work group and the job of interfacing with "subject matter experts" in other departments to find out answers to non-routine questions or problems that arise. Workers say they like this change because it requires managerial staff in other departments to give to workers the respect and credibility normally reserved for professional and managerial employees.

Additionally, teams report that a benefit of moving to self-management is the improved motivation that comes from having more independence, gaining respect, and working as a team. More learning takes place among group members who share knowledge in areas such as improving sales revenues, solving complicated billing problems, or handling difficult customers. Both workers and firms appear to benefit, therefore, but the differences between teams and traditional groups are not as strong or pervasive in customer services as they are in network. In summary, teams in customer services minimally expand vertical or administrative tasks and minimally increase depth of problem solving and learning.

III. Description of the Survey

To select employees for the survey, we began by identifying the total number of self-directed teams in the company. A total of 165 self-directed teams existed at the time of the survey, including 115 in network craft and 54 in customer service occupations. We then used the corporate HR information system to randomly select an equal number of traditional work groups (traditional groups), matched by occupation, state, and rural/urban location[2]. The first, second, and third level managers for these self-directed and traditional work groups were then added to the survey sample.

[2] We took great care to try and make sure that we "controlled for" variation in context and working conditions so that we could carefully examine the added affects of workplace innovations. As a result, for example, among network participants, we have roughly equal percentages of SDT and TOG members in each state, as well as who work in rural, urban, and suburban areas and handle residential, small business, and large business customers. We asked about the state of technology that workers use each day, and found similar percentages in both teams and traditional groups in network who reported working with "old cable" (lead or air core), or new plant. Roughly similar percentages say they routinely work in "high crime" areas; and both groups report similar average daily driving time (1.5 vs. 1.6 hours/day). There are also no large differences in the demographic characteristics of the groups (age, race, gender, education level, overall company tenure, union membership). These similarities also largely hold among customer service workers: similar percentages use the new regional negotiation system (RNS), and they are similar in demographic characteristics with the exception of the % female and company tenure (slightly higher in teams).

A total of 1,191 employees responded to the survey, representing a response rate of 59 percent -- relatively high for a mail survey[3]. This includes 395 managers and 796 workers[4]. There were roughly equal numbers of employees associated with teams and traditional work groups: 50 percent of all respondents from network were involved with teams; while 40 percent of all customer service employees were similarly involved. A higher number and percentage of network employees were included in the survey because self-directed teams are more widespread in network than in customer services[5]. Sixty-three percent of respondents are in network; 37 percent are in customer services. The sample is reasonably representative of the percentages of employees in the company who are in each respective occupational group: of the survey respondents, 66.8 percent are workers and 33.2 percent are managers; the management breakdown is 17.2 percent first level, 12.6 percent second level, and 3.4 percent third level[6]. Tables 1a and 1b present a breakdown of the numbers and percentages of respondents by department, job title, and whether or not they are involved with self-directed teams.

In addition, the sample has a relatively broad and even distribution of employees currently participating in the total quality program. Overall, approximately 20 percent of workers are participating, 54 percent of first line supervisors participate, and 64 percent of middle managers are involved in the total quality program. Two patterns are notable. First, as would be expected, the higher the level of management, the higher the percentage of employees who participate in the total quality program. Second, for each job category, roughly equal percentages of employees associated with traditional and self-directed work groups are also participating in

[3] In order to not unduly interfere with the work schedules of employees, I randomly selected one-half of the members in work groups to answer survey questions. Surveys were mailed to employees on the job in January and February, 1994, and returned to an MIT P.O. Box. The company director for Corporate Quality and the Regional District President of the CWA jointly sent a cover letter endorsing the survey. Instructions emphasized the voluntary nature of participation and managers were asked to cooperate and allow employees to use company time to respond. Employees returned the survey in enclosed stamped envelopes addressed to the "MIT Work Innovations Study" at a P.O. Box in Cambridge.

[4] Local union presidents also responded to surveys concerning how union responsibilities have changed with greater involvement in work reorganization efforts. The results of that survey are not reported here.

[5] The network crews in this study have a variety of sub-specialties, but the overwhelming majority are outside craft workers. The bulk (45%) are service techs. The next largest groups are cable repair and cable splicing techs (16%), and facilities and outside plant techs (10%). There are smaller numbers of electronic techs, network techs, and engineering techs also included.

[6] In the real company at the time of the survey, 73 percent of the workforce was nonmanagerial, while 27 percent was management: the management breakdown was 12.4 percent at the first level, 6.8 percent were second level, and 4.1 percent of the workforce at the third level.

off-line total quality problem-solving teams. For workers, the percentages are slightly higher among self-directed than traditional work groups; the pattern is reversed for managers. The central point here is that the sample contains a sufficiently large and evenly distributed group of employees who participate in off-line problem solving so that the outcomes of participation in total quality may be compared to the outcomes from the self-directed team program.

The survey covered seven domains of interest:[7]

- Individual job characteristics, including types and levels of skills required for the job; technology; degree of control over tools, procedures, and pace of work; types of customers served; geographic location (state and urban, suburban, or rural location); authority to meet customer needs; degree of change in control over work; workloads and changes in workloads; hours of work and overtime; span of control and changes in span (managers only);
- Work group characteristics (workers only), including composition, selection criteria, tenure of individual's membership, tenure of supervisor, work responsibilities, degree of control over decision-making, group leadership, work group relations, group meetings, relations with workers and managers outside of the group;
- Human resource practices, including extent of participation in QWL, Total Quality, and other problem-solving groups; days of training (basic, technical, quality, leadership, SNIT and group process)in previous two years; assessment of immediate supervisor, including adequacy of feedback, fairness of treatment, and support for participation and total quality); assessment of opportunities for career development and advancement; assessment of job security and changes in job security; annual earnings and satisfaction with earnings;
- Industrial relations practices, including the extent of involvement and support from the local union for workplace innovations (QWL, Total Quality, SMTs), and the quality of labor-management relations at the local level;
- Work-related attitudes, including satisfaction scales (satisfaction with job, participation in decision-making, opportunities for advancement, pay, employment security, and the company as a whole); commitment scales (loyalty and pride in working for the company); and attitudes towards top management (direction of the corporation, adequate commitment of resources, fairness of treatment);
- Perceptions of work group performance, including quality, quality improvement, and specific occupational measures for the month prior to the date the survey was issued;

[7] A copy of the survey is available upon request.

- Individual demographic characteristics, including age, race, gender, years worked, years of education, company tenure; union membership.

IV. Effects of Restructuring on Workers and Managers

How does participation in total quality and/or self-directed teams affect the daily lives of workers and managers? I begin with the effects of these programs on workers, followed by managers. I then discuss the effects of downsizing, and finally, the effects of human resource and industrial relations practices over and above work restructuring.

Workers in Network and Customer Services

Beginning with workers' participation in total quality, there are few significant effects that show up in the survey data. Participation in total quality does have a positive significant effect on workers' satisfaction with their participation in decision-making, but this effect does not carry over into other dimensions of work, such as job characteristics or job satisfaction. This finding is based on a comparison of the survey responses of workers in self-directed teams, of workers in traditional work groups, and of workers in traditional groups who are currently active in total quality improvement teams. The answers of workers who participate in total quality are not significantly different from the answers of workers in traditional groups. In multivariate equations, participation in total quality has no significant effect on attitudes or performance. This does not mean that the total quality program is unsuccessful or that it has not produced cost savings or innovations across the company. It suggests that the benefits from offline participation do not occur through improvements in employee attitudes(such as satisfaction or commitment) or the performance measures used here. An example of one of the benefits of the total quality program in customer services was a change in decision-making discretion for all employees so that they are able to make billing adjustments up to a certain limit without consulting their supervisor. In the survey, for example, over 55 percent customer service representatives said that their authority to meet customer needs had increased in the last 2 years -- a much higher percentage than reported in network where comparable across the board changes have not occurred.

