

**PERFORMANCE AND WELFARE EFFECTS OF WORK RESTRUCTURING:
EVIDENCE FROM TELECOMMUNICATIONS SERVICES**

by

Rosemary Batt

A.B. Cornell University
(1973)

M.A. University of Kentucky
(1981)

Submitted to the Sloan School of Management
in Partial Fulfillment of the requirements for the Degree of

Doctor of Philosophy

at the

Massachusetts Institute of Technology

July 1995

© Rosemary Batt, 1995
All Rights Reserved

The author hereby grants to MIT permission to reproduce and to distribute publicly paper
and electronic copies of this thesis document in whole or in part.

Signature of Author _____
Sloan School of Management
July 13, 1995

Certified by _____
Paul Osterman
Professor of Human Resources and Management
Thesis Supervisor

Accepted by _____
Birger Wernerfelt, Chairman, PH.D. Committee
Sloan School of Management

MASSACHUSETTS INSTITUTE
OF TECHNOLOGY

28
AUG 20 1995

LIBRARIES

Abstract
**Performance and Welfare Effects of Work Restructuring:
Evidence From Telecommunications Services**

Research on new systems of production, human resource management, and industrial relations has been at the forefront of academic scholarship over the last three decades because of the relative decline in the success of American model of mass production to compete internationally, particularly in the face of Japanese competitors. There is widespread belief that copying Japanese human resource and production systems provides the best solution to competitiveness and that there is a growing convergence toward adopting that system in the U.S. as well as in Europe.

Arguments that there is a convergence toward a new model of workplace organization, however, grow out of a longstanding bias in research that has focused on manufacturing assembly operations, and in particular, automobile assembly plants. By undertaking systematic and detailed studies of other industries, a much richer and more complex theory is emerging with respect to the history and transformation of work in the United States. This dissertation seeks to contribute to that literature by drawing on the telecommunications services industry to document the widespread variation in workplace strategies and outcomes.

I explore the development and transformation of work systems in the telecommunications industry in the pre- and post-divestiture periods. Through an interdisciplinary approach and combines historical, qualitative, and quantitative methods, I find that current theories of work transformation and industrial performance that elaborate the shift from mass production to flexible production systems do not explain key aspects of work restructuring in this industry. Briefly stated, current theories posit two alternative, coherent strategies for competitiveness in the global economy: a high quality road based on high commitment or high performance human resource practices and a cost minimization strategy built on low wage, low commitment labor practices. Work restructuring in telecommunications services, by contrast, involves complex and contradictory strategies that are not yet coherent and which do not appear to lead in the direction of either hypothesized ideal-typical model. This is true for two reasons: the first relates to the historical development of work systems in telecommunications services; the second concerns the thrust of new telecommunications technologies that have quite different implications for work reorganization than do flexible manufacturing technologies.

Similar to the way in which the internationalization of markets has increased competition for manufacturing enterprises, national-level deregulation has dramatically increased the number of competitors in telecommunications. A critical difference, however, is that unlike manufacturing in which new technologies have created opportunities for greater flexibility and decentralization in production facilities, new digital transmission and switching systems have led to far greater economies of scale and system than the past. Deregulation of telecommunications markets was premised on the assumption that new microwave technologies would have a decentralizing thrust, but the digitalization of the

network has far overshadowed these effects. The result is a mismatch between the “decentralizing thrust” of new market regulation and the “centralizing thrust” of new technologies.

Part II of this thesis considers how the competing logics of new forms of market regulation, on the one hand, and new technologies, on the other, are interpreted by former Bell companies in their search for new business and human resource strategies. I argue that these companies are pursuing two competing approaches to organizational reform: “market-sensitive decentralization,” on the one hand, and “centralized remote servicing,” on the other. The first builds on theories of total quality that argue for “getting close to customers” and developing a loyal customer base. It begins with customer contact employees as the central strategic asset; firms adopt “high commitment” human resource strategies to support this business strategy. Remote service strategies, by contrast, build on the scale economies and cost savings of new technologies, reengineering, office consolidations, and downsizing. Human resource strategies are derivative of technology, and firms make no prior commitments to employees. I argue that as firms simultaneously pursue both strategies, they create contradictory incentive systems for employees so that the anticipated benefits from either reform are unlikely to be realized.

I test a series of hypotheses related to this argument in Part III through a detailed quantitative case study of one regional Bell operating company. I develop and test multivariate and maximum likelihood probability models of the determinants of employee attitudes and performance, drawing on an extensive 1994 survey of 395 line managers and 796 workers. The unique multilevel survey allows me to test the simultaneous effects of competing workplace strategies on differently situated occupational groups. The results of the attitudinal model show that job-enhancing strategies such as self-managed teams increase employee satisfaction and commitment, while the understaffing and job insecurity associated with downsizing has the opposite effect. The performance model shows that self-managed teams increase by 15-20 percent the sales revenues of customer service teams and significantly decrease the indirect costs associated with network teams. Self-managed teams, therefore, provide mutual gains for employers and employees, but these may be offset by the contradictory effects of downsizing on the workforce.

PERFORMANCE AND WELFARE EFFECTS
OF WORK RESTRUCTURING:
EVIDENCE FROM TELECOMMUNICATIONS SERVICES

Acknowledgements

There are many people I would like to thank for their support and intellectual engagement. First and foremost are my committee, Paul Osterman, Thomas Kochan, and Richard Locke, as well as other members of the MIT Industrial Relations Section who have routinely provided helpful comments and a collaborative atmosphere in which to pursue research: Robert McKersie, Michael Piore, Jim Rebitzer, and Maureen Scully. I also especially thank Eileen Appelbaum. Other people whose comments and perspectives I have learned much from include Gillian Hart, Steve Herzenberg, Harry Katz, Jeff Keefe, Richard Lester, Lisa Lynch, Judith Tandler, and Nick Ziegler.

I am grateful for the collaboration and many exchanges with fellow graduate students: Lucio Baccaro, Susan Eaton, Ann Frost, Tony Frost, Philip Hirschorn, Hody Hoffer-Gittell, Brenda Lautsch, Lynn McCormick, Gil Preuss, Saul Rubenstien, Meenu Tewari, and Marc Weinstein. Many in the industry were extremely generous with their time, particularly Dennis Allen, Martha Lee Doyle, Gary Saddler, Jimmy Smith, and the staff and members of the Communications Workers of America and the International Brotherhood of Electrical Workers.

I also am grateful for the support of the MIT Industrial Performance Center, the Alfred P. Sloan Foundation, Coopers and Lybrand, The National Telecommunications Research and Policy Consortium, The Office of Technology Assessment of the U.S. Congress, and the Center for Advanced Human Resource Studies at the Industrial Relations School, Cornell University.

I particularly want to thank my husband, Ronald Applegate, and my step-sons, Ben and Nick, for their love and endurance.

Table of Contents

<u>Part I: Industrial Restructuring in Services</u>	11
1.1 Introduction	13
The Transformation Thesis	14
Research Strategy and Methodology	25
Performance and Welfare Effects of Innovations	28
<u>Part II: Internal Labor Markets in Telecommunications Services: 1895-1995</u>	33
2.1 Introduction	35
2.2 Internal Labor Market Theory	41
2.3 The Old Bell System: Markets, Technology, Business Strategy and Internal Labor Markets	49
Markets and Technology	50
Centralized Personnel Management	54
The Growth of Functional Specialization and Bureaucratic Control	59
The Limits of Mass Production and Scientific Management	60
Regulatory Influences on Work Organization	66
Occupational Specialties and Employment Subsystems	71
Network Crafts	71
Customer Services	74
Traffic	76
Managers	78
Implications for Internal Labor Market Theory	82
2.4 Post Divestiture: Markets, Technology, Business Strategy and Internal Labor Markets	85
New Technologies and Market Deregulation	88
Business Strategy and Structure: AT&T Versus the RBOCs	97
AT&T	98
The Regional Bell Companies	101

	Work Reform I: Industrial Relations & Labor-Management Cooperation	105
	AT&T	108
	The Regional Operating Companies: NYNEX Versus BellSouth	112
	Work Reform II: The Changing Nature of Jobs	118
	Network Crafts	120
	Customer Services	128
	Operator Services	139
	Managers	141
	Work Reform III: Consolidation, Reengineering, Downsizing	147
2.5	Implications for Internal Labor Market Theory	157
Part III:	<u>Who Benefits from Work Restructuring?</u>	
	<u>Attitudinal and Performance Outcomes Of Work Innovations</u>	163
3.1	Introduction	165
3.2	Theoretical Perspectives	173
	Organizational Behavior	175
	Industrial Performance	185
3.3	Implementing Work Innovations in Telecommunications Services	193
3.4	Hypotheses, Research Design, Methods, and Data	199
	Hypotheses	199
	Research Design and Methodology	204
3.5	Correlational Analysis: Work Groups, Job Characteristics, and Attitudes	209
	Network Technicians	209
	Customer Service Representatives	216
	Theoretical Implications for Work Group Typology	218
	Middle Managers and Firstline Supervisors	223
3.6	Multivariate Analysis of Attitudinal Outcomes: Managers, Supervisors, and Workers Compared	227
3.7	The Effects of Work Innovations on Costs, Quality, and Productivity	235
	Customer Services	237
	Network	241

Customer Services and Network Compared	246
Indirect Labor Costs	248
Conclusions	251
<u>Part IV: Conclusions: Implications for Future Research</u>	257
<u>References</u>	271
<u>Tables and Figures</u>	297
Table 2.1 Internal Labor Market Theory	299
2.2 Job Ladders in Network Occupations	300
2.3 Job Ladders in Service Occupations	301
2.4 Growth of Managerial Workforce at AT&T: 1950-1990	302
2.5 Comparison of Theoretical and Bell System Labor Market Models (Craft and Clerical Positions)	303
2.6 Comparison of Theoretical and Bell System Labor Market Models (Industrial and Salaried Positions)	304
2.7 Telecommunications Services: Business Strategy and Production Organization	305
Figure 3.1 Attitudinal and Performance Model	308
Table 3.1a Survey Participants: By Department, Job Category, & Work Group	309
3.1b Survey Participants: By Department, Job Category, & Work Group	309
3.2 Survey Participants: Percent of Employees in Each Category Who Are Currently Participating in "Off-Line" Participation	310
3.3a Correlations of Selected Job Characteristics in Network	311
3.3b Correlations of Selected Work Group Characteristics in Network	312
3.3c Correlations of Selected HR/IR Practices in Network	313
3.3d: Correlations of Job & Individual Characteristics in Network	314
3.3e Correlations of Selected Job-Related Attitudes in Network	315
3.4a Correlations of Job Characteristics in Customer Services	316
3.4b Correlations of Work Group Characteristics in Customer Services	317
3.4c Correlations of Selected HR/IR Practices in Customer Services	318
3.4d Correlations of Job Characteristics in Customer Services	319

3.4e	Correlations of Selected Outcomes in Customer Services	320
3.5	Determinants of Job Characteristics of All Workers	321
3.6	SDT-Volunteers as Predictors of Job Characteristics	322
3.7	SDT-Volunteers as Predictors of Job Attitudes	323
3.8	Correlations of Selected Job Characteristics Among Managers	324
3.9	Correlations of Selected Job-Related Attitudes Among Managers	325
3.10	Definition of Variables	326
3.11	Short Model: Determinants of Job Satisfaction	330
3.12	Short Model: Determinants of Overall Satisfaction	331
3.13	Short Model: Determinants of Organizational Commitment	332
3.14	Full Model: Determinants of Job Satisfaction	333
3.15	Full Model: Determinants of Overall Satisfaction	334
3.16	Full Model: Determinants of Organizational Commitment	335
3.17	Monthly Sales, Revenues Per Access Line, and Sales Objectives of Customer Service Representatives	336
3.18	Determinants of Group Tasks& Processes in Customer Services	337
3.19	Model I: Determinants of Performance of Customer Service	338
3.20	Model II: Determinants of Performance of Customer Service	339
3.21	Model III: Determinants of Performance of Customer Service	330
3.22	Quarterly Trends in Average Monthly Revenues of Customer Service Representatives	340
3.23	Productivity, Quality, Hours of Work in Network	341
3.24	Determinants of Performance of Network Crews: Hours of Work and Productivity Analysis	342
3.25	Determinants of Work Group Tasks and Processes in Network	343
3.26	Model I: Determinants of Work Quality of Network Crews	344
3.27	Model II: Determinants of Work Quality of Network Crews	345
3.28	Model III: Determinants of Work Quality of Network Crews	346
	<u>Appendices</u>	349
	Sample Survey: Network Craft Workers	351
	Sample Survey: Network Managers	365

Part I

Industrial Restructuring
in
Telecommunications Services

Part I

Industrial Restructuring in Telecommunications Services

1.1 Introduction

There are two questions that originally motivated this research. First, how are U.S. firms reorganizing work, human resource, and industrial relations practices -- and how do these changes affect the internal labor market institutions that have historically supported high levels of productivity growth and employee welfare? Second, what are the outcomes of workplace innovations for firm performance and employee wellbeing? Who benefits, who loses? Part II of this thesis considers the first question through an historical and qualitative analysis. Part III examines the second, using a carefully-designed quantitative case study.

I was interested in the first question because there was growing talk of a shift from mass production to Japanese practices of “lean production,” but there was little evidence at the time of what this change consisted of. My hunch was that the arguments about convergence toward a Japanese model of human resource management grew out of a longstanding bias in research that has focused on manufacturing industries, and in particular, automobile assembly plants. By undertaking systematic and detailed studies of other industries, a much richer and more complex theory would emerge with respect to the history and transformation of work systems in the United States¹.

I was interested in the second question because business and academic reports of workplace transformation usually cited performance improvements for firms, and implied that if firms benefited, then employees would also. I was skeptical on both counts. Even academic research tended to rely on survey responses or self-reports by managers of changes in work practices and the accompanying performance gains achieved. Employees who actually carry out the work, however, are probably more reliable sources of

¹ By work (or production) systems, I mean the choice of technology, work organization, human resource practices, and industrial relations that characterize an industry or enterprise (see Appelbaum and Batt 1994). What firms view as production systems, employees experience as internal labor markets or employment systems.

information because they are the ones experimenting with the innovations, and tapping workers' knowledge of changing work practices would also capture the variation in implementation that might help explain variation in performance outcomes. Differently-situated groups of employees -- different levels of managers and workers in distinct occupations or specialties -- are also likely to vary in their experience of change, some benefiting, some not, depending upon their current position and the type of work innovation introduced. Participatory management systems, for example, are likely to enhance managerial jobs because joint processes are likely to reduce conflict and managers may hold on to their positions and status while benefiting from workers' ideas. Self-management is likely to benefit workers who are freed up from oversupervision.

These observations shaped my choice of research subject. I chose to focus on the service sector to explore the extent to which theories of industrial performance and internal labor markets developed in a manufacturing context were applicable to services. I chose to research the telecommunications services industry for several reasons, the most important of which is that, of any service industry, it comes closest to approximating the conditions of large-scale manufacturing, with high fixed costs in technology. AT&T had applied mass production concepts and innovations to telephone services, had developed an elaborate internal labor market system, and had achieved high productivity and profits in the post World War II period. In addition, national deregulation coupled with growing internationalization of service markets had dramatically heightened competition, similar to what had occurred in manufacturing beginning in the 1970s. Theoretically, we would expect approaches to work reorganization in this industry to be similar to those in manufacturing; if they were not, this case would be a useful test for the generalizability of theories of industrial performance.

The Transformation Thesis

Several findings surprised me -- confirming some of my hunches in unexpected ways, refuting others. These findings are at the core of my central argument -- that what is unique in the industry and its history has shaped current restructuring in ways not anticipated by current theories of workplace transformation, as I elaborate below. My

original formulation of a distinction between manufacturing and services was insufficient because what matters is a series of decisions with respect to the choice of technology, market structure, business strategy, and labor relations in the industry. What is unique in the history of the telecommunications industry, in turn, has set the stage for current industrial restructuring that is quite different from that which has been described in other industrial contexts.

Arguments concerning similarities versus differences, convergence versus divergence, are often a matter of emphasis. While similar themes may be found in work systems across industries and countries, I have chosen to focus on differences because they offer the potential to develop more finely grained theories.

The central argument of Part II challenges current theories of workplace transformation. Summarized crudely, these theories argue that there are two models for competing in the new global economy -- one representing a break from the past and based on quality production and "high commitment" human resource and industrial relations practices, the other based on high volume and low cost and representing a continuation of mass production methods of operation. This strategic human resource model is referred to variously as "high commitment" (Walton 1985), "high involvement" (Lawler 1986), "transformed" (Kochan, Katz, and McKersie 1986), "high skill" (Commission on the Skills of the American Workforce 1990), "lean production" (Womack et al 1990), "flexible production systems" (MacDuffie 1991, 1994), "high performance work systems" (Appelbaum and Batt 1994), or "mutual gains enterprises" (Kochan and Osterman 1994).

The high commitment model entails a) a redesign of frontline jobs to increase breadth, enhance flexible deployment, and add greater worker discretion and responsibility for quality control; b) higher levels of skills and training; c) some form of pay linked to performance rather than to the job itself; and d) a commitment to employment security. This model is seen as a solution to the current lack of competitiveness of the mass production model -- of narrowly defined and routinized jobs that reduced the creativity and thinking of workers, of inadequate skills and training, of instability created by cyclical layoffs.

Central to the argument is the idea of congruence between the logic of technology and the logic of organizational practices: firms must develop a coherent set of reinforcing practices to realize performance gains. This model has emerged as a viable alternative to mass production because of the availability of new micro-processor-based technologies that allow for shorter production runs, more customized products, and faster cycle times (Piore and Sabel 1984). Manufacturers have developed more flexible work and human resource practices to take advantage of the flexibility inherent in new technologies. New flexible manufacturing systems are competitive because they offer higher quality and customization through a coherent system of technology, work organization, and human resource and industrial relations practices.

The case of Bell System transformation offers an interesting contrast for two reasons: the development of pre-divestiture work systems differed in important ways from large scale manufacturing; and the thrust of new technologies has different organizational implications.

With respect to the first issue, there are several historical developments that created a quite unique work system as it existed in 1980 prior to the dismantling of AT&T that led to dramatic organizational restructuring. Put simply, the dominant productive problem to be solved in Bell System restructuring was not that of mass production, but the problem of the inherited bureaucracy. A mixed system of production coupled with a highly bureaucratic management organization developed in the following way. The integrated nature or “systemness” of the network provided the basis for AT&T’s early monopoly over product markets, achieved through control over technology patents and license contracts to local service providers which stipulated standard operating procedures. By the turn of the century, AT&T expanded its centralized decision-making with respect to technological systems to include scientific management and centralized personnel systems as well. AT&T, however, was only partially successful in applying concepts of mass production and scientific management of labor to telecommunications -- one of the unexpected findings from the historical research. Instead, AT&T developed a highly mixed system of production with three core occupational groups: telephone operators, network craft technicians, and business office or customer service representatives. AT&T

successfully taylorized operator jobs early on, and subsequently used technological advances to shift the labor content of operator services to customers (through self-dialing long distance, then local, then credit card calls). But the critical jobs in network remained craft-like (highly skilled, autonomous, geographically-dispersed and resistant to managerial control). And universal service representatives in local business offices offered a broad range of service, billing, repair, and problem-solving services to customers.

As regulators in the post World War II period increasingly demanded the expansion of universal service in exchange for a system of cross-subsidization that guaranteed high rates of return, the demand for services spread. But unlike mass production or even continuous process manufacturing in which the spread of the market increased volume and decreased unit costs, the spread of the market in telecommunications demanded increased labor in network and customer service jobs. To compensate for the inability to rationalize these jobs, AT&T developed a rigorous system of performance measurement, and expanded the managerial workforce to supervise these hard-to-monitor jobs. In addition, increasing regulatory demands also led to the expansion of managerial and clerical ranks. The result was a highly profitable system offering quality service to virtually all Americans. It was efficient (productivity grew at 6.9 percent annually between 1950 and 1980) because it avoided duplication of infrastructure and took advantage of economies of scale and system; yet it was highly bureaucratic in its reliance on centralized decision-making, functional specialization, standard operating procedures, high ratios of managers to workers, and limited rationalization of labor.

Viewed from the perspective of theories of work transformation and internal labor markets, the Bell production system in 1980 had many of the features of "high performance" work systems currently advocated. It offered quality service at relatively low cost through state of the art technology for its time. With the exception of operator jobs, which represented less than 15% of the workforce in 1980, jobs in network installation and repair were highly skilled, autonomous, and problem-solving in orientation. The universal customer service jobs (which required considerable skill, responsibility, and problem-solving to meet individual customer needs) provided the kind of "one-stop-shopping" that current analysts advocate as the key to quality service.

Employees frequently knew their customers well, either as neighbors or through repeated transactions; customer satisfaction was quite high according to surveys. Entry-level education requirements were stiff, employees received high levels of company-paid formal training and retraining, and the well-developed system of internal job ladders created tremendous opportunities for advancement and implicit lifetime security. Telephone jobs were considered public service jobs, and employees took great pride in their work. Employee satisfaction was high. Relations between labor and management were also highly cooperative, the opposite of what existed in most manufacturing industries at the time. The high stable demand and guaranteed profits led to a system of promotional ladders and employment security much more stable than that found in private sector mass production enterprises. The pre-divestiture Bell System of internal labor markets, therefore, differed in significant ways from the classic industrial model (e.g., Doeringer and Piore 1971), and I more fully elaborate this argument in Part II.

In the post-divestiture, deregulated period, therefore, (anticipated but not fully in place in local telephone markets), former Bell System companies have articulated their central competitive disadvantage as the problem of bureaucracy. They define the bureaucracy problem as including: a) unacceptably high labor costs; b) organizational inefficiencies; and c) technological inefficiencies. Bell companies have more employees per access line and higher unit labor costs than do their competitors who are lean, new entrants using non-union labor. Organizationally, the inherited AT&T centralized operating procedures result in slow response time to customer service orders and repairs. The bureaucracy problem also has a technological dimension because old operating procedures are built on old information systems which are embedded in antiquated functional silos and hierarchies.

This brings us to the second way in which work transformation in telecommunications differs from theoretical models. There exists a mismatch between changes in market structure and organizational strategies, on the one hand, and the direction of new technologies on the other. The divestiture and deregulation of AT&T was premised on the assumption that new microwave technologies would create decentralized alternatives to the provision of telecommunications services. Advocates of

deregulation argued that the historic notion that telecommunications systems form a “natural monopoly” was obsolete; telecommunications no longer required an integrated wire system because wireless service provided an alternative. In fact, by the time the 1984 Consent Decree was enacted, microwave technologies were made obsolete by the digitalization of network switching and transmission systems, which dramatically increased network economies of scale and scope, and led some economists who supported deregulation to question that decision. While future technological developments are uncertain, the result to date has been a mismatch between the “decentralizing” thrust of market deregulation and the scale economies of new technologies that point to a return to an integrated system. Overcapacity in long distance networks is such that the entire call load in the United States can currently fit into one of the three competing networks. Productivity growth in the 1980s was one-half of what it averaged in the three decades prior to deregulation.

At the level of production, new technologies in telecommunications are at odds with new forms of work organization in the following sense. The coherence of high performance systems in manufacturing rests on a congruence between new technologies that allow greater flexibility, for example through batch production, and new forms of work organization that take advantage of these technologies by increasing organizational flexibility in the deployment of a more highly trained workforce. In telecommunications, the scale economies of network digitalization create opportunities for increased consolidation and centralization and are therefore at odds with work innovations that increase the discretion and problem-solving responsibilities of the workforce. The result is that no coherent form of new work organization is emerging; instead, competing alternatives continue to be implemented while the debate over their applicability continues.

The result in the Bell companies is that they have tried to respond to the bureaucracy problem by adopting a number of competing and uncoordinated strategies that do not correspond to the models of workplace transformation in the literature. First, rather than reduce taylorism and machine pacing, they have used new computer and software information systems to introduce it into network and customer service jobs for the first time. Customer service positions increasingly resemble the routinization of operator jobs

due to the introduction of automated call distribution and expert systems. Due to the shift in demand from electro-mechanical to digital computer skills, the traditional craft workforce is being replaced by a handful of highly skilled computer technicians, on the one hand, and a larger workforce of semi-skilled clerks who monitor computer reports of network problems, on the other.

At the same time, companies have experimented with innovations to "decentralize" decision-making or "empower" employees, including various forms of employee participation, total quality management, and self-managed teams. Companies have generally used total quality tools to improve communication and joint problem-solving between managers and workers and to train all employees to have a greater awareness of the importance of quality and customer service. More importantly, self-managed teams have gained increasing popularity, but not for the reasons outlined in the sociotechnical systems literature -- such as the improvements in work process and quality of worklife associated with autonomous work groups. Rather, self-managed teams are viewed as a critical tool for reducing bureaucracy because workers absorb supervisory tasks and companies anticipate large savings in indirect labor costs (as documented in Part III of this study). New jobs in self-managed teams are often highly specialized or taylorized while at the same time self-supervised. Perhaps the critical component that makes this model feasible, however, is the information systems that electronically monitor all employees, including outside craft workers who now report all work as it is finished through handheld computers.

Additionally, reengineering and downsizing have come to dominate most corporate organizational strategies, swamping many of the work unit experiments in joint labor-management process improvements or employee participation. Reengineering is the preferred macro-organizational strategy because companies believe it will solve the problem of bureaucracy; they anticipate significant gains in cross-functional organization through reengineered information systems that flow horizontally. Reengineering projects in such complex and tradition-bound organizations, however, are proving much more difficult than anticipated so that in the short run companies have simply proceeded with across-the-board head-count reductions as a way of reducing bureaucracy. The result is

often understaffing, declines in service quality, and employee demoralization associated with the loss of historic job security. Union-management relations, once cooperative, have deteriorated over the decade.

I have formalized this argument in the following terms. To reduce bureaucracy and shift to an “enterprise” organization, former Bell companies have undertaken two competing approaches to organizational reform. Both respond to the problem of bureaucracy, but in different ways and with significantly different consequences. I refer to the first as “market-sensitive decentralization” and the second as “centralized remote servicing.” The first represents a break from past practices and is consistent with theories of high performance work systems developed in manufacturing. The second represents greater continuity with past practices, consistent with prior applications of mass production concepts and technological displacement of labor.

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. Work innovations such as total quality, employee participation, and self-managed teams are tools -- human resource strategies -- for accomplishing this business strategy.

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. They do so by building personal relationships through geographically dispersed local offices that have high visibility. 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 longterm 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 and job instability may accompany this strategy, but is 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 the short run, 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-managed work systems. For employees, the quid pro 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. 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 temporarily -- so that the net effect is uncertain.

The implications of these organizational changes for internal labor markets are quite uncertain because outcomes depend upon which strategy will come to dominate the industry. To date, the centralizing strategy appears to be dominating, leading to more specialized or routinized jobs and to high levels of labor displacement. But the future depends upon new regulatory changes, the most recent of which would completely deregulate telephone markets in ways that privilege the regional Bell companies, opening up possibilities for the reconfiguration of new, but unregulated Bell monopolies. Under such a scenario, the pressure to downsize and reengineer might be considerably lessened. In Part II, therefore, I conclude by presenting a wide range of alternative internal labor market outcomes that are possible, but at this point, uncertain.

Several underlying themes are implicit in the arguments articulated throughout this thesis. The first is the central and often driving role that technology has played both in the evolution of the industry historically and in its current transformation. This recognition is not meant to invoke a technologically-determined argument. As I argue in Part II, industry and government officials made technological choices early on that shaped later decisions, but alternative paths periodically emerged and currently provide a broad set of different opportunities.

On the other hand, the technology-intensive nature of the industry means that as new technologies become available, they have had a powerful transformative effect on the course of business strategy and work organization, which in turn shape the jobs and careers of different occupational groups. As new technologies have become available,

they have swept over one or another group of workers, dramatically changing their daily working lives.

Related to the technology theme is the question of uncertainty. Ironically, an institution that for almost a century was a symbol of stability in the American economy is now a source of ongoing uncertainty -- a large part of which stems from the unparalleled changes in information technology and the uncertainty as to which competing technologies will prove most viable in the longrun. To what extent, for example, will wireless communications pose a serious alternative to wire services, making the current infrastructure obsolete? Will the government subsidize the information highway and make universal access to information services affordable? Will interactive multimedia to the home supplant telephones, televisions, and personal computers? These decisions will have significant implications for the new shape of the industry, the relative benefits to consumers, and welfare of employees.

A third underlying theme is the question of continuity versus change. The perspective of most observers and practitioners in the telecommunications industry is that it is undergoing the most dramatic transformation in its history: divestiture of AT&T, deregulation of markets, internationalization of services, industrial restructuring, unprecedented technological change, and massive labor displacement. Yet historically the industry has always undergone change, introducing new technologies, expanding markets, and displacing labor through new systems applications. What, therefore, is really new and what represents a continuation of past practices? Are current changes of the same character as those of the past, only writ large and occurring at greater speed? Or are fundamentally new structures and business, organizational, and human resource strategies replacing the past? Moreover, the industry has deep institutional roots - the architecture of the industry, the organization of work, and internal labor markets were largely in place by the first decade of the century. Even if companies are attempting to implement radically new policies, are they succeeding? That is, how much do prior customary ways of working and institutional relationships hinder implementation of work reforms?

Research Strategy and Methodology

These arguments, presented in Parts I and II and responding to the first question posed in the thesis, grow out of a research strategy that combined historical and qualitative methods. While a more detailed discussion of theory and methods is incorporated into each part of the thesis, a brief discussion of methodology is appropriate here. The historical and qualitative field research allowed me to conceptualize the changing nature of technology, work organization, and internal labor market policies in the Bell system. A weakness of this part of the thesis is that I was not able to undertake the kind of archival work at AT&T that would have strengthened the historical material. But this is not an historical study. Rather, I drew selectively from secondary sources to lay the groundwork for understanding the direction of current changes. While there remain unexplored issues for future research, I have pulled together the critical historical information needed to inform my central argument.

The qualitative research entailed interviews with over 150 workers and managers at different levels and functional departments, as well as union representatives, across four former Bell System companies in different regions. The initial purpose of this work was to learn about the extent and variation in workplace “innovations,” defined as new types of employee participation, job redesign, total quality or quality-enhancing practices, autonomous teams, training and reward systems, or joint labor-management partnerships. This turned out to be too narrow a conceptualization because of the profound organization-wide changes the companies were undertaking -- most of which had not yet been publicly announced. It became clear that what was needed was not only an understanding of work unit innovations and human resource practices, but a multi-level analysis of how changes at one level or functional area of the organization influenced changes at another area.

Through a series of detailed interviews across departments and organizational levels in three regional Bell companies, I found similar patterns of business unit reorganization, office consolidations, and reengineering and downsizing projects at a time when few inside or outside of the industry understood what these processes would entail. The substantive importance of this information in all three cases was that firms were undertaking

organizational reform efforts that were completely uncoordinated and often contradictory -- implementing reengineering at one level that wiped out recent innovations at another or asking employees to increase their commitment to the firm at the same time the firm was decreasing its commitment to them. This qualitative research was critical to developing the central insight into how current restructuring in this industry is unique and contradictory and why the outcomes remain quite uncertain.

This background also informed the quantitative research designed to address the second question -- concerning the outcomes of workplace change for firms and employees. The field research brought to light major methodological problems associated with the kind of empirical testing research I had intended to undertake for the second phase of the project. How, for example, does one design carefully controlled experiments measuring specific performance outcomes in the context of a sea of change? How does one explain the effects of innovations at the work unit level -- such as a customer service office -- while incorporating or controlling for simultaneous changes in information systems, office consolidations, and announcements of downsizing in an industry that had formerly guaranteed lifetime employment security?

In addition, the methodological difficulties of studying workplace innovations across highly dispersed and occupationally-diverse work groups became apparent. In studies of manufacturing, for example, the unit of analysis may be somewhat more clear -- an assembly line producing a particular product or part, a plant in which employees work on the same technology often with the same management making critical decisions. A regional telephone system includes thousands of workers and managers with remarkably specialized functions dispersed in small work sites throughout a several state area. This geographical dispersion and occupational diversity posed significant challenges to a research strategy designed to control for external variation -- a design appropriate for more bounded or self-contained work units. This was further complicated by the fact that most workplace experiments involved a minority of worksites that were also dispersed randomly across hundreds of locations in each company.

I attempted to deal with these methodological challenges in several ways. First, from field research I identified work innovations that were common to the Bell companies and

chose to focus on two that were significant tools used to enhance quality and decentralize decision-making -- total quality and self-directed team programs. I then chose for more detailed study a regional Bell that was more advanced in its experimentation with these programs. Selecting one company helped control for variation in corporate strategy, culture, technology, and regulatory environment, in order to empirically test the attitudinal and objective performance outcomes of the innovations. I further limited the study to two core functional areas -- network service technicians and customer service representatives - - and the three levels of managers that supervise them. These groups were active in total quality programs and had the highest number of experiments in self-directed teams. Additionally, these departments had not yet been influenced by reengineering or other major macro-level reorganization. They had experienced downsizing through attrition and some relocations due to reorganization, but these effects were random -- downsizing, for example, occurred as employees accepted early retirement. In addition to setting these parameters, I developed detailed questions in the surveys pertaining to the effects of downsizing, the nature of technology, service markets, and the conditions under which employees worked.

The company chosen also had a history of positive labor-management relations, and the union actively supported these work innovations and participated in negotiating the parameters of employee participation in innovations. The changes introduced by self-directed teams, for example, were detailed in written agreements between workers and managers in conjunction with union stewards about what new responsibilities workers would adopt. From interviews and survey data, most managers, workers, and union representatives believed that the level of union support for innovations was a strong reason for their widespread diffusion across local work sites. The labor-management environment during the period of the survey was characterized by considerable trust and mutual respect for mature bargaining institutions that allowed employees to participate more freely in work innovations than would otherwise be possible. It should be emphasized that the study took place at a time when announced plans for downsizing were still limited to voluntary programs, but most employees were fearful of job loss and anticipated future forced reductions.

These methodological choices have strengths and weaknesses. By carefully limiting the sources of variation in the organizational and external environment, I obtained interesting and significant positive outcomes of innovations for both objective company measures and employee outcome measures, as I detail below. I also found significant negative effects of understaffing and job insecurity associated with downsizing -- even in these departments where little organizational instability had occurred. The tradeoff is that the parameters limit generalizability. The quantitative benefits found here may not hold in more unstable work environments or in environments where union-management cooperation is not strong -- that is, the environments that currently characterize much of the industry. The parameters test the effects of innovations in an environment that is a "better case" if not a "best case" scenario. The models do not capture the full effects of organizational change and instability that is occurring, and is likely to continue, in the industry more generally. Because the case represents a snapshot of the effects of experiments before major organizational restructuring has occurred, it may serve as a useful benchmark for future comparative research.

Performance and Welfare Effects of Work Innovations

To summarize the quantitative analysis presented in Part III, it addresses three questions related to the central argument regarding the contradictory effects of organizational strategies. 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?

To answer these questions, I develop and test multivariate and maximum likelihood probability models of the determinants of employee attitudes and performance. I draw on an extensive 1994 survey of 395 line managers and 796 workers in the two core departments of network and customer services. The survey asked detailed questions regarding the type and extent of workplace innovations, human resource practices, and

industrial relations practices, as well as employee attitudes and perceptions of performance. The unique multilevel survey allows me to test the simultaneous effects of workplace innovations on differently situated occupational groups. While the attitudinal model estimates the relative effects of employment practices on indices of employee satisfaction and organizational commitment, the performance model estimates the relative effects of these practices on a subset of workers, using both subjective performance measures (as reported by workers) and objective occupation-specific measures.

The central findings 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 occupational 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 customer service representatives 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 62-75% less time, depending on how estimates are calculated.

The amount of savings in indirect costs is contingent upon how much the span of control of first line 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.

To summarize, the objectively measurable effects of the SDT program in customer services are increased sales revenues, while those in network indirect cost savings which

occur as a result of worker absorption of supervisory functions. The self-management innovation, therefore, appears to be one in which there are mutual gains: workers like their jobs better and firms increase revenues and reduce costs. While the quantitative results show that first line supervisors are least satisfied, qualitative evidence suggests even they may benefit if their jobs are redesigned in ways that enhance their responsibilities.

The organization of the remainder of the thesis is as follows. Part II assesses the changing nature of product markets, technology, business strategy, structure, and internal labor markets in Bell System companies, pre- and post-divestiture. Part III presents the detailed quantitative analysis of the relative effects of organizational restructuring on firms, managers, and workers. Part IV brings together the findings from Parts II and III to suggest the ways in which the lessons from this industry have broader implications as well as to outline a future research agenda.

Part II

Internal Labor Markets in Telecommunications Services:

1895-1995

Part II:
Internal Labor Markets in Telecommunications Services

2.1 Introduction

In this section of the study I argue that four historic conditions make the current restructuring in telecommunications services unique and more tumultuous than that experienced in most other sectors: a) the powerful role of technology in shaping firm strategy and structure; b) the Bell System's monopoly position in product markets and monopsony position in labor markets; c) the continuous growth and expansion in the demand for services; and d) the public good nature of the service and the political-embeddedness of firms.

I begin by reviewing internal labor market theory, and analyze the extent to which it is useful in explaining work organization and human resource and industrial relations systems in this industrial context. The telecommunications case is a useful one to use because by conventional accounts, the Bell System developed a classic and highly elaborate internal labor market system that mirrored industrial labor markets in mass production industries. Unlike most service industries, it rivaled manufacturing enterprises with respect to capital-intensity and copied many mass production innovations. Nonetheless, I argue in this section that the nature of the industry, technology, and product and labor market institutions created unique elements in the Bell System of internal labor markets. These differences, in turn, have meant that the transformation of work in the current period has taken a somewhat different turn than the kind of transformation in employment systems evident in mass production industries.

The details of the internal labor market story are as follows. AT&T's system of internal labor markets has a deep history, much of which was set in place by World War I: AT&T and the Bell operating companies were organized along functional departments from the beginning; AT&T created a top-down, command and control organization by

requiring operating telephone subsidiaries to purchase standard AT&T equipment which in turn required standard operating procedures and shaped the organization of work.

By the turn of the century, the company's "human resource strategy" combined the insights of scientific management advocated by Taylor, on the one hand, and centralized personnel management, as promoted by the social welfare and vocational education movements, on the other. It was the service nature of the industry, and the need for a positive customer image, that apparently led the Bell companies to develop particularly stringent, exclusive, and paternalistic employment policies. Similar to other large corporations, it introduced in 1913 the "American Plan" (employee benefits such as vacation and pensions) in order to build loyalty and long term commitment to the firm. In 1919, it set up company unions in an explicit response to heightened unionization and militancy, particularly among telephone operators. Additionally, in the 1920s, AT&T was one of the first companies to embrace the human relations movement, offering its Western Electric Hawthorne plant for Mayo and Rothlisberger's experiments in industrial psychology (Rothlisberger and Dickson 1939). By the 1930s, Chester Barnard, a former president of New Jersey Bell, was completing his theory of cooperative industrial organization (1938) based on his experience in the Bell System.