In contrast to participation in total quality, the cumulative effect of participation in QWL, other problem-solving committees, and total quality programs does have significant positive effects on workers' satisfaction with their jobs and the company more generally.

With respect to participation in self-directed teams, several findings are important. In general, team members have significantly different job and work group responsibilities, and these translate into positive benefits, in terms of their greater autonomy, greater on-the-job learning, use of skills and creativity, and sense of satisfaction with their jobs and pride in their

work. This finding is consistent with what we learned in field interviews. Additionally, self-directed teams bring about considerably greater changes in network than in customer services, and I attribute this difference to the organizational and technological constraints on the latter group that limit their decision-making discretion.

Tables 3-7 present the survey results that support the findings summarized above. Each table compares the percentages of workers in self-directed and traditionally supervised groups who answered positively to a particular question, and indicates where they are significantly different[8]. Table 3 shows that teams in both network and customer services have significantly greater autonomy and control over various aspects of work -- from tasks and pace of work to authority to meet customer needs. Overall, the differences between teams and traditional groups are large and highly significant in network; they are smaller and somewhat less significant in customer services. For example in network, almost three times as many members of teams (33.6%) versus traditional groups (12.8%) say they have control over their daily task assignments; and 50 percent more say they have control over tools and procedures. Twice as many network SDT members say they have adequate authority to meet customer needs. Moreover, many more SDT members report increased control in these areas of work: 48.3 percent (of teams) versus 30.8 % of traditional groups report increased authority to meet customer needs; 31.8% versus 13.5%, respectively, report increased discretion in task assignments. By contrast, in general, the percentage of customer service workers who say they have "complete or a lot" of control over their jobs is considerably less than even the traditionally organized workers in network.

The teams do not, by contrast, report greater workloads, increased workloads, too much overtime, understaffing, or job insecurity associated with downsizing. Workforce reduction -- which at the time of this study involved some consolidations, voluntary retirement, and attrition -- rippled through the organization as older employees took voluntary retirement and attrition reduced ranks. Some work units lost more employees than others, but this variation was not related to whether teams were self-directed or not. Reductions of supervisors, however, as I discuss below, are associated with the introduction of teams. In field interviews, managers stated that self-directed teams were formed in the wake of early retirements of supervisors, or that interest in teams had increased as a result of the threat of downsizing management ranks. This is reflected in the fact that a minority (25 percent) of network team members said their team

[8] Note that in the tables we include asterisks (*) to indicate whether the estimates of the differences between the self-directed and traditional groups are statistically reliable at the 5 percent or 1 percent level (e.g., whether the estimate has a probability of error 5 percent, or 1 percent). No asterisk means that the estimates are not reliable at the five percent level or below, even though they may be large.

was formed when their supervisor left or retired. This was not true, however, in customer services.

Table 4 shows that there are large and significant differences in the way teams and traditional groups are supervised and the responsibilities they assume. Fifty-seven percent of network teams and 71% of customer service teams say that supervision has decreased since they formed self-directed teams, almost twice as many as report decreased supervision among the traditionally organized groups (in the latter case, presumably the result of quality training that encourages empowerment). While supervisors attend less than 60% of regular staff meetings of teams, they attend on average over 95% of meetings with traditionally organized groups. Over 85% of teams say they choose a work group leader, a position that normally rotates among team members.

More importantly, teams in both network and customer services take more responsibility for supervisory tasks. Whereas 27% of teams in both network and customer services set their work group goals, and over 50% assign daily tasks, the comparable figures for traditional groups are less than 2 percent and 5 percent respectively. Sixteen percent of teams in both departments say they have primary responsibility for quality and safety inspections, but less than 2 percent of the traditional groups say they do.

The table also shows how the organizational constraints in customer services limit the ability of self-directed teams to assume some new responsibilities. For example, whereas network teams have significantly more responsibility for scheduling, setting breaks, and dealing with absences compared to their counterparts in traditional groups, customer service teams and traditional groups show little difference in responsibility in these areas.

A third area of significant differences between teams and traditional groups is in their management of relations with other employees -- both internally and cross-functionally (see Table 5). Self-directed teams in both network and customer services are much more likely to say they help one another solve problems on a regular basis, that they have good co-worker relations, and that these relations have improved in the last 2 years. Moreover, much higher percentages of SDT members in both departments say that they get good cooperation from other work groups, that they have the authority to contact managers in other departments to solve non-routine problems, and that they regularly interact with these managers to get their work done. In network, the differences are larger than in customer services; network teams are also more likely to say in general that they have good relations with employees in other departments and that these relations have improved in the last 2 years.

At the same time, however, it is noteworthy that the self-directed groups in network are less likely to interact directly with other workers outside of their group. This suggests that they tend to work as a self-contained unit. They are also less likely to be "pulled from their turf' to fill-in for other workers or do emergency repair work in other territories if needed. This is an important issue. If workers are to work as a "team" and develop a small business mentality of "ownership" or full responsibility for a particular area or set of customers, they cannot simultaneously be flexibly deployed by the company to other areas as needed. In other words, there appears to be a trade-off for the company: self-directed work teams are likely to improve ownership and internal flexibility in covering a particular territory, but decrease flexibility across work groups or territories.

In contrast to the significant differences between self-directed and traditionally organized groups in the area of job characteristics and work organization, there are relatively few significant differences between groups in the area of human resource practices (Table 6). This is logical, given the fact that most human resource policies, including those covering advancement and promotion, pay, benefits, and employment security are set at the company-wide level; we should not, therefore expect, significant differences in perceptions at the level of the work group. Overwhelming majorities of all groups note the decline in opportunities for promotion or advancement and the decline in employment security occasioned by downsizing. Training does, by contrast, vary by locality, arid there are significant differences between teams and traditional groups: in network, 10.6 days (teams) versus 7.1 days (traditional groups); in customer services, 9.8 versus 8.7 days respectively.

Additionally, labor-management relations vary across local jurisdictions (Table 7). Members of teams in network are significantly more likely to say that management-union relations are "good or very good," and that both management-craft and management-union relations have improved in the last 2 years. By contrast, customer service teams are less likely to say that management-union relations are positive than are their traditionally organized counterparts (32% versus 36% respectively). Network (but not customer service) teams report higher levels of local union involvement in some workplace innovations (for example 57% of teams say the union have been actively involved in teams, versus 39% of traditional groups). They also have significantly more positive attitudes towards the effectiveness of workplace innovations (QWL, Quality, and teams) for improving working conditions and job security. A higher percentage of customer service teams also believe that teams improve working conditions and that teams and the Partnership Training program enhance job security.

One question that frequently arises is whether team members are different to begin with. For example, do they have significantly different job characteristics to begin with? Do they already have greater autonomy? Are they better performers? Are they more highly educated? Are they predisposed to be more satisfied with work to begin with?

I attempted to answer this question in a number of ways. First, I asked employees whether they were already in the work groups that made up their teams or whether new groups were formed. In network, 88 percent said that the groups were already formed; in customer services, it was the opposite -- almost 80 percent were newly formed from volunteers. This difference again reflects the organizational differences in the two occupations -- field technicians are already divided into geographic units whose boundaries can be more or less rigidly defined. Customer service representatives work in large office complexes; to form SDT experiments, volunteers must be pulled from the workforce as a whole.

I then asked managers how selection criteria were developed for participation in teams and specifically whether performance was used as a selection criteria. The overwhelming majority said that management and the union jointly determined the process. Asked if (good) performance was used as a criterion for selection, 11 percent of network managers said yes, but only 4 percent of customer service managers said yes. This is consistent with field interviews with customer service managers and union representatives who insisted that they wanted to "mix up" the "good and bad" performers so that the teams would not be resented by other work groups in the same office who would have to compete with the self-directed groups on sales objectives.

Another way of assessing whether members of SDTs are systematically different in some way is to analyze whether there are differences between employees currently in traditional groups who say they would volunteer or not for self-directed groups. That is, while we cannot go back and capture the attributes of team members before they participated in the experiment, we can compare current volunteers and non-volunteers. I analyzed whether there were significant differences between volunteers and non-volunteers along the dimensions of interest in this study, and found that there were not with the exception that the volunteers were more likely to be currently participating in the total quality program. This makes intuitive sense. People who volunteer for self-management are more likely to want greater participation in decision-making. Absent the opportunity to join self-managed teams, they are more likely to get involved in off-line problem solving or quality action groups.

Middle Managers and Firstline Supervisors

In contrast to non-management workers whose job characteristics and work responsibilities vary significantly depending upon whether they are part of traditional or self-directed work groups, the statistically significant effect of this work innovation on managerial job characteristics is relatively narrow. This is expected given the focus of the SDT program on redesigning frontline jobs[9]. The primary effect on firstline supervisor jobs is an increased span of control: supervisors of traditional groups SDTs have an average span of 9.5 versus 12.6 for SDT supervisors, a difference of 26 percent (see Table 3.8). While all supervisors on average have increased their spans of control, those associated with SDTs have increased the number of employees they supervise by an average of 4.3 versus 3.0 among supervisors of traditional groups -- a difference of 40 percent. There are also some differences in reported time allocation, with SDT supervisors reporting more weekly hours of work in "coaching" and less in "long-term planning." There are no differences between the two groups in terms of daily work hours reported (on average 9.4 per day).

Middle managers associated with self-directed groups differ from their counterparts only with respect to their spans of control: on average, overall spans of control (including direct and indirect reports) of traditional managers are 54 employees versus 71 for SDT managers, a difference of 31 percent.

Beyond these differences, there are no statistically significant correlations between the job characteristics of supervisors and managers and the type of work group these management employees oversee -- for example, in greater job autonomy, a sense of increased job autonomy, or a sense of greater authority or control over meeting customer needs. Moreover, surprisingly, the participatory management program seems to have little effect on the job characteristics or attitudes of managers and supervisors. The exception to this pattern, presented in Table 9, is in attitudes towards using self-directed teams. Managers who currently oversee teams are much more supportive of their use than traditional managers. While on its face we might expect this pattern -- participants are likely to support what they have chosen to participate in -- the opposite is certainly plausible. If managers and supervisors involved in the program have had their spans of control or workloads increased, then they might have significantly negative views based on their experience.

[9] Because of this, I only report here the correlations for dimensions of work where significant differences exist between management employees associated with traditional versus self-directed groups.

Comparing the Outcomes for Workers and Managers

How do these changes in job characteristics and responsibilities translate into workers and managers sense of satisfaction with their jobs and the company? For workers these differences in job responsibilities do translate into positive benefits, in terms of their greater autonomy, greater on-the-job learning, use of skills and creativity, and sense of satisfaction with their jobs and pride in their work. The results of multivariate analysis show that, after controlling for demographic characteristics as well as technology, location, and service market characteristics, human resource and industrial relations practices, self-directed teams do positively enhance workers' satisfaction with their jobs and the company[10].

By contrast, firstline supervisors, but not middle managers, are significantly negatively affected by self-directed teams in terms of their job satisfaction; but surprisingly, their involvement with SDTs is a significant predictor of commitment to the organization. Apparently, they signal their commitment by participating in an innovation that does not enhance their job, but that they perceive as necessary for competitiveness.

For both workers and managers, the understaffing and loss of job security associated with downsizing have significantly negative effects on job satisfaction and overall satisfaction with the company. These effects contradict the positive incentives provided through job enhancing strategies.

Finally, over and above the effects of these work innovations, there is strong evidence that employee satisfaction and commitment are enhanced by a coherent set of human resource and industrial relations strategies that provide a supportive work environment. These include supervision that is fair and supportive of worker participation, opportunities for advancement, and positive co-worker and labor-management relations.

V. Effects of Work Innovations on Performance

This section analyzes the performance effects of participation in total quality and self-directed teams based on objective company performance data. It also evaluates the potential reductions in indirect labor costs associated with teams. The analysis uses data on a subset of non-management employees in network and customer services to assess whether differences in the way self-directed teams operate are reflected in higher quality or productivity measures in objective company data[11]. It also compares these outcomes to employee perceptions of work group quality and quality improvement.

[10] The full results of multivariate analysis are not presented here, but are available upon request.
[11] The analysis is limited to workers because objective company performance measures for managers were not available at this time.

The question of what kinds of performance and productivity measures to use is an extremely important one which has been debated in the quality literature and which will be discussed throughout the section. In brief, in the first instance this study relies on occupationally specific measures developed by the company to evaluate the performance of individual workers (for example, tasks completed per day for network technicians). The company historically used these measures, and continues to use them. As will be evident from the analysis, most of the measures focus on quantity and productivity. While they may be necessary, they are unlikely to capture the full effects of improvements brought about through work innovations that are intended to affect the quality of performance and customer service. The study was unable to utilize extensive customer service survey data collected by the company because the data is not statistically reliable at a unit of analysis below large geographic regions. It therefore cannot capture the effects of changes occurring at the individual worker or work group level -- the unit of analysis here.

Historic measures also fail to capture work process or behavioral changes that may have long term benefits for organizational performance and competitiveness, such as the ability of employees to problem-solve or continuously learn from each other. As a result, this study also developed behavioral measures such as group problem solving and teaching which are believed to have important long-term benefits.

Performance Results in Customer Services

The quantitative results in customer services are based on matching the sample of respondents from the survey on work organization with individual level sales data from Customer Services. The performance data include individual monthly data for the period January, 1993 to June, 1994. Of the 330 customer service representatives who responded to the survey, I was able to match performance data in 223 cases. The inability to match all of the individuals is explained in part by the fact that some states were not fully participating in the region-wide information system. I have limited this analysis to employees in five states. The data include a random sample of 87 individuals from 28 self-directed teams and 136 employees from 43 traditional work groups.

There is on-going debate in Bell system companies concerning what are the appropriate performance measures for customer service representatives. The company collects data on two primary measures of performance: monthly sales revenues (SR) and monthly sales revenues per access line (RPAL). It is noteworthy that these measures are quantitative. Moreover, customer service representatives receive credit in this system only for sales over and above basic service. This is consistent with the heavy emphasis on sales since divestiture, as noted

earlier, and is the result of attempts by Bell companies to increase revenues in what have been essentially stagnant residential markets by offering enhanced features such as voice messaging, call waiting, and other similar features. There are no usable measures of quality or customer service. While electronic monitoring to observe customer handling does occur, the information is only used to provide individual feedback to the employee. Customer service surveys are also conducted, but cannot be linked to individual employees or groups. As a result, sales levels continue to be the primary focus of performance measurement in customer services.