State and federal regulation of the industry was virtually non-existent until at least the 1930s, and by some accounts, the 1940s. Beginning in the World War I period, some states did institute rate regulation, but the primary effect was to shape AT&T's corporate policies of promoting a positive public image and keeping the regulators at bay. After World War II, the primary effect of state and federal regulation was to moderate telephone rates and put upward pressure on safety and service standards, particularly by demanding more universal service in unprofitable rural areas. The regulators treated the telephone as a public good, and pushed for reliable, universal service. AT&T's response was to increase the size of the managerial and clerical workforce handling detailed performance measurement, reporting, financial accounting, and public relations with regulators -- that is, to increase bureaucratization

During this time period, AT&T pursued two strategies to increase profits and productivity: the further application of mass production to services, on the one hand, and increased managerial control through monitoring and performance measurement, on the other. The mass production strategy informed by scientific management met with mixed success because some jobs (operator services) lent themselves to Taylorism more than others (network craft or customer services). The result was a very mixed system of production and internal labor markets that varied by occupational group. Attempts at increasing managerial led to a larger corporate bureaucracy while it fueled worker resistance and independent unionism.

Overall, the net result of these two factors -- the partial application of mass production innovations on the one hand, and, regulatory oversight, on the other -- was dramatic improvements in productivity and quality, significant increases in the size of the bureaucracy, and expansion of the network to provide nearly universal service.

In the post-divestiture period, I argue that the shift from the public to private good nature of the industry creates a series of contradictory incentives and organizational dilemmas for firms. Juggling competing objectives in the context of institutional constraints creates strategic dilemmas for firms which are not easily reconciled. The contradictions are complex and have created new conflicts within the organizations between different levels of managers as well as between managers and workers. They play out differently between AT&T on the one hand, and the regional Bell companies on the other, as well as among the RBOCs, because of increased regional variation in product and labor market regulations and institutions.

The conflicts crystallize around the mismatch between product and labor market strategies. Given the shift away from the public goods nature of the industry and towards private goods, firms now have opportunities to enter new service markets and to maximize profits in new ways. They have viewed their regulated business as a largely saturated market, but use it as a cash cow to invest in new enterprises. In the process, they engender the resentment of the traditional workforce whose employment security is put at risk.

A second contradiction concerns firm attempts to cut costs and downsize on the one hand while competing on quality on the other. Firms are pursuing business strategies that compete on the basis of technology-based consolidation and economies of scale (remote servicing) on the one hand, and those that compete on the basis of human resource strategies of decentralized participation, on the other. The technology-based strategy allows firms to realize dramatic cost savings; this strategy represents a continuation of the past use of technology to deskill and automate jobs to reduce costs -- an expansion of the logic of mass production to new areas. Since 1980, Taylorism has entered customer service jobs and some craft jobs for the first time while technological displacement of operators has accelerated. While cost-cutting and downsizing undermines employment security, total quality efforts rely on the goodwill of employees to increase effort and commitment to the firm and provide superior customer service.

Third, more generally, the old Bell system companies are attempting to reconstitute themselves as aggressive, lean, "entrepreneurial" firms, but this involves breaking with prior customs and institutional arrangements. Employees who were taught and came to believe what AT&T preached -- that the public service nature of their work is important and that it gives their work meaning and makes them different than other workers -- find it difficult to adopt a sales-maximizing attitude. In addition, the lean approach leads firms to break their historic social contract of lifetime job security with labor. These institutional constraints vary across regions, regional Bell companies have taken somewhat different approaches, and some have been more successful in breaking from the past than others. During this transitional period, the outcomes for new internal labor market rules are still uncertain.

The organization of this section is as follows. Part 2.2 reviews the relevant theoretical and empirical literature on internal labor markets. Part 2.3 presents a detailed summary of the Bell System as it operated in 1980, including the relationship between business strategy, work organization, and internal labor markets. It uses the framework of internal labor market theory to analyze the logic of employment subsystems for four occupational groups -- network craft, clerical (customer service and accounting),

telephone operators, and the managers of these groups. These correspond to four occupational models of labor markets: craft, secondary, industrial, and salaried. It traces the development of these job clusters over the course of the twentieth century, culminating in 1980 just prior to divestiture and deregulation. This history lays the groundwork for understanding the direction of work transformation in the current period, between 1985 and 1995, the subject of part 2.4. Conclusions follow.

2.2 Internal Labor Market Theory

Three questions are of central interest in internal labor market theory. First, why do internal labor markets exist and what do they consist of? Second, how and why do they vary across industries, firms, and occupations? And third, how and why are they changing? With respect to the telecommunications industry, I take up the first two questions in Section 2.3 and the third question in Section 2.4.

Theories of internal labor markets grow out of observations by institutional economists and industrial relations scholars that labor markets rarely follow neoclassical rules of supply and demand: wages fail to clear markets and unemployment is persistent. The theory developed as an explanation for the lack of labor mobility (Kerr 1954), the existence of high job vacancy rates (Dunlop 1966), and the prevalence in large mass production enterprises of administrative rules governing jobs, training, promotion, and reward systems (Doeringer and Piore 1971).

The classic account of internal labor markets in American industry draws on the experience of blue collar workers in unionized manufacturing firms and emphasizes the technical efficiencies gained by firms and employees (Doeringer and Piore 1971). Through a system of narrowly-defined jobs in skill hierarchies, firms secured a steady supply of workers with job-specific skills appropriate to the dedicated technology and Taylorized jobs in mass production industries -- an efficient system of recruitment, screening, and training. With wages tied to jobs, and promotions and lay-offs based on seniority, firms minimized turnover of skilled workers, thereby security a steady supply of specifically-trained labor. Workers, on the other hand, gained rights to jobs in skill hierarchies based on seniority, a system of "job control" institutionalized by unions. More senior workers consented to train their replacements because layoffs depended on seniority, and seniority-based promotions ensured steady income growth and job security (Piore 1968:437-9; Ryan 1984). While emphasizing the role of technology and technical efficiencies in shaping internal practices, Doeringer and Piore also indicated the

importance of custom and unions in shaping and institutionalizing these administrative rules (Doeringer and Piore 1971).

Their theory turns primarily on the distinction between general and specific skill (Becker 1964) and on the idea that in mass production enterprises with high investment in dedicated equipment, labor becomes a quasi-fixed factor (Oi 1962): high productivity requires low turnover because of the employer's investment in training specifically-skilled workers. Others, by contrast, emphasized the considerable degree of strategic choice that firms enjoy vis-a-vis the design of work systems. Scoville (1969), for example, argued early on that the Beckerian dichotomy between general and specific skills should be replaced with the concept of a continuum of choices in the design of jobs, and hence, the breadth of skills required of workers. Subsequent theories have varied in the extent to which they emphasize purely economic efficiencies as determinative of internal labor markets (e.g., internalizing transactions costs, Williamson 1975, 1981) or whether they focus on sociological (Althauser and Kalleberg 1981), or political explanations (Jacoby 1985).

The most convincing evidence against technological and efficiency arguments comes from historical and case studies documenting the contested nature of rules governing jobs and careers. Case evidence comes from Elbaum's study of the steel industry (1984). Broader historical evidence comes from Jacoby (1985), who convincingly demonstrates that industrial labor markets emerged from social movements as well as political conflicts between employers and workers over the definition of jobs, work rules, and job security. He supports this explanation by tracing the rise of scientific management, which taught employers how to reengineer craft jobs into narrow, semi-skilled machine-operator jobs, and the influence of social welfare and vocational education movements, which led firms to develop paternalistic personnel management programs as an alternative to unionization. He concludes that the most significant expansion of industrial internal labor markets occurred during periods of heightened bargaining power for labor -- during World War I and the years of union militancy in the 1930s.

Other empirical support for sociological and political explanations for internal labor markets come from organizational sociologists who have shown the existence of considerable intra-organizational variation in the design of jobs and internal labor market structures (Pfeffer and Cohen 1984; Baron and Bielby 1986; Baron, Davis-Blake, and Bielby 1986). There is accumulated evidence, therefore, that considerable variation exists in internal labor market rules across industries, firms, and occupational groups within organizations -- even in the post World War II period in U.S. history when the mass production model dominated the thinking of employers and engineers.

This brings us to the second question -- what does this variation consist of and what explains it? Osterman (1982, 1984, 1987) elaborates a fuller theory of internal labor markets across occupational groups. He distinguishes between occupational labor markets that are driven by external rules versus internal rules. Traditional craft (including technical/professional workers) and secondary markets -- high and low ends of the skill spectrum -- are characterized by high mobility and are driven by external market rules. Craft workers control their own mobility while employers hire and fire secondary workers at will. The Osterman model begins with the importance of the nature of work, technology, and demand for particular skills that place workers in a more or less powerful bargaining position, as he states, "...what drives the distinctions among the sub-systems are differences in the mobility prospects of the workers. These, in turn, are related to skill levels and training systems" (1982:352). But technology and skill are not determinative because employers seek to minimize costs and maximize predictability and flexibility in the supply of labor (Osterman 1987:60). Firms may use technological and organizational strategies to modify their demand for skill (e.g., turn craft markets into secondary markets) to accomplish these goals. Workers, on the other hand, resist the job and income insecurity associated with secondary market conditions. Consistent with Jacoby's historical account, Osterman argues that internal labor markets (industrial and salaried) have often emerged as a compromise between craft and secondary models.

Osterman (1987, 1988), therefore, identifies four labor market models or "employment subsystems" that may co-exist within firms for distinct occupational groups:

a) craft for highly skilled and technical workers; b) secondary, for clerical; c) industrial, as described in the classic model; and d) salaried, for managers and professionals. Each subsystem has its own internal logic, defined by variation along four dimensions of the employment relation: job assignment, deployment, employment security, and compensation systems. Elaborating on Osterman, job assignment would include not only the definition of tasks, but the skill requirements and decision-making discretion inherent in jobs. Deployment refers to mechanisms for the deployment of workers over time -- systems of vertical or horizontal mobility and the mechanisms for training and career development implicit in promotional arrangements. Employment security would vary according to whether there are implicit or explicit mechanisms for security, and whether the security is tied to specific skills, jobs, organizations, or occupations. Reward systems vary by both the level and mechanisms for compensation system.

Table 2.1 presents this classification of craft, secondary, industrial, and salaried models. Craft or professional/technical workers have highly specialized expertise -- with analytical depth and problem-solving knowledge that allows them to do similar kinds of work across a wide variety of organizations. With highly valued and portable skills, craft workers are likely to have bargaining power in the labor market that allows them to choose the jobs they want and move laterally across organizations. Training is paid for by individuals (e.g., doctors, lawyers, computer programmers), or through company and/or union apprenticeship programs (e.g., machinists). In stark contrast to craft jobs, secondary labor market occupations -- clerical jobs being the classic example -- are characterized by low but highly portable skills, and high mobility but dead-end jobs. Training is minimal, wages are low, and job security is non-existent.

Industrial and salaried models represent coherent sets of rules for non-management and management workers in large enterprises characterized by longterm employment relations. While the industrial model follows the classic description of Doeringer and Piore, the salaried model has a contrasting set of rules with a coherent logic: broadly-defined jobs, flexible deployment across functions and rewards based on merit and

personal networks, company-provided training, and firm-based employment security pledge.

In Table 2.1, I also suggest how these different employment systems, if viewed as incentive systems, are likely to affect employee commitment: craft workers are likely to be committed to their craft or occupation, secondary workers to their individual survival, industrial workers to the firm and the union that protects their job rights, and salaried managers to the firm.

Osterman's model builds on prior research in the field as well as on case studies of white collar job markets -- technical, sales, and clerical (1984), as well as managerial (1984; Kanter 1984). It is useful because it has the potential to explain not only intra-firm variation based on occupational groups, but inter-firm and inter-industry variation based on the relative power of management and labor as well as constraints on actors based on the characteristics of product and labor markets, the limits of technological solutions, and the role of government regulation. The task for empirical research is to take this framework as a working hypothesis and analyze the extent of variation in these occupational models across distinct national, regional, industrial, and organizational contexts -- and why it is that some factors, such as technology or labor unions, are more determinative in one context than in another. This is the subject of the next section, in which I elaborate how and why craft, secondary, industrial, and salaried labor markets took on quite unique characteristics in the telecommunications industry during the post World War II period. Before turning to this history, however, I want to consider the third central question concerning internal labor markets -- the causes, direction, and extent of change in the current period.

At first glance, the overarching causes of change may be understood from the discussion above. To the extent that historic labor market institutions are shaped by the factors identified above, such as stable product markets and technology and contests between labor and management, dramatic changes in these conditions should disrupt internal labor market arrangements. But this argument becomes interesting only in the

elaboration of specific histories which show how and why these factors interact in different ways to produce particular outcomes.

For example, there is wide acceptance of the view that technological advances accompanied by globalization and deregulation of national product markets have set the stage for radically new and heightened competitive conditions -- conditions that undermine the power of unions, throw labor back into competition, and lead to a returned dominance of external labor market mechanisms. In this view, the search to reduce costs and increase organizational flexibility in response to market uncertainty leads firms to "externalize" labor as well (e.g., Baron and Pfeffer 1988). In this scenario, we would likely see a polarization of labor markets into skilled professional workers in craft or occupational markets (e.g., Sabel 1990) and semi- and unskilled workers in secondary markets. There is certainly growing evidence of displaced managers and professionals turning to self-employment as consultants, on the one hand, and a growth in contingent workers on the other (Mishel and Bernstein 1994; Herzenberg et. al.1995; duRivage 1992). But there is also evidence that longterm employment relations remain robust and that they have increased for women while deteriorating for older men (Osterman 1994). Conventional views that read off the disintegration of internal labor markets from the deregulation of product markets, then, are far from the mark. Rather, the patterns of change are much more complex, and the extent and direction of change for firms, unions, and workers in historically-constructed labor market institutions are quite uncertain, as the case material in section 2.4 demonstrates.

The contest between quality and commitment-enhancing labor strategies, on the one hand, and cost-cutting and labor-displacing strategies, on the other, is on-going. What is particularly interesting in the current literature on the significance of workplace transformation for non-managerial workers is the existence of two dramatically different and competing theories of change. On the one hand, some argue that firms can only be globally competitive in the long run if they adopt quality and commitment-enhancing strategies emphasizing the investment in human resources (e.g., Appelbaum and Batt 1994). So-called higher performing or transformed work places would compete on

quality and innovation, and would transform their internal labor market rules for workers in ways that mirror the salaried model (with broader jobs, greater internal flexibility in deployment through job rotation and multiskilling, wages tied to personal performance, and security linked to the organization rather than a particular job) (Osterman 1988). Alternatively, as indicated above, firms that continue to compete on cost would gain flexibility by reducing labor costs, increasing employment-at-will, and transforming industrial labor markets back into secondary arrangements. Anecdotal and case evidence (including the material presented in section 2.4) suggests that many firms are doing both, including well-known "best-practice" cases of "transformed organizations" such as Xerox (Appelbaum and Berg 1995).

The theoretical and empirical debate on managerial labor markets is equally contested and confusing. On the one hand, the popular and business press carries images of the new manager, the "product champion" and innovator: corporate restructuring gets rid of bureaucracy and frees up middle and lower level managers to be more entrepreneurial. In this story, middle managers are the most highly valued players -- the heart and soul of the enterprise. Participatory management allows managers to gain from workers' creativity; self-managed teams free up managers from administrative chores. Managers are the source of corporate excellence and competitiveness (Peters and Waterman 1982; Peters and Austin 1985; Peters 1987). The resource mobilization literature makes middle managers the real source of innovation in large firms (Kanter 1982a, 1982b, 1983). In stark contrast to the dominant literature of earlier periods which focused on top managers as the sole source of creativity and innovation (Barnard 1946; Drucker 1967; Mintzberg 1973; Kotter 1982), writers in the 1980s argued for loosely-couple organizations with "lean staff" that would create room for innovators across layers and departments of management. By recreating market-like conditions inside large organizations, or "small in large organizations" (Drucker 1988), managers would have greater incentives to initiate change and would take greater ownership over their productive units. New managerial ladders could provide greater opportunities -- a shift

from narrow, functionally-based careers to a variety of ways of making it to the top (Kanter 1984).

On the other hand, the popular and business press provide numerous anecdotes of unemployed managers who are victims of corporate downsizing (Fisher 1991; Cowan and Barron 1992; Zachery 1993). Researchers note the "collapse of internal labor markets" for managers and the growing similarity of employment conditions for managers and workers -- for example, in the decline in managerial employment security. Researchers have also identified the loss of power and authority of supervisors when firms introduce employee participation or self-managing teams into production-level jobs (Klein 1984; Schlesinger and Klein 1987). Finally, new managerial pay systems introduce "market-like" pay systems, reducing the percentage of fixed-base pay or salary while increasing at-risk pay and linking an individual's pay to his or her contribution (pay-for-performance) (Lazear 1992; Shuster and Zingheim 1992; Gerhart, Milkovich, and Murray 1992). Implementing such systems requires much greater tracking and monitoring of managerial performance, a practice that treats managers more like workers, decreasing trust and offending managers accustomed to their autonomy.

Clearly these two stories may go hand in hand, with winners and losers in different organizations depending upon the strategies adopted by firms. Alternatively, winners and losers may coexist in the same enterprises as firms create core and peripheral groups in the same occupations. The central argument here, however, is that the outcomes for internal labor market systems are far from certain, and only detailed qualitative studies of particular industries and occupations are likely to provide the building blocks for a more complete understanding of the direction of change in labor market institutions, a task I turn to in the next two sections.

2.3 The Old Bell System: Markets, Technology, Business Strategy, and Internal Labor Markets

In this section I draw on the framework of internal labor market theory discussed above to analyze the development of employment subsystems in the Bell system. By the first part of the century, AT&T developed clearly delineated and occupationally segregated internal labor markets for network technicians, customer service workers, telephone operators, and line managers. The internal labor market rules for these groups are analogous to the craft, secondary, industrial, and salaried models, respectively, discussed in section 2.2 above.

Four historical conditions, however, shaped internal labor market rules so that the Bell System differed in important ways from theoretical models. These conditions include: a) the powerful but also limited role of technology in shaping firm strategy and work organization; b) the Bell System's monopoly position in product markets and monopsony position in labor markets; c) the continuous growth and expansion in the demand for services; and d) the public good nature of the service and the political-embeddedness of firms.

I begin by providing an overview of technology and market regulation in telecommunications and the ways in which decisions made in these domains have set parameters for the organization of work and internal labor markets. I draw on secondary historical sources to highlight the critical junctures that have defined the direction of the industry, ownership structure, and regulatory framework. I then describe the logic of internal labor markets that drew on the ideas of personnel management and scientific management in the formative period (late 1800s-1920s). This is followed by a more detailed discussion of the evolution of technology, jobs, and job ladders for each occupational group. I conclude by comparing the theoretical models with the characteristics of rules governing each occupational group in the Bell system.

Markets and Technology

Central to political battles over telecommunications product market structure and regulation have been debates about "the nature of the technology." These debates are at the heart of current legislative and regulatory contests over the extent of deregulation and reregulation of the industry. They were central to the debates in the first decade of the century as well, when the architecture of a private, regulated monopoly system was set in place.

The debate centers on whether the integrated nature or "systemness" of telecommunications creates the conditions for a "natural monopoly." Historians of technology trace the issue to early decisions by the Bell company to focus on a systemic network -- Alexander Graham Bell used the analogy of a sewer or drainage system -rather than the point-to-point private lines that constituted the original technology. Customer demand for multiple connections led to the invention of central switching systems, creating the possibility of a networked system (Rosenberg 1994:207-9). Once the high costs of building a switch were absorbed, the marginal cost of adding another user were minimal, creating large positive network externalities. The value of the network also increased with the number of users, and the strategy of the Bell company was to use its technological edge to provide exclusive switched local service, successfully fending off competitors in many areas.

Rosenberg emphasizes two implications of this technological choice: first, its path dependent nature, and second, the subsequent importance of engineering. The early commitment to the network system created a path dependency that "...precluded research on how to make the system more flexible from the viewpoint of any specific user" (Rosenberg 1994:211). Two-way wireless communications, for example, were used for ship-to-shore communications throughout the century, but Bell Labs did not pursue research and development on wireless as an alternative to wireline or numerous other technologies. Danielian (1939) provides a useful history of AT&T's business strategy and how it shaped its research and engineering investment decisions. Additionally, the systemness or interoperability of the network meant that scientific advances were of little

use unless they could be engineered into the overall system: advances in systems engineering were critical to taking advantage of new technologies.

Economic historians divide early telephone history into three regulatory periods: a) 1876-1880, unregulated competition; b) 1880-1984: unregulated Bell monopoly based on patent rights; c) 1894-1914: renewed competition (Brooks 1976, FCC 1938, Danielian 1939, Stone 1989). The Bell Company gained its first patent in 1876, then successfully fought off competitors in over 600 patent suits, the most important of which involved the much larger Western Union (WIJ). An 1879 settlement between Bell and WU divided up telephone and telegraph markets, with Bell withdrawing from wireless and WU giving up wireline communications. Under the management of Theodore Vail (reputed "organizational genius," who subsequently organized the U. S. Postal Service into "the most efficient" of its day), Bell began building a vertically-integrated organization. In 1882, it bought Western Electric, WU's manufacturing arm, and began manufacturing equipment as a sole source supplier to Bell local telephone subsidiaries. Under license contracts on Bell terms, local companies agreed to use only Bell equipment and connect exclusively with Bell subscribers. Long distance toll calls were first introduced between Boston and New York in 1885, and Bell subsequently began using its exclusive patent in long distance to attract local companies to its network while prohibiting them from interconnecting with non-Bell franchises for long-distance service (Goulden 1968:57).

When Vail left for the Postal Service, Bell went on to build a highly profitable empire in the second period, backed by Boston financiers. In 1896, it reorganized and incorporated New York's AT&T into the Bell Company (renamed AT&T in 1900). End-to-end integration (equipment supply to local to long distance service) dates to this period. As summarized by one telecommunications historian, "After less than a decade, the fundamental elements of AT&T's business strategy were already in place: horizontal integration of local exchanges, backward integration (into equipment manufacturing), forward integration (through the practice of retail equipment leasing), and first-mover development of an inter-exchange (long-distance) transmission network" (Vieter 1989:30).

Bell's high rates and poor service, however, apparently led to public dissatisfaction, opening the way for new "independent" competitors when the Bell patents expired in 1984. According to many accounts, Bell ignored the public, overcharged in cities where it had monopolies, and strung wires over fences and homes rather than on poles: "Populists made Bell-baiting a national sport, and 'dollar a month service' their rallying cry" (Goulden 1968:59). Independent companies owned one-third of the market in 1900 and 50 percent by 1910, according to Cohen (1992:26-7). Vail, rehired by AT&T in 1907, and now financed by Morgan Banking (which had taken over controlling stock interest), started buying up competitors to beat them.

The early history, therefore, does not support the idea that a natural or regulated monopoly solution was inevitable. Political debate over ownership structure and regulation took hold in the first decade of the century, in the midst of the anti-trust movement. Three alternatives were debated: anti-trust enforcement, nationalization, or regulation. AT&T faced anti-trust suits filed by independents, who favored a competitive market solution. Social reformers and progressives pushed for nationalization, similar to what was occurring throughout Europe. Vail lobbied for regulated monopoly -- a solution he believed was efficient (consistent with his belief in the scale economies of the natural monopoly), would protect the Bell System from competitors more than would a laissez-faire approach, and would defuse the anti-trust and nationalization movements. During the same time period, influenced by the progressive movement, Wisconsin and New York led the way for individual state regulation of telephone prices and service standards. Thirty states had some form of regulation by 1910, and 42 by 1920 (Cohen 1992:32-43). In the meantime in 1913, AT&T settled an antitrust suit filed by independents agreeing that it would not acquire control over any competing company and that it would connect its system with the independents provided their equipment met Bell's operating standards (Goulden 1968:72).

The federal government included telephone service under the Interstate Commerce Commission as of 1910, but between 1914 and 1934, federal oversight was virtually non-existent with the exception of establishing a uniform system of financial accounting. States

primarily focused on regulating prices, although some increasingly put pressure on the Bell system to provide equitable and universal service (Viotor 1989:35). AT&T developed a strong public relations approach to the government, and built quite friendly industry-government relations (Danielian 1939:275-285). Unhampered by anti-trust concerns, it continued to buy competitors. By 1920, AT&T controlled two-thirds of the industry; by the mid-1930s, it controlled 83 percent of local telephone stations, 91 percent of plant and equipment, 98 percent of long distance, and 90 percent of total revenues -roughly the same percentages that existed at divestiture in 1984. It provided high continuous dividends to stockholders from 1900 through the depression, averaging between \$7 and \$9 dollars per share (Coon 1939: 1-10). The ownership structure was highly skewed, however, with the Bell system concentrated in lucrative, high density metropolitan areas and operating less than one-third of the rural telephone stations (Danielian 1939:21). Several hundred small companies provided small town and rural service in relatively unprofitable markets while 25,000 "tiny" rural mutualist organizations of owners and farmer-subscribers provided service in more remote areas (Schacht 1985:20).

In summary, AT&T built an integrated telecommunications monopoly in the first fifty years of the industry's history through a strategy that controlled access to the technology using government-issued patents, targeted the most profitable markets, created a vertically-integrated system in which subsidiaries bought over-priced equipment from AT&T's manufacturing arm, and passed costs on to consumers. By making minimal concessions to regulators while cultivating a public service image, it continued to operate as a largely unregulated entity until the post World War II period. Revenues, profits, and shareholder dividends grew continuously throughout the period.

How did this business and technology strategy affect its employment practices? Was there a link between business strategy and the development of internal labor market rules? This is the question to which I now turn.

Centralized Personnel Management

If AT&T's business strategy was to monopolize markets and profits by building a highly integrated technological infrastructure with standard operating procedures, it needed standardized personnel rules to ensure consistency of service. It was also concerned about its public image, and one way of developing a positive public face was to create a reliable, service-conscious workforce. Historical accounts trace the Bell system's elaborate personnel management policies to the late nineteenth century when Bell was building a vertically-integrated empire but was under public scrutiny over its monopoly practices and poor service.

In one of the few accounts of labor policies in this period, Norwood traces the Bell companies' personnel management system to the turn of the century when centralized administration of recruitment, selection, and training were introduced. By 1910, a federal investigation of the telephone industry described the administrative organization of the Bell system as one of "perfection" rivaled by few other older industries (Norwood 1990:31). Norwood's convincing explanation of the growth of personnel management focuses the nature of the service work and the clientele. Because customers were largely middle and upper class, operators needed to be well educated, speak good English, and present a positive image to the public. Stringent gender, age, race, and education criteria (single women, aged 17 to 26, white, with preferably 2 years of high school) were in place by the turn of the century, and probably earlier. Bell companies in larger cities established training schools by the first decade of the twentieth century, with formal training lasting 3 to 4 weeks and including courses to master switchboards, operating procedures, and memorization of carefully-phrased scripts lasting (Norwood 1990:40-44).

Given the fact that operators comprised the overwhelming bulk of the work force, it is plausible that overall corporate labor policies were shaped by the dominant core workforce. What is not clear from his account is whether the exclusive hiring of women occurred because of the "white collar" nature of the work, because they were considered non-threatening and more accommodating in interpersonal transactions (better at sales and service), or whether the introduction of scientific management in the 1890s and

routinization of work (discussed below) reduced wages and made these jobs unattractive to men. Male operators were common in the 1870s and 1880s when the work of operators was quite skilled and varied, but were virtually non-existent in operator jobs by 1900 (Norwood 1990:53).

It is also unclear how far these stringent hiring policies extended to male outside craft jobs, although education and race criteria seemed to be firmly in place early on. At least by the 1920s, all job applicants had to pass detailed entrance examinations for entry-level jobs as well as for promotions, and the policy effectively limited the workforce to native-born whites. According to Schacht:

"Despite the informality of its employee recruitment methods, based mostly on the family and friendship networks of current employees and contacts with public and parochial school officials, Bell's hiring standards were relatively systematic and stringent. The normal educational requirement in the early 1920s was completion of eighth grade; by the late 1930s it was completion of high school or trade school. Bell further required the ability to speak clear English; it generally hired only people in their late teens and early twenties; and blacks were excluded from all but the most menial work, leaving them with less than one percent of the jobs in the industry's entire pre-World War II history" (1985:23)

As a result, even in this early period, the median number of school years for operators was 11.8, while that of the entire female workforce was 10.8; comparable figures for craft workers were 10.5 years versus 8.7 years for the entire male workforce (Schacht 1985:23-4). AT&T also employed industrial psychologists to develop detailed job descriptions and associated batteries of tests for entry-level applicants. Once a worker passed the examination, he or she received considerable formal and on-the-job training.

The Bell system also encouraged loyalty through paternalistic benefits policies, which again began prior to World War I: company-paid pensions, sickness and disability benefits, employee stock options, and an organization of retired and long-service employees.

In addition to standardized and highly restrictive screening, selection, and training procedures, the Bell companies developed paternalistic benefit or social welfare policies in the decade between 1910 and 1920. They introduced employee cafeterias, “retiring rooms,” athletic programs, and benefit plans by World War I. The “American Plan,” introduced throughout the Bell system in 1913, provided vacations, a noncontributory retirement plan, accident and disability payments, and an organization of retired and long-service employees, all designed to build loyalty and long term commitment. From at least the 1920s on, the company established employee stock option plans, seniority-based benefits and career ladders filled almost exclusively from within (Schacht 1985:35-6).

Archival documents show that the company’s welfare program was strictly “a business proposition” to prevent unionization (Norwood 1990:51). The threat of unionization was serious, particularly among the telephone operators who had the most oppressive jobs and working conditions. Norwood documents the growth and power of militant operator unions (separate IBEW operator locals) in particular regions, particularly after 1912, and their successful series of strikes to improve working conditions until their defeat in the late 1920s. The militance focused on repressive working conditions and the repetitiveness, tedium, and intense supervision associated with taylorized jobs, as discussed in greater detail below. Similarly, the IBEW attempted to organize outside craft workers throughout the period, but with limited success. At the height of its strength in 1919, the IBEW had a combined membership of 25,000 or 9% of the 278,000 employees in the industry (Schacht 1985:12). Thereafter, the IBEW lost ground while, beginning in 1919, Bell companies initiated company unions as alternative employee organizations. The company unions stagnated in the 1920s, but following the passage of the Wagner Act, 180 employee associations were formed between 1935 and 1937 (Schacht 1985:6)¹

¹ Schacht identifies several major factors that both limited independent unionization and facilitated the adoption of company employee associations: geographic dispersion of the workforce in thousands of small offices and work sites across the country, often in small towns with strong anti-union biases; gender-based occupational segregation that limited worker solidarity; hiring practices that favored native-born whites and encouraged their elitism; Bell companies’ monopsonist position in local labor markets. The Bell companies provided resources and time off for employee meetings that helped overcome these obstacles (1985:20-25).

The threat of government regulation also shaped AT&T's and the Bell companies' employment strategies. AT&T's aggressive take over tactics drew anti-trust concerns and demands for investigation. Moreover, many argued that the telephone and telegraph industry -- characterized by high capital investment and scale economies and requiring a single integrated infrastructure -- was a "natural monopoly." Theodore Vail, president of AT&T during two terms in this period and architect of the company's takeover strategy, believed that more than one telephone company was a waste, and that the private monopoly should be regulated as a public utility. He opposed, however, the attempts by government and consumer advocates to incorporate telephone and telegraph into the national postal service, as was occurring in European countries (Scott 1992:64). Furthermore, the importance of telecommunications to the national security became particularly apparent during World War I, and the federal government in fact took over operation of the system during part of the war period.

To keep the government at bay, therefore, AT&T developed a sophisticated public relations operation that included the establishment of the company's first statistics department to gather information on AT&T's cost, quality, and service operations that would be used to counter accusations of high costs or poor quality (Scott 1992:65). This marks the beginning of the Bell system's pervasive performance measurement system, which significantly shaped employee evaluations and working conditions and which I discuss in greater detail below. Another effect was to solicit the participation of the entire employee population in maintaining the company's public image. AT&T viewed employees as the public face of the company, and encouraged and rewarded active employee involvement in community service, such as for example, "The Pioneers," which involved thousands of volunteers from Bell companies in community service activities. Employees were expected to play leadership roles in community and charitable organizations, and those who did so were looked on favorably for their leadership potential and promotion in the Bell companies. While corporate pressure on managers to participate was probably more intense than for workers, the policies promoting community participation applied to all employees.

A detailed account of AT&T's attempts to manipulate public opinion in its favor traces the company policies to the 1910s and 1920s: "Every employee in the Bell System is considered a potential public relations representative. Telephone company employees, as a class, are gracious and accommodating. This is no accident. The uniformity of behavior is the result of design. Employees are selected and trained by the company as public relations agents, because it is believe that through constant cultivation of public sympathy, telephone companies will have less trouble in getting increased rates and in opposing adverse legislation" (Danielian 1939:281). All employees were encouraged to join civic organizations and use those ties to promote a positive image of the company. Company-paid dues to such organizations totaled \$4.8 million between 1924 and 1935 (Danielian 1939:284). In a speech at a Bell system conference in 1921, for example, then president of AT&T Thayer stated:

"Membership in such organizations as the United States Chamber of Commerce, National Labor Organizations and National Farmers Organizations, etc., local Chambers of Commerce, Rotary Clubs, etc., and civic organizations of every description, improvement societies, neighborhood groups, church clubs, consumers' leagues, etc. afford unusual opportunities for establishing contacts with the leaders in general public activities and those who are molding public sentiment" (In Danielian 1939:285-6).

This research captures the cynical side of AT&T's manipulation of public perceptions. What is unclear is whether corporate policies simply encouraged, effectively remunerated, or implicitly mandated such behavior. Whatever the motivation, AT&T systematically built a culture of strong commitment to public service. Representative of the rhetoric of the period is an address by an AT&T official in which he admonishes employees, "...there is one common responsibility for the president, the janitor, the operator, the lineman...and everyone else in the whole outfit...the obligation and devotion to public service'" (cited in Schacht 1985:35). Many employees apparently learned to take their public service mission and participation in community affairs seriously. Most

had grown up in the towns or communities in which they worked as adults representing the telephone company, and took pride in public service. The telephone was viewed as a vital service, and association with advanced technology and modernization contributed to a sense of high status and elitism.

In summary, this series of personnel policies developed in the first two decades of the century was a strategic response to the service nature of the industry and the monopoly position of AT&T that brought with it the threat of government intervention. AT&T's monopsony power allowed it to successfully defeat unionization and to create its own company alternative. This strategy, however, also laid the groundwork for an employment system of good benefits, internal promotions, and implicit lifetime job security for all employees in the Bell system.

The commitment-enhancing policies were reinforced by the Bell companies' monopoly and monopsony position. By 1920, the Bell System controlled two thirds of the industry; by 1937, it controlled 98% of long distance service, 93 percent of equipment manufacturing, and 83 percent of service wire. Its competitors consisted of several hundred small rural companies in markets that were not particularly profitable, and some 25,000 "tiny" rural companies in which much of the work was done by owners and farmer-subscribers (Schacht 1985:20). Because the Bell System monopolized most local markets and because telephone skills were quite industry specific, the Bell companies held a monopsony position which considerably limited external labor market opportunities for telephone workers. In addition, except for the depression when the company laid off thousands, demand for services grew steadily, and with it the demand for labor. The result was a highly stable system of employment with implicit lifetime security undisturbed by the business cycle fluctuations that undermined most other private sector enterprises.

The Growth of Functional Specialization and Bureaucratic Control

Beginning in the 1930s and continuing into the post World War II period, three primary factors shaped the direction of work organization and internal labor markets. The

first consisted of AT&T's on-going efforts to improve technological efficiency and apply the logic of mass production to services -- scientific break-throughs at Bell Labs that were in turn made viable through AT&T's advances in systems engineering. The second was the introduction of federal and state regulatory oversight in a much more significant way, which led to the elaborate system of cross-subsidies that in turn supported universal service. The third was the post war growth of unionization, which AT&T responded to in part by creating more management positions. These conditions led to the development of a highly efficient system of service production, but bureaucratic management organization, which I elaborate on below.

The Limits of Mass Production and Scientific Management

In order to understand the nature of work organization and functional specialization in telecommunications, it is important to understand some additional aspects of the basic technology and infrastructure. The dual nature of the enterprise -- of building and maintaining a network infrastructure while at the same time providing services based on that infrastructure -- has led to a complex functional organization in which sets of "internal" service functions attempt to map, or work in tandem with, the "external" network.

On the network side, the physical infrastructure at its simplest consists of large cables or "trunk lines" that house transmission wires, on the one hand, and switching equipment located in "central offices" or outside boxes, on the other. Long distance cables (containing large bundles of transmission wires), or what AT&T referred to as "long lines," connect central office switches in different geographic locations. Other networks of cable, or "lata" connect the central office switch to smaller switches and ultimately to customer premises. Main cables or telephone lines are connected to the customer's premise by "service wires." Calls made within an exchange area are referred to as "intralata," while those across exchange areas are referred to as "interlata." Different specialties of craft workers build and maintain the transmission lines and switches.

On the service side, semi-skilled business office personnel were responsible for manually placing and tracking service orders and repairs. Over time, manual tracking systems were automated, and more recently integrated into computer information systems that are programmed to send messages to different parts of the system so that the internal information system maps the external network so that phone service may be installed, upgraded, repaired, and the correct address and billing information kept up to date as customers change locations.

Operators were initially the “human switch” connecting each call that came into a central office from one transmission line to another. They were the link between the network infrastructure maintained by craft workers and the service order and billing functions of the business office. Over time, AT&T replaced the manual switching of calls with electro-mechanical switching devices; digital switching has since replaced electro-mechanical.

Three core functions, therefore, -- network maintenance, customer services (business office and repair), and operator services (traffic) -- are at the heart of the historic functional division of AT&T and the Bell operating companies. The functional organization of the pre-divestiture Bell System had a deep and continuous history, with the company’s structure in 1980 closely resembling its framework in 1945 or even in 1910. Just prior to divestiture, AT&T and the Bell operating companies were each divided into Plant (network), Traffic (operator services), Commercial (business office/customer service), and separate departments for support functions: Accounting, Legal, Regulatory, and Personnel. Plant was further divided into functional divisions: Long Lines (long distance, AT&T only), Engineering, Construction, and Installation and Repair.

Similar to the development of personnel management, the application of scientific management also dates to the turn of the century. There appear to be two periods of work innovation, both of which primarily affected operator jobs while leaving craft work and other business functions largely unchanged. AT&T began to taylorize operator jobs in the 1890s through time and motion studies, the use of standardized manual operating

procedures, and the development of standard operator phraseology to reduce seconds per call and increase efficiency. Later, in response to the depressions of the early 1920s and 1930s, scientists at Bell Labs successfully developed electro-mechanical switching technologies to reduce the labor content of operator jobs. Widespread application of this labor-displacing technology allowed the company to maintain profits and shareholder dividends throughout the depression of the 1930s (Danielian 1939:209-212; Schacht 1985:38).