Of the two measures, total monthly sales revenues provide the most reliable data and are used in this analysis. The RPAL has been discontinued since the beginning of this study because its utility is debatable. CSRs have no control over the number of access lines that accompany a sale. That number is pre-determined based on usage rates. So a CSR may have high sales rates, but low RPAL, or visa versa. [12]

Table 3.10 provides a simple comparison of the sales revenues, sales per access line, and percent objectives met for employees in teams versus traditional groups. The average monthly sales per employee in self-directed teams versus traditional work groups is $5,783.69 versus $5,010.85, a difference of 15.4 percent. This figure is based on an average of 18 months of data, from January, 1993 to June, 1994. On average, self-directed groups also have a significantly higher percentage of RPAL objectives met: 109.3% versus 103.0%. For the other performance dimensions, the self-directed groups consistently perform higher than the traditional groups, but the differences between the groups are not significant at the 10 percent level of probability. For example, actual revenues per access line are $78.09 for teams and $73.66 for traditional groups, but the difference does not pass the test of significance at the 10% level of probability of error.

I first analyzed the relationship between participation in total quality or self-directed work groups and work group processes that both theory and qualitative interviews indicated should improve work group performance. These include the absorption of quality control monitoring, group learning, and greater interaction with subject matter experts outside the group -- what I refer to as cross-functional problem solving. The results show that membership in a self-directed

[12] The company also calculates the percent of sales objectives or RPAL objectives met. Measures of percent objectives met attempt to take into account the hours actually worked by an employee. The purpose is to reduce inequities for employees who, for whatever reason (training, participation in total quality, etc. are "off-the-board). The system, however, is administered quite differently from state to state so that cross-state comparisons are highly unreliable. Multivariate analyses using the RPAL and Percent Objectives Met data produced meaningless results and are not reported here.

team is a significant predictor of group learning and cross-functional interaction, while participation in total quality has a mild positive effect on greater quality inspection, but a strong negative effect on intra-group teaching behavior.

In the multivariate analyses of performance, three measures of performance were compared: two subjective (self-reports of work group quality and work group quality improvement) and one objective (monthly sales revenues). The subjective measures are drawn from the work innovations survey, in which I asked employees to rate the quality of work of their work group and the extent to which the quality had improved. The questions were as follows: a) "In your opinion, what is the quality of services provided by your work group?" (1 = very poor ... 5 = excellent); b) How does the current service quality provided by your work group compare to that of two years ago?" (1 = much worse ....5 = much better). Although research shows that self evaluations of performance are often inflated, there is no reason to expect that the inflation factor should be higher in one type of work group versus another. I found that 51 percent of SDT members but only 30 percent of TWG members rated their work group quality as excellent; similarly, 31 percent of teams but only 17 percent of traditional groups said that their work group quality was "much better" than it was two years earlier.

After controlling for external conditions that are likely to affect performance (technology, state location, human resource and industrial relations practices, and demographic characteristics, the multivariate analysis shows that membership in self-directed teams is a strong predictor of both subjective measures as well as monthly sales revenues. SDT membership increases monthly sales by between $927 and $971. If this amount is added to the average monthly sales of $5,011 of traditional group members, the result is an increase of 18.5 percent. Job satisfaction and group teaching behavior also positively affect perceived group quality and quality improvement, but are not significant in the revenue equation.

These findings are quite robust under various specifications that were explored in this analysis. It's possible that the self-directed teams are made up of employees who are more aggressive sellers to begin with. I discussed this issue in section 3.5 above, but further analyzed the performance data by exploring whether SDT-volunteers report better performance or have higher monthly sales than non-volunteers. I found no statistically significant correlation between volunteers and higher levels of self-reported group quality or quality improvement. Moreover, surprisingly regressions of SDT volunteers as determinants of objective sales revenues data while controlling for demographic characteristics produce significant negative coefficients of volunteers on sales, sales objectives and sales per access line.

These results are quite unexpected, given the reported problems and low evaluation of self-directed teams in customer services. That job satisfaction is significant is surprising, given the large body of research that finds no reliable link between satisfaction and productivity. There may be a more direct link in this case if the satisfaction is related to greater freedom and a sense of pride in providing better customer service -- service reps may enjoy their jobs more because their interactions with customers are more positive and less stressful. Given the technological and organizational constraints that these service workers face, it would appear that the real benefit from the reorganized teams comes from greater information sharing, learning, and internal problem-solving that these groups appear to undertake. Unfortunately, given the breadth of the survey in this study, there were not as many questions included that would clarify the types of information sharing and learning that goes on, and I believe that this is a fruitful area for further research. The trends over time in the data provide some additional support for the learning thesis: quarterly sales data show a trend over time in greater improvement for members of self-directed teams. There are no statistically significant differences between teams and traditional groups in the first half of 1993; teams thereafter show greater improvement (see Table 11).

Performance Results in Network Crafts

The analysis of objective network data produces quite different results from those in customer services: while network employees in self-directed teams show more dramatic differences in work group processes (e.g., responsibility for quality inspections, intra-group teaching, and cross-functional problem-solving) and perceptions of work quality and quality improvement, these differences are not reflected in better objective performance measures. This finding is surprising given the fact that most managers and trainers familiar with teams view self-direction among network craft groups to be more easily and effectively implemented. The major effect of self-management found in the objective network data is an increase in overall hours of work. In this section I first discuss the kind of data used for the analysis, followed by details of the findings, and alternative explanations.

The quantitative results in network are based on matching the sample of respondents from the survey on work organization with individual level productivity data from the Activities Measurement Plan (AMPS) in Network. The performance data include individual monthly data' for the period January, 1993 to May, 1994. Of the 466 surveys from network craft employees, I was able to match only 228 individuals. The reasons for this are not entirely clear, but network staff who operate the AMPS system stated that many states were not fully participating in the system until sometime in 1994.

A second reason for the limited matching may be the result of how the data was pulled from the system. Because the data was so voluminous, managers of the AMPs system had to use certain limiting criteria for pulling the data off the system. The criteria was that employees had to work at least 140 productive hours in a given month to be included. Any employees working less than that in a give month are not in the sample for that month, although they should be included in the data for months in which they do work 140 hours or more. Additionally, this analysis utilizes data on demand side work only (direct requests from customers for installation or repair). Routine work (work done by routinely to maintain the network infrastructure) is not included because there were no matches between the survey respondents and the routine reports.

There are two ways that this limiting criteria may bias the sample. First, the 140-hour cut-off truncates the low end of the hour's data. This may inflate hours overall, but should not systematically affect traditional groups differently than self-directed groups. Second, routine work usually accounts for between 10-20 percent of total hours of work. The failure to include routine work means that productivity (measured by hours per task) will be lower than normal (hours per task will be higher). Again, there is no reason to believe this would effect traditional groups differently than self-directed, unless self-directed do more routine work because they have more incentives to do preventative maintenance. Alternatively, however, because self-directed teams are absorbing supervisory tasks, they are likely to have less time to undertake routine work. The net effect is uncertain.

Despite the limited number in the sample, it is relatively evenly distributed between employees in self-directed (104 employees) and traditionally-organized (124 individuals) groups. They are spread across over 90 work groups throughout the region.

The data include the following categories:

Hours of Work:

Productive Hours - Hours/month spent on network operations.

Non-productive hours (Unclassified/Undistributed Hrs) - Hrs/month at work but in meetings or training (unclassified) or on vacation or sick leave (undistributed).

Overtime - Hours/mo. worked over 40/hrs. per week

Productivity Measures:

Productive hours/completed dispatch - productive hours spent per customer direct or customer service orders. Note if employees in this sample do carry out routine work, then this analysis underestimates their productivity.

Work hours/completed dispatch - productive hours + overtime hours per completed dispatch (excluding routine work).

Quality Measures:

Missed appointments/month - the number of times a technician misses an appointment when given adequate time to meet it

Multiple dispatches/month - the number of times in a month that technician requires additional assistance on a job. Note this may be due to lack of training or ability of the technician or the nature of the job (e.g., too large for one person to complete).