In the post World War II era, AT&T made dramatic improvements in cost and service quality through advances in technology and by more fully applying the logic of mass production to services. If we consider the logic of mass production, it's competitive advantage is high volume at low unit costs². From the perspective of economics, this is achieved through the reduction in labor hours per unit output. From the perspective of operations management, it is achieved either through moving down the learning curve (direct labor per unit) or the experience curve (value added per unit), both of which are dependent upon cumulative production. Operations management identifies several ways in which firms move down the learning or experience curve: a) through economies of scale as volume increases; b) through standardization of products; c) through specialization of process equipment; d) through centralization and control of input costs; e) through rationalization of production which reduces labor input and decreases the need for supervision; and f) through greater specialization of labor which shifts the demand for labor from skilled and flexible craft workers to machine operators.

AT&T succeeded on the first four of these dimensions. The logic of mass production in telecommunications began with scale economies based on high volume, the standardization of one product (voice transmission), the heavy investment network

² This argument is a summary of a more detailed explanation presented in Appelbaum and Batt 1994:16-18) that draws in particular on the work of Abernathy and Wayne (1974) and Hayes and Wheelwright (1984), among others.

infrastructure and systems engineering to create an integrated process for service delivery, standardized operating procedures, and vertical integration of equipment supply.

In the post World War II period, dramatic improvements in efficiency occurred through the development of AT&T systems engineering. Systems engineering served as analytical tool for integrating economic considerations of cost minimization into technical development and ensuring technical compatibility and interoperability throughout the system. As Rosenberg notes, "Systems Engineering owed much of its development within the telephone system to the fact that choices and tradeoffs in this industry attained levels of complexity that had not been attained elsewhere in industry" (1994:212-3). In the first decade following the war, AT&T focused on the application of pre-war inventions such as coaxial cable, multiple simultaneous circuits on a single wire (multiplexing), and electro-mechanical switching; the second decade brought advances in digital computers and the demand for high speed data transmission; by the mid-1970s, AT&T began shifting from analog to digital transmission and switching (Vietor 1989:49-52).

This approach created a virtuous circle of growth in productivity, demand for services, and employment. Productivity in the telecommunications sector grew by 5.9% per year between 1967 and 1988 -- over five times the average rate of 1.1 percent for the nonfarm business sector -- and ten times the rate of 0.8% in services (U.S. DOL 1990:10-12; Waldstein 1988:Table 2.3).

The rationalization of production and specialization of labor, however, met with mixed success: highly successful in operator services, but not in the remainder of jobs. As a result, despite advances of labor-displacing technology in operator services, overall employment grew as the service market expanded. The Bell System developed a very mixed system of production. Each occupational group, located in a separate functional department with a distinct set of specialized tasks, had a different production logic. Network jobs involved highly specialized craft work requiring electro-mechanical knowledge and skills to construct and maintain transmission cables and switches. Business office jobs, the predecessors to customer service positions, required substantial knowledge about service installations and operations. Workers required sufficient education to

provide personalized attention and creative problem-solving to a wide range of service questions and problems³. Operators were the human switch that made the system work, but over time their jobs came to closely resemble the narrow repetitiveness of classic assembly-line operators.

These distinctions in the design of jobs and work organization are significant because they imply that each occupation should require a different approach to work reform or reorganization in the post-divestiture period of increased competition, a discussion I take up in the next section. Taking the three core occupational groups in telecommunications services, the differences in work organization in 1980 could be summarized as follows:

The Bell System, 1980:									
Production Logic of Occupational Specialties									
Specialized Craft Model						Universal Service Model			
Inside CO Switches	Outside Cable	Customer I&R				Service, Billing, Repairs			
Mass Production Model: Traffic (Operator Services)									

These differences in work organization across the three occupational groups are reflected numerically in two types of data: a) changes over time in employment levels, and b) changes over time in the ratio of supervisors to workers. With respect to employment levels, in the post World War II period alone, automation led to an absolute and relative drop in employment of operators, who represented 43.5% of the workforce in 1950 but

³ Although I do not focus on them here, accounting jobs were similar to those in the business office; they required less customer contact, but specific knowledge of billing procedures as well as basic math and reading skills.

only 14.1 percent in 1980. By contrast, both network crafts and business office services grew proportionately and absolutely: from 24 to 36.5 percent of the workforce and from 5.3 to 11.1 percent, respectively (FCC Statistics of Common Carriers 1980). Elimination of low skill operator and clerical jobs in this period led a shift in the gender composition of the work force from roughly 70 percent female in 1946 to 60 percent in 1960 (Hacker 1979:545) and 52 percent at divestiture.

The second measure, the ratio of supervisors to workers, is an indirect measure of the extent to which workers may be technologically versus managerially-monitored and controlled. As technology increasingly paced the work of operators and allowed for electronic monitoring, technology replaced supervisors as well as operators. Spans of control (direct supervisor/worker ratios) increased in operator services from a low of 1:6 in the early 1900s -- when one service assistant or "gang leader" stood behind 6 operators and monitored their every move -- to over 1:20 by 1980, when electronic monitoring of operators was pervasive. But in contrast to the mass production model in which rationalization and machine pacing reduce the demand for managers, the demand increased dramatically from the 1940s on. In contrast to operator services, in 1980, spans of control in customer services were half that of operator services, averaging 1:10. Outside craft workers in network, the most difficult jobs to monitor, had one supervisor for every six workers in 1980. These figures are summarized in the table below.

Bureaucratization of the Bell System: 1950 - 1980				
Dimensions	Network Technician (Craft)	Business Office (Clerical)	Telephone Operators (Industrial)	Managers (Salaried)
Percent of workforce				
1950	24	5	44	13
1980	37	11	14	29
1980 Ratio: Sup/worker	1: 6	1:10	1:20	

Historically, strong occupational subcultures emerged in these functional departments due to corporate policies emphasizing occupational segregation. Schacht notes, "...white-collar workers in the accounting and commercial departments looked down on both the traffic operator and the 'greasy plant man out there climbing poles, with creosote all over him.'....In the commercial departments, particularly, insularity was encouraged by the company practice of paying monthly or bimonthly salaries, as distinguished from weekly wages in the other departments. Along with this practice went messages designed to nourished feelings of elitism, messages that 'you [customer services] are the telephone company in the eyes of the public' and therefore 'the elite'" (Schacht 1985:22). Network craft cultures also split along white collar (inside craft) and blue collar (outside craft) lines. Historically, network craft and operators organized separate union locals, while business and accounting resisted unionization. These subcultures continue to be robust. While the 1970s EEOC (Equal Employment Opportunity Commission) law suit against AT&T forced the opening of some craft jobs for women (for example, I&R jobs), occupational segregation has been quite resilient (Hacker 1979)⁴. While no careful study has been done of the effects of deregulation and downsizing on occupational segregation, it is very plausible that those women who gained craft jobs in the 1970s were the least senior and hence most likely to lose them in the tumultuous 1980s.

Regulatory Influences on Work Organization

I have indicated how the Bell System remained largely unregulated in the first fifty years of its development. The first serious investigation into AT&T began with the establishment of the Federal Communications Commission (FCC) in 1934. The three-year Walker Commission involving 300 staff at a cost of \$1.5 million produced a 70-volume

⁴ In fact, in the first three years following the 1972 affirmative action plan, AT&T placed thousands more men in female jobs than visa versa (16,300 versus 9,400); overall, women lost employment because technology eliminated 36,000 low level clerical and operator jobs in the same period (Hacker 1979:545).

scathing report with 2000 exhibits documenting AT&T's monopoly practices, particularly its high charges for equipment from its Western Electric subsidiary to the Bell operating companies, with costs passed on to consumers and profits to stockholders (FCC 1938, 1939). With the coming of World War II, however, the report was shelved.

During the next period (1934-84), however, state and federal regulators increasingly regulated rates of return and pushed for reliable universal service. The language of the act establishing the FCC is instructive because it sets forth a mission that was in fact quite broad, representing a departure from the narrow form of rate regulation pursued throughout the earlier period:

"For the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communications, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication, there is created a commission to be known as the "Federal Communications Commission".... (June 19, 1934, c 652, Title I, Section 1, 48 Stat. 1064; May 20, 1937, c. 229, Section 1, 50 Stat. 189).

The idea of the telecommunications network as a public good to serve the national interest as well as the safety and wellbeing of the citizenry became firmly rooted in this period, particularly in the wake of World War II and the central role that AT&T and Bell Labs played in the development of advanced defense communications systems (Vietor documents that roughly 2,000 of the 2,700 scientists at Bell Labs worked on defense projects during the war (1989:50)).

It is also during this time that federal regulators established the elaborate system of cross-subsidization that built and sustained a system of universal service. Long distance toll calls subsidized local traffic, business subsidized residential, and urban or high volume areas underwrote the losses of serving rural areas. Bell System companies, however, also fought regulatory requirements to provide universal service or to allow other solutions to rural service delivery⁵. In the 1940s, several attempts by Congress to extend the benefits of the Rural Electrification Administration (REA) to rural telephony failed, in part due to opposition from Bell companies and the Independents, but it finally passed in 1949. REA provided telephone access to thousands of farms over the next two decades (Goulden 1968:76). State and federal regulators continued to put pressure on Bell companies to provide universal service.

State and federal regulators also shaped the content of jobs by requiring detailed periodic reporting and maintenance of performance standards. That is, over time they expanded their domain of influence not only over rates and coverage, but safety and service reliability, and how these standards were achieved through technology, workforce deployment, operational standards, and measurement systems. Management could not introduce technology or work innovations without first going through the state PUC.

State PUCs, for example, set performance standards for network operations, from the length of time to repair a service outage to safety standards required during routine installation and repair. Each functional department in the telephone companies developed its own system of record-keeping and internal performance measures as demanded by the state PUCs, and these measures were unique to the functional specialization of the department. Quantitative measures were emphasized, for example -- tasks per day for network crews or seconds per call or call-waiting time for operators or customer service representatives. But PUCs also emphasized quality and universal service -- in network,

⁵ The growth of the Bell monopoly decimated the independents who had provided rural service. The Bell System's higher rates, coupled with the depression and the substitution effects of the automobile (Fischer 1987), led to a drop in rural phones. Goulden finds that rural phones dropped from 2.5 million in 1920 to 1.5 million in 1940 (1968:76). Fischer (1987) estimates that the percentage of farms with service dropped from 39 percent to 25 percent in the same period.

for example, the repair of service within a twenty-four hour period. Moreover, in the telephone service industry, quantity and quality of service are closely linked because good service is timely service. In customer services, for example, average waiting time is a key indicator of service quality because customers place heavy emphasis on quick response in judging service quality. As one long-time manager in the Bell system commented, "...the telephone company has always been obsessed with quality, probably too much so. For example, we used to require that a customer call be answered in two rings. That was our own internal measure, but maybe we didn't really need that -- and it was expensive" (Interview 57:8/11/93).

The system of functionally-specific measures reinforced separation and "turf" competition between different departments. Maximizing efficiencies in one department, however, often undermined efficiencies in another. Maximizing tasks per day in network, for example, creates incentives for network craft workers to find quick fixes to problems; but such quick fixes may result in repeat repair calls for repair attendants, thus increasing their workload and call-waiting time. Moreover, over time, quick fixes lead to network deterioration, which becomes a problem for construction and engineering. Functionally-based measurement systems, therefore, created employees who were "efficiency-minded," but narrow in perspective, and this often resulted in overall inefficiencies. As companies began to mechanize record-keeping and measurement systems in the 1970s and 1980s, they simply computerized the inefficiencies in the old system.

The PUCs emphasis on safety standards also shaped organizational and employment policies. Adherence to safety rules became a primary measure of the performance of managers and workers. The safety standards and training in the Bell system were always considered by the workers to be much higher than in non-regulated industries. PUCs were particularly exacting on safety because the state could be held publicly responsible for safety injuries and accidents -- accidents that could involve not only workers but the public as well (for example, if workers were repairing a line on a street or highway). Additionally, outside craft work is exceedingly dangerous -- climbing poles and repairing wires where there are several power connections (cable, gas and electric, telephone), and

sometimes in inclement weather. Managers, then, were judged on their safety records, and workers were subject to discipline and suspension for violating safety procedures such as failing to wear their safety gear, failing to put orange cones out while they were working, or violations of motor vehicle rules and regulations. One network supervisor interviewed described the historic and continuing concern with safety in the Bell system, "We've always had an intensive safety program. We're dealing with power lines. We play in traffic. Underground, there's water, dead air, organic gases....You can't skimp on safety" (Interview 48, 3/29/93).

State and federal regulation also reinforced the importance of public accountability and public service as a central mission for employees. For example Howard and Bray (1988) present a portrait of telephone company managers (also applicable to workers) of responsible public servants who took pride in their work. "Compared to managers in other organizations, they were more emotionally stable but less daring and more bound by rules. As managers of a government-controlled monopoly, they were less 'dollar' conscious in a proprietorship sense, but assumed social responsibility for the service the telephone business provided and had a real sense of obligation to the community." (Williams and Peterfreund, cited in Howard and Bray 1988:36). In the Management Questionnaire administered by Howard and Bray, these managers consistently scored high in terms of their pride in their jobs and their overall job satisfaction (Howard and Bray 1988:132).

Finally, for purposes of understanding subsequent restructuring of the industry following AT&T's divestiture, what is interesting about the role of the state PUCs is that they forced variation and diversity in workplace standards and practices so that "the Bell system" was not as monolithic as is conventionally described (or as the above description has portrayed). Historically, states varied considerably in the tightness with which they regulated telephone companies, reflecting variation in consumer protectionism as well as in the strength and role of local unions in influencing public policy. Despite the conventional view of "Ma Bell" as a highly integrated and uniform bureaucracy, therefore, telephone companies did vary considerably in the range of technologies, service and safety

requirements, and performance measurement systems that they developed over time. After divestiture, these differences in regional management and labor strategies became more evident. As I discuss in greater detail in the next section, what is remarkable in the post-divestiture period is that when regional Bell operating companies inherited several local phone companies, they had to spend considerable time and money standardizing technology and human resource systems across states, and this process has continued into the 1990s.

In summary, then, it was the combination of scientific advances made viable through AT&T's systems engineering, on the one hand, and regulatory oversight, on the other, that brought about efficient, reliable, and universal telephone service in the U.S. far earlier than in any other advanced industrial country: by the 1960s, over 90 percent of Americans had telephone service. The limits of scientific management, however, coupled with the demands of regulators, led AT&T to develop an increasingly bureaucratic form of management organization. From the viewpoint of employees, this mixed system of production created significant differences in the jobs and career ladders of occupational groups, a subject which I turn to in the next section.

Occupational Specialties and Employment Subsystems

The sections that follow briefly describe the evolution of technology, job design, and work organization in these core network and service occupations in the Bell system.

Network

Three generalizations are noteworthy with respect to network jobs in the pre-divestiture period. First, they remained highly skilled craft jobs that were resistant to Taylorism or machine-pacing or monitoring. Second, over time, the Bell companies increasingly divided network craft into subspecialties, but this functional specialization did not result in a proliferation of job titles, pay grades, or detailed job ladders. There were three broad functional departments, each with short job ladders with no more than three levels. The degree of specialization appeared to be more a function of whether workers

worked in rural or urban areas, with specialization greater in the latter than in the former. Third, because these craft skills were highly specialized and specific to “telephone work,” and because the Bell system had a monopoly on telephone work, the net effect in reality was that these craft workers’ skills were highly job- and firm-specific.

Bell companies were unsuccessful in taylorizing network craft jobs or controlling craft workers both because of the nature of the work and technology and because of the autonomy associated with work in dispersed geographic locations. The nature of the work requires craft workers to have responsibility for an entire installation or repair -- and outside craft jobs continue to require significant skill, autonomy, and decision-making discretion. Distances between jobs also make it uneconomical to send more than one worker to a job, for example, to a customer's premise to do an installation or repair.

AT&T tried to compensate for this inability to control the work process by a management strategy of heavy supervision and individual worker responsibility for detailed performance measures. As mentioned above, the ratio of first line supervisors to craft workers was 1:6. Individual performance measures were the basis of employee evaluations and discipline. Performance was measured purely on the basis of quantity, or tasks (jobs) per day. Management pushed for six or eight tasks per day; workers kept it to four or less. Workers complained that quantity was a poor measure that encouraged poor workmanship. The central issue, however, was management's on-going attempt to gain control over craft jobs that were resistant to such control. These management strategies of heavy supervision and quantitative performance measurement were a major and on-going source of conflict between management and labor, and resulted in a continual flow of union grievances.

Functional specialization was another strategy to increase efficiency. Prior to divestiture, departmental divisions on the network side included Engineering, Construction (“Long Lines” at AT&T and “trunk lines” in the Bell Companies), and Installation and Repair (I&R). Engineering departments consisted primarily of management-level engineers who drew up the blue prints for building or repairing trunk lines; these designs would be sent to the construction department for implementation. Engineering also

included three levels of inside craft jobs -- frame attendants, switching technicians, and engineering assistants required considerable skill and training. Inside tech jobs involved complex work on electro-mechanical switches. This was the most skilled and complex craft work in the industry. Engineering assistants were considered top-of-the-line craft and required specialized knowledge of drafting as well as electro-mechanical skills and engineering knowledge of the network infrastructure.

Outside craft jobs were divided between AT&T Long Lines and Bell operating company Plant Departments (Construction and I&R). In earlier periods, AT&T purposely deployed workers to a variety of jobs so that they could be cross-trained and deployed more flexibly: "...among the younger plant men there was considerable movement from craft to craft, as the company changed assignments in an effort to build a largely cross-trained force" (Schacht 1985:26). By the 1970s, construction and I&R jobs had clearly separate tracks. The distinction between Construction on the one hand, and Installation and Repair, on the other, centered on both the type and size of the transmission cable and the nature of the work. Construction jobs fell under the "Long Lines Department" at AT&T and "Construction Department" in the operating companies, but in both instances included both the construction and maintenance of the major "trunk lines" or cables. Linemen and Cable splicers built and maintained the trunk lines, so that they did not interact with customers or do work on customer premises. This work was heavy manual work, but generally considered more skilled and dangerous than installation and repair. There were two grades -- craft helpers on the one hand, linemen and cable splicers on the other; the latter two were defined as the same pay grade, but were considered different specialties.

Installation and Repair, by contrast, used outside craft to install and repair the service wire that connected the trunk line to the customer premise. When a customer ordered new phone service, for example, an I&R craft worker would connect the cable pair on the outside of the premise and install equipment on the inside. If installation could not be completed because a main line was damaged or did not extend far enough into a

new subdivision, then I&R wrote up a work order for the construction department rather than making the repairs themselves, and often leading to delays in service connections.

I&R jobs were also often divided between those who only did installation and those who only did repair. Installation work tends to be less skilled and is often looked down on by craft workers who disdain the greater contact with customers involved, but there historically there has been no difference in paygrade or job classification. Job ladders in I&R are also graded by type of customer which is synonymous with degree of difficulty. Residential I&R jobs are first level; small business, second level; and large business PBX⁶ installation and repair and special services, third level. Table 2.2 provides a diagram of the job ladders in functional specialties across the three departments I have discussed.

The extent of specialization varied primarily by location in urban versus rural areas. High volumes in urban areas made specialization (for example, between installation and repair) more feasible. Urban workers were also more easily monitored. In more rural areas and small towns, outside craft work tended to retain its autonomy and multiskilled character -- by necessity. The distances were too great to have the kind of heavy supervision that was more feasible in urban areas and the workforce was too small to create subspecialties.

Technological advances that simplified or eliminated network craft work did not emerge until the mid to late 1970s, primarily through the use of digital transmission and switching technologies, and this trend has continued into the 1980s. As I discuss more fully in the next section, advances in software systems have made some craft skills obsolete while creating new opportunities for jobs requiring computer skills, so that the net effect on jobs and skills is still uncertain.

Customer Services

On the service side, the commercial (business office, currently referred to as customer services) and accounting offices hired a small number of higher skilled office

⁶ PBX, or Private Branch Exchange systems are large switches internal to large businesses that allow them to have their own internal telephone and data exchange systems.

workers. Commercial handled all business interactions with customers, such as service orders, change orders, billing questions and problems. Accounting handled all financial matters, including payroll and the license contract between the operating companies and AT&T. Historically, these jobs were few in number and viewed as confidential, or close to management. Commercial and Accounting represented 10% of the workforce in 1920 and 16% in the 1930s (Schacht 1985:22). AT&T treated commercial and accounting staff as management, and they were the last to unionize⁷.

Business office jobs increased by over 200 percent between 1950 and 1980 as telephone service expanded nationwide. These jobs retained their complexity and variety, although not their autonomy, through most of the post World War II period. In 1980, for example, service representatives continued to act as "universal representatives," working out of local business offices, often personally knowing the people they talked to and customizing responses to meet individual needs -- what today is referred to as "one-stop shopping." One service representative recalls, "I was a universal rep in 1971 in Ohio bell as well as when I moved here in 1977. I handled everything - residence and business, ingoing and outgoing calls, sales and final bills" (Interview 49:3/30/93). Orders included: new orders, incompletes, missed appointments; and close outs of completed orders. Service included: billing explanation; billing adjustments; collections, recovery. A job ladder in the business office started with service order writers and service order typists (lower level clerical jobs) and graduated through four levels to service representatives, and finally service consultants. The difference in the latter two positions depended on whether workers dealt with residential or business clients.

In summary, then, until divestiture, business and accounting office jobs were quite complex and diverse, requiring moderate education as well as strong interpersonal skills. Located in thousands of small local offices across the country, "universal representatives" provided highly specialized service and developed long-term personal relations with local customers -- the kind of customized one-stop shopping currently advocated as the source

⁷ One of the last non-union hold-outs was the 3,000-member unit of customer service representatives in New England, who voted to join the CWA in 1995 in a very closely contested election.

of competitive advantage in services, as I have discussed above. Job ladders were longer and more flexible in services than in network (see Table 2.3), with lower level clerical workers and operators being able to cut across departments, particularly into highly sought after customer service positions. Moreover, given higher levels of turnover among female employees, opportunities for advancement into management were quite good for longterm service workers. As companies began automating and expanding their use of computer and data systems in the 1960s and 1970s, opportunities dramatically expanded for women in services to enter new management jobs.

Traffic

While telephone operators are currently considered part of service operations, they historically held a dual position as machine operators, on the one hand, and customer-contact employees on the other. Until the 1920s when technological-displacement began, traffic represented 60% of the workforce. The Traffic Department consisted of thousands of operators tied to switchboards who sat in "banks" or rows of seats with supervisors or "service assistants" walking around behind them. Norwood provides the most comprehensive history of scientific management in operator services (Norwood 199:33-40). With the adoption of scientific management in the 1890s, operator jobs were heavily monitored, both by the physical presence of a supervisor and through by supervisors listening in on phone conversations, or electronic monitoring (Schacht 1985:30).

Historically, while operators had very carefully-defined and heavily supervised jobs, they were also complex and multiskilled -- both physically and mentally demanding. As described by Schacht, "...she entered the operating room and was seated at one of the several kinds of switchboards, donned a headset as well as a mouthpiece attached to a breastplate hanging around her neck (all connected to wire to the board), and began the work of connecting calls. The work required her to use her eyes to respond to signal lights, her ears and voice to briefly converse with customers and operators at other central offices, and both hands to plug cords and time and ticket long distance calls. Even during slack moments she had to keep her eyes on the board so as not to miss signal lights

indicating incoming calls. She had to seek permission to leave her board, and she could not speak to her neighbors at adjoining boards. Everything she did was according to procedure..." (Schacht 1985:31-32). Over time, as the manual side of the job was eliminated, operators were increasingly viewed as service workers.

Mechanical switching (dial tone), introduced in the 1920s, made it possible for customers to dial their own local calls. It both reduced the manual content of the job and reduced the demand for operator handling of local calls. Mechanical switches could recognize and route a seven-digit code, but not long distance calls. One switchboard operator did the work of six manual operators. By 1937, almost one-half of AT&T's customers had dial tone. A combination of the new technology plus a speed-up led to the elimination of over 50,000 operator jobs between 1929 and 1937. The average call-load per operator rose from an average of 134 units in 1929 to 150 units in 1931, 163 in 1932, and 172 in 1933 - a 29 percent increase in three years (Danielian 1939:210-12).

In the post World War II period, technological displacement of operators accelerated. A second watershed was the introduction of electronic switching equipment for long distance calls in the 1950s. Like local phone calls, this shifted the work of the operator to the customer, what in the industry is referred to as "customer participation practices." Digital switching systems and touch tone phones, which began replacing electro-mechanical systems and rotary phones in the 1970s, further eliminated operator work by allowing customers to direct dial with credit cards from public phones. While overall employment in telephone services doubled between 1950 and 1980, absolute numbers of operators dropped by one-half, from 244,000 to 128,000 (FCC Statistics of Common Carriers 1980).

The new technologies also had the effect of reducing variety in operators jobs: eliminating the physical side of the job, then the reducing the types of calls handled, then some of the diagnostic work operators did in identifying faulty telephone circuits (Kohl 1993:104). Operators were left handling the more difficult or non-routine calls.

It is not clear from available secondary sources what happened to displaced operators. Labor historians and union accounts refer lay-offs only in the depression and in

the post-deregulation 1980s, even though there is a long history of technological displacement. It is likely that many operators were absorbed into expanding customer services, clerical, and managerial jobs, as I discuss in greater detail below. Operator jobs were entry-level positions, and the tedium and repetitiveness of work led to high rates of turnover. They nonetheless had to pass stiff entry-level examinations and educational requirements; those who did not quit had opportunities for advancement either within operator services, as service assistants (gang leaders) or low level supervisors, or in other service departments, as higher level clerical workers or customer service representatives. As indicated in Table 2.3, job ladders in white collar service jobs were longer and more flexible than in network crafts.

Managers

Managerial jobs in the Bell system were highly regimented and functionally specialized -- resembling much more the Taylorism of industrial labor markets than the breadth commonly associated with managerial or salaried labor markets. There were seven layers of management leading up to officers in the operating companies and at AT&T. First and second levels were considered lower management, third and fourth were middle, and the remainder were upper level positions. The primary role of supervisors and managers was to monitor and enforce work discipline. Standard operating procedures set at the top created relatively fairly routinized jobs that required implementing policies down the chain of command, enforcing discipline, and funneling numbers back up. The top-down, command and control management style at AT&T has led a number of observers to use a military analogy to describe the system. One description comes from a writer in 1968:

"AT&T is to the Bell System what a general staff is to an army, and AT&T seems somewhat proud of the parallel. A company writer calls the military-modeled general staff 'the greatest contribution to the art of management' of the first half of the twentieth

century; pridefully he notes that AT&T adapted for its own use many of the staff concepts developed by Frederick the Great, Von Steuben, and Napoleon....

"A traffic manager in the smallest of Bell offices reports to the traffic manager directly above him in the next largest office area to district to regional to operating company and ultimately to 195 Broadway ['AT&T's Pentagon'] - just as an Army G-1 officer has counterpart from battalion level all the way up to the Defense Department.... (Goulden 1968:17)

This military organization of managerial expertise exploded in size in the post World War II period. While technology displaced operators, the management ranks swelled. Table 2.4 compares the relative growth of managerial and nonmanagerial jobs. Managerial jobs grew by 50% between 1950 and 1960, by 60% between 1960 and 1970, and by 47% between 1970 and 1980. By contrast, nonmanagerial jobs rose by 4.6% in the first decade, 23% in the second, and only 2.7% in the third. The proportion of managers in the total AT&T workforce grew from 13.5% in 1950 to 29.4% in 1980. (This contrasts to the average in the U.S. of 20% and in Japan and Germany of 12%). The ratio of all managers to all nonmanagers at AT&T was 1:6.3 in 1950 and 1:2.4 in 1980.

I have indicated above how the limits of scientific management coupled with AT&T's response to regulators led to an explosion in the managerial workforce. Unionization was also a factor, but the dynamics were complex. On the one hand, the growth of managerial, as well as technological, control was one factor that fueled worker resistance and unionization: an on-going complaint among workers continues to be the rigidity of management control and the extreme oversupervision in the industry ("the supervisor is spying on me, get the supervisor off my back"). Trade union activity and militancy grew in the post World War II period. In the years immediately following the war, IBEW and the old Bell company unions successfully used the Wagner act to break the company's domination of employee organizations. The CWA was founded in 1939, and in 1947 successfully waged a militant national strike for better wages and working

conditions (Schacht 1985). On the other hand, AT&T's response was to increase management ranks even more to reduce the effects of strikes on service; it persistently tried to redefine jobs out of the bargaining unit, even when they had no supervisory content, in order to weaken the skill-base and bargaining strength of the unions⁸.

I have discussed how regulators shaped the work organization and management methods. They had a particularly strong effect on the jobs of managers. Because the PUCs were so important in setting rate structures and performance requirements, the telephone companies geared their managerial job ladders and status hierarchy towards meeting the demands of the PUC. The state telephone company president held the most important political position as an official reporting to the PUC. Regulatory was viewed internally as playing a public relations role, massaging the interface between the telephone company and the members of the PUC as well as state politicians who periodically voted on rate hikes. As with other departments, regulatory was a vertical silo, with staff at the local level playing a public role vis-a-vis local officials similar to that played at the state level. Predominantly male managers in regulatory and network operations, then, held more important and significant positions than their female-counterparts in traffic and services.

Job ladders for the managerial workforce were long and vertical, and included seven levels of management leading to corporate officials. The Bell System recruited first level supervisors either from the rank and file or from the external labor market. Those hired from the outside were usually college-educated, and tended to be placed in positions dispersed throughout the organization (Plant, Commercial, Engineering, Accounting, Traffic). First level supervisors received considerable management training, much of which was designed to teach them to identify with management and clearly distinguish themselves from the craft or occupational workforce. This was particularly true for workers promoted to first level, who were encouraged to break all social ties with former

⁸ The total management numbers include some administrative, as well as technical, and professional positions, although the exact proportion is unclear from the archival data. According to official AT&T data, in addition to the managerial workforce, the clerical workforce grew from 18 to 22 percent of total employment between 1950 and 1980.

co-workers so that as supervisors they could maintain discipline and command respect. The advantage of promoting from within is that as former workers, supervisors had an intimate knowledge of the technology and job requirements, how long particular kinds of jobs should reasonably take, what kinds of skills and training a worker would need in order to perform a particular repair.

Management positions above first level were filled exclusively from within. Informal sponsorship or paternalism was extremely important for ensuring movement up the ranks. If a subordinate was particularly skilled and reliable, this sponsorship not only facilitated upward movement, but discouraged lateral mobility. Some employees complained of being "stuck" or penalized because they were the better performers.

Workers who became supervisors could expect to rise through the ranks to lower or middle level management. The Bell System provided generous educational allowances and tuition-aid for college courses, and many employees availed themselves of these opportunities in order to gain promotions. College-educated hires were expected to climb higher, and a select group was "fast-tracked" and chosen to be groomed for top management. In their longitudinal study of managers at AT&T, Howard and Bray (1988) document the advancement of college and non-college educated males through management ranks from 1956 to 1976. The modal level of achievement for non-college educated managers was a level two management position, while that of college-educated managers was level three. In contrast to grooming for lower and middle level managers, grooming for top management involved assignments across departments plus mid-career training or executive development courses. In Howard and Bray's sample of 422 managers (274 college and 148 noncollege-educated), between 5% and 10% of non-college educated workers were promoted each year (depending upon the year). By contrast, between 15% and 25% of college-educated managers received promotions in the same period (Howard and Bray 1988:128-9).

Implications for Internal Labor Market Theory

Historical and qualitative evidence from the Bell System in the pre-divestiture period provides a rich body of data for assessing theories of internal labor markets. We can use this information to analyze the ways in which the conditions in the industry shaped and modified the rules of labor market models discussed in the last section. Taking the craft model first (Table 2.5), the most striking difference between the classic model and the Bell System model is that craft workers in the latter case were located in internal labor markets with quite low inter-firm mobility and only moderate intra-firm mobility. Craft skills were highly specific to the telephone industry, and increasingly, to functional specialties within network. But network jobs also remained highly "craft-like" in the sense that geographical dispersion and field-based work allowed workers retain considerable autonomy and independence from management and also required them to complete "a whole task" -- installing service, or diagnosing, repairing, and splicing cable as necessary. The Bell companies' monopsony power, however, reduced external labor market opportunities and the bargaining power of craft workers. Schacht argues that this negatively affected unionization as well. In addition, job ladders were quite short so that although a minority of workers could move into lower and middle level management positions, the vast majority of network craft had highly specialized jobs that plateaued quite early. Wages were tied to the job rather than to credentials, and once workers reached the top of the ladder, wages increases thereafter were seniority-based. Employment security was not so much skill-based or seniority-based (although contracts provided for seniority rules), as much as it was based on the monopoly position of the Bell System and the steady growth of markets, revenues, and profits.

The differences between the clerical model and office workers in the Bell System are also noteworthy (Table 2.5). In contrast to the low-wage, insecure, and dead-end jobs associated with classic secondary markets, office workers in the Bell system enjoyed relatively long and flexible job ladders, company-provided formal training, and once past the lower rungs of the job ladder, quite broad and diverse jobs in customer services, accounting, and other departments. The introduction of office technology and computer

systems in the 1960s and 1970s eliminated some clerical jobs, and created other routinized data processing jobs, while also increasing the demand for computer skills among office workers and providing opportunities for women to enter new technical jobs as systems analysts and computer programmers. The skills of Bell office workers are much less transferable than those of clerical workers more generally, but are broader than craft workers, allowing for more lateral as well as vertical mobility within the system. Although the largely female workforce in services continued to earn substantially less than male craft workers, their wages are twice that of other female-dominated service sector jobs (Hartman and Spalter-Roth 1989; Spalter-Roth and Hartman 1992). Office workers, therefore, have benefited substantially from the Bell System of internal labor markets.

Internal labor markets for telephone operators (Table 2.6) appear quite similar to the classic model of industrial rules, particularly in the narrow and routinized nature of the work and the job-specific content of skills. An important difference, however, is in the degree of flexibility in promotional tracks and the greater provision of company-provided formal training. While turnover and technological displacement was historically high, those operators who chose to stay in the system had a number of different promotional avenues to pursue. Many women started out in operator services just to get their foot in the door, bidding on jobs in other departments, particularly customer services, as soon as they were permitted. In interviews with current female managers conducted over the course of this study, these women frequently pointed to their entry level job in operator services as the first step in a long career.

Finally, for managers, the striking difference between the classic model and the Bell System model is in the degree of breadth and flexibility in the design of jobs and promotional ladders (Table 2.6). Because of the high degree of functional specialization, particularly on the network side, Bell system managers appear to have had much more rigid jobs and job ladders than most managers are believed to have. At least for middle and lower level managers, seniority-based job hierarchies tied to specialized skills were the norm. Managers interviewed for this study indicated that it was commonplace in the old Bell System for managers, as well as technical/professional staff -- particularly engineers --

to live out their work lives in one department or sub-department. This appears to be somewhat less true for women on the service side. Functional specialization also did not hold for managers groomed for higher level positions, who were rotated every few years across departments and across geographic locations in order to gain the broadest possible experience.

In summary, the unique conditions of the Bell System led it to create internal labor market rules that varied considerably from other private or public sector enterprises. One notable difference is in the degree of specialization in jobs- which was higher for craft workers and managers, but lower for office workers such as customer service representatives. In addition, the hypothesized link between skills, training, and job security was not particularly strong. No matter what the degree of skill specificity in an occupation, the Bell System provided high levels of formal training, presumably because of its monopoly position which meant that it did not have to worry about losing trained workers to competitors. Job security, in turn, was not linked to job seniority per se, but was implicit. For workers, overall company tenure was much more important than job or job-cluster seniority, for it established rights to overall wage and benefit packages, particularly prized pension plans. Finally, in exchange for lifetime security, all groups held high degrees of commitment and loyalty to the Bell System (as documented in Part 3 of this study).

This brief overview of the Bell System does not do justice to the interesting variation that existed in the system, to the types of conflicts and grievances that occurred, to the dramatic and often disruptive changes in work and technology that occurred over the eighty year history. The end result is a description that is more idealized or devoid of problems than it actually was. The purpose of this section, however, has been to capture the essential elements of the old System in order to lay a basis for understanding the radical changes in strategy, structure, and employment relations in the present period, a task to which I now turn.

2.4 Post Divestiture: Markets, Technology, Business Strategy, and Internal Labor Markets

From the viewpoint of consumers, the Bell System in 1980 had both strengths and weaknesses. Its strength was in rapid productivity growth that kept unit costs low and in the provision of almost universal service. As I described above, this accomplishment of universal service at low unit costs was made viable through advances in electro-mechanical switching and transmission systems coupled with an elaborate system of cross-subsidies in which long distance and business customers subsidized unprofitable service to individual residences.

What is striking about this system is that in many ways it meets the criteria for what service sector theorists have recently described as a “high performance service model.” Schlesinger and Heskett (1991a, 1991b), for example, contrast a (Taylorist) cycle of failure to a (high performance) cycle of success. In the first instance, high volume markets with low profit margins lead firms to take a low cost strategy: hiring low skill workers at low wages, designing narrow jobs to accommodate these workers, using technology to control quality and rules to control workers. For workers, this approach creates dissatisfaction and poor service, high worker turnover, and therefore a lack of continuity between employees and customers. Failing to develop customer loyalty, the firms experience high customer turnover as well, and need to devote extensive resources to marketing and attracting new customers. The success cycle works in reverse: with a focus on higher profit markets, firms hire more skilled workers, invest in training, increase wages and reduce turnover. Satisfied employees make satisfied customers, and cost savings arise from lower customer turnover and lower marketing costs (Schlesinger and Heskett 1991a). Remarkably, in the post-divestiture period, deregulation has led to high rates of customer turnover among long distance companies as customers transfer back and forth between providers to take advantage of an ongoing series of marketing gimmicks designed to woo customers back.

As I have shown in the last section, in the pre-divestiture Bell System, only telephone operator jobs conformed to the Taylorized model, but even in these jobs there was less turnover and dissatisfaction than theorists would anticipate because operators were part of the corporate-wide internal labor market system that provided good wages, benefits, and promotional opportunities. Overall, workers were highly educated, received substantial formal training, had low turnover and high levels of satisfaction, and developed longterm and personalistic relations with customers. What, then, was wrong with the system?

In the following pages I briefly review the events that led to the dismantling of the Bell system. I argue that it was not widespread customer dissatisfaction but the availability of new technologies plus the aggressive political action of a coalition of new entrants and disgruntled corporate users which led to deregulation. This background, in turn, lays the basis for understanding the current competitive climate and why former Bell companies have pursued major organizational restructuring.

I consider three interrelated questions. First, what new business strategies and structures have Bell System companies pursued in the post-divestiture period? Second, what human resource and industrial relations strategies have they pursued? And third, what implications do these strategies have for transforming the prior system of internal labor markets for different occupational groups?

With respect to business strategy, I argue that AT&T and the regional companies have pursued quite different paths. Variation in strategy has also increased across the Bells in response to differences in state regulatory authorities and regional union strategy. I highlight this variation both to show the potential alternative paths available and to demonstrate why it is difficult or impossible to suggest that a coherent new system is emerging. Instead, I trace the range of workplace experiments that are suggestive of what lies ahead.