Out of Service over 24 hours/month - number of customers in a given service area whose service is out over 24 hours.

Originator of repeat reports/month - the number of times per month that a technician is the cause of a repeat report.

For each indicator, I developed monthly measures, quarterly averages, and averages over the 17month period. I did this to analyze trends over time and to identify whether certain periods were unique – e.g., did one or two quarters skew the data for the entire 17-month period.

Cross-tabulations of this data show that there are no significant differences between self-directed and traditionally organized teams in terms of objective productivity and quality measures. Average productive hours per dispatch, for example, is 2.75 for technicians in self-directed groups and 2.72 for those in traditional groups. These and other measures (presented in Table 12) are not significantly different for the two groups. The only consistent difference between teams and traditional groups is in the distribution of hours. Self-directed team members in this sample have about 2 hours less productive time and 1.4 hours more "non-productive" time each month. SDT workers then appear to make up the lost time by working about 2 hours more overtime per month. Overall, then, members of teams work more total hours for the company than do members of traditional groups.

The fact that there are no significant differences in productive hours per task is not surprising. The incentive effects of self-directed teams in theory should be linked to quality and customer service: if employees have their own "turf" they have greater incentives to undertake preventative maintenance. Moreover, productivity in network is highly dependent on the state of the technology. The greater time spent by teams in "non-productive work" is consistent with field interviews with SDT technicians who said they hold regular meetings to organize the way they work together. teams also undertake more training in group problem-solving and decision-making. In fact, one would expect the number of hours taken by teams to absorb new supervisory tasks (of scheduling, filling out reports, interacting with outside customers, and meeting and training to organize and operate as a group) to be considerably higher. In field

interviews, teams members said that the "lead" person would generally take 1 day per week to do the tasks that had been previously performed by a full time supervisor.

Multivariate analyses of the determinants of hours of work and productivity support this qualitative information and show that teams have the effect of reducing productive hours by 2 hours per employee per month, but this does not translate into significant differences in productivity (productive hours per task). Additionally, teams use 5.5 more overtime hours per employee per month, so that total hours per task (including productive, unproductive, and overtime) is 15 percent higher for teams.

The estimated extra hours are consistent with the SDT team statements that they use one day per week to absorb supervisory tasks. If teams average 8 members per team (multiplied by 5.5 hours per month, or 7.5 hours if "non-productive" hours are included), then they use between 44 and 60 hours per month to do what supervisors did fulltime (on average, 174 hours plus 11 hours of supervisory overtime, or a total of 185 hours per month)[13]. That is, network teams do the work of supervisors in 25-32 percent of the time that the supervisor used, depending upon which estimates are employed[14].

This is another example of how teams in network differ from those in customer services. In brief, network teams absorb many more supervisory tasks than do customer service teams because there are more tasks to absorb and few organizational constraints. Supervisors in network have an important role in interfacing with engineers, customers, and coordinating the maintenance and repair of the infrastructure. By contrast, the role of supervisors in customer services is focused much more on monitoring, reporting, handling non-routine problems, or helping CSRs solve problems or handle customers. Moreover, teams in customer services, as I have indicated, have been highly constrained organizationally, and prevented from assuming the number of supervisory tasks that network technicians do. They also by and large do not work overtime. What this difference means is that the network teams absorb considerably more supervisory work and this is reflected in the increased hours of work. The implications of these calculations for reductions in indirect labor costs are discussed below.

It is more surprising that no statistically significant differences exist along quality measures. Self-directed teams have slightly lower rates of originating repeats or missed appointments, but the differences are not significant. Participation in teams is a significant and strong predictor of all three work processes (quality inspection, teaching, and cross-functional problem-solving). In

[13] Supervisory hours = (40 hrs/week * 4.3 wks/month) = 174 + 11 ot/mo. (on average) = 185 hours per month.

[14] 44/174 = 25.2; 60/185 = 32.4.

the performance models, team membership is a strong determinant of perceived group quality and quality improvement but not of objective quality measures (missed appointments and multiple dispatches)[15]. Group teaching behavior predicts group quality while organizational commitment is a significant determinant of quality improvement.

It should be noted, however, that there are more serious methodological problems in attempting to apply this kind of analysis to network occupations for several reasons. I have already indicated areas in which the network data is weak[16]. More importantly, the extent of variation in working conditions and technology is much greater in network than in customer services. Customer service representatives work in a controlled environment with standardized equipment very similar to a manufacturing plant, no matter what region or state the office is in. Controlling for the effects of environmental differences is not problematic. In multivariate analyses of the network data, the most significant determinant of performance results was state location. States vary in the ways they use performance data, in the level of modernization of plant and equipment, in the extent of urbanization, and in their weather patterns. In contrast to service representatives, network technicians work in radically different environments -- both in terms of region (weather conditions), geographic location (inner city, urban, suburban, rural) and degree of modernization of plant and equipment. Unlike customer services, variation in weather and the state of technology play a fundamental role in the quality of the network -- how often it breaks down, how quickly it can be repaired. Coastal areas with hurricane seasons have much higher rates of trouble and repairs than inland areas. States with higher percentages of aerial cable are much more vulnerable to weather conditions than those with buried cable. Moreover, the quality indicators used by the company are relatively poor indicators of the work quality of the technician because the indicators are highly influenced by the state of the technology. While fiber optic cable requires little or no maintenance, lead core and copper wires do and are much more vulnerable to deterioration due to bad weather. Out of service over 24 hours and the level of repeat reports are certainly influenced by the degree of modernization of plant. Missed

[15] While I report two out of four quality measures (missed appointments and multiple dispatches), the results are the same for the other two measures (out of service over 24 hours and originator of repeat reports).

[16] The network data appear to be of questionable reliability. For example, in any given month, much of the data is missing. Of the 228 in the sample, for example, for any given month there are only 50 to 150 observations. This is why I developed quarterly averages as well as average performance over the 17 month period. While some of the missing data may be explained by the use of the 140 hour monthly cut-off in collecting the data, it does not make sense that the matched data pool is so small. And because I don't know the reason for the lack of data, I cannot analyze what types of biases the missing data introduce.

appointments and multiple dispatches may increase in regions with high demand due to inclement weather. In: general, what this suggests is that although the survey attempted to identify variation in these environmental and technological conditions, surveys are not the best way to do this.

Indirect Labor Costs

The use of teams results in the reduction of indirect labor costs by shifting some supervisory tasks to frontline workers and by changing the job responsibilities of frontline supervisors. The amount of savings per year will depend upon the extent of adoption of teams and the average increase in the span of control of first line supervisors. In the current experiment, "coaches" of teams usually have responsibility for two groups rather than one -- either two teams or full supervisory responsibility for a "traditional group" and much reduced responsibility for the self-directed group. In our survey data, supervisors who coach at least one SDT do not actually have two times the span of control of traditional supervisors, however, because the average size of SDT teams tends to be smaller than traditional work groups. In this survey, the average span of control reported by network supervisors with teams was 12.3; network supervisors of traditional groups reported an average of 8.8 direct reports. The span of control in customer services tends to be larger: supervisors of teams reported average spans of control of 13.2, while those supervising traditional groups reported an average of 10.6.

To estimate reductions in indirect labor costs associated with self-directed teams, I calculated the net savings from reducing numbers of supervisors, minus the increased costs associated with extra overtime hours of teams. Note that I draw on the hours of work analysis from network discussed above. If teams in customer services do not increase overtime use, then savings may be greater. I estimate savings both with and without the inclusion of overtime estimates for workers and supervisors.

The total cost of wages and benefits of first line supervisors in network and customer services is $73,497 in 1995. This includes a mid point average salary of $47,000 plus 55% loading of costs of benefits. Many supervisors also receive overtime or compensatory pay. In my survey, 66 percent of customer services supervisors and 79 percent of network supervisors reported receiving overtime or compensatory pay in the last year. Customer services supervisors reported working an average of 9 hours per day, while network supervisors averaged 9.7 hours per day. Company data from the Human Resources Department estimates $7,000 per year in added overtime pay for firstline supervisors -- in both network and customer services – bringing total costs per supervisor to $80,497.

The reduction in supervisory hours associated with self-directed teams is likely to be offset by at least some additional hours of work needed by the teams to absorb supervisory work. In the analysis hours worked by network craft employees, I found that on average, self-directed team members work 5.5 more hours of overtime per month plus 2 hours more of straight time than workers in traditional teams. Assuming that the average size of work groups is 8, it appears that the teams need an additional 44 hours per month of overtime and 16 hours of straight time. Network service techs earned on average $35.77 per hour in 1995 (loaded estimate including benefits). If we assume time and a half for overtime, their hourly rate is $53.66. A simple calculation of the cost savings associated with creating one SDT and eliminating one supervisor is as follows:

In the case in question, there are 8,650 firstline supervisors. The total cost savings associated with the use of self-directed teams depends on two factors: the percentage of the nonmanagement workforce that shifts to self-management and the relative increase in the spans of control of firstline supervisors. For example, if one-half of the workforce shifts to self-directed work teams and the span of control of supervisors of those teams doubles (from between 8-10 to 16-20), then reductions of roughly one-quarter of the supervisory workforce are possible. Alternatively, if one-quarter of the nonmanagement workforce becomes self-directed and the spans of control of supervisors triples (from 8-10 to 24-30), one-quarter of the supervisors may be surplused. If eventually all of the workforce becomes self-directed and supervisory spans of control double, then fifty percent of the supervisory workforce might be eliminated. Annual savings in indirect labor costs associated with these various scenarios are presented in Table 13. They range from $113-$144 million at the conservative end to $225-$288 million at the high end.

The low end of the estimate is the more realistic scenario. Moreover, some of these reductions might be accomplished without the use of self-directed teams. For example, the use of hand-held computers by field technicians has most likely eliminated the need for reporting and monitoring functions of firstline supervisors, yet many may still continue to do this work, thereby duplicating what technology currently accomplishes.

The cautionary note to be considered, however, is how much reduction in supervisory staff can occur without the complementary use of self-directed teams. The objective performance data analyzed below show that network teams have maintained equal quality and productivity while absorbing some of the supervisors' prior responsibilities; customer service representatives have higher sales. It is unclear whether traditionally-organized groups would be able to do the same without some of the benefits attached to self-direction. Moreover, without the change to

self-management, it is unclear how firstline supervisors would double or triple their spans of control and be able to manage the workload. Ultimately, therefore, it would appear that the use of self-directed teams is a needed complement to efforts to streamline management and reduce indirect costs.

Conclusions

In conclusion, I have used a variety of methods -- including qualitative interviews, surveys of workers and managers, and comparisons of objective company performance data to analyze whether there are benefits to employees and the company of adopting a market-sensitive decentralized approach to service delivery. To do so, I analyzed the effects of adoption of total quality management and self-directed teams. I also assessed the effects of downsizing associated with corporate efforts to consolidate and centralize service delivery. Finally, I considered whether there is an overall set of employment practices that mutually benefit employees and the company.

I found that participation in total quality improves employees' satisfaction with their participation in decision-making, but has minimal effects on the job characteristics and other attitudes of employees and no effects on the performance indicators used here. In multivariate analysis, offline participation is never a significant determinant of either attitudes or performance. This does not mean that the total quality program is unsuccessful or that it has not produced cost savings of innovations across the company. It suggests that the benefits from online participation do not occur through improvements in attitudes or the performance measures used here. The cumulative effect of participation in QWL, other problem-solving, and total quality programs does, however, have significant positive effects on satisfaction for both management and nonmanagement employees.

The self-management program in this case does appear to have positive benefits for non-management workers, in terms of their greater autonomy, greater on-the-job learning, use of skills and creativity, and sense of satisfaction with their jobs and pride in their work. Seventy-five percent of those not in teams would volunteer, while less than 10 percent currently in teams would choose to abandon them.

The major change for managers associated with the adoption of self-directed teams is an increased span of control. First line supervisors, but not middle managers, are significantly negatively affected by self-directed teams in terms of their job satisfaction; but surprisingly, their involvement with teams is a significant predictor of commitment to the organization. Apparently, they signal their commitment by participating in an innovation that does not enhance their job, but that they perceive as necessary.

By contrast, the understaffing and loss of job security associated with downsizing have significantly negative effects on job satisfaction and overall satisfaction with the company. These effects contradict the positive incentives provided through job enhancing strategies. Over and above the effects of these work innovations, there is strong evidence that employee satisfaction and commitment are enhanced by a coherent set of human resource and industrial relations strategies that provide a supportive work environment. The understaffing and declines in job security associated with downsizing, however, have a significant negative effect on satisfaction and organizational commitment, which in turn affects performance in some of the performance models. This suggests that while the direct effect of downsizing has a stronger negative effect on employees, it is not just employee satisfaction, but firm performance that is likely to suffer as a result of the organizational upheaval associated with downsizing.

Firms appear to benefit from the adoption of teams, both through better performance and cost savings. The objective performance results are more robust for customer services, where team members on average have 18-20 percent higher sales rates. In network, teams absorb significantly more supervisory tasks as well as internal processes that foster more learning and problem-solving; they report better work group quality, quality improvement, but these do not show up in the objective performance data. A conservative and probably realistic estimate of the potential savings in indirect labor costs associated with self-directed teams is in the range of $113 to $144 million annually. A more extensive program in self-directed teams could accomplish more -- and without sacrificing quality and customer service.

The limits of generalizing from the findings in this study should be recognized. I have argued that the outcomes of work innovations are contingent upon the nature of the work and technology, and this argument is substantiated in the study by the comparison effects in two occupations -- network and customer services -- within the same company. Additionally, as I have discussed more fully in part II, the historical and institutional context of this case shapes the outcomes in important ways -- particularly the role of the union. A history of mature bargaining and union participation in negotiating the parameters of employee participation in innovations cannot be underestimated. The changes introduced by self-directed teams, as noted, grow out of written agreements between workers and managers in conjunction with union stewards about what new responsibilities workers will adopt. While the labor-management environment is not always characterized by high levels of trust or agreement over issues, particularly in this period of downsizing and job loss, there is mutual respect for mature bargaining institutions that allow employees to participate more freely in work innovations than would otherwise be possible.