I focus primarily on the Bell companies, outlining their business strategy and organizational restructuring. In brief, I argue that the Bell companies have competitive advantages as well as disadvantages. Their primary advantage is their local customer base

and relatively high quality service. Although complaints about poor service are not uncommon, customer service ratings in most Bell companies are considerably higher than unregulated cable monopolies, one of their major new competitors. Bell companies view their primary disadvantage as the inherited bureaucratic form of organization, which includes high relative labor costs, centralized and functionally specialized hierarchical organization, and outmoded technology embedded in the bureaucratic organization. High relative labor costs are the result of several factors: the limits in the past on rationalizing labor, the high labor rents that accompanied guaranteed rates of return, and the large managerial workforce. New entrants by contrast, begin with new technologies that are much more maintenance free, use nonunion labor, and do not have an inherited bureaucracy. Bell companies with sunk costs in existing copper cable and highly bureaucratic procedures for service installation and repair have had difficulty competing with the low overhead costs and speed of new entrants who could respond quickly to business demand for new services, lay fiber optic loops, and cream-skim the most profitable business customers.

Finally, I show Bell companies are pursuing uncoordinated and often contradictory approaches to restructuring in order to be competitive. They believe they should decentralize operational and customer service decisions to lower levels in order to improve quality and be more responsive to local consumer variation. At the same time the cost and quality advantages of consolidation and increased mechanization and rationalization of labor made possible by new digital technologies are extremely attractive. The latter strategy has increasingly dominated the former.

The implications for internal labor markets that may be drawn from this analysis are quite tentative because the industry continues to be in constant flux. Both the direction of new technologies and the extent of deregulation and reregulation of product markets are uncertain. Nonetheless, the last ten years has produced a rich history of heightened management-labor conflict and cooperation, an increase in variation in strategies across the Bell System, and a wide variety of workplace experimentation -- some of which appears promising and some of which does not. In this section, I draw on this history to

analyze the strategic, organizational, and labor-management dilemmas posed by current industry-wide restructuring. While it cannot draw firm conclusions, it does outline how these conditions have already altered prior internal labor market institutions.

New Technologies and Market Deregulation

The reasons for the break-up of the Bell System have been well-documented by economic and political historians, and I only briefly review them here. There is strong evidence that the break-up was not motivated by general consumer dissatisfaction, but by a corporate revolt against the system of cross-subsidization that functioned essentially as a progressive tax system: wealthy consumers subsidized the less wealthy so that telephone service could be provided as a public good. The attack on AT&T began shortly after World War II: technological advances coupled with a series of regulatory decisions and continual attacks on the AT&T monopoly over a thirty year period led to the dismantling of the system in the 1980s. A political coalition of competitors and large corporate users succeeded in bringing about deregulation, and they have been the primary beneficiaries of deregulation to date. The result has been a fundamental transformation of the industry away from its mission of providing universal service as a public good. The future competitive structure of the industry, however, is highly uncertain. The demand for integrated services coupled with the scale economies associated with network digitalization argue for new forms of vertical integration in the production and transmission of information services -- but in a deregulated environment.

A series of histories have documented the deregulation movement of the 1960s and 1970s leading to the deregulation of long distance and equipment markets and the divestiture of the "baby Bells" from AT&T -- some written from the perspective of MCI (e.g., Coll 1986), others defending AT&T (Kraus and Duerig 1988), others more objective (e.g., Temin 1987). The purpose of my review of the facts is to briefly summarize the key political and economic actors, technological changes, and regulatory decisions that set the stage for dismantling the Bell System in the 1980s and subsequent

restructuring. It is also to highlight the continuity in the issues and debates in the earlier and later historical periods.

In the post World War II period, competitors and critics of AT&T continued to object to the kind of monopoly practices highlighted in the FCC investigation a decade earlier, particularly the lucrative long distance market and AT&T's unchecked profits from selling Western Electric equipment to operating companies. The decision to deregulate long distance and equipment markets in 1984 stems from a series of interrelated developments in this period.

With respect to long distance markets, changes in federal regulations coupled with the emergence of new technologies put increasing pressure on the integrity of Bell System, and created the conditions for its eventual collapse in the early 1980s. At issue was long distance pricing, known in the industry as Separations Policy. A 1931 court decision (Smith vs. Illinois) found that because AT&T long distance calls utilize Bell company local infrastructure, then long distance must pay a portion of the costs of the local network. In 1943, the FCC in conjunction state regulators and AT&T adopted the first major plan for separations and settlements in which AT&T paid a portion of toll revenues to Bell and non-Bell companies. Over the next four decades, the portion paid by long distance increased because the relative costs of long distance calls were decreasing. Rather than pass these savings on to long distance users, federal regulators increased the extent to which long distance subsidized local traffic, thereby increasing resources to extend universal service and keep local or basic telephone consumer rates low. The 1971 Ozark plan, in particular, used a new allocation formula which had the effect of shifting more costs to interstate tolls. As a result, local telephone rate increases were the fourth lowest of all goods in the Consumer Price Index, growing 114 percent between 1967 and 1984 when the CPI grew 311 percent; they averaged \$ 12.61 per month in 1970 but only \$8.61 in 1980 (constant 1980 dollars) (Teske 1990: 4). By 1980, while subscriber line use of long distance was 7 percent, long distance toll calls paid 25 percent of total costs (Cohen 1992:58).

This regulatory strategy, however, created ever greater incentives for new entrants to compete against AT&T by offering long distance rates that were lower than those of AT&T but above market-clearing prices -- what is known as "creamskimming." At the same time, advances in switching technologies (e.g., PBX systems) and microwave and satellite transmission technology in the 1950s and 1960s provided a means by which competitors could provide alternative systems of long distance services. A 1959 decision, known as the "Above 890MC," allowed specialized communications services over the microwave spectrum -- a decision that opened the way for companies such as Microwave Corporation Inc. (MCI) to offer point-to-point private line services. In 1969, the FCC granted MCI the right to offer private line service between Chicago and St. Louis, and in 1971, created a category of "specialized common carriers" who could provide private line services. MCI filed its antitrust lawsuit against AT&T in 1974, and won a series of decisions over the next decade, including the right to interconnect with AT&T and offer "EXECUNET," (a low cost equivalent of AT&T's WATS line) (Coll 1985; Temin 1987). MCI was responding to the demand for cheaper long distance rates by large business -- a major constituency contributing to the deregulation movement of the 1960s and 1970s. In addition, the growth of multinational transactions led corporate consumers to seek ways of creating reliable international telecommunications networks without the hassle of national bureaucratic boundaries. Using PBX systems (private internal switching systems), private lease lines, and satellite systems, corporations could bypass public telephone systems around the globe, a practice that exploded in the 1970s among multinational business consumers. McKenney and Nyce (1989) provide a detailed example of how multinationals established their own global telecommunications networks in their case study of Manufacturers' Hanover Trust. Financial services and airline companies were particularly large users and key players in the deregulation movement.

Events that led to equipment deregulation also began with a Justice Department anti-trust suit against AT&T in 1949 seeking divestiture of Western Electric. In a 1956 settlement, AT&T agreed to divest its motion-picture sound equipment manufacturing and to adhere to strict cost accounting procedures at WE. It was also barred from entering

the computer industry which was in its infancy. Competitors began producing and selling customer premise equipment -- initially different styles of telephones but later computers and internal systems that transmitted messages -- which AT&T challenged but which courts upheld because the equipment did not interfere with the integrity of the network (e.g., Husha-Phone decision, 1956; Carterfone, 1968; Computer I, 1971; Computer II, 1976) (Stone 1989). The Justice Department filed an anti-trust suit against AT&T in 1974 in another effort to divest Western Electric.

Faced with both the MCI and Justice Department suits, AT&T and the Bell companies lobbied long and unsuccessfully to get Congress to amend the 1934 Communications Act to protect their position. Several accounts provide details of the odd interest group coalitions that fought over deregulation (Temin 1987; Aronson and Cowhey 1988; Stone 1989; Teske 1990; Cohen 1992). The Bell System was backed by its unions, by the independent telephone companies through their national organization (United States Independent Telephone Association, USITA), and by the state public utility commissions through the National Association of Regulatory Utility Commissioners (NARUC). Over seventy percent of telephone customers opposed the break-up, according to public opinion polls (Keefe and Boroff 1994:316). Opposing AT&T were the specialized common carriers led by MCI, the computer industry led by IBM, and large multinationals particularly in financial services and airlines (Aronson and Cowhey 1988; Teske 1990; Cohen 1992).

In 1980, MCI won \$1.8 million its anti-trust suit against AT&T, an amount appealed by AT&T and subsequently reduced in 1985 to \$37.8 million. AT&T and the Justice Department reached a settlement in January, 1982, effective January, 1984: Judge Green's Modified Final Judgment (MFJ) created a partially-regulated industry -- opening competition in long distance and equipment markets while continuing monopoly conditions in local service. AT&T retained its equipment and long distance operations, but was divested of its twenty-two local telephone subsidiaries. AT&T's long distance and equipment manufacturing portion of the business employed 373,000 of the roughly 1 million employees in the former Bell System. While the MFJ opened competition in the

long distance and equipment markets, it continued to regulate AT&T's participation in those markets, with the logic that it continued to have an unfair competitive advantage. The goal of continuing regulation of AT&T was to ensure a reduction in its market share, which steadily occurred from 1984 on, so that by 1994, AT&T's share of long distance had dropped to 61 percent (FCC 1994). AT&T lost Bell Labs, which became jointly owned by the operating companies

The reorganization plan for local service consolidated the twenty-two local companies into seven "Regional Holding Companies" (RHCs), each with a "Regional Bell Operating Company" (RBOC) subsidiary for operating local telephone services. In addition, companies that were not wholly-owned by AT&T (such as Cincinnati Bell, Southern New England Bell, Rochester Bell) continued to operate independently, as did GTE, the company that is often referred to as the eighth Bell. GTE has grown over time by buying up small independent telephone companies across the country, so that it has no regional base per se. The RBOCs were required to provide interconnect services without discrimination to all long distance carriers. In lieu of long distance cross-subsidies, the RBOCs would receive access charges from interconnect carriers and were given directory services, a profitable non-regulated enterprise. The RBOCs were barred from equipment production, but could enter other markets provided they could prove they were not using their monopoly position to do so. In 1987, Judge Green modified the MFJ to allow the RBOCs to enter information services markets, to transmit but not produce information. What has gone relatively unnoticed in the deregulation debates is the fundamental shift that is occurring in the overall nature of the telecommunications industry. The central issue is not that deregulation has increased competition and therefore lowered prices, leading to consumer benefits. In fact, the beneficiaries of deregulation are those who formed the winning coalition: new competitive providers and large corporate users of telecommunications services. Long distance rates have dropped by 40 percent and call volume has doubled, but basic residential rates have increased more than 60 percent -from \$11.58 to \$18.66 (Keefe and Boroff 1994:318). While advocates of local deregulation argue that it will bring about similar decreases in rates due to competition, the history of

the industry shows that unregulated periods produced highly uneven development of services. Universal service occurred only after persistent pressure by state and federal regulators.

The important change that is occurring is the shift away from the public good nature of the industry. Since the depression, the telecommunications industry has had a twofold mission: to maintain national security and to provide a universally-available public service. Now firms and governments have redefined the role of telecommunications in national security and the public interest: rather than to build an integrated national system and maintain national boundaries the role is to support national economic competitiveness. The importance of telecommunications as an input into other industries is a central driver in current restructuring, and has surpassed the importance of telecommunications as a public good. The more that the telecommunications system can provide connectedness with markets around the globe, the more it serves as a source of competitive economic advantage for a nation's businesses.

An unanticipated consequence of deregulation, however, was that it contributed to a worsening in the U.S. balance of trade. The rapid influx of foreign equipment manufacturers -- particularly Canada's Northern Telecom and Germany's Siemens -- at a time when other countries continued to maintain closed markets, led to an unrecovered decline in AT&T's market share. Trade deficits in telecommunications equipment totaled \$14 billion between 1984 and 1992. U.S. telephone manufacturing employment fell by 42 percent in less than a decade (Keefe and Boroff 1994:318-320).

Also unexpected were subsequent developments in technology. Divestiture and deregulation were premised on the assumption that new microwave technologies would create decentralized alternatives to the provision of telecommunications services -- that is, the "natural monopoly" argument would be obsolete. By the time the 1984 Consent Decree was enacted, however, interest in microwave technologies was dramatically weakened by the continued digitalization of network switching and transmission systems, which dramatically increased network economies of scale and scope, and led some economists who supported deregulation to question that decision. Even economists who

are strongly pro-deregulation admit that technological efficiencies may lead to a re-centralization of the industry:

"The future of competition in markets for long-distance services is under some shadow because of the revolution in fiber optics. Fiber optic transmission costs have been dropping at an astronomical rate -- and there is no end to that decline in sight. In dealing with high-density traffic, the basic trade-off between switching and transmission is thus very different from the trade-off between these same factors at the level of the local exchange. Indeed, long-distance networks may well be moving toward an architecture that is highly centralized" (Huber 1989:117).

Huber goes on to argue that competition will not collapse under the economies of scale offered by that fiber optics because of the sunk capital costs of the three major long distance competitors. Other researchers, however, point to significant reductions in productivity growth that have accompanied this period of duplication and overcapacity in the industry. Consumer confusion and heightened transaction costs, for example, are a consequence of the ongoing marketing wars between the long distance providers, offering rounds of new package deals to consumers (MCI's Friends and Families, AT&T's Reach Out and True Voice, etc.). This trend is in sharp contrast to current theories of quality in customer service that argue that customer loyalty and longevity are the key to competitiveness (e.g., Schlesinger and Heskett 1991a, 1991b). Using three different measures of productivity used in the industry (average annual increases in access lines per employee hour, in switched minutes per employee hour, and in adjusted revenue per employee hour), Keefe finds that productivity growth in the 1984-1991 period was half (3.4% annually) that of the 1974-1983 period (6.9% per year) and the 1951-83 period (6 percent per year). While AT&T currently serves 60 percent of the market, MCI and Sprint together have the capacity to meet the needs of the entire country (Keefe and Boroff 1994:321-2).

As a result, there is a mismatch between the decentralizing thrust of product market deregulation, on the one hand, and the centralizing thrust of new technologies on the other. While great instability and uncertainty continue to characterize the environment, there are strong pressures not only to recentralize and reintegrate the delivery of services, but to expand vertical integration to include the production and transmission of information as well. The thrust is to create an information industry and collapse boundaries between telephone, wireless, cable, computer and information services, publishing, broadcasting, and entertainment. This trend is evidenced in the flurry of corporate mergers, acquisitions, and joint ventures from the late 1980s on: AT&T's purchase of NCR; joint ventures between AT&T and McCaw Cellular, US West and Time Warner, BellSouth and Prime Management, and the failed agreement between Bell Atlantic and TCI. Competitors have responded with law suits challenging the legality of such ventures. The logic of providing "one stop shopping for customers" as well as the technological economies of scale and scope argue for the collapse of boundaries between telephone, cable, computer, and broadcasting industries and the creation of an information services industry.

In pending 1995 legislation to deregulate local markets, Congress appears to favor a fast-track deregulation that would privilege Bell operating companies who are in the position to use their regional base to provide end-to-end service. Many industry analysts believe that over time the industry will shake out into a handful of major telecommunications services firms who provide interactive multimedia services (fax, data, image, video, voice) to homes and businesses. Other industry players are attempting to go farther and vertically integrate the production and transmission of information as well (the failed QVC-Viacom deals with Paramount Pictures that involved several regional Bell companies as partners).

This raises the fundamental question of whether market deregulation will in fact create a more competitive industry or whether the centralizing thrust of new technologies will not lead to a reintegrated and unregulated monopoly or oligopoly structure -- going beyond the historic Bell system to combine the production and transmission of information

as well. To date, the future of regulatory decisions and technological developments are unclear, and have left the industry in a state of great instability and uncertainty.

What do these changes in product markets, technology, and industry structure mean for employment levels and the structure of labor markets in the industry? Overall, employment in telephone communication services dropped by 19 percent between 1981 and 1993 (1.5 percent annually), from a high of 1,077,300 employees in 1981 to 872,100 in 1993 (U.S. BLS, Employment and Earnings). While employment declined significantly overall, it was concentrated in the traditional regulated businesses of the Bell system companies; by contrast employment grew among non-regulated companies such as Sprint and MCI and alternative local carriers such as Metrofiber and Teleport Communications as well as in the non-regulated subsidiaries of the Bell system companies.

AT&T shed almost one-half of its domestic workforce, with the bulk of reductions occurring among the non-management workforce. Union density as a result has fallen from 67 percent in 1984 to 42 percent in 1994 (Keefe and Batt 1995:25). Downsizing occurred through massive early retirement buyouts, attrition, and forced reductions. Many employees accepted early retirement buyouts or left the company when AT&T's consolidation of plants and service centers forced workers to choose between relocation or exit. By contrast, AT&T increased employment in its nonregulated subsidiaries (e.g., NCR, global communications) by 21.2 percent, or 3.5 percent per year. AT&T employment in nonregulated subsidiaries grew from 14.3 percent of its total workforce in 1984 to 22.8 percent in 1990 (CWA 1994).

Despite the fact that the RBOCs continued to enjoy monopoly status in local markets, employment in the traditional wireline service declined by 28 percent between 1984 and 1992. Until 1994, this downsizing occurred almost entirely through attrition and early retirement buyouts. New downsizing announcements in 1994 and 1995, however, were accompanied by anticipated forced reductions to meet 1995 and 1996 goals. By contrast, the employment in the non-regulated subsidiaries of the RBOCs grew by 312 percent, from 23,999 in 1984 to 98,984 in 1992. This represents a jump in employment from 4.1 percent of the RBOC workforce in 1984 to 19.6% in 1992 (CWA 1994). While

union density rates in the RBOCs have remained close to historic levels (about two-thirds), they are likely to fall in the wake of new rounds of downsizing.

The result of these shifts is to create a segmented labor market in the industry and even within companies themselves. The regulated markets were over 90 percent unionized at the time of divestiture, with the bulk of workers represented by the Communications Workers of America (CWA) and a minority by the International Brotherhood of Electrical Workers (IBEW). New entrants are non-union and often highly anti-union companies because they rely on the low cost as a competitive advantage in the industry. Similarly, AT&T and the RBOCs have resisted unionization of their nonregulated subsidiaries. The result is a dual labor market structure that encourages firms to compete on the basis of labor costs, throwing labor into competition for the first time since the depression.

In the next section I explore the implications of changing industry structure for firm level business strategy, work organization, and internal labor markets. As is evident from this section, however, the uncertainty in technology and market structure in the industry makes it extremely difficult for firms to pursue a coherent or long-term business strategy or system of productive organization as occurred in the century leading up to divestiture. This means that the restructuring of internal labor market systems and the outcomes for employees are also highly uncertain and contested.

Business Strategy and Structure: AT&T Versus the RBOCS

AT&T and the Regional Bell companies have pursued quite distinct business strategies which in turn have significant implications for labor. These differences are due to their location in distinct product markets, differences in the extent and rapidity of deregulation of those markets, and differences in the political-embeddedness of the enterprises. AT&T, which represents the most unconstrained case, has followed a downsizing and cost-cutting strategy far beyond what the regional companies have pursued or are likely to pursue. Long distance deregulation occurred rapidly, and AT&T responded. The Bell companies, by contrast, have had over a decade to reduce bureaucracy through attrition, before major local deregulation has begun.

More importantly, the division of labor between AT&T and the RBOCs within the United States means that AT&T has had largely indirect contact -- long distance service through access to the local phone companies -- to the massive customer base. The local phone companies, by contrast, have a direct and on-going relationship with customers and are the ones responsible for maintaining the network infrastructure that provides basic service. While AT&T continues to be regulated by the FCC, the Bell operating companies continue under the jurisdiction of state authorities. They have retained a regional embeddedness that constrains their behavior in ways that AT&T does not encounter. Their service base is geographically-tied, their political orientation is to state authorities, their ability to restructure or move operations is limited to the states in which they currently operate. AT&T, by contrast, covers the entire country, and has taken advantage of this opportunity to consolidate operations and move them to whatever location offers the most economical choice. In this section, I review the major differences between the strategy and structure of AT&T with the regional Bells. Differences among the Bell companies also exist in part because of the relative differences in state regulatory approaches and union militancy. In subsequent sections, I further elaborate differences in labor strategies among the regional companies, using NYNEX and BellSouth as examples.

AT&T

AT&T assumed control of Network Long Lines and Long Distance Operator Services as well as its equipment manufacturing subsidiaries, representing approximately one-third of the Bell System workforce. The bulk of the service operations and two-thirds of the employees from the prior Bell system remained with the twenty-two local telephone companies, now consolidated under the direction of seven regional Bell companies. This division of labor has had some important consequences for business strategy. First, the "natural" extension of the long distance business -- where unsaturated markets still exist -- has been international. Just as in the early part of the century, AT&T's strategy was to use its control over long distance service to gain control over local service and create an

integrated system, AT&T's current strategy is to leverage its competitive advantage in long distance service to become a dominant player in global networks. AT&T's strategy, first and foremost, has been to reshape itself as a global corporation. And because so many global customers are multinational businesses, global service means providing an integrated set of voice, data, and video services through a seamless global network. Politically, AT&T has also been at the forefront of efforts to reduce international barriers to global communications and push for deregulation of the public monopolies that have controlled most national telecommunications systems around the globe. While the regional Bell operating companies have also had international aspirations, they have entered international markets primarily by taking over or forming joint partnerships with national governments to improve basic domestic services within a particular country.

In addition, AT&T began dealing with competition in long distance immediately after divestiture in 1984. It responded rapidly and followed past practices that rely on economies of scale and cost-cutting, with labor costs a priority. In 1984, for the first time since the depression, AT&T employment fell. Post-divestiture AT&T eliminated over a third of its domestic workforce between 1984 and 1990, equal to the percentage of its workforce laid-off between 1929 and 1935 (see Danielian 1939:208). In the 1980s, network and service workers bore the brunt of the layoffs: the nonmanagerial workforce dropped by 48.5 percent, while the managerial workforce rose by 4 percent. The relative percentage of managers rose from an already high level of 29 percent in 1980 to 46 percent in 1990; the ratio of managers to nonmanagers was 1:2.4 in 1984 and 1:1.2 in 1990 (Keefe 1994:29) (see Table 2.3). While many argued that AT&T's drive to cut labor costs would subside after it eliminated the excessive bureaucracy, downsizing continued in the 1990s. Overall, bargaining unit employment fell from 250,000 jobs in 1984 to 100,000 in 1995, a 60 percent fall (Keefe and Batt 1995:23).

To deal with its antiquated organization of functional silos, AT&T created a "decentralized" structure of twenty-two business units based on national or international market segments (consumer, network, data, global communications, etc.). Each business unit is entirely responsible for all functions, from strategy and operations to marketing and

human resources. It also expanded rapidly into new areas, purchasing NCR to as a computer subsidiary, creating AT&T Universal Card (financial services), and investing heavily in global communications.

Domestically, AT&T's business strategy has focused on using advanced technologies to increase capacity, quality, and economies of scale, and to consolidate service delivery into remote centers. On the network side, it completely redesigned the long distance network by replacing copper with fiber optic cable and completing the digitalization of switching and transmission systems. Together these technologies create a system which is virtually maintenance-free and which also has greater capacity to transmit voice, video, and data, and higher quality service. Central office switching was consolidated into two major centers --- one serving customers east of the Mississippi and one serving the western half --- plus a handful of remote regional centers (MacDuffie and Maccoby 1986). On the service side, AT&T cut costs and labor by consolidating operator services into a small number of regional centers and customer service offices into a handful of remote national centers serving the nation through 800 numbers. Consolidation has continued over the course of the 1980s and 1990s.

This extensive nationwide consolidation has meant that employees who were not displaced often had to move to retain their jobs, and often move again. Many chose to leave the system instead, particularly if their families relied on two incomes and finding work for a spouse was difficult. A 1991 survey found that those employees that were surplus and stayed at AT&T, were surplus an average of 2.5 times (Keefe 1994:26). While in 1981 68 percent of the non-management employees felt that the company provided job security and only 8 percent did not, by 1991, the opposite was true: 73 percent said there was little job security while less than 4 percent felt there was any job security. Two-thirds felt unable to affect the course of events at AT&T, and 80 percent had little confidence in management's ability to lead the corporation (Keefe and Batt 1995:23).

Within the traditional workforce, employee morale plummeted. Labor management relations, historically cooperative, collapsed. Efforts to gain employee participation in

total quality programs largely failed. Since the late 1980s, the company has attempted to introduce experiments in workplace reform aimed at improving quality, such as self-managed teams. A 1992 negotiated labor-management pact ("Workplace of the Future") designed to reestablish a cooperative relationship with the union by involving it in workplace reforms at several levels of the organization -- from the strategic business units to the workplace -- has met with mixed results. Many workers and trade unionists remain highly skeptical, as do lower and middle level managers, who worry that the company is not serious about this effort. They cite a history of AT&T in presenting a positive image through public relations campaigns, but in not following through on implementation.

The Regional Bell Companies

The regional companies have monitored the AT&T experience, and drawn on it in shaping their own strategies. They have moved more slowly largely because competition did not begin entering local markets in a serious way until the late 1980s. With legislation deregulating local markets pending in the mid 1990s, however, most Bell companies began announcing an accelerated program of downsizing of an additional 30 percent of the workforce in regulated services, with forced reductions and layoffs anticipated for the first time. Until now, they have followed a set of strategies similar to those of AT&T, but with somewhat different timing. They began investing in those unregulated markets which the Modified Final Judgment allowed -- such as information services, cellular, and international services. They began restructuring and consolidating operations in their regulated businesses, but relied on attrition and early retirement buyouts spread over longer time horizons to reduce force so that displacement and demoralization has been less severe. Nonetheless, the workforce in the regulated telephone business of the RBOCs dropped by an average of 28 percent between 1984 and 1992.

Deregulation in local services accelerated in the late 1980s as local access carriers (LACs) such as Metrofiber and Teleport were able to construct local fiber loops in metropolitan areas and creamskim the more lucrative business customers. Large institutions -- schools, hospitals, universities, utilities -- developed their own private

networks, thereby retreating from reliance on the local phone companies. And cable companies, with cable wired to over 65% of households nationally, are perched to enter the local residential market as soon as legislative changes take place.

In the 1990s, the Bell companies created a unified lobbying organization in opposition to AT&T, other long distance carriers, and the cable companies. While the Bell companies, supported in most regions by their unions, have advocated complete deregulation of all markets, long distance and cable companies have pushed for slower deregulation and restrictions on Bell companies' entrance into long distance. At issue is access to the massive business and residential consumer base. The Bell companies are banking on the strength of their infrastructure and customer loyalty, and unions believe this is the best strategy for preserving union jobs. Their opponents also believe that the Bell companies' historic monopoly in local markets will give them an unfair edge and prevent penetration of new players in local markets; they have advocated slower entry and greater judicial oversight over Bell company activities. Absent from the debates has been any consideration of the effects of deregulation on consumers or employees, or the internal labor market system that provided the continual training and upgrading of a highly technically skilled workforce that is central to the industry's productivity.

Overall changes in strategy and structure among the regional Bell companies are listed in Table 2.7 and may be summarized as follows. First, they are shifting from being a utility driven by a public service and an "engineering" mentality to a market-driven private corporation driven by finance and marketing. Their financial decisions are shaped much more by Wall Street now, than by federal and state regulators. Second, they have pushed for changes in state-regulated rate structures to allow "incentive" structures -- structures that allow them to make a larger profit if they improve efficiency or productivity beyond a certain level. At the same time, states have cut into the RBOCs profit margins from access fees charged to long distance carriers by moving towards "cost-based" rates -- rates that allow access carriers to unpackage services provided by the regional Bell companies and pay only the cost of services used.

Third, the Bells have shifted from a standardized high volume product market (voice) to a differentiated product market (voice, enhanced services such as voice messaging, data, video, image). To support this shift they have invested heavily in fiber cable and integrated services digital networks (ISDN) to allow them to carry high speed data, voice, video, and imaging and remain technologically competitive. Similarly, they have used the cash generated in the regulated markets to expand in lucrative non-regulated markets such as information services, cellular, and international services. Regulated and nonregulated activities are carried out under separate subsidiaries.

Fourth, their labor policies have focused on reducing costs. They have done so to date largely through attrition and voluntary early retirements providing generous severance packages. Additionally, they have increased automation and rationalization of the labor content of jobs, a trend I describe in greater detail below. While at AT&T nonmanagerial workers have borne the brunt of workforce reductions, the regional Bells appear to be reducing roughly proportionate numbers of managers and nonmanagers. For managers, this means the elimination of at least one level of management, and more importantly, significant increases in their span of control.

The RBOCs also realize, however, that they cannot compete on cost alone -- that their competitive advantage is in trying to hold on to and build their large customer base by improving quality and service. The cost of gaining back a customer who has left is four times that of keeping the customer in the first place, according to one company estimate (U.S. Congress 1993:38). As a company executive noted, "We will be extremely sensitive to our existing customers because we know that our greatest strength lies in holding onto our \$8 billion revenue stream" (Tom Bystrzycki, Vice President, Mass Markets and Operations, U S West Communications, in US Congress 1993:37). To accomplish this business strategy, they have attempted to simultaneously implement cost-cutting and performance-enhancing strategies -- on the one hand reducing size through workforce reductions and reengineering, on the other hand implementing total quality and employee participation and self-management programs that call on the commitment and discretionary effort of all employees to enhance service quality. The underlying idea is to

shift from a bureaucratic organization to one that is "lean and flexible", from a public service culture to an "enterprise culture", but the effects on employee effort and well-being are uncertain.

Fifth, the RBOCs are restructuring their organizations in ways that centralize some functions while decentralizing others. As I have detailed in Part I, these attempts to introduce remote servicing on the one hand, and decentralized market-sensitive strategies, on the other, have created uncoordinated and confusing reform agendas that provide quite contradictory incentives for employees. On the one hand, strategic decision-making has been centralized at the regional corporate level. Companies have then taken advantage of economies of scale by consolidating functions, offices, and staff from the state-level telephone company to the regional corporate entity. This centralization has required the standardization of most organizational and management practices. Additionally, the companies have moved operational decision-making from the state level (where it was traditionally located) to newly-created regional (multi-state) business units defined by market segment. These "customer-driven" entities are to include most functions necessary to meet customers needs. In the past, by contrast, the state president of the telephone company was the key decisionmaker because the interface with the state PUC dominated operational decisions (for example, safety and service standards). Departmental units (construction, engineering, network installation and maintenance, "traffic" or operator services, marketing, customer service) were independent silos with local actors reporting up the chain of command to their counterparts at the state level.

At the same time that this centralization is occurring, companies are attempting to decentralize other areas of management decision-making to the local or "district" level (the analogy in manufacturing would be the plant level) -- in keeping with the recommendations of quality and excellence theorists that "empowering" managers to "get close to the customer" is the key to continuous improvement is service quality. The idea is to free up middle managers to be "entrepreneurs" and to get them to work more crossfunctionally to solve problems and improve quality and customer service. Part of the change also involves breaking down the command-and-control management style of prior

eras and replacing it with a more participatory one of "coaching" -- to "empower" workers to have more discretion in handling customer requests and problems. These innovations, however, have tended to occur in pockets while consolidations and the effects of technologically-driven changes are implemented across the organization.

In summary, the direction of change is to hollow out the old state organizations, with key operational decisions shifting either up to the regional business unit or down to the "district" or local managerial level. Responsibilities of frontline supervisors are in turn shifted to workers in self-managed teams. This is the vision of new work organization, but implementation has been slow and uneven. In the sections below, I discuss the evolution of three parallel and often uncoordinated efforts to bring about this organizational reform: a) labor-management cooperation to improve participation; b) "micro-level" work reorganization and job redesign in conjunction with new technologies; and c) "macro level" restructuring through reengineering, downsizing, and consolidation. This is followed by a discussion of the implications of these changes for the four occupational groups and internal labor market institutions discussed in section 2.3 above.

Work Reform I: Industrial Relations and Labor-Management Cooperation

In 1980, labor-management relations between the Bell System companies and CWA and IBEW were generally positive. Formal industry-wide bargaining had been in effect since 1974, and the unions had made important gains in wages and benefits in 1974, 1977, and 1980. The major issue separating AT&T and the unions was the continued application of new technologies that had an adverse impact on the workforce -- not only operators, but increasingly skilled workers as well. The union complained that even when technology decisions did not cause displacement, workers were being asked to "retrofit jobs" after technology decisions were made. "They would constantly put new technologies on the floor that didn't work" (Interview 114, 12/1/92). Operators in particular were revolting against the monotony and stress associated with increasingly automated and electronically monitored jobs (Keefe, personal communication, 10/4/94).

The negative effects of new technologies and automation on jobs were a strong impetus for union interest in a QWL program. The company was also concerned about employee morale, and as a result, both unions and management found it in their interest to negotiate a joint QWL program in 1980 bargaining. The AT&T-CWA experiment, one of the most extensive and reputedly successful in the country, was designed to introduce employee participation in the workplace. Five million dollars was allocated for QWL training. Between 1980 and 1984, over 100,000 employees participated in the program (U.S. Department of Labor, Bureau of Labor Management Relations 1985). Although later analyses criticized the QWL effort as "cosmetic" or superficial in the types of issues it took on ("environmental," the color of wallpaper, adequate bathrooms, etc.), the real benefit of the program was in initiating change in management behavior -- the first movement away from a command and control style of management to a more participatory style. The experience gave employees more confidence in their ability to raise issues with management and at least create a dialogue to push for changes in working conditions.

From the perspective of the union, QWL and employee participation became a central strategic initiative. According to one staff member involved, "This was absolutely the focus of our organization until 'the war' began [layoffs following divestiture]...No one knew what QWL was, or what it was supposed to do, but we went around the country doing great training through QWL. We emphasized four key principles: skill, control, employment, and pay" (Interview 114, 12/1/92). National Union headquarters had a several-member staff devoted to QWL.

In addition, management and the union set up a joint national committee to develop a job evaluation system: one that could be jointly agreed upon and which could be used to establish wage scales as new technologies created the need for new jobs. The union had filed numerous grievances in the late 1970s over unilateral management changes in the content of jobs. The union position was that wage scales had been negotiated based on the content of jobs. When management unilaterally introduced changes in the content of jobs, it violated collective bargaining laws which require negotiation over wages and

working conditions. Management maintained that operational decisions were legally the sole discretion of management. The union filed grievances; cases were arbitrated; each side lost some cases and won others (CWA 1985:259-274). This joint committee was in effect a vehicle for on-going bargaining over wages -- a way to avoid grievances and respond quickly to the dramatic changes in jobs brought about by new technologies introduced by AT&T. The joint committee, which included industrial psychologists, developed and field-tested a job evaluation instrument which was piloted in one operating company. The committee trained workers and supervisors to use it. Job descriptions were 12-14 pages long. Each job took two weeks to evaluate, with one person from labor and one from management on each team. In 1983 negotiations, however, the company and union were unable to agree on implementation of the instrument, and the joint effort evaporated; some operating companies, however, went on to use the evaluation instrument unilaterally" (Interview 114, 12/1/92).

There were other local stories of success. One of the first was in operator services -- the "HOBIS" experiment -- an AT&T hotel billing and information system office in Tempe, Arizona, which in 1983 used a QWL committee to become entirely self-managed. The company estimated cost savings of 35 percent from reductions in supervisors. After a year, worker morale was high; grievances and absenteeism dropped; and the office was the most profitable in the country. "This unique autonomous work group was born out of concern by company District Manager Ed Murdock that supervisors were spending too much time with operators who didn't need attention, and a hunch on his part that workers with good records are motivated enough to perform at least as well without supervision" (CWA News, February 1984, in CWA 1985:248). The experiment, however, lasted only 2 years because AT&T closed the office as part of its consolidation plan following divestiture (Register 1991:47).

Another important success coming out of QWL was joint labor management committees to correct health and stress problems arising from the use of computers and video display terminals (VDTs). In the early 1980s, for example, a Wisconsin local (CWA 5530) commissioned an employee survey and identified four problems (chair design, back

support, temperature extremes, and room lighting) which caused back problems and eye strain. Management agreed to install ergonomic furniture, change lighting, and explore better screens. The union created training materials and fostered health and safety committees throughout the country to correct strain and stress associated with new workstations (CWA 1985:409-475).

This development of positive labor-management collaboration did not occur evenly throughout the Bell system: product and labor market constraints shaped this variation. It was more advanced in the western and southern states than in the northeastern states or in the AT&T divisions of Long Lines and Long Distance Operator Services which were managed from AT&T headquarters in New Jersey. Initiatives were particularly extensive in the local telephone companies that after divestiture formed BellSouth, Pacific Bell, and US West. By contrast, at the opposite end of the spectrum were NYNEX, BellAtlantic, and AT&T long distance, where labor-management relations were traditionally more hostile, and where consequently, little union or employee involvement in productivity-enhancing efforts took place. This interfirm and regional variation became more pronounced in the post-divestiture period after 1984, when regional companies and unions, influenced by their prior history, pursued different strategies. The following brief histories of labor-management relations at AT&T, BellSouth, and NYNEX are suggestive of this variation.

AT&T

AT&T represents the least constrained case. Because it was primarily responsible for long distance service, it was regulated by federal rather than state utility commissions, and never developed the local and regional political ties that Bell Companies relied on. AT&T Long Lines operated through the local phone companies and benefited from their local political ties. At divestiture, the FCC continued to regulate AT&T but did not constrain its domestic strategies with respect to the consolidations and relocations that particularly affected employment and labor relations. AT&T at divestiture immediately initiated drastic cuts and consolidations, and whatever union-management collaboration

had existed ceased, along with whatever goodwill had been engendered in the workforce. AT&T has pursued a fairly consistent anti-union strategy, resulting in a decrease in its domestic unionized workforce from 67 percent in 1984 to 42 percent in 1994 (Keefe and Batt 1995:25). Labor's resentment of AT&T's anti-labor strategy increased with the company's purchase of the non-union NCR and Paradyne and its establishment of two nonunion subsidiaries -- AT&T Universal Card in Jacksonville, Florida, now the second largest credit card operation in the country; and American Transtech, the largest telemarketing firm. Additionally, as indicated above, the company has routinely redefined new technical jobs with no supervisory responsibility as management, thereby eroding the bargaining unit in unionized operations.

The union refused to participate in total quality or other participative efforts initiated by AT&T until the company dealt with employment and union security issues. The only significant activity involving labor-management cooperation took place through a 1986 negotiated training program called "The Alliance for Employee Growth and Development," in which the company provided approximately \$75 million in funds between 1986 and 1991⁹. Initially for displaced workers, it was increasingly used by active employees to prevent employment loss by retraining for other jobs within the company. The success of cooperation, by most accounts, came from the particular structure of the program that created an independent, non-profit training organization to run the program, and so divorced it from the conflict inherent in the collective bargaining relationship (Batt and Osterman 1994b). While thousands of workers took advantage of the Alliance and found it to be a worthwhile program, many trade unionists cynically viewed it as a cheap AT&T public relations program that allowed the company to gracefully eliminate thousands of employees at a very low cost.

It was not until 1992 bargaining that the CWA, IBEW and AT&T, negotiated an agreement known as the "Workplace of the Future (WPOF)," which set up an on-going

⁹ The 1986-89 contract set funding at \$3.75 per employee per month and generated approximately \$19 million. Negotiated funding for the 1989-92 period was \$7.50 per employee per month in 1989 and \$9.50 thereafter (Batt and Osterman 1993b:44).

joint structure charged with overseeing work reorganization efforts. The document sought to create a shared vision of the future with the twin goals of achieving enhanced service quality and employee job satisfaction and employment security: "The Company recognizes that gaining employee involvement and commitment to the Workplace of the Future model, which targets customer satisfaction and market flexibility, requires the Company to be sensitive to employees' needs regarding employment security...It is not the Company's intention for employees to be negatively impacted by workplace innovations resulting from employees' ideas" (Bahr and Ketchum 1993:3).

The vision also incorporates the idea of trust as the centerpiece of labor-management relations -- a radical departure from the prior decade of 'war': "This requires that management and the Unions be committed to a relationship where information is openly exchanged, problems are solved mutually and cooperatively, critical differences are accepted and accommodated, agreements are developed in good faith and commitments are honored...joint training, jointly designed, will be essential to develop common understandings, describe business strategies, and develop union expertise in new technology" (Bahr and Ketchum 1993:3). The agreement established four representative bodies at three levels of the corporation: the level of the workplace, the business unit, and the corporation. The purpose of this tiered structure was to create "interactive planning, both top down and bottom up" (Bahr and Ketchum 1993).

At the workplace level, the union-selected employee representatives participate in planning and implementing work reform efforts, or "workplace models," designed to address particular problems or local needs. Suggested models include employee participation initiatives, self-managed teams, quality improvement teams, and new systems of work organization. Workplace models must be jointly designed and approved before implementation.

At the business unit level, union representatives participate with top-level department managers in regularly-scheduled meetings of Business Unit Planning Councils (BUPC). These meetings provide an on-going forum for discussing technological change, work organization, and the skill content of jobs. The contract does not require equal

numbers of management and union representatives or union veto power on these planning councils, but the intent is for substantial information sharing and union influence in strategic business decisions.

At the third or corporate level, the "Constructive Relationship Council" (CRC) consists two top-level representatives from the union and two from management who resolve issues that arise in the Business Unit Planning Councils that affect the negotiated contract. The CRC is a mechanism for integrating on-going changes into the contract so that labor-management participatory structures are extension of, rather than alternatives to, collective bargaining. Additionally, for consideration of long-term global and strategic issues, the parties established a "Human Resources Board" made up of representatives of top management, the union, and outside experts in human resource issues.

In the three years after 1992 bargaining, implementation of Workplace of the Future was painstakingly slow. Of AT&T's twenty-two business units, three (Operator Services, Network Services, and Global Communications) had already developed joint structures that reasonably fit the WPOF model. Because AT&T's business unit structure leaves the decision of whether or not to participate in WPOF to the Head of each Business Unit, implementation has been highly uneven, with the majority of business units refusing to participate. Moreover, the 1992 agreement failed to provide an independent funding mechanism (such as the one critical to the success of the Alliance), to provide the kind of training and resources necessary to make joint partnerships effective. Instead, WPOF competes with other demands on operating budgets, making the institutionalization of WPOF fragile and subject to the whims of particular managers and union leaders. In addition, some of the most promising initiatives have been undermined by continued downsizing. Operator Services, for example, developed a joint Planning Council and had implemented self-managed teams in several offices, but AT&T's announcement of the elimination of 10,000 operator jobs in 1993 severely strained the labor-management relationship and led to the collapse of the self-management program.

The Regional Operating Companies: NYNEX Versus BellSouth

In contrast to AT&T, the regional Bell companies have continued to be regulated by state PUCs, and their regional political embeddedness has significantly shaped and constrained their business strategies¹⁰. The New York PUC, for example, in response to a CWA and consumer coalition, refused NYNEX's request for rate increases during the violent 1989 strike, and this decision was one factor that influenced the company's decision to settle the strike. The Bell companies, however, face quite different regulatory environments: BellSouth and NYNEX represent opposite ends of the spectrum. While NYNEX has historically faced a "tough" state utility commission, BellSouth faces a much more lenient one. Similarly, on the labor market side, the regional union (District 1 of the Communication Workers of America, CWA) is the most militant and aggressive of the seven CWA regional districts, and this adversarial relationship has reduced the managerial strategies that are available to NYNEX. BellSouth, by contrast, operates in a "right to work" environment in all but one of its nine states, and a history of labor-management cooperation has evolved because the union has viewed it as the most effective way of building union membership and power. These institutional differences have led to significant regional differences in corporate and union strategies in response to restructuring. Compared to other RBOCS, the BellSouth strategy has emphasized joint partnerships to improve customer service, relatively high levels of employment stability, but low relative wage and benefit increases. NYNEX, by contrast, has no union involvement in workplace innovations, high wage and benefit increases and high levels of workforce reductions.

BellSouth. Taking the example of BellSouth first, the company confronts a relatively weak regulatory environment and is located in a strong anti-union environment backed by right to work laws that make it more difficult for unions to organize and

¹⁰ This section draws on the theoretical framework of Locke (1992), who argues that local institutions and local variation in union strategies significantly shape and constrain the direction of corporate restructuring.

weaken their financial base. In his history of the CWA in Southern Bell, Crane (1990) argues that this environment led the union over time to adopt a cooperative approach to labor-management relations because workers were less likely to join the union when labor-management hostilities were high. Because membership is not mandatory, management knows who chooses to join, making union members more vulnerable to management retaliation. Worker fear of retaliation is also reflected in the fact that, according to the current district leadership, many workers drop their union membership just before contract negotiations, then rejoin after a contract is settled. Whatever the motivation, the strategy has produced a union with strong institutional security and with a large membership. Currently, over 80 percent of union-eligible employees are members, up from 75 percent in the mid-1980s.

This "cooperative" approach began after violent and bitter 72-day strike involving 50,000 workers in nine states, triggered by the company's demand for a no-strike clause. The members' militancy surprised the company and union alike, and resulted in 245 strike misconduct cases and 200 arbitrations. Equipment was damaged and exchanges dynamited and burned down. The national union spent \$4.3 million on strike relief (Crane 1990:29-30). From the 1960s on, the company accepted the union as a fact of life and began building a relationship of trust and mutual respect. In 1966, for example, when AT&T and the CWA negotiated a "responsible relationship clause" at the national level, management at Southern Bell set up meetings with state and local union leaders throughout the region to implement the clause. The head of labor relations began meeting regularly with his counterpart, the CWA District 3 Vice President, and inviting him to company meetings in which business and operational issues were discussed. The parties streamlined the grievance procedure, allowing local settlements to stand without higher level approval. By 1971, a problem-solving approach to grievances reduced by 50 percent the number of grievances reaching the state executive level; and in 1977 negotiations, the parties agreed to a procedure to expedite arbitrations (Crane 1990).

Experiments in "participatory management" began by the late 1970s (Crane 1990:34-46). When AT&T and the national CWA negotiated the joint QWL program in

1980, Southern Bell and CWA District 3 used the program to advance participatory management at the local worksite level. QWL programs began in 1982 at Southern Bell; and unlike AT&T and some of the other RBOCs, QWL programs continued in BellSouth after divestiture and numbered over 600 in 1989 when they were merged into the total quality program, "Excellence Through Quality" (ETQ).

Experience with the QWL program gave lower and middle levels managers, local union representatives, and workers experience in joint problem-solving. Workers generally viewed QWL programs as a benefit -- an example of where management actually listened to the concerns of workers. Additionally, BellSouth and CWA District 3 developed a joint QWL oversight structure in which management at the district (local), state, and corporate levels invited union leaders to attend regularly-scheduled business meetings. While union leaders were only invited for the QWL portion of the agenda, the three-tiered structure and regular attendance of union leaders at line management meetings provided a solid precedent for labor-management information sharing and consultation at various levels of the organization.

In conjunction with 1989 contract negotiations, the parties agreed to sponsor an "Excellence through Quality" program that set up joint labor-management quality training teams at the local, state, and corporate levels. The training teams are composed of equal numbers of workers (selected by the Union) and managers (selected by management). The teams developed curriculum and provided training to virtually all employees in BellSouth Telecommunications over a two-year period. The quality trainers work with Quality Action Teams (formerly QWL committees) to provide technical assistance in problem-solving, process improvement, and job redesign efforts such as self-managed teams. Both management and the union considered the effort a success based on the extent of positive employee support for the program. Success, by most accounts, was the result of piggy-backing the Total Quality Program on top of the QWL program, a labor-identified program that employees viewed as a positive benefit.

In addition, since divestiture, bargaining relationship between the company and the union has been constructive. In 1986 negotiations, BellSouth was the only one of seven

RBOCs to agree to region-wide (rather than telephone company level) bargaining. In 1989 and 1992, the company and union put their bargaining teams through joint training programs in team building and problem solving in order to improve a mutual gains approach. All three rounds of bargaining have produced contracts approved by the membership without strikes. The company and union also use memoranda of agreement extensively between contracts.

Central to the union's active involvement in supporting quality efforts has been the company's long-term recognition of the union and its institutional security. At the time of divestiture, for example, when BellSouth set up a separate subsidiary known as Advanced Systems, Inc. (ASI), it negotiated a separate contract with the CWA rather than operate ASI as a non-union subsidiary. In the first round of bargaining after divestiture, BellSouth was the only RBOC to agree to the union's request for regionwide bargaining (as opposed to the more decentralized approach of bargaining with each telephone company in the region). Since 1986, BellSouth and the CWA have jointly operated a program to provide workers with training in career planning and thereby improve the potential for employment security.

During the 1989 negotiations, the company agreed to several clauses that improved job security and union membership levels. One agreement set up a joint union-management task force to study the content of managerial jobs and to return to the bargaining unit those jobs that were not managerial. As a result, 550 jobs were returned to the bargaining unit between 1989 and 1992. In 1992, the union and company agreed to set up a series of additional joint task forces to identify work to be brought back in-house and to develop pilot innovative work arrangements, including self-managed teams and telecommuting. One such joint effort did a comparative study of the relative costs of doing in-house versus subcontracting-out the work of "buried service wire" (the laying of cable underground between the main telephone cable and the house). The union worked closely with management to choose managers, buy equipment from vendors, review full financial information, and monitor the results. The trial demonstrated that higher quality work could be done more cost-effectively with in-house, unionized workers. Customer

complaints about workers damaging sprinkler systems or failing to clean up debris were down. The union and management negotiated a separate contract to bring the work back in-house.

In another example, an eighteen-member quality improvement team (one-half union members) studied Florida's system of provisioning (network engineering and construction). After three months of work using a process of consensus decision-making, the design team made a recommendation to co-locate processes that had been located in two separate centers (the Customer Premise and Loop Assignment Centers) and to consolidate four centers into two. Management implemented the recommendation and closed centers in two cities, leading the union leadership in those cities to object to the plan. The plan involved a transfer of 50-100 jobs from Miami to Fort Lauderdale, x miles away. The number of jobs actually lost was twelve, and these cases were handled through attrition. Cost savings of \$4 million came from streamlining processes and redundancies and consolidating facilities. Union involvement was controversial because the changes resulted in workforce reductions; one union representative involved explained the union's dilemma "There are two schools of thought in the union: the first says don't be a part of any layoffs. The second is that if we get involved, we can understand the process and save more jobs than otherwise would be saved. That's what we did in Florida" (Interview 134, 12/13/93).

As a result of these strategies, BellSouth has enjoyed high levels of employee involvement in quality-enhancing activities. Relative to their other RBOC counterparts, workers have maintained high employment levels (for all employees, a drop of 10,000 out of 83,000 through attrition between 1990 and 1993, with another 10,800 targeted in the next two years), but low wage increases (averaging about 2-3 percent annually since divestiture).

NYNEX. In contrast to District 3 of the CWA at BellSouth, the official position of the regional leadership of both the IBEW and the CWA, which represent workers in New England Telephone and New York Telephone respectively, is non-participation in joint

quality and performance-improvement teams. Both unions have consistently refused to enter into any cooperative labor-management productivity bargains (such as employee participation programs, total quality, job redesign or self-directed team experiments). Both unions collaborated very effectively in a successful three-month strike in 1989 over maintaining health care benefits, and the bitterness evoked during that struggle continued for several years and undermined suggestions of joint labor-management efforts. As a result of that history, the company made the strategic decision to bring in a seasoned labor relations expert from AT&T (James Dowdall), whose sole purpose has been to develop a mature bargaining relationship with the two unions. For 1992 bargaining, Dowdall hosted the unions in a two week joint training session in mutual gains techniques and paved the way for labor peace. In 1992 bargaining, the company and union established formal joint committees around technology and workplace issues, and these were set up in an attempt to create a new vision of labor-management cooperation; but by most accounts these forums existed largely on paper. Because both unions give considerable autonomy to locals, local union leaders have the choice of participating in joint committees, and some have done so. Most, however, have chosen not to do so, suggesting that locals across the region have taken a fairly consistent approach to participatory programs.

The company and unions negotiated early contracts in 1992 and 1994 that provided high wages in return for large employment reductions through attrition on the regulated side of the business. The union has negotiated 3-4% annual wage increases since divestiture. In 1994, however, the union not only achieved lucrative early retirement buyouts for members, but the most innovative retraining and employment security provisions in the industry -- company-paid retraining and placement of members in the growing non-union subsidiaries of the firm (wireless, information services, etc.). A company-paid two year associate degree program is at the heart of the training initiative, which will train employees one-day a week while they continue to work. The new negotiated job category, "telecommunications technical associate," is envisioned as a multiskilled technical job that will allow the company to deploy network technicians in a broad variety of inside and outside work. Some 2,000 employees have enrolled in the

program, but interviews with managers and union leaders suggest that they as yet have no clear strategy or work organization plan as to how they will actually use the new technicians (Clifton 1995). The union also won concessions for union security, negotiating neutrality clauses and access to non-union workplaces that some unionists believe were critical in the recent and very closely contested union election victory among 3,000 customer service representatives in New England, a unit that has been historically anti-union and has turned down representation in several previous campaigns.

In exchange for high wages, retraining, and union security, the union has agreed to among the most radical workforce reductions in the industry. By 1993, NYNEX had eliminated 19,000 of approximately 60,000 jobs, but only 6,000 were among bargaining unit members who accepted generous early retirement offers. The remaining 13,000 were among managers, who either accepted generous settlements or forced layoffs. Under the 1994 contract, 17,000 jobs will be eliminated by 1996, leading to an overall drop of 60 percent of the workforce.

The NYNEX/CWA strategy, therefore, appears to be a high wage, low employment strategy. The company is banking on building a highly skilled, flexible, and productive workforce, but without their involvement in new forms of work organization. What is striking is that although the company and the union have reached amicable settlements in recent negotiations, they continue to have very "traditional" labor-management roles, with little or no union or employee participation in quality or performance-enhancing innovations.

Work Reform II: The Changing Nature of Jobs

There are two competing approaches that influence the skill content of jobs in the current period: a) explicit organizational efforts intended to enhance, broaden, or increase the responsibilities of particular groups; and b) technological advances designed to simplify and reduce the labor content of jobs. The first is linked to decentralized business strategies while the second is linked to remote-servicing strategies. The first approach represents a break from the past, while the second represents a continuation. Moreover,

while companies have undertaken job enhancement experiments in most occupations, they tend to occur in "pockets" and affect only a minority of workers. New technologies and reengineering, by contrast, affect the entire workforce in particular occupations, and therefore, where introduced they have been more widely felt.

Job enhancement strategies beginning in the 1980s have been of three types: a) those that absorb supervisory tasks (task assignments, scheduling, monitoring, reporting); b) those that broaden jobs (job rotation, multitasking, job enlargement); and c) those that deepen jobs (multiskilling, added quality control and problem solving). The most popular have been of the first type -- through the introduction of self-managed teams. Most Bell System companies (including AT&T, Pacific Bell, US West, BellSouth, NYNEX, and BellAtlantic) have experimented with self-managed teams, although they still cover only a small fraction of the workforce. Interviews with managers across the former Bell System, however, indicate that most companies view this innovation first and foremost as a solution to the excessive management hierarchy. That is, they are driven more by the goal of reducing costs and less by sociotechnical theories that advocate teams as a solution to problems of quality control and innovation -- although, as demonstrated in the next section, self-managed teams in this context have had the effect of increasing the breadth, depth, autonomy, and group learning of team members.

One manager, for example, identified the company's self-managed team program as a success because it helped downsizing (Interview 145, 10/6/94). Another manager commented, "We lost so many management jobs that they backed into it. It forced a reorganization at the bottom" (Interview 17, 9/30/92). In another case, a manager responsible for introducing self-managed teams stated, "This experiment was viewed as my 'toy'. Now that were downsizing, it's being taken more seriously" (Interview 19, 10/27/92). Asked what the company's objective was in initiating self-managed teams, another network manager stated, "...increased span of control.... Traditionally in my area it was 1:5. The company wants to go to 1:30. But there's no way to supervise this many, so the duties of the supervisor have to change (Interview 47, 3/29/93). A staff manager in another instance stated, "...the broad initiative has come from operations managers who

feel pressured by the head count squeeze. There's been a growth in interest at the same time that downsizing has been occurring" (Interview 61, 9/10/93).

By absorbing the duties of frontline supervisors, self-managed teams reduce the demand for managerial employees and are a critical reform in companies efforts to cut indirect labor costs. Telephone companies that have successfully introduced self-managed teams, for example, have turned first line supervisors into "coaches," doubled or tripled their span of control (from an average of 1:8 to 1:16 or 1:24), and eliminated the need for one supervisor entirely at a savings of approximately \$80,000 per supervisor. I estimate the cost and productivity savings of this innovation in Part III of this study.

Self-management is one type of job redesign effort that helps reduce bureaucracy, but it does not necessarily eliminate the routinization associated with Taylorism. Workers can be self-managed and still have narrowly-defined, repetitive jobs that do not involve problem-solving. In contrast to job redesign theories that emphasize the benefits of breadth and multiskilling, Bell companies have continued the pre-divestiture strategy of applying new technologies that reduce the content of labor. In operator services, new software technologies or "expert systems" have accelerated labor-displacement and job fragmentation. In customer services, as a direct result of deregulation, companies have created detailed divisions of labor to separate out the sales function from other service functions; they have also introduced automatic call distribution and expert systems to pace work. Network digitalization has both decreased the demand for and changed the skill content of some network craft jobs; and new handheld computers represent the first introduction of electronic monitoring into outside crafts. The following sections review these changes.

Network Crafts

As indicated above, by 1980, AT&T had created highly functionally-specialized occupations in network, but the jobs themselves remained craft-like. The jobs required electro-mechanical skills and the completion of a whole task; geographic dispersion reinforced autonomy. AT&T tried to compensate for its inability to control outside crafts

by a management strategy of heavy supervision and individual responsibility for detailed quantitative performance measures (tasks or jobs per day). Job discipline based on these measures was an on-going source of labor-management conflict.

It was not until the late 1970s and early 1980s that new technologies -- particularly the digitalization of the network -- began to reduce employment levels and change the skill content of network craft jobs¹¹. The demand for skill has shifted from electro-mechanical to computer-based skills; the overall demand for labor decreased because systems were more maintenance free. This change was particularly significant because it represents the first time in the network's history that increases in productivity were not accompanied by increases in employment; instead, the relationship has reversed.

In the Central Offices, for example, switching technicians in the past had hand-wired and manually-repaired the relays and switches. Failures were electrical and mechanical in nature. With electronic switches, by contrast, switching technicians use computers to test switches via remote work stations and write up orders for other technicians in the central offices to carry out. More recently, new advances in software programming make digital switches both self-diagnosing and "self-healing," further reducing the demand for traditional electro-mechanical skills of craft workers. A similar trend has occurred with the digitalization of PBX and other customer premise equipment, which may now be remotely tested and repaired.

The net effect of these changes on the demand for skill is mixed. On the one hand, repair work formerly done by top craft is now done by clerks. For example, companies have created computer-based inventories of network specifications -- information that used to be contained in blueprints. Engineering assistants who created blueprints of high level circuit order layout designs (COLD) have been replaced by clerks who do the same work at computers at roughly sixty percent of the craft pay. Similarly, historically "testmen" would manually test the line to identify the source of faulty transmission. In the

¹¹ AT&T has been four to five years ahead of the Bell companies in introducing these technologies. It introduced the first electronic switches that switched analog transmissions in the late 1960s. It introduced the first fully digital switches in 1983.

late 1970s and early 1980s, the Bell system replaced testmen with "maintenance administrators," clerks who use computer systems to identify the problem. On the other hand, while the change eliminated a top craft job, clerks learned new software skills and were upgraded to a job at eighty percent of testmen's wages. In addition, a relatively small number of systems analyst and computer programming jobs have been created. These trends in the reduction of skilled craft jobs are in striking contrast to the stated goals of the NYNEX/CWA "technical associate" job which is envisioned as a multi-skilled technical/professional position.

The introduction of fiber optic cable in the short run has increased the demand for construction crews to replace copper wire, but in the long run reduces the demand for cable splicers because it is relatively maintenance free. While AT&T and the operating companies have substantially replaced their trunk lines and feeder cables with fiber, the "last mile" (the 90 percent of the network connecting the distribution cables in streets to the customer premise) continues to be copper. If regulators resolve the current uncertainty of local cable and telephone markets in favor of deregulation, local phone companies are likely to replace copper with broadband cable (coax cable or fiber), creating both an immediate demand for more network construction and installation, but a longer term dramatic decline in network employment.

Other changes in network crafts are the introduction of handheld computers which allow workers to input work reports as they finish them. While companies view this recordkeeping system as more efficient (and another tool in their attempt to reduce managerial staff), workers argue that also doubles as a monitoring system because it records the exact time that an employee punches in the data. Many workers view this "innovation" as introducing electronic monitoring into the field for the first time.

Another dimension of change concerns the attempt of companies to turn network craft workers into a supplementary sales force. In Total Quality training, network craft workers are encouraged to use every opportunity to "meet customers needs," or sell. Craft workers have tended to resist this change, and its diffusion is relatively minimal because network craft consider sales to be demeaning, unskilled work. One worker, a

woman in installation and repair, described the common feeling: "Most of the guys don't like to do installation work because you have to deal more with customers....I like it, so I'm generally given all of the installation work in my group" (Interview 78, 11/1/93). Federal Express is a frequently cited example of a company that successfully uses its courier field staff as assistant sales representatives, promoting the company and using their knowledge of customers and routes to suggest new services (Commission on the Skills of the American Workforce 1991).

The absorption of this sales function appears to occur more successfully in the context of self-managed teams because workers who have responsibility for a given 'turf' are more likely to develop ongoing relations with customers. The experience of a self-managed team in New York is exemplary. The team took over its own turf, and members were routinely seen in the neighborhood. Over time, customers started calling to repairmen when they were out on another call, asking them to take care of a problem (Interview 18, 10/2/92).

Many managers and workers hold quite positive views regarding the viability of self-managed teams in network because workers already have considerable autonomy and discretion. Part III provides a quantitative comparison of the differences between self-managed and traditionally-organized work groups and multivariate analyses of the performance outcomes. Yet the outcomes of team innovations depend significantly the problem that needs to be solved, the point of departure of the work group, the intentions of management, and whether the union is involved and how. The following examples are indicative. The first represents a case in which very traditional style management was in place, and workers in conjunction with a young new manager worked to overhaul outdated work practices. The second represents an example of management misusing a team system to improve performance through heightened competitiveness that backfired and produced heightened conflict among workers. These are contrasted with an example from a rural area where geographic dispersion limited the erosion of craft autonomy.

A NYNEX (New England Telephone) garage in Reading, Massachusetts won the company's quality award in 1992 for improvements in quality and productivity resulting

from the initiation of a self-managed team. The garage had been known for its poor performance. Workers who were involved in the self-managed team experiment claimed that poor performance was the result of traditional command and control management that gave little respect to workers and created a demoralized workforce. The garage had a reputation among union members as one of the worst, and labor turnover was high. Junior workers were hired in, and as soon as they gained some seniority, they tended to transfer to another location. Workers described their daily routine:

"Management began each day with a buzzer....Mornings used to start off with the manager giving orders -- frustration, negative atmosphere. Management focused heavily on productivity - sacrificing quality. The ideal was the 2 hour repair job. We weren't doing any maintenance. Technicians would cut cable and make the quick fix rather than deal with the real problem and solve it. If the cable was down because it was wet, they would do a bypass. Over time the cable deteriorated, causing major outages. Trouble would build....Our men would go into our manholes and find them full of water [underground cables would deteriorate in water because paper insulated the copper]. Now we have transducers at every manhole....

"I dreaded coming to work. Supervisors told you what to do. They would go around with binoculars spying on you. You weren't allowed to work together. Had to ask permission for everything. If on the job, you had to call the supervisor to get help. The supervisor would come out and examine it before agreeing or not to get you help. A waste of time. And no trust. You left your personal life at home -- you were a responsible adult there, but nothing here. The managers had a hand-picked elite. Nothing was done by seniority. Training, tools, jobs, all were handed out on the basis of favoritism....If you spoke up, you were punished -- sent to high crime areas day in and day out. There were lots of grievances. If you got a minor fender bender, you were suspended" (Interview 24, 10/30/92).

A "revolution" in management occurred at the garage in 1990 as a result of downsizing that was occurring throughout the company. Workers with considerable seniority were surplus from the other departments and forced to take undesirable positions at the Reading garage. They had little tolerance for the old style management system, and soon began a cooperative effort with a young assistant manager to introduce self-management. After two years of effort, the traditional managers were retired to office work, and the assistant manager took over and created a new environment with the help of workers who overwhelmingly voted to "go self-managed." While the union did not actively oppose the collaboration, it did not give its support.

Under the new system, teams of workers have full responsibility for their turf. One worker reports to work a half hour each day on a rotating basis to review installation and trouble reports and divide up assignments, distributing them according to who has the particular skills needed for a job or who has worked the customer's premise previously and has prior knowledge of the layout or wiring. Workers team-up as needed, resulting in increased on-the-job training by more experienced craft workers and increased cross-training. Workers have demanded and received training in cable splicing so that the majority now qualify for top-of-the-line craft pay.

Performance at the garage rose dramatically in two years. The Customer Report Rate (problems reported per 100 lines -- an indicator of preventative maintenance) fell from 2.19 in 1990 to 1.20 in 1992. Percent of repeat reports (percentage of repeat calls for problems within a 30 day period) dropped from 17.2 in 1990 to 10.5 in 1992. Measures of quantity are no longer used because management and teams agree that quality and preventative maintenance is more important than quantity.

In the second example, an early experiment in self-managed teams in the New York Telephone, the process and outcomes were entirely different. In this case, the management involved sought to increase productivity through an incentive system. Management held a meeting of workers in a large garage (about 60 employees) and announced a new program of self-managed teams. The best performers were selected to

participate. There was no union involvement or consultation. One worker summed up his experience:

"In 1988 management promoted several techs to the self-managed team. It was a 'super gang.' It was very elitist. I had to ask why I wasn't included. I was very angry, as were the others....Finally I was promoted. The self-managed teams have a lot of perks. Everyone gets his own beeper. We get the large business accounts [the good jobs in large office buildings] -- you go to the same place every day all day long rather than be out climbing poles. We meet in a separate room every morning behind closed doors. They [management] leave you alone. We have coffee, donuts every morning; the other workers try and peek in the windows to find out what's going on" (Interview 22, 10/28/92).

The separation created friction between the self-managed team and the rest of the workers. A second team, (the B Team) was soon formed, with members chosen again based on their individual performance record. Workers who improved their performance could be promoted to the B team. The remaining workers were labeled "the traditionals."

The number of firstline supervisors, in the meantime, dropped from six to three, increasing the span of control from 1:10 to 1:20. The supervisor with the "traditionals," however, had most of the "problem workers," and therefore had an unmanageable workload. Recognizing the problem it had created, management decided to reshuffle the teams, incorporating the workers from the traditional team into one of three semi-autonomous teams. Workers from the self-managed teams complained bitterly because the decision undermined their autonomy, and the additional workers undermined the positive group cooperation that had developed. The "traditional" workers had never wanted to be in self-managed groups, and resented the new work organization.

In this case, the performance of the A and B Teams improved while that of the third fell; the approach seemed to separate already better-performing employees from less-well performing or less-experienced workers; and the overall net effect on performance is

unclear. The use of self-managed teams as perks to create competition created conflict and resentment.

Self-management, according to some, recreates the kind of craft autonomy and responsibility that has historically existed in rural areas, where large distances made heavy supervision unfeasible, and where workers retained not only greater autonomy but more varied skills. A manager in one company familiar with the experiments in self-management cited them as successes because the improvements in performance brought the work groups up to par with those in rural areas, where performance measures have traditionally surpassed those of urban areas. Commenting on one rural work group, the network manager stated,

"This 'team' has probably been working like this for years. They don't call themselves a team or anything in particular. Due to geographic distances in rural areas with one foreman spread over hundreds of miles, telephonemen were always independent of management, had significant control over their work... worked together to get things done; status differences between workers and 'management' were small... everyone helped out because the foreman was just one step away from the workers; telephonemen knew their communities, knew their customers, had a geographic territory.... Also, these areas have always had the best performance, customer service ratings (Interview 18, 10/2/92).

Where companies have introduced self-managed teams in rural areas, therefore, workers have often experienced it as a formalization of the way they have always worked. As one rural worker responded, "What's the difference between before and after the self-managed team?...not a whole lot. Now, the deadlines fall on us rather than on someone else. We work and live around here so the customers are our friends. Now, if we do something right, we get the credit -- like the job on highway 531. We also order all our supplies. If we need cable, we see to it that it's here" (Interview 46, 3/29/93).

Yet even in these instances, the job of craft workers changes in at least two ways: in their absorption of the supervisor's responsibilities for both internal management as well as for external coordination with other departments and customers. Workers take formal responsibility for daily work assignments and scheduling, and rotate the "lead" or "coordinating" position, usually on a monthly basis. Within the office, the lead worker absorbs the supervisor's administrative paperwork responsibilities. This work involves scheduling and writing up service orders and work reports, which often include quality inspection and safety reports. The more significant change is in workers, rather than their supervisors, relating directly to other managerial and professional staff in outside departments: engineering, installation and repair, the facility assignment center, cable TV and the power company (since they often share joint-use poles). Additionally, the lead worker interacts more frequently with outside business and residential customers.

Whereas the supervisor used to interface with outside departments and customers to order supplies, bring in jobs, negotiate with parties over turf responsibilities, answer customer complaints, and work with engineers in the pre-survey stage, craft workers now assume these responsibilities. In construction crews, the involvement of workers rather than supervisors in pre-survey work is particularly important. Engineers draw up the details of the project, but don't always go to the field to check for accuracy. Because craft workers more intimately know the requirements of the jobs they do, their involvement in the pre-survey stage produces more accurate estimates, which also improves overall planning and workload projections.

Customer Services

Customer service representatives (CSRs) are frontline employees who deal directly with customers over a range of issues, including sales, service orders, questions on service or billing, and collections on overdue accounts. Historically, telephone companies had "universal" service representatives who handled all customer requests and problems. As one manager who began as a service rep and rose through the Business Office stated, "Whatever the customer wanted, you handled" (Interview 26, 3/24/93). Over the past

decade, the companies and unions have debated the content of the service representative job, and the future is still uncertain. As a direct response to deregulation and the desire to increase revenues, operating companies subdivided the service rep job into sales (CSRs) on the one hand, and services (Collections Representatives or Credit Consultants) on the other. The logic of the split job titles was to separate out interactions with customers that are "positive" from those that are "negative," thereby allowing CSRs to sell more. The split title allows companies to pay a lower hourly rate to the Collections Representatives (about 90 percent of what CSRs receive). On the billing side, some companies have further divided the job into those who handle active bills versus past-due bills.

This split in job functions has negative cost and service implications according to workers in customer services and collections. Customer service reps say they sell enhanced services, even to people who are poor credit risks, because management puts pressure on them to sell. Collections representatives then find themselves dealing with repeat offenders -- trying to collect from people with bad debt records who should not have been signed up again for services. A universal representative who is responsible for all aspects of customer interaction has incentives and information available to prevent these kinds of problems. U.S. West, for example, found that uncollectible payments, or net bad debt, had tripled in the five years after it split the titles, and this led them to create yet another job classification of customer credit approval (U.S. Congress 1993:41-3).

Additionally, service reps claim that the split title is confusing for customers. "It's very hard to separate out orders, sales, and service. The company has flip-flopped on whether to keep these functions together or separate. The customer gets confused if he has to call different reps for different problems. When we started out we were collections [past-due bills], but everyone in the company now refers to us as billing [adjustments on current bills]. Some adjustments we can do, some we can't....the system locks us out of doing some types of adjustments; and locks the customer service reps out of doing others" (Interview 150, 3/30/93).

Companies have also divided service rep jobs by market segment -- between those handling residential customers, small business, and large business accounts. While the first

two job categories are narrower and involve only phone sales, account executives for large business provide one-stop-shopping for their clients. AT&T has developed an automated system that distributes incoming customer calls by their call volume, with high end users forwarded to an account executive and mid level users to a service rep, and low end users to a recording and voice mail (Interview 148, 7/8/94).

In addition to the split titles in customer services, telephone companies have added telemarketing departments which only handle high-volume outgoing sales solicitation, usually follow-up calls to ad campaigns. Traditionally, telephone sales occurred primarily through incoming customer calls, handled by universal service representatives. To maximize sales, however, companies have dramatically increased their marketing budgets. Telemarketing jobs usually rely on a secondary, or low wage, high turnover workforce; the jobs resemble those of operators in terms of their low cycle time, repetitiveness, and use of expert computer systems to control the timing and script of calls. Most Bell companies initially set up these operations as non-union subsidiaries operating outside the bargaining unit. Workers were paid on a commission basis, many worked part-time, pressure to "stay on the board" and sell was high, as was turnover. Customer turnover was also high, and some managers believed that this was the result of the commission system: workers were overly aggressive in making sales that customers later recanted on. Influenced by company total quality programs, at least two companies -- US West and BellSouth -- subsequently decided that they could improve quality by bringing the work in-house, and negotiated with their unions to "accrete" the telemarketing workers to the bargaining unit. In these companies, telemarketing jobs became full-time and carried good benefits, base wages rose and the percentage of income based on commission fell.

One telemarketing worker, a former contract employee who now works with the quality improvement team in her office described the difference:

"In the past we had a bonus structure for sales that didn't emphasize quality....The base pay was \$240 per week, but top reps averaged \$600-700 per week....The commission drove a very pushy sales attitude. Sales reps didn't care about company image

or how long people signed up for service. They would ask people to try it out for two months [the length of time required to get the commission]. People would then cancel....lots of customer turnover....

"The change meant increased job security and benefits for me...and I feel valued. Not everyone liked the changed. The cut in pay was the obvious thing, but it averages out when you count benefits....the union has training now and is committed to more people making the same pay....and turnover is much lower" (Interview 149, 12/10/92).

Since divestiture, the job of CSR has also become more high pressured, more specialized, and increasingly complex as telephone companies have developed differentiated products -- a variety of enhanced services -- to add value in saturated telephone markets. Service representatives along with operators are considered to have the highest stress jobs in the bargaining unit. A manager who worked in the business office and rose through management positions in the 1960s and 1970s compared today's jobs with those of the past:

"The jobs of service and collections reps have become increasingly technical. In the 1970s, initial training for a service rep was seven weeks; last year it was up to eighteen weeks. Every state has a different tariff; there are legal requirements for what we must say to explain everything about the new services.....

"I couldn't stand the job now...In the past I could say 'this is what I think you need'...I had a lot of latitude, I could use my discretion. Now the PUC dictates what must be said. There are more rules to follow and decision-making is more constrained....The job is much more complex, there's more to offer, more product information to digest, and everything's mechanized so you have to know more about different systems and be able to go back and forth" (Interview 26, 3/24/93).

In another company, management stated that formal training for customer service reps is thirteen weeks, with proficiency achieved after one and one-half years (Interview 55, 3/31/93). When the customer calls, CSRs are responsible for determining what the customer's needs are and suggesting appropriate services: call-waiting, call-forwarding, voice mail, fax. Although much of the product information is now in one or more data bases, a CSR must still be very familiar with the different types of service, their prices and variants, and in which neighborhoods they are available, as availability depends upon the quality of the outside network.

CSRs are judged entirely on their sales volume. They receive a monthly "objective" or quota, which is adjusted for days absent from work. Monthly performance is based on the percentage of sales objective met, usually translated into sales per access line or revenues per access line. CSRs keep a running total of their sales, and feel under constant pressure to sell more. As one worker described it, "The pressure on sales is tougher and tougher. They emphasize our revenues per access line. Customers don't have 'needs'. There's a standard procedure to determine what they need - a series of questions we ask to determine need or show them how they need certain features. This is called customer centered sales and service" (Interview 54, 3/31/93). Because pressure to sell is intense, customer service workers say they prefer to have sales and billing separate, "We don't want to handle problems because that take time away from sales -- and that's what they measure" (Interview 54, 3/31/93).

Pressure to sell has led to several successful lawsuits against telephone companies for fraud. In Florida and Pennsylvania, for example, courts determined that CSRs were automatically assuming the same level of services on a new line as on an old one or fraudulently signing up customers for more than they asked for, leading to higher rates. As a result, the companies were ordered to provide standardized scripts to be read by CSRs for any order. According to one customer service rep, "What this means for us is a huge amount of details and questions that we have to ask about different types of services wanted....we can't assume prior levels. This is very time consuming" (Interview 49, 3/30/93).

To increase efficiency, companies have adopted new policies, both to reduce the amount of time that service representatives take between calls and to spread the distribution of calls more evenly. First, they have shifted call distribution from a local level to a state level or beyond. While in the past, customers received specialized service from a local service representative they could come to know personally, now calls are automatically distributed to service representatives in consolidated offices around a state or region. For CSRs, this means they have a constant call-load, rather than a pace of work that varies over the course of a day. A second strategy has been to distribute calls over a longer period of the day -- to establish 24-hour service with workers divided into three shifts for the first time.

Third, companies have introduced "automated call distribution" (ACD) systems that pace work and expert systems that instantly supply customer background information, help identify selling opportunities, and electronically monitor the service representative. Workers experience this as a speed-up. While in the past they controlled when the customer came on the line, and had time to finish up an order from a previous customer or get themselves psychologically prepared for the next sale, now they automatically receive a call, much as operators and telemarketers do. One worker described the change between the old and new systems:

"Our job is constantly changing as the system does more and more for you. The old system was USOX - this was the traditional Bell system-wide language that you had to learn to put in an order...you had service order codes. It used to be that the telephone would ring and you'd pick it up. Now they come on the line automatically. We have no control of the pace. It's a speed up. It used to be you'd finish writing up an order while waiting for the next call. Now you can't. As soon as you get off the line, another one comes on. You can't ever adjust your mind.... So to manage, you have to keep the customer on the line longer - make them sit there while you write everything down because you won't have the chance once you get them off the line - or you put the new customer on hold while you finish the prior customer..."