Table 1a
Survey Participants:
By Department, Job Category, and
Association With Traditional (TWG) or Self-Directed (SDT) Groups
(Numbers)

Job Category	Both Depts.	Network All	Network TWG	Network SDT	Customer Services All	Customer Services TWG	Customer Services SDT
Managers:							
3rd Level	40	32	13	19	8	3	5
2nd Level	150	107	53	54	44	24	19
Mid. Managers	190	139	66	73	51	27	24
1st Line Suprs.	205	143	80	63	62	34	28
Total managers	395	282	146	136	113	61	52
Workers:	796	466	227	239	330	203	127
Total	1,191	748	373	375	443	264	179

Table 1b
Survey Participants:
By Department, Job Category, and
Association With Traditional (TWG) or Self-Directed (SDT) Groups
(Percentages*)

Job Category	Both Depts.	Network All	Network TWG	Network SDT	Customer Services All	Customer Services TWG	Customer Services SDT
Managers:							
3rd Level	3.4	2.7	1.1	1.6	0.7	0.3	0.4
2nd Level	12.6	9.0	4.5	4.5	3.7	2.0	1.6
Mid. Managers	16.0	11.7	5.5	6.1	4.3	2.3	2.0
1st Line Suprs.	17.2	12.0	6.7	5.3	5.2	2.9	2.4
Total managers	33.2	23.7	12.3	11.4	9.5	5.1	4.4
Workers:	66.8	39.1	19.1	20.1	27.7	17.0	10.7
Total	100.0	62.8	31.3	31.5	37.2	22.2	15.0

* Percentages are all in relation to the total number of respondents (1,191)

Table 2
Survey Participants:
Percent of Employees in Each Category Who
Are Currently Participating in "Off-Line" Participation

Job Category	All	TWG	SDT
Middle Managers			
Network	74.8	78.8	71.2
Cust. Serv.	35.3	55.6	12.5
All Middle Managers	64.2	72.0	56.7
1st Line Suprs.			
Network	53.9	56.3	50.8
Cust. Serv.	53.2	41.2	67.9
All Supervisors	53.7	51.8	56.0
Workers:			
Network	17.6	15.4	19.8
Cust. Serv.	23.0	22.7	23.6
All Workers	19.6	18.9	21.1

Table 3
Comparison of Workers in
Self-Directed (SDT) and Traditional Work Groups (TWGs)
Percent With Positive Responses to Questions

	Network		Customer Services	
Job Dimension	SDT	TWG	SDT	TWG
Sample size	N=238	N=226	N=120	N=202
Individual Workers				
Job complexity has increased!	62.3	67.8	60.9	62.7
Have "complete or a lot of" !!				
Control over tasks	33.6***	12.8	17.8***	11.4
Control over tools	64.3***	45.5	21.2	18.9
Control over pace	55.5***	47.9	34.5***	24.7
Have adequate authority to meet customer needs: !!	45.3***	21.7	49.6	43.8
Work rules get in way of meeting customer needs !!	38.5	47.0	47.3	52.1
Have increased control over: !				
Meeting customer needs	48.3***	30.8	63.6**	50.5
Pace of work	29.0***	21.2	27.5**	20.1
Task assignments	31.8***	13.5	18.4***	9.1
Have heavy workload:				
Unrealistic objectives !!	22.4	22.4	11.7	14.7
Too much overtime !!	12.1	13.2	8.3**	15.1
Frequent understaffing !!	48.3	40.8	55.0	53.5
Increased workload !	62.2	58.0	83.8	81.2
Have participated in: !				
Quality teams	14.2**	8.4	13.3	13.4
Crossfunctional teams	12.1	7.5	6.7	10.5
QWL teams	24.3	20.4	25.0	20.1
Problemsolving teams	10.9	6.2	16.7	22.5
At least 1 of the above	37.7**	31.9	41.7	47.0
Ave. # monthly meetings	0.4	0.3	0.4	0.4
Ave hours/meeting	4.6	4.6	5.3	5.4

For this and subsequent tables:

! % of positive responses to yes/no questions
!! % of positive responses to questions (1-2 on 5 point scale).
** significant differences between SDT and TWG at 05% level of probability
*** significant differences between SDT and TWG at 01% level of probability

Table 4

Comparison of Workers in

Self-Directed (SDT) and Traditional Work Groups (TWGs)

Percent With Positive Responses to Questions

	Network		Customer Services	
Job Dimension	SDT	TWG	SDT	TWG
Work Group Supervision				
Tenure of supervisor (yrs)	2.7***	3.8	1.5***	2.4
Ave. # of suprs. in last 2 yrs.	1.6	1.5	1.7	1.8
Supr. attends group meetings!	54.9***	95.4	57.8***	96.9
Supervision has decreased!	56.5***	25.5	70.6***	43.8
Work group chooses leader	86.7***	10.8	85.5***	29.5
Group meets at least 1/wk.	40.3***	23.2	45.0***	24.4
Ave. hrs/meeting	2.8***	2.5	2.6***	2.4
Wk grp. "primarily responsible" for:				
Setting work group goals	27.7***	1.8	26.7***	1.5
Assigning daily tasks	56.0***	5.0	53.5***	3.6
Setting lunch, rest breaks	64.4***	28.8	7.8	5.6
Scheduling vacations	60.0***	8.0	11.5	11.7
Dealing with absences	24.4***	1.8	4.3	1.5
Doing quality inspections	16.1***	0.5	15.8***	1.0
Doing safety inspections	15.3***	1.4	15.8***	1.0
Deciding who gets training	4.2***	0.5	8.6***	0.5
Work Group Characteristics				
Ave. tenure of members (yrs.)	7.7**	9.2	2.3***	3.6
Ave. work group size	8.0***	11.4	13.5***	22.5
Ave. # members gone in 2 yrs.	1.0**	1.3	1.6	2.9
Ave. # replaced in 2 yrs.	0.9	1.1	2.6**	4.3
Ave. change in group size	-0.1	-0.0	0.0***	0.0
Demographic Composition:				
%Female	26.6	21.3	94.9	89.1
%White	88.1	88.1	75.7	74.4
Ave. age (years)	46.0	45.1	47.5	45.9
Ave. education (years)	13.0	13.0	13.0	13.4
Ave. years worked	29.2	27.8	23.9	23.3
Company tenure (yrs)	23.4	22.6	19.3**	17.4
Are union members!	87.3	87.3	82.1	81.0

Table 5

Comparison of Workers in SDTs and TWGs:

Network and Customer Services

	Network		Customer Services	
Work Group Relations	SDT	TWG	SDT	TWG
Internal Relations				
Members often help each other	61.5***	35.0	70.0***	54.3
Members rely on each other to solve problems	64.6***	48.0	73.1	67.0
Members rely on supervisor to solve problems	13.7***	27.5	9.5***	27.0
Members have good relations	83.7***	78.6	93.2**	89.9
Members' relations have improved in last 2 yrs.	40.3***	22.7	58.7***	31.7
Cross-Functional Relations				
Members get good cooperation:				
From other work groups	55.7***	44.3	56.3**	49.0
From other departments	51.7	42.0	47.9	40.1
Members have authority to directly contact managers	86.1***	66.3	94.9***	72.4
Members have daily/wkly. contact:				
With managers outside dept.	34.7***	17.3	22.3***	17.8
With workers outside dept.	65.1	75.5	84.9	83.5
Members have "good" relations with employees in other depts.	69.6***	52.0	53.2	49.4
Relations with other depts. have improved in 2 yrs.	21.9**	14.9	30.3	23.8

Table 6

Comparison of Workers in

Self-Directed (SDT) and Traditional Work Groups (TWGs)

Percent With Positive Responses to Questions

	Network		Customer Services	
Job Dimension	SDT	TWG	SDT	TWG
Human Resource Policies				
Days of training in prior 2 yrs.				
Technical	3.9	4.2	3.4	5.2
Quality	2.5	1.9	2.2	2.3
Basic (reading, math)	1.0	1.1	1.5	1.3
SDT training	3.4***	0.2	3.3***	0.2
Total training in 2 yrs.	9.8***	6.4	9.8	8.7
Training is adequate for job	59.4	52.5	56.2	54.7
Advancement				
Skills very useful for future jobs in co.!!	41.7	37.6	59.7	50.5
Have real opportunity to improve skills!!	38.7***	31.1	50.0	45.5
Would accept promotion!	24.1	26.1	47.8	51.6
Transfer oppor. have declined!	68.5	70.6	79.8	72.4
Training oppor. have declined!	36.7***	55.2	31.8	36.1
Promo. oppor. have declined!	79.7	83.3	87.4	83.1
Compensation				
Yearly earnings	41,309*	43,379	32,724	32,766
Employment security:				
"Feel less secure in job than 2 yrs ago"!	86.6	86.5	90.8	83.3
Was forced to relocate to retain job	10.2	12.3	6.8**	14.1