"What was taken away is 'closed time'... time off the phone has dropped to nothing. Closed time is the only time we have to handle customer problems. We used to target 15 minutes in the morning and afternoon to handle customer problems. If a customer problem arises, we fill out a slip with problem to be handled later -- things that are more complex and can wait. Now I do these on my break; or I close out and risk getting a negative evaluation.... The new system has added stress a lot of stress...." (Interview 151, 3/31/93).

Electronic monitoring also adds to the stress on the job. Although unions have negotiated protections which require companies to notify employees when management is listening in on phone conversations, employees say that the experience is still stressful. According to one worker, "Electronic monitoring - a green light goes on in the room when they are listening in... happens daily... could be listening to anyone... you never know. You should see the sugar go up in the room. I've been here two years. It's degrading. I can't be trusted to do my job. They do so many observations on me and call it 'development.' We get very little development, but lots of appraisals" (Interview 150, 3/30/93).

Workers experience expert systems and electronic monitoring as a loss of control over work, a speed-up, and a source of increased stress. Yet, at the same time that companies have been introducing these technologies, they have also tried experiments in "empowerment," in self-managed teams, and in job redesign to return to the "universal" approach to customer service. An example of the "empowerment" approach comes from a total quality program initiated by one company to give service representatives greater discretion to make nonroutine billing adjustments, a decision formerly made by supervisors.

In experiments with self-managed 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. This change 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 one of the side benefits of moving to self-managed teams is the improved motivation that comes from having more independence and gaining respect and working as a team. Moreover, because employees work as a group rather than individually, more learning takes place among members of the group in terms of sharing implicit knowledge in areas such as improving sales revenues, solving billing complicated problems, or handling difficult customers¹². One member of a self-managed team reported:

"I like the small group... people give sense of community. The disadvantage is that you feel more responsible for the job.... The advantage is that we have more freedom, no supervisor standing over our shoulder. There's the satisfaction in handling problems on our own. For example, sales dropped once and the we figured out how to correct it" (Interview 54, 3/31/93).

In this case, supervisors indicated that lower performers in the group had improved as a result of their experience in the self-managed team. In one instance, a team that began with members who had a mixed record of performance ended up as the leading sales team in the state. Another worker reported that the difference in work was not as much in the content of the job, but in the kind of inter-group cooperation and training that took place as well as some added autonomy:

"As for our work, it's not that different. The difference is that we work together. If I need help with an order, my teammates will help me so we get everyone's work done at the same time. We're family.... We work differently because the training and team building we received. We make sure we're here at 8 am.... We now have the right to call different departments -- marketing reps, frame engineering. Now we decide who among us

¹² These effects are quantitatively measured in Part III.

handles special projects. Now we're also in on coordinators meeting and conference calls. But we've had to fight to get all of this (Interview 52, 3/30/93).

The shift to self-management in customer services and other skilled office jobs is much more difficult to achieve than in the cases of outside craft for various reasons. A fundamental difference is that it is more feasible to create self-contained units or closed systems among outside craft workers by simply establishing separate turfs for each group. The traditional autonomy of craft workers and the often small size of garages also make the process easier and more manageable.

Among service representatives and other skilled office workers, by contrast, workers experience considerable resistance from supervisors who would refuse to acknowledge the team, refuse to give them sufficient time to meet, or refuse to allow them to participate in informational staff meetings that they were entitled to attend. While in some cases, supervisory resistance may be the result of self-interest, other sources of conflict arise from the technology and the way work is already organized. Expert systems, as already noted, set the pace of work. Call-loads are set at the state level, for example, so that not even lower or middle level managers have discretion over work assignments. To give these office workers the kind of time away from the board needed for them to absorb tasks of self-management, supervisors would have to reduce the workload or call-load of the teams; many supervisors are unable or uncomfortable to do this either because workloads are already too heavy as a result of downsizing or because they feel it will engender conflict between the "traditional" work groups and the self-managed teams. The following comments from workers reflect these conflicts:

"We are asking for the responsibility to be a self-directed team. But the supervisors won't let go. The supervisor still makes the decision and we do the paper work. We're not invited in on decisions made by the supervisor. She decides overtime; we can't set our work schedule. She sets the vacation schedule for all of us [in both traditional and self-

managed groups].... So she basically treats the traditional and self-directed groups the same" (Interview 52, 3/30/93).

In another case, workers report:

"In general we've gotten support from upper management, except on the closed time issue. We have extra duties, which makes the lack of closed time doubly hard for us....We were supposed to be part of the supervisory meetings. But we have not been able to attend any meetings due to too many calls.... We get one and one-half hours per week for meeting time. We meet when the office holds general meeting for employees. But we need about 4 hours/week to do reports and other management activities" (Interview 54, 3/31/93).

The limits to the autonomy of self-managed teams in this context, therefore, seem to arise from the types of work systems and technologies in existence. As a result, self-managed teams in customer services and other skilled office settings end up with a much narrower domain of decision-making; they don't have control over decisions concerning scheduling, vacations, and work load that self-managed teams commonly have in manufacturing or network settings. If the call-load is heavy, self-managed teams in CSR offices have less time "off the board" to undertake the kind of training they need, meet to divide up supervisory tasks, or handle problems normally undertaken by supervisors. If this occurs, workers may experience a self-managed team more as a speed-up than as a source of greater autonomy and responsibility.

In addition to self-managed teams, a number of companies currently appear to be rethinking the specialized job titles in customer services; and some have made the decision to return to the concept of "universal service representative" -- a multi-tasked job that allows companies to provide "one-stop shopping" to customers. The push for change has had different sources. In some cases, large business customers were the first to complain. According to one quality manager who was involved in rethinking customer service, "Big businesses were complaining bitterly about the number of different calls they had to make

-- for repair, bills, service orders -- no one was totally involved with them except the account exec. Now, as an outgrowth of a quality improvement team (QIT), we have 'one-stop shop' -- customer service, network repair, billing -- all are in one place" (Interview 26, 3/24/93).

That reform, however, initially applied only to large business, not residential or small business customers. Employees and unions began a drive in the late 1980s to create better jobs and reduce work-related stress for all service representatives. Union locals such as CWA Local 7777 in Denver, which had large numbers of dissatisfied customer service workers, led the campaign. The Denver local hosted a nation-wide CWA conference in 1990 to develop a union strategy for better jobs in customer services. Subsequently, local union members approached a new Vice President and General Manager in charge of US West's residential services (Home and Personal Services) and asked her to end the 'sweatshop conditions' in her division. The manager agreed to work with the unions through the Employee Involvement Quality Council, and signed an agreement that no employee would be laid off or downgraded as a result of the joint job redesign effort. Management also did away with sales quotas and performance measures that engendered deep employee resentment (U.S. Congress 1993:43-5). US West has undertaken the only significant experiment to cross-train service representatives in a variety of jobs on the theory that both employees would be better off and so would customer service.

The two-year US West job redesign effort, jointly carried out by management and the unions, used a sociotechnical systems approach to integrate the technological (computer systems) and social (especially customer contact) aspects of the job. The job redesign, piloted in Phoenix, envisioned a center for customer service that reintegrated sales, credit verification, billing, and collections. Employees would be cross-trained in different functions and work as a team, rotating jobs and gaining some choice in task-assignments. Additionally, rather than using an automatic call distributor, the design called for an "interactive work distributor" which would allow service reps to log on and choose the types of calls they would receive during a given work period. The Job Design Team further proposed to integrate functions from other centers: that of Translations

Specialists in Recent Change/Memory Administration Centers (RCMACs); the assignment of phone numbers to customers, currently carried out in the Facilities Assignment Center (FAC); and the performance of routine repair tests, currently done by Maintenance Administrators or Testers in the Maintenance Loop Center (U.S. Congress 1993:49-50). The job redesign, however, was never implemented. The company halted implementation at the end of 1993 when it announced a company-wide reorganization that would consolidate offices across the several state area. While workers and managers in the Phoenix pilot center say they have continued with their experiment, the remaining 4,000 service reps in the company continue in narrowly defined jobs, and the future fate of the experiment is uncertain (Interviews 152, 153, 5/18/94).

Other operating companies, including Bell Atlantic, Ameritech, and New England Telephone (NYNEX) have made the decision to return to the use of universal representatives for different reasons. In some cases, the decision grew out of a frustration with the inability to clearly separate the responsibilities of service representatives versus collections representatives: when customers call the telephone company, they often want to take care of more than one concern -- for example, handling a bill as well as changing service. Companies received numerous grievances from employees for "working out of title." In other cases, the shift in policy is an unintended consequence of settlements from law suits against telephone companies for fraudulent sales. In the Pennsylvania case, for example, the PUC required the telephone company to develop a long script for full disclosure of sales information which all service representatives must recite when selling enhanced phone services. To meet these requirements that add time to calls, the company needed to use collections representatives for sales (Interview 155, 9/22/94).

Operator Services

Some of the same contradictions that have arisen in job redesigns for service representatives are also evident in those for operators. As indicated in section 2.3, operator jobs were the first to be divided and streamlined through the introduction of new technologies and "customer participation practices." In the 1980s, AT&T and the

operating companies continued to develop new technologies, especially software systems, that reduce the labor content of tasks performed by operators. Four important changes have occurred. First, companies installed automatic call distribution systems (similar to those discussed for service representatives, but at an earlier date). Second, using computer systems with enlarged computing power, new "Operator Service Position Stations" or "automated response systems" have made it possible to further reduce the amount of time an operator spends on each long distance call. Whereas in the past, an operator stayed on the line to wait for an answer on a collect or third-party call, now she only punches in the numbers and goes on to another call while the computer is making the connection. When the connection is made, another operator comes on the line to ask if the collect call will be accepted. This 'split' in call-handling saves several seconds in an operator's handling of each call, and saves companies millions of dollars each year. The system operates similarly for directory assistance, where operators find a name on a list, punch it into the computer, and go on to the next call (Kohl 1993:105). These systems reduce call cycle time and further fragment the tasks that operators perform, increasing the repetitiveness and tedium of jobs. "Directory assistance operators now handle about 1,000 calls per day, with the pace of calls continuing to rise because of new technologies" (Interview 113:11/4/92).

Complementing new technologies are new work procedures that further limit the time operators spend with customers. Operators are restricted, for example, from giving out more than two numbers at a time. According to one experience operator, "New work procedures serve to reduce customer reliance on operators. Operators are instructed to be more forceful in turning back callers and telling them to direct dial or use a credit card. The standard procedures mandate turnback, but operators can tell if someone is angry or impatient. They know when to offer to dial for a customer" (Interview 113:11/4/92).

A third change is the now widespread use of computer-generated voice messages, primitive voice recognition systems or "robot operators," which instruct callers to enter a series of numbers in order to place a call or obtain billing or other information. Another automated procedure is automatic calls to customers to remind them their bill is overdue.

More sophisticated voice recognition software is in the process of being trialed in a number of parts of the country. This technology allows computers to recognize key words and handle a greater variety of calls (collect, person to person, third party billing) as well as recognize different languages (Interview 113:11/4/92).

In contrast to the thrust of new technologies and work methods which further reduce the discretion of operators, companies have also introduced self-managed teams or "team-centered management" in operator services. AT&T's Eastern Region of Consumer Customer Services (CCS, formerly Operator Services) introduced self-managed teams in 1988, and the program subsequently expanded throughout the region. "Teams" of 12 to 25 operators meet on a monthly basis to discuss performance objectives, results, and appraisals. In addition, smaller teams of 6 to 10 employees absorb the administrative tasks previously handled by managers and take responsibility for problem-solving and conflict resolution. Multiple purposes of the effort include reducing management ranks and increasing their span of control, improving employee morale and involvement in decision-making, and improving labor-management trust. The change in work organization covered 5,000 employees, before the 1994 downsizing announcement that led to the unraveling of the cooperative effort.

Managers

Consistent with the changes in the jobs of occupational groups discussed above, former Bell companies have drawn on the ideas of employee participation, total quality, and job redesign to reform the jobs of managers as well. Beginning in the 1970s, experiments in "participatory management" focused on changing the military-style command-and-control nature of managerial jobs. The changes for managers stressed new behaviors rather than new skills in the narrower sense of the term. Management training emphasized a "softer" approach, listening skills more than dictating skills. QWL required a change in attitude -- of learning to respect the ideas of employees and the union -- what was then a novel idea. Middle and lower level managers had to learn to discuss and negotiate with union leaders over problems as they arose, rather than only in the context

of grievances. This entailed giving more respect and credibility to union leaders than had been done in the past. In places where QWL and employee involvement took hold, managers learned to change their behavior, and then used total quality program to shift the agenda from cosmetic issues to workplace performance.

The shift to self-managed teams was the next step in managers "letting-go;" and where these teams were introduced, they particularly changed the jobs of firstline supervisors, whose titles were subsequently changed to that of "coaches." Coaches no longer monitor or write up performance reports for their subordinates; they are supposed to "lead rather than command, inspire commitment rather than demand obedience." One network supervisor described the difficulties involved in the change:

"It was scary for me. They would go to meetings for me, kick-off sales, did all the paper work -- the foreman's job, including time sheets, work narratives, production sheets. They were given more and more empowerment. The gang got motivated to do the best quality. I would build up their confidence, morale. If a problem occurred, we would talk, problem-solve... It's a new coaching role, new foreman role. In the past, I was constantly monitoring them. I was the whip.... I fought it at first. Needed to build trust. Then I relaxed. Then I found my job to be very boring. I had no job. I had to find new things to do. I set up a sales committee...." (Interview 156, 10/28/92).

Coaches who have gained experience with self-managed teams find that they apply the "coaching skills" they've learned to other work groups they still supervise, so that the experiments have had spillover effects. According to one network supervisor, "the 'traditional' group requires more supervision, but now my management style is to provide leadership....I've gotten them working more by themselves, even though I still supervise them" (Interview 48, 3/29/93). Supervisors who have learned to become coaches appear to like the job better because they are freed up to get out in the field more and do less paperwork.

By contrast, firstline supervisors who continue with traditional responsibilities express frustration and resentment over their jobs because paperwork and administrative tasks are heavy and downsizing has led workloads to increase. In one case a company-sponsored survey found of network supervisors found high levels of discontent, with only one-third of respondents indicating they were satisfied with their jobs; another one-third stated they would return to craft jobs if given the opportunity. One network supervisor described how his job has changed:

"My span of control has tripled...I work 14 hours a day, five days a week....I'm fully accountable if anything goes wrong. Supervisors now spend 60 percent of their time doing paperwork. High stress. Performance is slipping some. We used to make two or three visits a day to each worker. You'd go out and find out how he's doing. Now I see each worker once a week...." (Interview 48, 3/29/93).

As a result, some companies are redesigning the jobs of firstline supervisors. In one company, for example, the company used the experience from self-managed teams to develop a new job description. Based on an extensive study of supervisor's use of time, the company found that traditional supervisors spent approximately 60 percent of their time doing administrative work and less than 10 percent of their time in the field training and developing workers. Under the piloted job redesign, coaches spend fifty percent of their time in the field. Some paperwork has simply been eliminated; other is incorporated into the jobs of workers, for example, through the use of handheld computers in the field which allow workers to punch in the job reports on the spot (Interview 157:9/22/94).

Companies are also redesigning the responsibilities of upper and middle-level managers to incorporate total quality concepts that emphasize being "market-driven" and "getting close to the customer." To get business units focused on sales maximization rather than public service, some companies have broken with tradition and hired from the outside top executives with marketing skills.

For middle level managers responsible for local or district level operations, companies have also applied total quality concepts to try and decentralize responsibility and create "ownership." For example, to break from the past when local managers had relatively little discretion and reported through department hierarchies to state operations managers, one RBOC has attempted to invigorate district operations councils as a locus for cross-functional problem-solving. The district councils, local geographic units established at divestiture and made up of local managers from different departments, had functioned in the 1980s primarily as vehicles for public relations, employee involvement in community affairs, and the telephone company's interface with the regulatory environment. If service problems arose, the pattern was to try and locate blame in a particular department. Local managers from different departments interacted little beyond the monthly council meeting and maintained departmental turf.

Under the total quality program, the new role for the district operations councils was to improve service quality, maximize revenues, and control costs. Legislative and regulatory issues are now considered secondary priority; and coordination of community activities and routine administration have been discontinued. The councils are to act as cross-functional problem-solving teams to improve service quality on an ongoing basis, not just at monthly meetings. All departments are held responsible for local service problems. Each council establishes a quality steering team which has the authority to initiate quality action teams or workplace innovations. Newly revised customer service reports provide data at the local level, rather than at the state level as had previously occurred.

Conceptually this reform represents a change not only from centralized to decentralized, and functional to more collaborative ways of operating, but from a focus on public service to individual customer service, from actions such as community service that present the collective face of the company, to actions designed to respond to individual customer service requirements or complaints. For middle managers, this requires a shift in skills. In the past, managers focused heavily on staying on top of new technology and influencing utility regulations and the legal environment. Now, they are focused on new

areas, such as group decision-making and other skills such as business, marketing, general management, and keeping abreast of the new competition. While the district organizations do not constitute profit centers, they come much closer to cost centers than historically (Interviews 51:3/30/93; 129:3/29/93).

For managers, companies have also introduced changes in performance, compensation, and benefit plans. Whereas workers are covered by collective bargaining contracts and unions to date have successfully avoided major restructuring of compensation systems or benefit plans, companies have unilaterally introduced changes for managers. A representative example comes from one Bell company that has reclassified jobs and introduced new measurement and compensation systems in order to increase competitive behavior, "raise the performance bar," and link internal labor markets more closely to external markets. To match jobs more closely with the external market, managerial job classifications dropped from 3,600 to 2,000, largely by eliminating departmental distinctions and creating short descriptions of broad responsibilities rather than detailed lists of specific tasks. The new job classifications drive changes in performance measurement and compensation. To "raise the performance bar," a new performance management system requires managers to develop individual work plans that align his or her goals with higher level organizational strategies. Additionally, managers (in conjunction with their supervisors) develop an annual plan to improve a limited number of "commitments" to key job responsibilities and "behaviors" related to quality improvement. These become the basis for annual performance evaluation with a five-point rating scale (as opposed to a three-point scale in the past), which supervisors use to determine annual pay increases. The company has also implemented a peer and subordinate feedback system which they anticipate would eventually be included in the formal evaluation system, thus putting more emphasis on human resource management skills.

The new compensation plan shifts from a salary-based plan built around internal equity considerations to a variable-based system linked more closely to the external market. Rather than moving to broadbanding with a number of gradations in each band,

the company expanded the number of pay grades from eight to fifteen, a change that allows the company to more accurately link internal rates with external variation. To promote pay-for-performance, the company moved from more or less across the board increases to a forced distribution system. In the past, almost all managers received a top rating in a three point scale and therefore gained the maximum amount in annual pay raises available. Most quickly moved to the top of their grade. Under the new system, managers receive between 80% and 120% of their grade, but a forced distribution means that supervisors will be forced to differentiate more between high and low performers among their subordinates. In addition, 10 percent of salary continues to be at risk (a innovation since divestiture), with group payouts dependent upon financial and service performance by the state organization.

Additionally, the company has altered its promotion policies. Historically, internal promotions were the rule for management positions above the first level. Now, the company will rely on external recruitment as well, particularly to fill skill gaps. The question for managers is what constitute skill gaps and to what extent they will be allowed to train and skill up in new areas before external recruits are added.

To summarize the job design efforts in the Bell companies, there is evidence of considerable innovation and experimentation across different occupations and companies. The employee participation and total quality movements have been an important source of ideas for increasing employee discretion and decentralizing decision-making and responsibility for customer service. While these experiments have been important, however, they have been competing with other powerful efforts to restructure organizations on a more "macro" level. There are competing logics to organizational reform, and these have not been well-coordinated. The competition comes from the application of new technologies such as expert systems which reduce employee discretion and control over workflow; from those that reduce the budgets of middle managers at the same time they are told to innovate (Interview 70:11/2/93); or from those that increase

workloads and stress through downsizing. These macro-organizational strategies are the subject of the next section.

Work Reform III: Consolidation, Reengineering, Downsizing

As suggested throughout this section, corporate cost-cutting strategies involving consolidation of operations, reengineering of work processes, and downsizing of the workforce, have frequently undermined efforts at labor-management cooperation and job-enhancing strategies over the last decade since divestiture. While conflicts have been most apparent at AT&T, they have accelerated among the regional Bell operating companies as these companies intensified their cost-cutting drives from the late 1980s on.

Most of the cost-cutting efforts are facilitated by advances in software technologies which allow service delivery to be accomplished more automatically and remotely. Office consolidations in customer services, as noted above, have been made possible by the use of 800-number service inquiries and automatic call distribution systems that allow companies to distribute call-loads over larger and larger areas. Local business offices were made obsolete, as were local network dispatch and repair bureaus. Digital technologies have increased the power of switches, making it possible to consolidate switching functions into central offices that cover larger and larger geographic areas. As indicated at the beginning of this section, micro-processor-based technologies were leading to automation of delivery systems and the reconfiguration of jobs in the 1970s. Regardless of the course of regulatory changes, it is likely that AT&T and the Bell companies would have continued to exploit these economies of scale as they had in the past.

Deregulation, however, in some cases has created opportunities for consolidation. For example, as regional Bell companies inherited several state telephone companies, the obvious need was to consolidate and standardized management functions across states, and the RBOCs have done so. In other instances, deregulation has undoubtedly accelerated the consolidation movement. For example, while the technology was available

by the late 1970s and early 1980s to create more remote service centers, it was AT&T that moved rapidly, while the regional Bell companies have only recently begun to exploit these opportunities. The extent of deregulation of local phone markets is likely to determine how far down this road the RBOCs in fact proceed. A major determinant will be the continued vigilance of state PUCs. If state governments take the position that they continue to have an oversight responsibility to protect consumers, then they are likely to continue to impose constraints on local phone companies. More importantly, until now, state PUCs have limited the extent to which the RBOCs can move operations out of their state, in part because of the political interest in maintaining jobs. Whether they will relax this constraint in the future remains to be seen.

There are two effects that these consolidations have that potentially undermine customer service and the competitiveness of telephone companies. Consumers prefer more personalized or customized service, and quality consultants point to the added value to "getting close to the customer." The examples in the section above of rural network groups that provide the best service are noteworthy. Consolidations, by contrast, reduce opportunities for direct customer contact and reduce the public face of the telephone company. As one industry analyst observed, "It used to be that everyone knew the local telephone man -- now, everyone knows their local cable TV man. Cable may gain an edge on the residential market when local telephony and cable merge" (Interview 158:6/29/93). Additionally, when telephone companies eliminate jobs in small towns and rural areas, they lose important political support from local politicians on whom they still depend of regulatory support.

In addition, the effect of consolidations on employees is often displacement as workers with community ties or two-earner families find it difficult or impossible to follow their work. Over time, the trend in consolidation is likely to eliminate an important source of middle class jobs in rural areas and small towns. Finally, consolidating workers in fewer locations has the unintended effect of consolidating union power in more centralized urban locals -- locals that have traditionally been more militant and aggressive than their rural counterparts.

While consolidation of units appears somewhat straightforward, much of the macro-level restructuring of these complex organizations has proceeded in fits and starts, and it is still unclear what they will look like in five or ten years. One example is the now common restructuring of functional divisions into business units by market segment. While the Bell companies have divided their regulated businesses into residential, small business, large business, and interconnect customers, there is considerable debate and conflict over the new management power structure. Particularly sticky is the Network Department, the most powerful in the old Bell System. Its resilience, however, is not just due to turf battles, but to an unresolved debate within the industry: how do you fragment responsibility for an integrated system. The network infrastructure serves all market segments equally. The same cable that transmits data worth thousands of dollars for business also transmits chatty conversations between old friends. Network managers maintain that the integrity of the infrastructure is at the heart of providing quality service. It must be conceptualized in its entirety. Managers responsible for delivering increased sales and revenues from their particular market segment argue that they cannot be held accountable if they do not have control over what gets fixed when, where, and how -- if they cannot control investment, operational, and human resource practices in the part of the business that is central to providing or improving upon service. The uneasy truce that has been reached is that each market business unit (as an internal customer) pays for a percentage of the costs of maintaining the network. This, however, is an awkward arrangement in which the manager supposedly in charge of a business unit has very little control over the central technology at the heart of providing quality service. The nature of the telecommunications industry -- its integrated system nature -- makes it difficult to apply concepts of decentralization that appear to work well in manufacturing settings.

Managers and industry analysts view reengineering as a process capable of transforming the old Bell bureaucracies into streamlined cross-functional organizations. There are powerful reasons why these companies are interested in reengineering, which, if successful, has the potential to automate many functions, reduce redundancies, and

improve the speed and quality of service. Most of the information systems have been built incrementally on top of manual systems in antiquated functional silos. A simple example comes from the service order process in traditional telephone companies. One manager explained:

“The current systems have evolved through add-ons over the years. We first had a manual, serial process that handed off service orders from the business office to the assignment center to installation...then we mechanized some of it in the business office and sent the mechanized information to the assignment center. Then another piece would be mechanized and sent on. We ended up with very complicated interfaces between the mechanized systems, with a lot of leakage of orders that did not flow through the system due to slightly incorrect information, errors, or mismatch...So we would build another group of people to handle the exceptions...and as new services came on, we added more people to correcting the problems that the system couldn't handle. Now, only 40% of our new orders and transfer requests flow through the system. With almost 5 million new orders and transfers a year, that's a lot of problems, and that negatively affects customer service...That's where we are today, and the purpose of reengineering is to fix the leakage” (Interview 95, 12/10/93).

Teams of consultants and engineers, then, take one work process at a time and map the work flow. While some consultants advocate starting from scratch (e.g. Hammer and Champy 1992), others (such as Rummler-Brache) start with the existing system and determine what needs to be accomplished more incrementally. As applied to telephone companies, reengineering is supposed to reconstruct work processes so that they flow across functional divisions, rather than vertically as in the past. Much of the work entails reengineering computer information systems so that they can be accessed by those that need them from anywhere in the company. In the reengineering of the service order process, the goal is to completely automate installation so that a customer service representative taking an order can enter the information, and the computer system sends

the information to the necessary departments (billing, directory assistance, 911, central office switch which automatically turns on the service, etc.). There are clear theoretical advantages to such a system which would result in remarkable reductions in cycle time. Customers could have phone service in the matter of an hour rather than days. The reengineering would also result in the elimination of thousands of jobs.

In the case described above, the Bell company had undertaken over a dozen reengineering projects, each designed to overhaul a piece of the old telephone bureaucracy. They included: service order activation, address information processing, central office maintenance and repair, outside plant maintenance and repair, provisioning (construction), data center processing, forecasting and budgeting, comptrollers, complex business services, regulatory, and others. The difficulty in achieving the intended effects, however, is that each process is linked to another, as a member of a reengineering team explained, "We got ourselves in trouble because we were out in front on this one... We were operating in a vacuum... Now we'll need to go back and add some software, change the number of centers we decided on. We need to look at all the efforts and move ahead on all fronts without letting one area get ahead -- because we don't know the interrelationships between the different systems and how they work... Nobody does" (Interview 95, 12/10/93).

As a result of the complex nature of reengineering, it has proceeded much slower than anticipated. As a result, while companies have announced they are downsizing in response to reengineering projects that eliminate work, in reality no one really knows -- not even the reengineering teams as indicated above -- where the reengineering processes will end up, what types of jobs and skills will be in demand, or how many employees will be needed in the future. Instead, many companies have announced across-the-board downsizing targets and then told reengineering teams to figure out how to do it -- the reverse of what theorists say should occur. Managers interviewed for this project state that they have been given quotas for across the board cuts well before reengineering analyses are completed (Interviews 29:12/7/92; 61:9/10/93; 71:10/26/93; 93:12/7/93).

An example of this pattern is from US West, which in March of 1994 announced that it was undertaking a massive reengineering effort to streamline and consolidate its operations. The reengineering was to result in 17,000 layoffs, affecting over one-third of the workforce. Recent service disasters, however, have forced the company to halt its campaign and rethink its strategy.

Employees experience the dislocation in the same way, whether it is called consolidation, reengineering, or downsizing. These macro strategies not only undermine employment security, but increase uncertainty and often workloads, at least in the short and often intermediate term. Employees experience these decisions as top-down impositions -- very much at odds with the message of "empowerment" and trust presented in total quality training (Interview 70:11/2/93). Macro restructuring has tended to halt job-enhancement and redesign efforts throughout the regional Bell companies. Examples include the disruption of AT&T's Operator Services Program of self-managed teams, US West's termination of the job redesign effort for customer service representatives, and self-managed teams eliminated as a result of reengineering of information services at BellSouth.

Survey evidence indicates that downsizing has had important effects on the jobs and internal promotional ladders of all employees: at AT&T, it has adversely affected workers more than managers, while until now among the regional Bell companies, it appears to have adversely affected managers to a greater extent. Managers appear to be more strongly effected because they have no negotiated union contract to slow or modify unilateral decisions on the part of management. As indicated above, at least some Bell companies have unilaterally altered managerial pay, performance measures, job duties, and health care benefits of managers.

For all employees, downsizing has had three major effects: a) an increase in workloads; b) the paralysis of internal mobility; and c) demoralization associated with job insecurity. In the survey conducted at a regional Bell company for this study, sixty-three percent of workers and ninety-three percent of all managers said their workloads had increased over the last two years, and this response did not vary significantly by

department or managerial level. In the absence of successful reengineering, downsizing increases workloads and is likely to reduce productivity. Sixty-three percent of all managers (68% of network and 52% of customer services) said they worked ten hours or more each day, and over 60% said they had more overtime or take-home work than they wanted. Sixty percent (64% in network and 51% in customer services) said they were always or quite frequently understaffed. These higher workloads are reflected in increased spans of control. Seventy-two percent of all managers say that their span of control has increased, with a significantly greater percentage (82 percent) in customer services than in network (67 percent). Almost 40 percent of those with enlarged spans of control now supervise 3 to 5 additional workers; another 37 percent manage between six and fifteen additional workers. Traditionally, the standard size of work groups in network was 6-8 workers, and in customer services, 10-12.

Downsizing has also, at least during this period of transition, reduced overall mobility throughout the workforce. In most cases, job ladders created under the old Bell system continue in place. While some lower level managerial jobs have been "backfilled" when employees accepted early retirement buyouts, mobility throughout the system has substantially decreased. The overwhelming majority of employees surveyed for this study said that opportunities for promotion or lateral transfer had declined. In 1990, for example, approximately 5 percent of managers were promoted to higher pay grades, a fraction of what existed in the period of the Howard and Bray study. Moreover, approximately the same number of managers were promoted in 1990 as in 1991-1993 combined; and the very small number of new managers hired from the outside in 1990 was still over twice the combined total of new hires for 1991-1993.

Gender-based occupational segregation has historically reduced lateral mobility and apparently continues to do so: while 31 percent of the managers in the sample were female, they were concentrated in customer services (71 percent female) and under-represented in network (14 percent).

Interviews with managers indicate that downsizing also reduces requests for lateral transfers: managers don't want to risk losing their "sponsorship" and joining a new

department where they will be the new person, a relative unknown to a new supervisor who will evaluate them. Interviewees also related stories of managers reluctant to take advantage of opportunities for mid-career educational programs or international experience for fear that ("out of sight, out of mind") their departments would have learned that they were dispensable, their jobs would have been eliminated, and they would face less attractive job prospects or the necessity to relocate in order to have a job at all (Interview 63:10/14/93). In response to survey questions, 92% of workers and managers said job security had decreased, 89% said that opportunities for promotion had declined, 80% said that opportunities for mobility had decreased. A large minority of managers (38%) (but not workers) said they had had to relocate in the past 3 years as a result of organizational restructuring.

Third, the ongoing downsizing undermines morale. Survey evidence of the displacement and demoralization associated with downsizing at AT&T, reported above, indicates that through the early 1990s, AT&T continued to suffer the effects of a "traumatized" organization (Keefe and Boroff 1992). In the current survey of Bell surveys, levels of dissatisfaction were not nearly as high, but the survey was undertaken in 1994, when the company in question was still downsizing through attrition and generous retirement packages. Like other Bell companies, it has since announced major reductions, with forced layoffs for the first time. The 1994 survey found that the upheaval and dislocation is reflected in employee dissatisfaction over particular aspects of their jobs that have been effected and of corporate leadership more generally. Among all employees, whereas less than twenty percent are satisfied with their employment security or opportunities for advancement, seventy percent or more are satisfied with their jobs, pay, benefits, and company as a whole. They like the work they do and the skills they use and have very low absentee rates. Most score high on commitment variables such as their willingness to work harder for the company, their pride in working for the company, and the loyalty they feel. But they are critical of top management's commitment to them: to quality, to providing adequate resources for getting the job done, to providing clear

strategic direction, and to taking into consideration the interests of employees when making technological and organizational decisions.

2.5 The Implications for Internal Labor Markets

Returning to ideas about the changing nature of internal labor markets, as discussed in section 2.2 above, two alternative theories offer competing visions: one argues that deregulated product markets will undermine internal labor markets, leading workers to compete individually in external markets and negotiating wages and working conditions based on their relative skills and credentials; the other anticipates that companies will survive only by transforming work practices in ways that enhance internal labor market conditions, with firms investing in training and employment security in exchange for workers' consent to high degrees of productivity and flexibility in deployment. Both of these visions are in contention in the current restructuring of telecommunications services.

Former Bell System companies have continued past practices of reducing the labor content of jobs through advances in technology while also experimenting with job-enhancing innovations. On the one hand, they have extended labor-displacing technologies from operator services into network and customer service occupations, reducing the breadth and depth of these jobs for the first time. Digitalization of the network has reduced the demand for electro-mechanical skills, and in some instances high-skilled craft jobs have been replaced by semi-skilled clerks reporting on output from computer screens. Similarly, universal customer service positions have been increasingly fragmented into sales, billing, collections, and telemarketing jobs, and the use of expert systems has further reduced the autonomy and cycle time so that they increasingly resemble operator jobs. The following table, comparable to the one presented in section 2.3 above, graphically depicts these changes for each occupational group.

Expansion of Labor Rationalization
in The Bell System, 1990:
Production Logic of Occupational Specialties

Technical/Professional/Craft Model			Mass Production Model				
Computer specialties ----- Computer clerks	Outside Cable	Customer I&R	Tele-market	LgB sales ----- SmB sales ----- Res sales	Active billing	Bad debt collection	Re-pairs
Mass Production Model: Traffic (Operator Services)							

But this is not the whole story. Digitalization of the network also creates a new set highly technical and specialized jobs, albeit relatively small in number. Other innovations, such as self-managed teams, seek to restore the craft autonomy of network technicians along the model historically preserved in rural areas. Members of these teams may retain their degree of specialization, as the evidence in Part III suggests, leading to teams of highly specialized technicians deployed more effectively because they coordinate work as a group. NYNEX is exploring the alternative model of training multi-skilled "telecommunications technicians" who may be flexibly deployed, but the details have yet to be worked out.

There are also competing visions of what CSRs should do. While applications of expert systems have pushed these jobs in the direction of narrow, routinized operator services, some in the industry are pushing for a return to the universal model. At least in the short term, the evidence suggest that internal labor markets will be segmented in tandem with produce market segmentation -- with one stop shopping handled by account

executives for large business, by service consultants for small business, for service representatives for high end residential, and automated answering and voice messaging for low-end consumers. CSR job ladders would allow workers to move from low to high value-added customers.

The powerful effect of new technologies is evident in the responses of workers in this study to survey questions. In both network and customer services, workers overwhelmingly said that the new skills needed for their jobs were technical in nature, (related to digital switching and fiber optics for network and new information systems for CSRs). This is in contrast to the total quality consultants and others who have emphasized behavioral skills.

Among operator jobs, fragmentation has accelerated, and it appears unlikely that any counter movements will be successful. Union attempts to increase diversity or add sales functions have been rebuffed because such changes inevitably result in the increase in cycle time (seconds per call), the key productivity measure that companies have sought to reduce since the 1920s.

By contrast, managers who remain in the Bell companies stand to gain. To the extent that companies eliminate layers of management, increase spans of control, incorporate reporting and monitoring requirements into information systems, and decentralize human resource and industrial relations decisions, they create the potential for more creative and interesting managerial jobs. These advantages may be offset by the continued consolidation and centralization of operational decisions, frustrating middle and lower managers who want to exercise their new-found entrepreneurialism. The findings of this study -- in which middle managers who attempted to use their creativity were undermined by cuts in capital improvement and training budgets and discouraged by reengineering projects imposed from above -- are consistent with those found by researchers studying the restructuring of British Telecom (Colling and Ferner 1992). Middle managers in the Bell system interviewed for the current study spoke openly of their resentment towards top management for failing to provide the resources and support needed for improvements in quality and customer service in local markets.

Another significant change for all employees is the shift from public service to private sector jobs. For employees who have grown up in the Bell System, the shift to a market mentality and the reduction in corporate commitment to employment security has undermined the strong sense of moral commitment both to the public and to the organization that the Bell System cultivated among employees, as articulated in the management philosophy of Chester Barnard. Although I have not explored this theme in great detail in this study, it is a constant that pervaded many of my interviews with employees.

The ultimate shape of internal job ladders in the Bell companies is also uncertain. In the short term, downsizing has paralyzed both horizontal and vertical mobility, but the structure of promotional ladders does not appear to have changed significantly. Delaying and reduction in management positions will reduce overall opportunities, but that does not mean that a system of longterm employment relations and promotional job ladders will not continue in the future. Opportunities for horizontal movement have increased, and are likely to continue to do so, as Bell companies open new subsidiaries in enterprise units. As indicated above, a large percentage of managers displaced from the regulated side of the business have found opportunities in new "enterprise units." The central question is whether companies will afford the same opportunities for workers, as NYNEX has done in its 1994 contract with CWA and the IBEW. If Bell companies follow the NYNEX lead, with retraining and transfer opportunities made available to displaced telephone workers, then internal job ladders will become more horizontal but will not "disintegrate." Consistent with this scenario is the on-going corporate commitment to training. In fact, former Bell companies and unions across the board negotiated innovative joint training programs in the 1980s, both to assist out-placement for displaced workers but also to provide opportunities for retraining and replacement. NYNEX has now set the standard for the industry in this regard.

The commitment to company-paid training, historically high, continues in place, with companies reporting training budgets of 3.5 percent of payroll. This is surprising, given the fact that Bell companies have competitors for the first time who are, by some

accounts, taking advantage of the skills of displaced telephone workers. While these workers are receiving generous retirement packages from former Bell employers, they have taken new jobs with upstart competitors at less pay -- with the rich training and benefit package of the old Bell system essentially subsidizing the labor costs of new entrants. To the extent that competitors become a serious threat, Bell companies may have to rethink their generous training systems that developed in a monopsony environment in which investments in training were sure to be captured because employees had few other employment opportunities. To date, employees surveyed reported few changes in training and also reported that it was adequate. Changes in training have had to do with the changing content of training: for workers, in new technical areas; for managers, in business, marketing, knowledge of the industry, and leadership skills. Surveyed employees reported relatively high levels of opportunities for skill development. This is in contrast to their reports of significant decreases in internal mobility options and employment security.

The most significant change for workers and managers alike under the new internal labor market rules is the break in the historic commitment to employment security. As indicated, companies have continued to rely on full-time workers at relatively high wages and benefits; education and training opportunities remain above average, and companies have increased opportunities for retraining in some cases. Use of two-tier wage structures or part-time and contingent workers remains relatively marginal, although subcontracting is on the rise. The commitment to downsize, however, has shaken a workforce unaccustomed to even cyclically-based unemployment. The stability of the "Ma Bell" undoubtedly had the effect of attracting less risk-prone individuals to begin with, and with the current median age of the workforce at forty-six and the median tenure of 21 years (in this study), many employees simply want to live out their work lives in their current job until they can retire early with a large pension. With announcements in 1994 and 1995 of workforce reductions of roughly 100,000, Bell companies are moving in that direction.

But the results for the surviving workforce remain uncertain. In the case of AT&T, continued downsizing has resulted in on-going dislocation, job instability, and

demoralization. The alternative is a strategy that would reduce size and then restabilize employment levels, job ladders, and employment security among a reduced core. This does not coincide with the notion of a lean, flexible, and entrepreneurial organization envisioned by some, but it is more consistent with the institutional memory of the Bell System companies as well as external environment. Bell companies continue to be dependent upon the goodwill of state politicians; additionally, they are sensitive to their public image because they believe their competitiveness depends on public perceptions of corporate responsibility and how they treat their employees. To the extent that they continue to be regionally-embedded service enterprises, these political dimensions may continue to constrain their behavior. Consistent with this observation, their current practices tend to lag behind formal policy announcements. The regional companies, for example, have resisted implementation of their own formal policy announcements. Force reductions have occurred more slowly than anticipated, reengineering has gone in fits and starts, "backfilling" of vacancies has been noted, and companies have resisted layoffs even when they officially announced they would implement them. While external recruitment is occurring more than in the past, new hiring is extremely limited and companies still maintain a strong commitment to internal transfers and promotions. There is a recognition that the embedded skill base of the workforce is a vital resource that should be tapped and redeployed rather than discarded. While new performance management systems have been announced, the systems of the past were intended to differentiate "higher" and "lower" performing employees, but as implemented did not. Changes in job design and human resource policies are difficult to implement because their implementation often depends upon managers who stand to lose in the process. Thus, this study captures organizations in the midst of transition, but the endpoint is still unclear; and it may fall far short of the lean and nimble entrepreneurial player that is envisioned in current management theory.

Part III

Who Benefits from Work Restructuring?
Attitudinal and Performance Outcomes
of Work Innovations

Part III:
Who Benefits from Work Restructuring?
Attitudinal and Performance Outcomes
of Work Innovations

3.1 Introduction

Part II of this thesis analyzed changes in business strategy, work organization, and internal labor markets in the Bell System brought about as a result of deregulation and divestiture of AT&T. I argued that 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 Taylorism, the former Bell System companies have articulated 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.”

I have detailed this argument in Parts I and II, and only briefly summarize it here. The decentralized approach views 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 the kind of trust and personalized service that helps retain customers as well as customized service that responds to the particular needs of customers. Cost savings may be realized through the elimination of higher level management staff rather than frontline workers. This strategy represents a departure from the past and is consistent with “high commitment” human resource strategies.

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 relies on centralized decision-making rather than decentralized discretion, and is consistent with past practices of reducing costs through mechanization and automation. 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 and 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-managed work systems. For employees, the quid pro 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. As was indicated in Part II of this study, 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.

In this section of the thesis, I explore these arguments 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-managed 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. Moreover, while the organization in question had downsized through attrition and voluntary retirements, the data-gathering for this portion of the study took place before forced reductions had been announced. 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 (SDTs) are the leading example of attempts to introduce self-management, and are inspired by the socio-technical systems (STS) movement. Differences in the two center 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.

Because both programs are voluntary in nature, there is variation across the company in the levels of implementation of each, and this variation provides the research opportunity to develop a quasi-experimental research design which tests the attitudinal and performance effects of the different innovations. In this section, I describe how each of these approaches -- participatory and self-management -- has been implemented in the context of management and non-management occupations in network and customer services. I utilize survey data from a stratified random sample of employees to analyze the similarities and differences between the two approaches. While in theory these two approaches are distinct, they may in reality shade into one another as implemented. On the one hand, managers involved in total quality programs may eventually push employees

to be more independent and innovative; on the other hand, self-directed teams may fail to take on the responsibilities intended for them and may continue to defer to the advice or authority of higher level managers. The survey data allow us to capture the extent to which these initiatives differ in fact, and then to measure the relative similarities and differences in outcomes.

While Part II of this study drew on qualitative and archival information to outline the history of change in work organization and internal labor markets, this section utilizes both employee survey data and objective company performance data to measure the competing effects of workplace changes on differently situated groups of employees. It answers the following two sets of questions.

The first set of questions investigates whether there are systematic differences in the job characteristics, attitudes, and performance of workers and managers who participate in workplace innovations -- either total quality (participatory management) programs or self-directed team initiatives. If differences exist, are they attributable to differences in the prior attributes of the employees or are they the result of the workplace innovation itself? Additionally, who benefits? Are there mutual gains or conflicting outcomes for the stakeholders involved? I measure changes in job attributes and satisfaction to test whether innovations benefit workers and/or managers in different occupations. I measure changes in organizational commitment and work group processes as well as objective, occupationally-specific performance measures to test whether innovations lead to improvements in performance, either directly, or indirectly through improved work attitudes and processes.

My working hypothesis is that after controlling for individual differences in employee attributes, workplace innovations do affect both the attitudes and performance of employees. Distinct innovations, however, have different effects on differently-situated groups of employees. While participatory management is likely to benefit and enhance the satisfaction and commitment of middle managers and firstline supervisors, self-management is likely to have a similar effect on frontline workers. Self-directed team programs are likely to have a particularly negative effect on supervisors, who stand the

most to lose from these programs in terms of their job significance and job security. Performance gains among workers and work groups are more likely to result from the job redesign and work processes associated with self-management than from more modest participation through off-line problem-solving teams associated with total quality management.

The second set of questions concerns whether there is a coherent set of human resource and industrial relations practices that supports workplace innovations. This issue has two parts. First, are there in fact contradictory effects of different components of organizational restructuring? In particular, does organizational downsizing have a countervailing negative effect on the employee attitudes and performance, contradicting the benefits of job-enhancing innovations? Organizational downsizing, for example, is likely to have a negative effect on employee satisfaction and commitment, either through increased workloads and understaffing or through loss of job security. These effects on employees, may in turn, reduce performance along quality, customer service, or productivity dimensions. Second, what is the relevant set of human resource and industrial relations practices that increase employees' overall satisfaction with their employment and provide positive incentives that induce employee effort and commitment? My working hypothesis is that the relevant set of employment practices include training, opportunities for career advancement, compensation, positive support from immediate supervisors, and positive co-worker and labor-management relations. This set of HR/IR practices should significantly enhance the attitudes and performance of both managers and workers, over and above the effects of the work innovations discussed above.

To answer these questions, I develop and test multivariate and maximum likelihood probability models of the determinants of employee attitudes and performance. The models integrate theoretical frameworks from organizational behavior, human resource management, and industrial relations. While much of the research on industrial performance employs cluster analysis because of the argument for systems effects, the choice of a multivariate approach is appropriate for this study because I am interested in unbundling the relative, and hypothesized contradictory effects, of different components of

employment systems. Currently, most U.S. firms that are in the process of restructuring are experimenting with a variety of approaches and strategies that may or may not form a coherent whole. This is particularly true when firms are introducing workplace innovations in the context of a downsizing environment. We cannot assume that coherence exists in a system even in so-called best practice cases.

I draw on an extensive 1994 survey of 395 line managers and 796 workers in the two core departments of network and customer services in one Bell operating company. The survey asked detailed questions regarding the type and extent of workplace innovations, human resource practices, and industrial relations practices as well as employee attitudes. The unique multilevel survey allows me to test the simultaneous effects of workplace innovations on differently situated occupational groups. While the attitudinal model estimates the relative effects of employment practices on indices of employee satisfaction and organizational commitment, the performance model estimates the relative effects of these practices on a subset of workers, using both subjective performance measures (as reported by workers) and objective occupation-specific measures.

Part Three of the thesis is organized as follows. In section 3.2, I discuss the relevant theoretical and methodological literature. Section 3.3 briefly explains how theories of work innovations play out in telecommunications services occupations. Section 3.4 presents the hypotheses, research design, methods, and data. Section 3.5 presents cross-tabulations and correlations; section 3.6, the attitudinal outcomes for workers and managers; and section 3.7, the performance model. Conclusions follow.

3.2 Theoretical Perspectives

Three decades of empirical research on workplace innovations have brought important advances in understanding the determinants of employee work attitudes and performance outcomes. Researchers in industrial psychology and organizational behavior spearheaded this research, but more recent contributions come from studies in strategic human resources and industrial relations - what has come to be known as the work restructuring or industrial performance literature. While incorporating many of the insights from OB concerning employee participation and the reorganization of work, the industrial performance literature has capitalized on its strength, which is an appreciation of the complex interaction between technology, production organization, and human resource and industrial relations in specific industry contexts.

While both research traditions identify similar outcomes of interest, their theoretical and methodological approaches have different strengths, with the former focusing on psychological determinants of individual performance through employee participation and enhanced job characteristics, and the latter on the organizational and incentive effects of integrated employment systems. Both approaches also have weaknesses. On the one hand, the organizational behavior literature tends to ignore the effects of industry-specific technology and production systems and to conceptualize variables beyond the level of the individual job or worker as merely "context." It rarely captures these effects. As I have argued, however, both specific industry and technology effects are important, and reforms in jobs or participation at the level of the individual or work unit are often at odds with larger macro-level changes involving organizational downsizing, departmental restructuring, or process reengineering.

The industrial performance literature, on the other hand, often fails to adequately measure types of employee participation, job characteristics, or variation in implementation, relying instead on managers or human source professionals' answers on surveys as to whether or not the company has a particular policy or program, such as employee participation, total quality, or teams. Clearly, however, the effectiveness and outcomes of these policies depend on how and under what conditions they are

implemented. Individual employees who experience the innovations are the most accurate source of information on the content of jobs and the extent of implementation of work innovations.

Moreover, both bodies of research have tended to focus on manufacturing over service sector applications and within manufacturing, on production-line workers, measuring for example the effects on workers of innovations such as employee participation or self-managed teams but ignoring the simultaneous effects on managers; and despite the fact that workers are the subject of research, both research traditions have emphasized outcomes for the firm, either directly through performance effects, or indirectly, with attitudinal outcomes of interest only to the extent they are a vehicle for enhanced firm performance.

Despite these weaknesses and differences in focus, over 30 years of accumulated research and thinking about the way we work has produced important theories of what kinds of employment systems produce “high performance.” The central idea is that firms need to adopt a coherent set of practices that include enriched or high-skilled jobs, employee participation in decision making, high investments in training, opportunities for advancement, employment security, compensation systems that link pay to performance, and in unionized settings, a constructive role for unions in strategic business decisions (Walton 1985; Lawler 1986; Kochan, Katz, and McKersie 1986; Commission on the Skills of the American Workforce 1990; Womack et. al. 1990; MacDuffie 1991, 1995; Osterman 1994a; Appelbaum and Batt 1994). The implicit argument, made explicit more recently (Kochan and Osterman 1994), is that such employment or human resource systems provide mutual gains for firm competitiveness and employee well-being. Systematic evidence to support this idea is growing, but slim, as I will discuss in this section.

The purpose of this section is to briefly review the theoretical and empirical literature relevant to theories of high performance work systems. This review is highly selective because the relevant literatures are vast and diverse. As Cotton has noted (1993), different subspecialties have tended to focus on particular pieces of the puzzle -- micro OB on participation and job redesign; organizational development specialists on sociotechnical

systems and self-managed teams; human resource professionals on compensation; labor economists on skills and training; and industrial relations specialists on QWL and joint labor-management strategies. The driving idea in the industrial performance literature, however, is that organizations must somehow integrate these pieces into a coherent whole. The review undertaken here is an attempt to illuminate the logic behind new work systems by selectively drawing on relevant literature across disciplines. I begin with the contributions from organizational behavior, followed by relevant work in industrial performance.

Organizational Behavior

Organizational Behavior's main contribution to theories of high performance has been theoretical and empirical research into the effects of various forms of employee participation and job redesign -- what I have referred to broadly as job enhancing strategies -- for employee work attitudes and performance. Three distinct, but overlapping research traditions exist: on employee participation, job redesign, and small group behavior and self-managed teams. These traditions correspond to differences in the form that worker participation takes. Workers may participate in decisions at work through joint problem-solving or decision-making (with supervisors); by incorporating greater decision-making authority into the design of individual jobs (either through rotation, enlargement, or enrichment); or by incorporating greater authority over work decisions into self-managing groups. The form matters because it is likely to affect the outcomes (Cotton et. al. 1993)¹.

Despite the differences in form, researchers and practitioners have viewed each of these work innovations as a reform to solve the low morale, productivity, and absenteeism

¹ Organizational psychologists have long distinguished between employee participation (joint participation in decision-making between workers and managers) and job redesign (delegation of decision-making) (eg. Locke and Schweiger 1979; Leana 1987; Leana, Locke, and Schweiger 1990). Levine and Tsyon (1990) refer to the distinction as consultative versus substantive decision-making, and others use off-line versus on-line participation (Appelbaum and Batt 1994; Rubenstein, Kochan, and Bennett 1993).

problems associated with Taylorist forms of work organization in large in manufacturing enterprises (e.g., U.S. Department of Health, Education, and Welfare 1972). Researchers have offered similar theoretical explanations as to why any form of increased participation is likely to improve both work-related attitudes and performance. Miller and Monge (1986) provide a useful conceptual roadmap, distinguishing between affective, cognitive, and contingency theories of how and why participation works. Affective models grow out of the human relations school (Maslow 1954; McGregor 1957; Herzberg 1966; Likert 1967): participation increases satisfaction by fulfilling “higher order needs” (growth needs and social needs); satisfaction in turn increases motivation, and ultimately productivity. Participation also decreases employee resistance to change: employees who participate are more likely to accept management decisions (Maier 1950, 1953). A “participatory climate” is sufficient to produce these positive results; and the participation is more likely to positively effect workers (who do not have higher order needs met) as opposed to managers. In sum, there is no direct link between participation and productivity (Miller and Monge 1986:731).

In cognitive models, participation by workers (who are assumed to know more about the work process) leads directly to improved performance through more effective information flow and utilization. This “human resources theory” (Miles and Ritchie 1971) argues that participation leads to the more effective utilization of workers’ skills and capabilities. Workers are in a better position to organize the way work is done and scheduled and to resolve obstacles (Hammer 1988). The effects should be strongest for decisions involving the workers’ expertise (for example, participation in the work process matters, while involvement in scheduling should not). Worker satisfaction is a by-product of participation, but not a cause of performance-enhancement.

Contingency theories argue that attitudinal and performance effects of participation are contingent upon differences in individuals and situations, with the focus on individual differences, in for example, personality and need for independence (Vroom 1964), or job levels and values (Singer 1974). Organization-level variables are not part of these contingency models.

While Miller and Monge do not include the job redesign or work group literature in their review, their theoretical typology is applicable to these literatures. Most of the research on job redesign follows job characteristics or job diagnostics theory developed by Hackman, Oldham, and Lawler (Hackman and Lawler 1971; Lawler, Hackman, and Kaufman 1973; Hackman and Oldham 1975, 1980). The thrust of the model is motivational -- employees with enhanced jobs (greater autonomy, significance, identity, variety, and feedback)² will experience greater motivation at work, greater job satisfaction, and lower absenteeism and turnover. The motivational effect, however, is contingent upon individual differences in “growth need strength.” Moreover, it recognizes the role of feedback and increased knowledge as a source of effectiveness³.

The STS approach, while initially quite broad in its conceptualization, has come to be narrowly associated with the use of semi-autonomous or self-managing work groups as a cornerstone to work reorganization. Depending upon their theoretical emphasis, researchers variously refer to these groups as autonomous work groups (Cordery and Wall 1985; Wall, Kemp, Jackson, and Clegg 1986; Cordery, Mueller, and Smith 1991), self-managed work teams (Cohen and Ledford 1991; Cohen 1993), or self-regulating work groups (Cummings 1978; Pearce and Ravlin 1987; Appelbaum, Bailey, Berg, and Kalleberg 1994).

² Autonomy refers to the degree to which the job provides substantial freedom, independence, and discretion in work scheduling and procedures. Variety is the extent of variety of different activities and skills. Task identity is the degree to which a job requires completion of a whole and identifiable piece of work. Significance is the extent to which the job has a significant impact on other people. Feedback is whether the job provides direct and clear information about performance effectiveness (Hackman and Oldham 1980:78-80).

³ Critics have argued that the dominance of the Job Characteristics line of research effectively truncated alternative approaches and explanations of employee attitudes and performance. Prior to 1971, there were a variety of approaches to studying the nature of work; after Hackman and Lawler's 1971 piece, researchers focused on the job characteristics model to the exclusion of others. By focusing on the intrinsic or motivational side of jobs, however, researchers ignored the importance of pay, employment security, social status, and safety, among other issues (Roberts and Glick 1981).

While there are significant differences between the research on participation and job design on the one hand, and the STS literature on the other, there are important similarities as well. The differences concern the unit of analysis (individual versus group), and the hypothesized way in which performance improves. STS theory builds on the concept of “joint optimization” of the social and technical systems. Trist and Bamforth (1951) originally argued that it was the ability of workers to organize work in a way that fit their social needs to the technical environment that produced a more productive work system. In their classic coal mining study, workers met their social needs by working autonomously in small groups, or the “short wall” method, rather than individually on a long wall. Greater autonomy gave them discretion to reorganize how they worked; working as a group allowed them to alternate jobs and work more flexibly. The combination produced better outcomes for workers and for performance.

Critics have noted, however, that few STS experiments have considered the effects of technology (Pasmore, Francis, and Haldeman 1982). Rather many of the elements central to the STS approach revolve around the job characteristics that self-management allows for -- increased autonomy, greater participation in decisions regarding the work process, and the enriching of jobs through job rotation or multiskilling -- elements that closely resemble the Hackman and Oldham job characteristics approach. As a result, some researchers early on advocated a convergence in the theories (e.g., Rousseau 1977, Cummings 1978, Denison 1982). Hackman (1983) and others (Goodman, Devedas, and Hughson 1988) have developed models of team effectiveness that integrate the job design and team or group effectiveness literature. A number of studies of autonomous work groups have used Hackman and Oldham’s model (Ondrack and Evans 1987; Appelbaum et. al. 1995) or a similar affective model (Wall et. al. 1986; Cordery, Mueller, and Smith 1991) and have found positive attitudinal effects from enhanced job characteristics, such as autonomy, resulting from SMTs.

Yet, other researchers argue that the performance affects of teams are due to self-regulation and the group effects or processes over and above the effects on individual jobs and attitudes. Better attitudes from enhanced jobs are a by-product of SMTs, but better

performance is not the result of better motivation and effort, but better work organization -- flexible deployment, coordination, group learning, and innovation (Trist and Bamforth 1951; Locke and Schweiger 1979; Cohen 1993; Cohen, Ledford, and Spreitzer 1994; Appelbaum et.al. 1994).

Klein's (1993) recent model of team effectiveness integrates the job design and team literature and appears to be the model most relevant to the self-directed teams I have found in telecommunications services. Klein identifies three classic dimensions of job design -- vertical tasks (administrative, supervisory), horizontal tasks (mutli-tasking, variety, rotation), and depth of knowledge (technical expertise, analytic knowledge, continuous learning). Traditional taylorist jobs are narrow on all three dimensions; traditional craft jobs have great depth, but are relatively narrow in specialization; job enlargement emphasizes horizontal breadth, while enrichment builds greater analytic depth. Highly-educated professionals incorporate all three dimensions, but the costs of training are high. Self-managed teams are an alternative. By building skills and tasks at the group rather than the individual level, training costs are considerably lower because no one employee must absorb all three dimensions. Employees in this team concept gain more expertise in some areas than others, although the potential for learning across jobs over time is considerable. Klein's concept of the efficiencies gained from teams is considerably different than that found in the classic STS and the job design literature which place heavy emphasis on gains from job variety and the flexibility in deployment associated with multitasking and job rotation.

Thirty years of empirical research has yielded at least three generally accepted findings. First, there is no reliable link between satisfaction and productivity. Research in the 1960s and 1970s found considerable support for a link between participation and satisfaction, but no link between satisfaction and productivity (Schwab and Cummings 1976; Kaztell and Yankelovich 1975). One reaction to these research findings was to develop alternative measures of employee attitudes that appear to be more closely linked to performance, such as discretionary effort, measured by organizational commitment

scales (e.g., Steers, Mowday, and Porter 1982; Lawler and Mohrman 1987; Lincoln and Kalleberg 1990) and/or citizenship scales (Cappelli and Rogovsky 1994).

Second, there is continuing support for the link between participation and satisfaction or other employee attitudes, but the relationship between participation and performance remains mixed. Locke and Schweiger's (1979) review of 46 studies found modest positive effects of participation in decision-making on satisfaction, but little support for a link between participation and productivity⁴. Schweiger and Leana's (1986) follow up review reaches similar conclusions. Spector's (1986) meta-analysis of 88 participation studies finds participation linked to various measures of satisfaction, but not to organizational commitment.

Empirical studies of particular forms of participation, such as quality circles, are also mixed. In his review of over a dozen empirical studies of quality circles between 1986 and 1990, Cotton concludes that quality circles have a positive effect on attitudes towards quality circles, minimal effect (mostly no effect) on general job attitudes, such as satisfaction and organizational commitment, and on performance.

A third generalization from the empirical literature is that substantive or on-line participation (job redesign and autonomous work groups) has stronger effects (albeit modest) on attitudes and performance than does consultative or offline arrangements. Loher, Noe, Moeller, and Fitzgerald's (1985) meta-analysis of 24 empirical studies found a .39 average correlation between job characteristics and job satisfaction. Neuman, Edwards, and Raju (1989) review seven studies with 1,400 subjects, and find a correlation of .27 between job enrichment and satisfaction. The most comprehensive review of the job characteristics literature (covering 200 studies) finds modest, but significant correlations between job characteristics and job performance and absenteeism (Fried and Ferris 1987). Cotton's detailed review of the job characteristics literature concludes that there are positive, but not overwhelming links between job characteristics and satisfaction,

⁴ Participation increased satisfaction in sixty percent of the studies, had no effect in 30 percent, and negative in 9 percent. Participation decreased productivity in 22 percent of the cases, had no effect in 56 percent, and had a positive effect in 22 percent.

and weaker (less reliable) links between jobs and behavior (including performance, absenteeism, and turnover) (1993:160).

Meta-reviews of the STS literature reach somewhat more positive results. Pasmore, Francis, and Haldeman (1982) report positive effects of self-managed teams on attitudes, safety, and quality; 89 percent of studies that included productivity measures reported improvements in them. Pearce and Ravlin (1987) reported overall positive results from 10 field experiments in SMTs between 1970 and 1980. Beekun's (1989) meta-analysis of 17 empirical studies found higher productivity increases for more autonomous work groups compared to semi-autonomous or non-autonomous. By contrast, a series of quasi-experiments and longitudinal studies by Wall and colleagues found improvements in intrinsic satisfaction, but no effects on work motivation or performance (Kemp, Wall, Clegg, and Cordery 1983; Cordery, Mueller, and Smith 1991). Cost reductions accrued from the elimination of supervisors (Wall, Kemp, Jackson, and Clegg 1986).

Overall, this empirical literature has several methodological weaknesses. Early case studies were descriptive (Goodman 1982; Guest 1982a, 1982b), suffered from an overly positive-bias and lack of comparison groups, or an inability to separate out the effects of changes in participation from other organizational or environmental changes (e.g., Rice 1958, Seashore 1981). While lab experiments produced more rigorous results, the implications for developing specific types of participative work systems in specific industries or work environments were ambiguous. Researchers acknowledged different forms of participation, but failed to undertake comparative research on whether or not these differences matter (e.g., Locke and Schweiger 1979).

Over the last fifteen years a series of quasi-experimental and longitudinal field studies as well as meta-analyses have produced better results. Several methodological criticisms of this research, however, remain. The first critique grows out of the social information processing approach of Salancik and Pfeffer (1978) and disposition arguments of Staw and his colleagues (1985, 1986). These arguments question whether any work innovation can alter the pre-existing behavior and attitudes of workers. The social processing approach argues that the social context, past choices of individuals, and

self-justification are the most salient factors shaping attitudes. Job characteristics and attitudes are related to each other because they share prior cognitive and social processes. A series of studies by Staw and his colleagues similarly argued for the stability of attitudes over time (e.g. Staw, Bell, and Clausen 1986). Staw and Ross (1985) found that the best predictor of job satisfaction was job satisfaction five years earlier.

These weaknesses are exacerbated by research using a single source (or common method bias) -- the use of one-time questionnaires to measure both independent (job characteristics) and dependent (attitudes and self-reported performance) variables. Correlations between independent and dependent variables are likely to be inflated, particularly when similarly worded questions and scales are used (Roberts and Glick 1981; Cotton 1993). Wagner and Gooding's meta-analysis of studies between 1950 and 1985 supports this argument. Studies using only perceptual data (which were more common in 1960-1975 than they were in either 1950-1960 or 1976-1985) tended to find stronger relationships between participation and performance than did studies using more objective data. Subsequent research, however, has convincingly demonstrated that despite the stability of attitudes, job changes can significantly change attitudes (Gerhart 1987; Newton and Keenan 1991).

Most strategies for overcoming this problem also carry tradeoffs. Pre- and post-test control group or longitudinal designs are particularly effective, but the labor-intensiveness tends to increase costs and limit the scale and scope of the research. Small numbers often prevent multivariate analysis or generalizability.

Another strategy is to develop separate or confirmatory sources of information: for example, allowing non-incumbents or supervisors to provide information on either job characteristics or performance outcomes. Some research, however, has shown that observers may be more positively biased than workers. Glick, Jenkins, and Gupta (1986) compared incumbent-supplied, observer-supplied, and pooled responses to job and attitude questionnaires, and found the highest correlations for outcomes occurred when observers were the sole source (1986:454). With respect to independent variables measuring job characteristics and working conditions, supervisors' subjective assessments

also may not be a reliable source for how much individual workers vary in what they do. This is particularly true in cases in which the purpose of the work innovation is to change the content of work and responsibility. After all, the central premise behind participatory work systems is that that supervisors and managers know less about work organization and the content of jobs than do production-level workers. Alternatively, supervisors can provide the dependent variable, for example, by filling out individual performance appraisals (e.g. Cappelli and Rogovsky 1994). Compared to employees responsible for particular jobs, supervisors are equally self-interested and unreliable sources of information, or more so. Historically, a major motivator in unionization campaigns has been the favoritism shown by supervisors. To the extent that a work innovation such as self-managed teams threatens the job security or status of supervisors, they may be negatively biased against workers involved in the innovation; and to the extent that supervisors benefit from participatory or joint problem-solving arrangements that reduce labor-management conflict, they are likely to be biased in favor of those workers who are more willing to participate.

More studies have begun using objective company data in the last decade or so (e.g. Gladstein 1984). Objective company data such as sales revenues, productivity (costs per unit of output), or quality indicators (defect rates) provide more relevant measures for the firm, but also have limitations. Data is often poorly kept or inaccessible to quantitative assessment. The measures tend to be organization- or occupation-specific, making it difficult to compare across groups or organizations. And to the extent that company measures reflect types of performance that either do not enhance competitiveness or do not capture new or more intangible behaviors (for example improvements in customer service or continuous learning), those measures are also inadequate. What this suggests is that a variety of outcome measures are needed, a strategy that I have followed here.

Finally, most studies ignore technology, the relationship between technology and the changing skill content of jobs, the role of employer-provided training, the nature of work and production, and the larger organizational and industrial environments in which firms operate. Even sociotechnical systems research, which gives a theoretical nod to the

importance of technology, fails empirically to illuminate the ways in which technological choices facilitate and constrain the possibilities for the reorganization of work. As I discuss more fully below, however, the choice of production system should largely shape the potential for autonomy in self-regulating teams. Citing Susman (1976), Cotton concludes, "The production process will in large part determine the degree of control that team members have in day-to-day operational decisions. In a continuous-process production facility or a service facility, almost all operational decisions could be left to the team. However, in a facility where long-term decisions are made or capital expenditures are required, such autonomy may not be possible. In general, then, the autonomy of the team to make work decisions will depend in large part on the environment in which it operates" (1993:192).

A handful of scholars have also called attention to the lack of research on the effects of work innovations on supervisors and managers, and have argued that for job redesign or team efforts to be effective, supervisors play a pivotal role: workers must gain supervisory support in order to change the way they work; and supervisors must gain support from higher level management in the form of new job roles and responsibilities (Klein 1984; Frost 1992; Manz and Sims, 1986, 1987; Manz, 1990, 1992; Schlesinger and Klein 1987). Job enhancing strategies for supervisors replace monitoring and reporting responsibilities with coordination, leadership, and customer service roles more akin to what middle managers have historically done.

Finally, a few studies have begun to incorporate measures of organizational and environmental context (e.g., Gladstein 1984). Lawler (1986) and his colleagues (e.g., Cohen 1993, Cohen, Ledford, and Spreitzer 1994) are among a handle of human resource specialists who have articulated the link between innovations in participation, job redesign, and self-managed teams and HR variables such as the role of training, alternative pay practices, and the role of the supervisor in advancing or undermining workplace innovation.

Industrial Performance

In contrast to organizational behavior, research in industrial performance has focused on the ways in which technology, skills, work organization, and human resource and industrial relations practices can be integrated into coherent systems of production. The literature attempts to bring together the insights from across disciplines, from engineering and operations management, on the one hand, to institutional labor economics and industrial relations, on the other (e.g. Jaikumar 1986; Dertouzos, Solow, and Lester 1988; Kochan and Useem 1992). A central assumption, drawn from internal labor market theory, is that firm performance depends on the coherent integration of technology, work organization, and human resource practices.

As I have discussed more fully in Part II, under mass production, internal labor markets for blue collar workers in large mass production enterprises included narrow repetitive jobs; low skill requirements; advancement through job ladders that provided seniority-based job security for workers and a steady flow of workers trained on-the-job in specific skills; and compensation tied to jobs and seniority. Theories of transformation of work organization (Piore and Sabel 1984), internal labor markets (Osterman 1984, 1987, 1988) and industrial relations (Kochan, Katz, and McKersie) argue that post-Taylorist forms of work systems entail greater flexibility in the design of jobs and deployment of workers, higher skill and education requirements associated with micro-processor-based technologies, compensation systems linked to performance, and employment security as a quid pro quo to greater employee participation and voluntary effort. Bailey (1993) has articulated this new vision of a coherent employment system as resting on three pillars: the design of jobs to provide employees with the chance to use their knowledge and fully participate work decisions; on-going training systems that provide the skills needed to take advantage of broader jobs; and human resource systems designed to provide incentives for workers' discretionary effort. Brown, Reich, and Stern similarly advance three dimensions that distinguish JAM (job classifications, adversarial relations, and minimal training) from SET (security, employee involvement, and training)(1991). MacDuffie and Krafcik (1992) refer to the need for a flexible, skilled, and motivated workforce as a prerequisite

for flexible production systems. Central to the argument is the congruence between the logic of flexible forms of technology and the logic of new forms of work organization.

This integrated view of industrial performance grows out of research in a series of sub-disciplines and specialties that over time developed a set of specific hypotheses. These may be summarized in four categories: a) the relationship between changing technology, skills, and work organization; b) the role of “human resources” as a strategic asset, and the incentive effects of “high commitment” human resource systems; c) the link between business and human resource strategy; and d) the role of industrial relations systems and joint union-management partnerships in firm competitiveness

The first debate considered the relationship between technology, skills, work organization, and productivity. While some argued that technology determines levels of productivity and the demand for skill (e.g., Noble 1984), others countered by assumptions that new micro-processor-based technologies led to “upskilling” (e.g. Kern and Schumann 1984). Empirical research in the mid-1980s concluded that technology is indeterminate and that the demand for skill largely depends on choices made by employers and employees (e.g. Childe 1985; Hyman and Streeck 1988; Zuboff 1988; Keefe 1991; Thomas 1993). Researchers concluded that while micro-processor based technologies (such as computer-numerically-controlled (CNC) equipment and flexible manufacturing systems (FMS)) may facilitate quality improvement, they did not guarantee success (e.g., Jaikumar 1986, Kelley 1986). Researchers also found that investments in information technologies did not produce anticipated performance gains (Roach 1991). Further evidence on the ambiguous effects of technology came from auto industry which showed that given equal technologies, Japanese auto producers significantly outperformed U.S. auto makers along dimensions of cost, quality, product innovation, and customer satisfaction (MacDuffie and Krafcik 1992).

The second argument -- that employees are an asset that firms should strategically manage -- became popular as a result of the apparent superiority of Japanese human resource practices from the late 1970s on. The theoretical and empirical research on the importance of human resources for firm performance, however, draws on research in labor

economics which tested human capital theory and found that education is a significant predictor of higher productivity and wages. To the extent that labor is a quasi-fixed capital asset (Oi 1962; Becker 1964), then firms should seek ways to strategically utilize human resources to enhance firm competitiveness. That involves developing coherent sets of human resource practices (e.g., careful selection and recruitment, deployment, training, and rewards and compensation systems) that induce employee commitment to the organization (Walton 1985). Further, if competitiveness is based on continuous learning, then firms that seek to compete on the basis of quality and innovation should invest more in training (Bishop 1994; Kochan and Osterman 1994; Batt and Osterman 1993a, 1993b; Lynch 1994).

In this vein, a handful of research has tested whether higher levels of investment in particular HR practices leads to higher performance. Bartel (1991), for example, finds that labor productivity increased by 17 percent or more between 1983 and 1986 among firms that introduced formal training programs. Several studies of alternate compensation systems have found performance gains associated with profit sharing (Weitzman and Kruse 1990), gainsharing (Kaufman 1992; Welbourne 1994), and other forms of pay for performance (Gerhart and Milkovich 1992; Gerhart, Minkoff, and Olsen 1994). Evidence on the link between participation and employment security is slim. Kochan, Katz, and Mower cite examples of how threat of layoffs undermines participatory efforts (1984); but Drago finds that fear of job loss fuels participation in QWL (1988).

The third argument, concerning the link between business and human resource strategies, grows out of the strategic HR/IR literature (Tichy, Fombrun, and Devanna 1982; Dyer 1984; Beer et. al. 1985; Dyer 1988; Cappelli and Singh 1992). Firms in the same industry have a choice of business strategies, often broadly defined as emphasizing quality and customization versus cost minimization. While in reality, the strategic choices may not be so clearly drawn, the point is that such business decisions have implications for whether firms pursue “high commitment” or “low commitment” HR strategies. One empirical test of this thesis is Arthur’s (1991) study of American steel mini-mills. Through cluster analysis of data from 29 mills, Arthur found significant positive correlations

between business strategies (differentiated product versus cost minimization) and a cluster of industrial relations strategies (“commitment maximizing” versus “cost minimizing”). Business strategy was a significant determinant of IR strategy in OLS regressions that controlled for variation in firm size, technology, location, and labor market variables (1991:502).

Finally, there are several ways in which the industrial relations literature hypothesizes that employee and union participation in workplace decisions may enhance competitiveness. Relevant empirical research on this issue includes three questions: a) whether lower labor-management conflict associated with better industrial relations systems translates into better economic performance (e.g., lower costs and higher product quality); b) whether QWL programs reduce labor-management conflict, which in turn leads to improved performance; and c) whether better labor-management relations lead to reductions in work rules and job classifications that in turn reduce costs and improve quality. Based on multi-plant studies of the assembly plants of one of the major U.S. auto makers, researchers have found consistent support for the first proposition. Lower grievance, disciplinary, and absentee rates led to lower costs and higher product quality in most model specifications. By contrast, they found no consistent effect of QWL programs on performance because QWL committees rarely discussed performance-related issues (Katz, Kochan, and Gobeille 1983; Katz, Kochan, and Weber 1985; Kochan, Katz, and McKersie 1986). Cutcher-Gershenfeld (1991) similarly found that “transformed” industrial relations characterized by increased cooperation and dispute resolution led to lower costs, lower scrap, higher productivity, and higher net return. Researchers found mixed results, however, with respect to the performance effects of changes in work rules or job classifications. Katz, Kochan, and Keefe (1987) analyzed the effects of various innovations in work organization (including greater management discretion in deployment, work group participation and the use of teams), and found that only higher levels of managerial discretion in the allocation of work reduced costs and improved quality. The effects of worker participation were mixed; and teams negatively affected productivity and costs by increasing labor hours and the use of supervisors. Keefe and Katz (1990) further

found that reductions in skilled and semi-skilled job classifications led to a very small (less than 1 percent over 7 years) increase on product quality. More significantly, and contrary to the strongly held belief in the industry that the proliferation of job classifications was very costly, reductions in assembly line job classifications had no performance effect. Plants with more job classes had higher productivity. The authors concluded that changes in classifications absent changes in work processes were unlikely to produce better outcomes.

Taken as a whole, the research in strategic human resources and industrial relations suggests that better productivity and quality depend on the fit between business and human resource strategy and on a coherent set of work organization and human resource practices, as indicated above. MacDuffie's analysis of the MIT international auto data provides the richest systematic evidence on the topic. Using on detailed plant-level data from 62 auto assembly plants internationally, MacDuffie develops a typology of mass, transitional, and flexible production systems based on cluster analysis of work organization and human resource variables. Using hierarchical regressions, he finds significant positive effects on labor productivity and quality of the work system (an index of measures of employee participation, job design, and rotation), human resource system (an index of practices covering recruitment and selection, contingent compensation, status differentiation, and training), and overall production organization index (combining buffer, work, and HR system effects), as well as interactive effects of buffers and work systems and buffers and human resource systems (1995:215-217).

The industrial performance literature has produced a growing body of careful research into the performance outcomes of organizational and human resource strategies. Some limitations are also noteworthy. In dramatic contrast to research in organizational behavior, most researchers have not been precise in capturing the type of participation, job redesign, or "teamwork" associated with higher performance. Different types and levels of participation tend to be lumped together as part of a cluster (e.g. Cutcher-Gershenfeld 1991:250; Ichniowski 1994; MacDuffie 1995:218). Yet, even in the auto industry, a keen debate concerns whether the technological and organizational constraints associated with

assembly line production mean that highly taylorized jobs and off-line problem-solving are a more effective solution to organizational learning (as at NUMMI, Adler 1993; Adler and Cole 1993; Wilms, Hardcastle, and Zell 1994) or whether various forms of autonomous team-based production are viable, as in the Swedish tradition, (Berggren 1992, 1994), or at GM's Saturn plant (Rubenstein, Bennett, and Kochan 1993).

A second limitation is the narrow industry base of the empirical research. Because little research has been conducted outside of the auto industry, researchers and analysts tend to use the conceptual framework and empirical results from that industry as if they were generalizable -- whether or not this was the intention of the original authors. Research in other manufacturing industries is beginning to accumulate so that comparative analyses may be undertaken. Ichniowski et. al.'s study of 30 finishing lines in 21 U.S. steel companies is an example. That study also finds system effects from HRM clusters developed from a series of dummy variables created by the authors to estimate whether firms were adopting "innovative" or "traditional" practices. The authors estimate that innovative systems increase productivity by 10 percentage points (1994:31).