Table 7

Comparison of Workers in

Self-Directed (SDT) and Traditional Work Groups (TWGs)

Percent With Positive Responses to Questions

	Network		Customer Services	
Job Dimension	SDT	TWG	SDT	TWG
Industrial Relations				
Management & craft relations:				
Are "good or very good"!!	48.3***	40.5	39.0	38.8
Have improved in last 2 yrs.!	15.5***	13.8	17.4	9.4
Management & union relations:				
Are "good or very good"!!	48.8***	30.6	32.7	36.0
Have improved in last 2 yrs.!	12.1*	11.5	12.2	8.2
Attitudes toward union:				
The union should participate in quality!	90.8	87.4	92.1	92.1
The local union has participated "a lot":				
In QWL	64.7*	55.7	56.0	62.2
In Quality	57.7**	51.3	55.6	60.5
In SDTs	57.1***	39.6	47.8	51.7
Union participation is critical to success of:				
QWL	59.5*	52.0	59.4	60.8
Quality	53.6**	47.6	57.6	58.0
SDTs	55.1	56.1	56.1	57.3
Attitudes toward innovations:				
The following improve working conditions "a lot";				
QWL	24.8***	15.1	27.8	26.1
Quality	30.8***	25.3	31.9	33.0
SDTs	50.7***	20.8	43.8***	28.3
Partnership training	33.3***	25.6	33.0	36.8
The following improve job security "a lot":				
QWL	13.6***	8.6	15.8	17.1
Quality	24.9	22.6	35.3	30.5
SDTs	21.9***	10.9	30.8***	18.6
Partnership training	24.6	24.1	36.3***	34.8

Table 8

Changes in Managerial Jobs Associated with Self-Directed Teams

Middle Managers and Firstline Supervisors Compared

Job Dimension	Managers of SDTs	Managers of TWGs	Supervisors of SDTs	Supervisors of TWGs
Sample size	N = 97/190	N = 93/190	N = 83/148	N = 65/148
Workload:				
Span of Control	71.059**	54.405	12.578 ***	9.954
Direct Reports	12.134	11.387	12.578 ***	9.954
Indirect Reports	58.925**	43.018	---	---
Total Span	71.059**	54.405	12.578***	9.954
Average Increase in Span	3.876	3.237	4.325 **	3.015
Average Daily Work Hours	10.245	9.978	9.420	9.421
Time Allocation:				
Hours per week spent in:				
Scheduling	1.471	1.903	2.527	2.729
Quality Inspections	5.584	5.513	6.427	5.525
Safety Inspections	2.403	1.797	3.097	2.472
Coaching, Training	9.063	9.444	11.182 **	8.590
Crisis Management	14.266	14.247	12.405	13.468
Longterm Planning	5.325	4.861	2.904 *	3.982
Paperwork	13.253*	11.683	9.103	9.050

Table 9

Comparison of Managers in Network and Customers Services

Concerning the Use of Self-Directed Teams

(Percent with Positive Responses to Questions)

	Network Managers		Cust. Ser. Mngrs	
Job Dimension	With SDTs	With TWGs	With SDTs	With TWGs
SDTs improve quality/Cust. Serv.	42.3***	19.2	45.8	28.6
SDTs require more cooperation	85.6**	78.1	84.0	89.3
SDTs' increase worker 'ownership'	73.5	57.5	76.0	62.1
SDTs create friction between SDTs & non-SDTs	30.2	34.9	26.0**	39.3
SDTs create friction w/in grps.	23.8	15.9	12.2**	25.0
Management treats SDTs as privileged groups	27.7	21.7	16.0***	37.0
SDTs cost less	27.6**	13.2	30.6	16.7
SDTs absorb supr. function	27.3	15.3	22.0	31.0
SDTs free up suprs. time	36.4	24.3	56.0	39.3
SDTs have better attendance	31.5***	16.7	28.6	11.5
SDTs free up workers from too much supervision				
SDTs cost too much	19.8**	22.0	14.6***	8.3
SDTs don't improve perf.	37.2***	55.2	44.0	46.4
SDTs undermine authority	13.9***	22.1	0.0***	14.8
Support use of SDTs	90.7***	47.9	3.3	0.0

Table 10

Monthly Sales, Revenues Per Access Line, and Sales Objectives of

Customer Service Representatives:

Self-Directed and Traditional Work Groups Compared

(Monthly Averages Over 18 Month Period)

Indicator	All	Self-Directed	Traditional
	N = 223	N = 87	N = 136
Average Monthly Sales			
Revenues	$5,312.36	$5,783.69***	$5,010.85
RPAL*	75.39	78.09	73.66
Percent Objectives Met			
Percent Sales Met	105.74	108.73	104.51
Percent RPAL Met	105.33	109.33***	103.04

* Revenues Per Access Line (RPAL)

Table 11

Quarterly Trends in Average Monthly Revenues of

Customer Service Representatives:

Self-Directed and Traditional Work Groups Compared

(Monthly Averages Over Six Quarters: 1993-1994)

Indicator	All	Traditional	Self-Directed
	N = 223	N = 136	N = 87
Average Monthly Sales			
1st Quarter, 1993	$4,863.58	$4,679.65	$5,122.63
2nd Quarter, 1993	4,875.57	4,805.86	4,977.46
3rd Quarter, 1993	5,302.44	5,111.24	5,601.19
4th Quarter, 1993	5,815.96	5,461.39	6,314.77**
1st Quarter, 1994	5,974.91	5,616.59	6,604.87**
2nd Quarter, 1994	5,340.79	5,114.76	5,711.89

Table 12

Productivity, Quality, Hours of Work in Network:

Self-Directed and Traditional Work Groups Compared

(Monthly Averages Over 17 Month Period)

Indicator	All	Traditional	Self-Directed
Productivity			
Prod. hrs./task	2.36	2.37	2.35
Work hrs./task	2.81	2.80	2.82
Quality			
Out Service > 24 hrs.	.363	.367	.357
Originator of Repeats	5.49	5.61	5.35
Missed Appointments	1.29	1.32	1.25
Multiple Dispatches	7.51	7.36	7.69
Hours of Work			
Productive	157.2	158.1	156.1***
Unclass/Undis.	15.6	14.9	16.3**
Overtime	30.5	29.2	32.0
Total hours	203.3	202.3	204.5

Table 13

Estimated Cost Savings Associated With SDTs

Category	Low Estimate:	High Estimate:
Supervisor cost	$73,470	$73,470
Supervisor OT*	+ 7,000	-----
Subtotal	80,470	73,470
Team Time	- 28,332***	- 6,868***
Savings per position	$52,138	$66,602
Supervisory Reductions:		
1/4 supervisory force	*2,162	*2,162
Potential savings:	$112,722,356	$143,993,524
1/3 supervisory force	*2,883	*2,883
Potential savings	$150,313,854	$192,013,566
1/2 supervisory force	*4,325	*4,325
Potential savings	$225,496,850	$288,053,650

* Based on company estimate
** (8 members *(2 hrs.*$35.77/hr)+(5.5 hrs.*$53.66/hr))*2 months.
*** (8 members *(2 hrs.-$35.77/hr)/mo. * 12 mos.