A series of studies in the low wage apparel are tracking the development of modular production systems designed to improve delivery times and speed of response to changing style demands of retailers (Bailey 1989; Appelbaum, Bailey, Berg, Kalleberg 1994). In contrast to the preponderance of evidence from the auto industry which suggests that lean production using standardized jobs and offline problem-solving may be the most effective type of work reorganization, the evidence from apparel favors self-regulating work groups because of their ability to reduce in process inventories, solve problems and conflicts, and eliminate bottlenecks⁵. A different result comes from research on machining which locates

⁵ Under traditional bundle methods, employers maximize individual operator time by fragmenting production of the garment into repetitive sewing tasks and tying piece rates to tasks. The result is that a whole garment that requires 20 minutes of labor may be in process inventories for 15-20 days. Under modular systems, unit costs decline because of overall reductions in handling time (time each piece of a garment is handled by a worker), reductions in inventories, reductions in overhead, and speed of delivery of new styles (Berg, Appelbaum, Bailey, and Kalleberg 1995).

the source of performance improvement in the decentralization of programming responsibility to frontline workers (Kelley 1992).

The contrast between autos and steel on the one hand, and apparel and machining, on the other, underscores a growing contribution of the industrial performance literature: that the differences in nature and demands of product markets, industries, and technologies are likely to produce different types of work reorganization. Offline participation may be the most effective solution in one context, self-managed teams in another. In summary, the ways in which new work systems are implemented varies by the type of industry and institutional setting -- the mix of product and labor market institutions, the choice of technology, and the nature of the productive task. My study of telecommunications extends this work into services. The proliferation of additional industry studies should illuminate this debate in the future.

Another limitation in this literature is the lack of attention to measuring worker outcomes or even utilizing workers as sources of information (an exception is Appelbaum et al. 1994). This also is in sharp contrast to the organizational behavior literature which relies primarily on worker surveys and measures attitudes, albeit as theoretical inputs into performance outcomes. While there is an implicit and plausible assumption that employees will gain from "high commitment" HR practices such as training or employment security, the effects of other aspects of new work systems -- such as contingent pay or reduced advancement opportunities with flattened organizations, or the increased stress or responsibility associated with new work demands -- are not as transparent.

Finally, the manufacturing bias in this research limits the applicability of its methodological approach in other industries, particularly services. The unit of analysis is likely to be different. While plant or establishment level outcomes are the appropriate unit in manufacturing, the unit of analysis in services depends upon the nature of the work -- it may be the individual in client-centered work, or groups such as sales teams or network crews. Additionally, the use of cluster analysis may be inappropriate for three reasons. First, because change in services has proceeded more slowly than in manufacturing, it is

still uncertain what the defining cluster of “high performance” work organization and human resource practices might be. Second, most organizations in services are in transition, with few examples of coherent “best practice” available, even when cross-national comparisons are possible. Third, cluster analysis in general is not conducive to identifying and understanding the effects of contradictory practices within work systems. And it appears that contradictions are quite widespread at least among U.S. firms that are attempting to both downsize, cut costs, and reduce employment security at the same time they are introducing participatory and job enhancing innovations.

In the next section, I briefly discuss how the research from Organizational Behavior and Industrial Performance can be applied to the case study of telecommunications services.

3.3 Implementing Work Innovations in Telecommunications Services

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. At the same time these work innovations were taking place, the company had downsized through attrition and voluntary retirement offerings and had announced future plans to reengineer and further downsize, if necessary, through forced reductions.

To implement the work innovations, the company and union 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, charts 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. As indicated in Part II above, the company expects to benefit from SDTs 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. This emphasis contrasts in part with the STS literature which focuses on the benefits of coordination and

innovation associated with self-regulating teams. Currently, roughly five percent of the workforce in network and customer services are participating in SDTs.

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 SDTs 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 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 rationalization or 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 skills.

The idea behind self-managed 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. Firms anticipate two benefits: improvements in quality and customer service and reductions in indirect costs. Quality is likely to improve 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 help⁶. This advantage, however, may be offset by the time required to absorb supervisory tasks.

One manager called self-managed 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-managed 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' interaction with both "internal" and "external" customers has grown. In Klein's framework, 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-managed 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

⁶ 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.

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-managed 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 data bases 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. Companies have periodically increased sales quotas and demand "adherence to quotas." Increased workload and stress, therefore, is generalized, and is not associated with self-managed 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-managed groups will create resentment from other workers. There is less ability for teams to create a "closed system," unless an entire office becomes self-managed; 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-managed 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-managed 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 Klein's framework, SDTs in customer services minimally expand vertical or administrative tasks and minimally increase depth of problem-solving and learning.

3.4 Hypotheses, Research Design, Methods, and Data

Hypotheses

The model used in this study builds on several insights from organizational behavior and industrial performance. It draws on the organizational behavior literature in two ways: a) in its use of employee surveys to measure variation in job characteristics and the perceived outcomes of this variation; b) in the conceptualization and measurement of how participation and job redesign through self-managed teams is likely to affect employee attitudes and performance. It draws on the industrial performance literature in two ways: a) to identify the set of human resource and industrial relations variables that should positively affect attitudes and performance over and above the effects of work reorganization; and b) in its use of objective performance data. It goes beyond both traditions in the following ways: a) in the analysis of the relative effects of different work innovations on differently situated employees -- managers and workers in radically different occupations; and b) in the attempt to measure how different organizational strategies -- job enhancement versus downsizing -- have contradictory effects on employee attitudes and behavior.

The attitudinal and performance model is presented in Figure 3.1. Work organization variables include both job enhancing and downsizing strategies. Human resource practices include offline participation, training, advancement opportunities, compensation, and the supportive behavior of immediate supervisors. Industrial relations variables measure co-worker and labor-management relations and union membership. Based on this framework, I developed two sets of hypotheses. The first pertain to the outcomes of participation in total quality and self-management for differently situated groups of workers and managers. The second considers the set of overall human resource and industrial relations practices that affect employee attitudes and performance, and whether job enhancing versus downsizing strategies offer competing and contradictory incentives.

With respect to the first question, my general hypothesis is that after controlling for individual differences in employee attributes, workplace innovations do affect both the attitudes and performance of employees. Distinct innovations, however, have different effects on differently-situated groups of employees.

Hypothesis 1: Participation in self-directed teams will have a significant positive effect on the attitudes and performance of frontline workers. Participation in total quality, by contrast, will have an insignificant effect on job attitudes and performance.

Frontline employees in self-directed teams are likely to improve work-related attitudes and performance in two ways: through enhanced individual jobs and through group processes over and above individual jobs. On the first question, they should gain from enhanced job autonomy, significance, and sense of accomplishment in being able to fully complete or respond to customer demands. Self-directed team participation provides relief from the historic over-supervision that has characterized management practices in this industry. To explore this dimension, I use Hackman and Oldham's job diagnostics model, including four of the five constructs to measure job characteristics: autonomy, significance, identity, and variety⁷. On average, members of self-directed teams should score higher on these job dimensions than members of traditional work groups; their scores should be intermediate between those of workers in traditional groups and managers. These higher scores on job dimensions should translate into improved work-related attitudes such as satisfaction and commitment. They should also produce better customer service because workers are able to respond more immediately to non-routine customer demand without prior consultation with supervisors.

Additionally, workers should also gain from group processes or responsibilities. Based on field research, workers in teams are more likely to absorb quality control responsibilities, to learn from one another, and to solve-problems by directly contacting

⁷ I do not include variety for service workers for lack of accurate measures of these dimensions. Feedback from supervisors is incorporated into the overall measure of supervisory support.

managers or “subject matter experts” outside of their group. They are also more likely to view their group as a “team,” and compete against other work groups on performance measures.

In contrast to self-management, front-line employees stand little to gain from participation in off-line problem solving. While they may gain some satisfaction from added participation in decision-making, their daily jobs and working conditions are unlikely to change to any great extent under participatory programs. The improvement in satisfaction associated with better communication between management and workers is likely to be minimal compared to the effects of job redesign. This hypothesis is consistent with the qualitative evidence provided in Part II -- historically employee participation programs in this industry and more generally have failed to bring about major work reorganization or job redesign. They have tended to produce minor “cosmetic” changes under QWL and minor incremental cost-savings under quality circles or quality improvement programs⁸.

Hypothesis 2: Gains in attitudes and performance associated with self-management are constrained by the nature of work, technology, and organizational structure. Workers with higher levels of skills and greater ability to create organizational boundaries will be more able to take advantage of the decision-making autonomy of self-management. In this case, network technicians should show greater gains in attitudes and performance from self-directed teams than will customer service representatives.

Two arguments -- based on variation in skills and technology, on the one hand, and organizational structure on the other -- support this hypothesis. First, network craft employees have higher skill levels and autonomy to begin with than do customer service

⁸ Note that participation may have broader cost reduction or process improvement effects that are not captured at the individual or group level of analysis.

representative, and these attributes facilitate the transition to self-management. Additionally, the network technology still requires individual craft skills to maintain and repair parts of the network. Craft workers continue to have considerable control over the tasks, procedures, and pace of work involved in electro-mechanical maintenance and repair. The second reason concerns organizational structure. Network technicians work in groups that are already geographically-based units. It is relatively easy and consistent with past practice to construct organizational boundaries for these groups in the form of spatially-delimited customer service market territories for which they are responsible. Research has suggested that the ability to put “closure” or boundaries on a work unit is important if individuals are to assume full responsibility or “ownership” for the work (Cummings and Huse 1989).

In contrast to network craft technicians, there are technological and organizational constraints in customer services which limit the extent of effective adoption of self-management among frontline workers. First, technological innovation is allowing companies to introduce automatic call-distribution and expert systems in customer services which pace the work and take control out of the hands of customer service agents. Second, call-distribution systems which facilitate remote servicing have allowed companies to consolidate customer service centers into large service bureaus. Because work is allocated across large numbers of employees, it is extremely difficult for a small group of employees, organized into a self-directed team, to establish organizational boundaries or put closure on a part of the work for which they can be held uniquely accountable. The overall result is that we would expect both the attitudinal and performance outcomes of self-directed teams to be more dramatic among network craft technicians than among customer service representatives.

Hypothesis 3: TQM is likely to positively affect the job characteristics and attitudes of middle managers and firstline supervisors. SDTs, by contrast, are likely to have marginal effect on middle managers but a significant negative effect on the attitudes of firstline supervisors.

Participatory management allows managers to maintain their traditional status and job security while gaining from the ideas of employees. These benefits should outweigh the adverse effects of having to spend more time in meetings with front-line workers. SDTs, by contrast, are likely to have a particularly negative effect on firstline supervisors because they stand the most to lose from the changes associated with self-directed teams, both in terms of job significance and job security. Middle managers jobs should be relatively unaffected by the introduction of self-directed teams per se, although overall both middle managers and firstline supervisors associated with self-directed teams should experience greater increases in their spans of control. If larger spans of control translate into greater workloads, then both middle managers and supervisors may be negatively effected.

The second set of hypotheses explores the relationship between different components of human resource and industrial relations systems.

Hypothesis 1: Whereas job enhancement strategies have positive effects on the attitudes and performance of employees, downsizing has a countervailing negative effect. This may occur in two ways: through the increase in workloads or understaffing associated with downsizing; or through the loss of job security that undermines morale.

The workload and understaffing outcome is likely to effect some employees more than others because downsizing at the time of the study was taking place through attrition and voluntary retirement. As employees left, they were not replaced; but because work processes had not been reengineered the probable net result was that a smaller number of employees absorbed, leading to understaffing problems. Survey questions capture the relative change in size of work groups over the two year period prior to when the survey was released.

The hypothesized relationship between self-management and understaffing is uncertain. To the extent that work groups absorb the work previously done by supervisors without adjusting other work responsibilities, they may experience understaffing. Similarly, to the extent that managerial employees associated with self-directed teams increase their spans of control without decreasing some task responsibilities, larger spans of control may simply translate into heavier workloads.

The hypothesized adverse morale effects of downsizing should affect employees more generally. When firms announce intentions to downsize, the announcement affects the entire workforce: few employees have the information needed to know whether they will be affected or not. Top managers themselves often do not know how deeply they will cut staff or what criteria will be used to determine who should be let go. Qualitative field research in this case substantiated the existence of generalized fear and uncertainty associated with anticipated downsizing and workforce adjustment across the organization.

Hypothesis 2: HR practices that should enhance employee satisfaction and commitment include: investment in training; opportunities for career advancement; relative earnings and satisfaction with compensation; and positive employee and labor-management relations. These practices should enhance satisfaction and commitment over and above the effects of enhanced job characteristics and team organization.

This hypothesis grows out of human resources and industrial relations theories which argue that a coherent set of HR/IR policies and practices are needed to elicit the overall satisfaction and organizational commitment of employees.

Research Design and Methodology

This analysis relies on a quasi-experimental research design to test the hypothesized attitudinal and performance effects of innovations in participation and self-management on a stratified random sample of workers and managers. The sample was stratified by

department (occupation), participation in work innovations, and location. To build the stratified sample, a total of 165 SDTs were identified in core nonmanagerial occupations (115 network craft and 54 in customer service occupations). I then used the corporate HR information system to randomly select an equal number of traditional work groups (TWGs), matched by occupation, state, and rural/urban location. This produced a total of 330 work groups in the study. The first, second, and third level managers for these self-directed and traditional work groups were then added to the survey sample.

A total of 1,191 employees responded to the survey, representing a response rate of 59 percent -- relatively high for a mail survey⁹. This includes 395 managers and 796 workers. There were roughly equal numbers of employees associated with SDTs and TWGs: 50 percent of all respondents from network were involved with SDTs; 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. 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 level¹⁰. Tables 3.1a and 3.1b present a breakdown of the numbers and percentages, respectively, of respondents by department, job title, and whether or not they are involved with self-managed teams.

⁹ 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.

¹⁰ 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.

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. The exception is among middle managers in customer services, and the explanation for low participation among this group is unclear. Second, for each job category, roughly equal percentages of employees associated with traditional and self-directed work groups are also participating in off-line 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 (A complete list of the survey questions is provided in the Appendix):

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

I designed the survey by drawing on previously tested questions from employee job diagnostics and attitude surveys (Hackman and Oldham 1976, 1980). I then developed additional questions based on field interviews and “shadowing” of managers and workers to incorporate questions concerning the nature of work and technology in each particular occupation. I used focus groups in each of the relevant occupational groups to provide detailed feedback on the initial survey instrument. Major changes in the survey resulted -- particularly in the development of more customized questions for each occupational group to capture variation in the nature of work responsibilities, working conditions, and the types of technology used by employees. I then piloted the survey among 175 workers and managers in network and customer services. Based on the pilot, I decided to customize the survey for each occupational group.

In all, I developed seven different survey instruments for middle managers, lower managers, and workers in each of network and customer services, plus a survey for local union presidents. Overall, approximately 80% of the questions were identical. The primary differences among surveys were due to customized questions relating to the nature of work, technology, and work organization. For each level of employee, the surveys were almost identical. For example, for the workers surveys, almost all of the questions were the same with the exception of customized questions relating primarily to differences in technology and organizational settings. Similarly, lower level managers in network and customer services received the same questionnaire with the exception of specific technology and departmentally-related questions. The differences in survey questions were greater across group levels.

3.5 Correlational Analysis: Work Groups, Job Characteristics, and Attitudes

Returning to the central hypotheses guiding this analysis, correlational analysis provides a first assessment of whether there are systematic differences in the behavior and attitudes of workers and managers who participate in either total quality (participatory management) programs or in self-directed team (self-management) programs. In this section I analyze the correlations between membership in different types of work groups (traditional, participatory, and self-directed) and various dimensions of daily work experience. I first analyze the experience of network technicians, followed by customer service representatives, and finally middle managers and firstline supervisors.

Network Technicians

Taking first the example of network technicians, Tables 3.3a-e present correlations between selected job characteristics and employee attitudes on the one hand, and participation in traditional, participatory, and self-directed work groups, on the other. Traditional work groups may be thought of as control groups: they include only those employees who are not participating in either off-line problem-solving or “on-line” self-directed teams. Employees in self-directed team are members of work groups officially designated as such, but for purposes of the correlational analysis, employees who participate in both off-line and on-line programs are excluded¹¹. Members of participatory groups are employees who work in traditional groups but are currently participating in at least one of several forms of participation: quality improvement committees, problem-solving groups, cross-functional teams. Correlations between job characteristics and participatory work groups were estimated in two ways: first, against a dummy if the

¹¹ Those who were active in both self-directed teams and off-line participatory groups (a total of 88 network technicians) were excluded from this correlational analysis so that the “pure” effects of SDTs could be assessed. In general, the pattern of correlations between job characteristics and these technicians is similar, but larger and more robust, than the pattern of correlations found for those only participating in self-directed teams.

employee was currently participating; and second against a weighted index of participation based on the number of off-line problem-solving meetings the employee was attending. The logic behind using the second measure is that those employees who are more active participants are likely to feel they have a greater role in decision-making and therefore may experience more of the benefits of participation. Similar results occurred under both specifications, but somewhat more robust correlations were found using the weighted index of participation. As a result, I use the weighted index in this and subsequent analyses for two reasons. First, it is theoretically more plausible that the more an employee participates, the more the experience is likely to have an effect; second, I wanted to present the strongest possible scenario for the effects of participation because my working hypothesis is that even under strong assumptions, the effects of participation on frontline employees are likely to be weak.

Several interesting patterns emerge from this analysis¹². First, with respect to individual job characteristics (Table 3.3a), self-directed teams show consistent, significant positive correlations with questions relating to job autonomy, job autonomy index¹³, increases in job autonomy, the job's use of employee skills, and the ability and authority of employees to complete tasks and fulfill customer needs. Traditional work groups have significant negative correlations with these job dimensions, but notably positive correlations with job variety. This is consistent with qualitative evidence from field interviews with self-directed teams who said that they tended to divide up the work according to who did what specialty best -- a pattern I discuss more fully in the multivariate analysis. Participatory groups closely resemble traditional groups on

¹² I also report correlations at a generous level of significance (.10) because the sample sizes are relatively small (N = 74-153). Even so, the overwhelming majority of correlations for traditional and self-directed teams are significant at the .01 level.

¹³ The job autonomy index and other indices reported in Tables 3.3 and 3.4 are mean values of the items grouped with the index. I used both Cronbach's reliability scale and confirmatory factor analysis to develop these scales. The results of reliability and factor analyses are reported in the next section (3.6) as well as in the variable definitions in Table 3.10.

dimensions of job autonomy, but otherwise correlations with job characteristics are low and insignificant.

This pattern continues in Table 3.3b, which lists correlations between the type of work group (traditional, participatory, self-directed) and work group characteristics. Five dimensions of work groups are important: their composition, the type and changing nature of supervision they receive, the new work responsibilities they assume, their internal work group relations, and their relations with employees outside of their group -- what I refer to as “external” relations and what quality theorists refer to as relations with “internal customers.” SDTs differ significantly from traditional and participatory groups on all of these dimensions. Furthermore, along most dimensions, participatory groups resemble traditional groups. Self-directed teams on average are smaller than traditional groups, have shorter work group tenure, and are less likely than traditional groups to gain replacements if members leave or retire. SDTs are less likely to involve supervisors in regular group meetings, meet more frequently as a group, and choose one of their own members to serve as a group leader. In the area of daily work responsibilities, SDTs are highly correlated with assuming tasks normally done by the supervisor (goal setting, task assignments, daily scheduling, vacation scheduling, dealing with absences, quality and safety inspections, and deciding who gets training). Using factor analysis with principle components varimax rotation these supervisory tasks factored into four dimensions: a) control over work goals and tasks; b) scheduling; c) quality and safety inspections; and d) training decisions.

With respect to internal work group behavior, SDTs are more likely to teach each other and rely on each other (rather than the supervisor) for solving problems. The opposite is true for traditional groups, who are positively correlated with relying on supervisors, and negatively correlated with relying on each other. SDTs are significantly more likely to report that work group relations are “good” and that they have improved in the two years prior to the survey. Finally, with respect to “external” relations, SDTs are significantly correlated with having the authority to contact managers outside of their department (subject matter experts), and regularly using this authority to solve problems.

Historically, this cross-functional problem-solving role was reserved for supervisors. For network technicians, this kind of problem-solving might involve direct exchanges with engineers working on the design, construction, and/or repair of the network. In the past, technicians would notify their supervisor, who in turn would contact the engineer or “subject matter expert” needed to solve the problem. For team members to handle these cross-functional issues should improve work group efficiency over time. SDTs also are significantly more likely to report better relations and improved relations with employees in other departments. These apparent improvements in cross-functional and cross-department relations are an important part of company’s attempts to reduce bureaucracy and functional specialization.

It is noteworthy, however, that the self-directed groups are significantly negatively correlated with directly interacting with other workers outside of their group. This suggests that they tend to work as a self-contained unit. This dimension is also consistent with another significant difference between traditional and self-directed groups (listed in Table 3.3d): SDTs are significantly 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. This trade-off was alluded to by one district manager who assumed that position in a district that already had a number of established self-directed teams. He argued that his responsibility was to provide service to an entire district or region and he wanted the ability to flexibly deploy network technicians as needed. Breaking up the district into self-directed team subunits created barriers between groups of employees and rigidities in deployment. At the same time, he agreed that SDTs had performed on average better than most the traditional work groups. Similarly, in interviews with team members, several argued that having a defined territory

was an important positive dimension of being in self-directed teams. They had control over their work and territory and knew what needed to be done on a day to day basis. And in one case in which management had frequently pulled team members from their “turf,” team-members complained in interviews that this was contrary to the agreed-upon rules of the teams and they were being treated “just as any other group.”

In contrast to these consistent differences in characteristics and behavior at the individual job and work group level, the division of workers into traditional, participatory, and self-directed groups is not significantly correlated with many other dimensions of work -- including most human resource and industrial relations practices (Table 3.3c) and dimensions of downsizing, working conditions, and demographic characteristics (Table 3.3d). This is what we would expect. While there is variation in human resource and industrial relations practices across the many work sites involved in this study, there is no reason we would expect them to vary consistently by type of work group.

There are four exceptions to this pattern (see Table 3.3c). First, as might be expected, in comparison to both traditional and self-directed groups, participatory groups spend significantly more time in monthly meetings off the job. Second, SDTs have received more training as a result of participating in self-directed teams, and this translates into higher levels of total training¹⁴. Third, SDTs’ assessment of their supervisor is significantly different than traditional or participatory groups. Again this makes intuitive sense. SDTs are correlated with getting adequate time to meet as a group, but are negatively correlated with receiving traditional aspects of supervision (such as “my supervisor knows enough to evaluate me” or “gives frequent feedback”) because their supervisors (referred to as “coaches”) no longer play that role. The supervisory support index is the mean value of the six dimensions of supervisory behavior listed in Table 3.3c, and overall it is negatively correlated with self-directed teams, as expected. Finally,

¹⁴ While participatory groups might be expected to have more quality training, this is not true because the company instituted a policy requiring all employees to participate in 2 days of quality training. Total training is the total number of days of formal company-provided training reported by the employee. It is the sum of technical, quality, basic, and self-directed team training.

members of SDTs report significantly better relations between management and their local union and report higher levels of local union participating in total quality and self-directed team innovations. This pattern is consistent with what we would expect. The regional labor union contract specifically states that experiments in work innovations must be developed in conjunction with the local union leadership.

The experience of downsizing is also not correlated with type of work group: downsizing -- 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. While many managers asserted that self-directed teams were formed in the wake of early retirements, or that interest in SDTs had increased as a result of the threat of downsizing, there is no statistically significant correlation between measures of the effects of downsizing -- such as understaffing and increased workloads -- and SDTs. There is, however, a significant but relatively small negative correlation between traditional groups and understaffing. More importantly, there are few significant correlations between type of work group and our control variables, which include the adequacy of technology, state location, residential or business service markets, or urban, suburban, or urban location. The exception is that SDTs are somewhat more likely to work with older technology.

The correlations between type of work group and attitudinal outcomes (Table 3.3e) are mixed: self-directed groups are correlated with higher levels of satisfaction with top management in two out of four dimensions, but not overall. Similarly, they are correlated with higher levels of satisfaction with their jobs and with participation in decision-making, but not with other aspects of human resource practices (such as pay, benefits, employment security), or with the overall index of satisfaction which incorporates all of these dimensions of work. This finding is what we would expect: the changes brought about by self-directed management practices affect employees' immediate job experience, but are unrelated to broader human resource practices. These significant differences, however, are not found in measures of organizational commitment with the exception that self-directed team members reported absences are significantly lower than the other groups.

In contrast to self-directed groups, there are no significant correlations between the participatory groups and attitudinal outcomes. Furthermore, traditional groups show a pattern of correlations that is consistently opposite that of SDTs: negatively correlated with some dimensions of satisfaction with top management, with participation in decisions, and with some dimensions of organizational commitment. They are positively correlated with higher levels of absenteeism. It is also noteworthy that traditional groups are negatively correlated with satisfaction with participation in decision-making and that participatory groups show no significant correlations along measures of satisfaction or organizational commitment.

Finally, key measures of self-reported work group performance are significantly correlated with the work group typology: SDTs are significantly correlated with better work group quality, improvements in work group quality, and the choice to use group (as opposed to individual) performance measures in their daily work reports. Participatory groups are significantly negatively correlated with better work group quality and quality improvement; traditional groups are negatively associated with the use of group performance measures.

In summary, several patterns emerge from this initial analysis of descriptive statistics. First, there are significant differences in the behavior and attitudes of network technicians in self-directed teams along expected dimensions -- at the level of individual job characteristics and work group characteristics and behavior. Second, traditional groups show a pattern of job characteristics and behavior that is consistently the opposite of that found in SDTs. Third, participation in off-line problem-solving is associated with few significant changes in job characteristics or work group behavior; participatory groups are largely uncorrelated with changes in jobs or work responsibilities; where significant correlations do exist, they tend to follow the pattern of the traditional groups. Fourth, as expected, there are few significant correlations between broader human resource and industrial relations practices, type of work group, or control variables such as technology, working conditions, and demographic characteristics. Finally, the different work groups

show some significant differences in attitudinal and self-reported performance outcomes, but these results are mixed.

Customer Service Representatives

The patterns that I have described above with respect to network technicians largely apply to customer service representatives as well. For customer service representatives, the correlations between work group type and work characteristics and attitudes are presented in Tables 3.4a-e, which follow the same format as Tables 3.3a-e. In this section I will briefly summarize the patterns, but focus primarily on the areas in which there are significant differences between network and customer service employees.

The patterns among customer service representatives may be summarized as follows. First, as compared to network technicians, CSRs score lower on almost all of the job characteristics listed in Table 3.4a: they have significantly lower levels of job autonomy, increased autonomy, job's use of skills, and authority to meet customer needs or complete a task. Furthermore, while the pattern differentiating self-directed and traditional groups found in network also prevails among CSRs, it is much less robust. For example, SDTs in customer services are significantly correlated with only one dimension of individual job autonomy and one dimension of increased job autonomy, and both of these correlations are significant at the .10 percent level only.

Second, consistent with findings in network, the areas in which the largest and most robust differences are found between the CSR work groups pertain to work group composition, supervision, responsibilities, and work group relations (as listed in Table 3.4b). CSR self-directed teams are smaller in size than traditional groups, members have less work group tenure, and they are more likely to have declined in size, probably because members who leave are less likely to be replaced. With respect to work group supervision, the SDTs are significantly correlated with a decrease in supervision, lack of attendance of supervisors in group meetings, the selection of a group leader, and more frequent group meetings.

Third, in the area of group responsibilities, self-directed teams of CSRs have clearly absorbed some supervisory responsibilities (including setting work group goals and tasks and handling quality and safety inspections and training decisions); but they are noticeably different from network SDTs in their inability to handle daily schedules, vacations, and absences. The survey evidence here is quite consistent with qualitative interviews of CSRs who complained about their inability to absorb these tasks. The explanation is technological and organizational. Because the company has shifted to a computerized statewide system of incoming call-distribution, management allocates call-loads at the state level. Daily break schedules and vacation scheduling also occur at this level of organization so that individual work group discretion in these areas is not possible; this is an example of the organizational limits of establishing self-directed teams in customer services, given prior management choices of technology and organizational consolidation.

Fourth, and similar to network SDTs, members of customer service SDTs are significantly more likely to teach one another and less likely to call on their supervisor to help solve problems; they also have authority to directly deal with subject matter experts outside of their department and interact with them on a regular basis.

Fifth, in the area human resource and industrial relations practices (Table 3.4c), the patterns discussed in network largely hold. There are few significant differences between the different types of work groups with the following exceptions: participatory groups have significantly more off-line monthly meetings; SDTs receive more SDT training (but this does not translate into significantly more overall training); there are some significant differences in supervisory support, but this does not hold for the overall supervisory index. One notable difference between network and customer services is that it is the participatory groups that on average have higher levels of union involvement in workplace innovations, and SDTs surprisingly show a negative correlation on this dimension.

There are few statistically significant correlations between type of work group and control variables (Table 3.4d): the exceptions are that SDTs are somewhat less likely to have adopted a new software computer system known as the “regional negotiations system,” and they are more likely to report that technology is adequate. Also, more years

of education is modestly correlated with participatory groups and negatively correlated with SDTs.

Finally, the pattern of outcomes is somewhat different in customer services than in network: SDTs are not correlated with any satisfaction measures except weakly with employment security. They measure significantly higher than either network groups or traditional and participatory CSR groups in organizational commitment. And they are similar to network SDTs in having significantly strong positive association with work group quality and improvements in quality.

Theoretical Implications of Work Group Typology

Given the pattern of correlations between the work group typology and work characteristics and attitudes, two questions are important to consider. First, how is participation in work innovations -- either in total quality or self-directed teams -- related to the job characteristics that theoretically, according to the Hackman and Oldham model, improve work-related attitudes and performance? Second, is it the workplace innovation that matters, or is it something about the prior attributes of employees who participate in innovations that is determinative.

To consider these questions, I begin with Hackman and Oldham's job diagnostics model and measure four out of the five job characteristics they use: job autonomy, task significance, task identity, and task variety. Job autonomy is a factor based on three questions concerning the employee's control over tasks and work assignments, tool and procedures, and pace of work¹⁵. Significance is defined as the extent to which the job makes good use of employee skills. Identity is the extent to which an employee is able to fully complete a job; for employees in customer services, the most important dimension pertains to the employee's ability to fully meet the demands of customers or solve problems that customers report¹⁶. Finally, for network employees, task variety was

¹⁵ Cronbach's alpha = .81 for the three items comprising job autonomy. The three items formed a single factor (eigenvalue = 1.62).

defined as the number of different types of jobs employees regularly performed (such as residential installation, residential repair, cable splicing, buried service wire, etc.).

I then used a maximum likelihood ordered probit to compare the relative effects of participation and self-direction on the job characteristics of interest. The results are presented in Table 3.5¹⁷. After controlling for demographic characteristics, participation in self-directed teams is a significant determinant of 3 out of the 4 job characteristics. Notably, it has a strong positive effect on autonomy and significance, but a strong negative effect on variety. While the first two effects are consistent with theories of job enhancement associated with self-management, the latter finding (on job variety) is not. Theories of self-management argue that workers in autonomous groups will increase the variety in their jobs both because variety enhances job satisfaction and because they will find it is a more efficient way to work. In this case, however, prior field research suggested that technicians prefer to specialize, and the survey evidence supports this observation. Given the opportunity, network technicians in SDTs choose to specialize in the tasks they do best, either because they enjoy it more and/or because it is more efficient¹⁸. This finding supports Klein's view of self-directed teams as being composed of

¹⁶ Alternate questions pertaining to the extent of authority employees' had to meet customer needs or whether rules and procedures in fact got in the way of meeting customer needs produced similar results, but did not form a factor. The latter question is used in this analysis.

¹⁷ Ordered or multinomial probits are estimated via a maximum likelihood technique; they are used because the dependent variables are measured by 5-item (multinomial) scales; ordered probits (logits) estimate the probability of making a choice between items on a scale. The probit and logit models differ in their assumptions about the error term. Probit models assume that error terms are distributed multivariate-normally, allowing error terms to be correlated across alternatives thereby allowing more accurate distinctions across similar alternatives. Logit models assume that the error terms are independently and identically distributed; this means that it does not distinguish between alternatives that are close substitutes. I tested both probit and logit models for the models in this section, and did not find significant differences in coefficients or levels of significance. I report probit results here. I use ordinary least squares regression analysis for some models, as indicated, where indices based on multiple questions form a continuous scale for the dependent variable (eg., overall satisfaction or commitment scale).

¹⁸ While an analysis of gender and occupational segregation is not part of this study, it is interesting to note that gender has a strong negative effect on variety in network. In field interviews, workers said that women in traditionally-male network jobs often take (or as the more

specialists, rather than the classic view of teams that predicts greater satisfaction and efficiency from greater job variety and flexibility in deployment.

In contrast to SDTs, off-line participation has no effect on the 3 job characteristics discussed above. More significantly, it has a strong negative effect on the fourth characteristic -- task identity, but the explanation for this is unclear. In addition, as expected, department affiliation also has a strong negative effect on autonomy, significance, and identity. That is, on average, customer service representatives have less autonomy, ability to use their skills, and control over meeting customer needs than do network technicians.

Having identified the significant effects of SDTs on job characteristics, we need to consider the second question: do employees who volunteer for teams significantly differ from non-volunteers in ways that bias research results along dimensions of theoretical interest. 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 have better work attitudes to begin with, such as higher levels of satisfaction or commitment? These questions raise the "social information processing" and "dispositional" arguments posed by Salancik and Pfeffer (1978), Staw et. al. (1985, 1986), and others.

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.

junior employees, are left to take), installation jobs which are considered less skilled and challenging and less desirable because they involve more customer interaction.

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 biased 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 SDT members before they participated in the experiment, we can compare current volunteers and non-volunteers. A question on the survey asked employees if they would volunteer for SDTs if given the opportunity. Of the 430 employees in traditional work groups, 54 responded; 68 percent said they would volunteer while 32 percent said they would not. Using this question, I correlated the dummy variable for SDT-volunteers against the set of work characteristics and attitudes discussed in tables 3.3 and 3.4. SDT volunteers in network and customer services were significantly correlated with more positive attitudes towards self-directed teams ($r = .3-.6$), and with a willingness to accept a promotion ($r = .3$). With one exception, there were no significant correlations along the dimensions of job characteristics, work group composition, work group supervision, or work group responsibilities associated with SDTs, or with attitudinal outcome indices of satisfaction, commitment, and perceived group performance -- that is, the dimensions of theoretical interest. The exception is that SDT volunteers in network were significantly negatively correlated with multiskilling ($r = .24$). This suggests that technicians who prefer to specialize may be more likely to volunteer for SDTs as a way of maintaining that specialization, rather than SDTs leading to increased specialization. A regression of SDT-

volunteers on task variety while controlling for demographic characteristics, however, shows no significant effect of volunteerism. With respect to demographic characteristics, SDT volunteers in network, but not in customer services, were positively correlated with being female ($r = .27$), and negatively with non-white (non-white, $r = -.25$).

To further analyze whether SDT-volunteers are a predictor of variables of interest, I used regression and probit models to analyze the relationship between SDT volunteers and the job characteristics and attitudes of interest, while controlling for demographic characteristics. This analysis used the same models as reported in Table 3.5, but replaced SDT members with SDT volunteers. The question is whether volunteering for a self-directed team is a significant predictor of the job characteristics and attitudes of interest in this study. The results are reported in Tables 3.6 (job characteristics) and 3.7 (job attitudes). Being an SDT-volunteer has no significant relationship to any of the job characteristics, although it is weak determinant ($p = .10$) of current involvement in off-line participation. This finding 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. As we have seen, however, off-line participation is unrelated to job characteristics in the Hackman and Oldham framework. Moreover, SDT-volunteers are no more likely to have higher levels of satisfaction or organizational commitment (Table 3.7)¹⁹ -- that is, more positive attitudes prior to joining a self-directed group that might positively bias the outcomes associated with the work organization change itself.

To summarize the findings of this section, the reorganization of workers into self-directed teams is positively correlated with a set of enhanced job characteristics, work group responsibilities, group behavior, and perceptions of work performance. Traditionally-supervised work groups exhibit significant negative correlations with the same set of characteristics; and groups that participate in off-line problem-solving groups

¹⁹ The definitions of the overall satisfaction and commitment indices are found in Table 3.10, along with Cronbach's alpha reliability scale and the results of factor analysis for each index.

closely resemble the pattern of traditional groups. Some attitudinal differences are also apparent. These patterns are stronger among network technicians than among customer service representatives. By contrast, there are few consistent differences between traditional, participatory, and self-directed groups with respect to broader organizational and human resource practices such as downsizing, employment security, compensation, and control variables such as technology, geography, service market, and demographic characteristics.

Additionally, I used a number of methods to assess whether the prior attributes, job characteristics, and attitudes of workers in self-directed groups might explain the observed differences between SDTs, participatory, and traditional groups. Nothing in the current data suggests that prior conditions systematically bias the characteristics and attitudes of self-directed groups. Before turning to the full discussion of attitudinal and performance outcomes of work innovations, in the next section I describe the set of changes in managerial jobs associated with total quality and self-directed teams.

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 jobs²⁰. The primary effect on firstline supervisor jobs is an increased span of control: supervisors of traditional groups SDTs have an average span of 9.95 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

²⁰ 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.

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 "longterm 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 supervisors²¹. There are three exceptions to these patterns, and these are presented in Table 3.9. First, middle managers using self-directed teams are significantly 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. In fact, a second pattern in the data is suggestive here: firstline supervisors

²¹ This analysis is based on correlating job characteristics and attitudes of all managers and line supervisors against a weighted scale for the extent of participation in total quality and against a dummy variable for coordination of self-managed teams. For middle managers, 64 percent currently participate in total quality, including 55 percent who manage traditional work groups and 45 percent who manage SDTs. For supervisors, 55 percent currently participate, including 43 percent who supervise traditional groups and 57 percent who supervise SDTs. It was not feasible to eliminate from the analysis those managers who participate in both total quality and SDTs because of small numbers. Excluding middle managers who participate in self-directed teams would yield sample sizes of traditional (n = 26) and participatory (n = 67); for line supervisors, the sample sizes would be 30 traditional supervisors and 35 participating in total quality.

who have more to lose from the SDT program are generally not significantly correlated with positive attitudes towards self-directed teams, although they are correlated with overall support for the program. More importantly, supervising an SDT has significant negative correlations with supervisors' job satisfaction and employment security. In the multivariate analysis, I explore more fully this difference between the attitudes of middle managers and firstline supervisors associated with self-directed teams.

Third, middle managers involved in total quality have significant positive correlations with some dimensions of satisfaction and organizational commitment, while middle managers of SDTs do not. That is, there is some suggestion that middle managers may benefit from participation in total quality, but the pattern is weak and it is not born out for firstline supervisors.

3.6 Multivariate Analysis of Attitudinal Outcomes: Managers, Supervisors, and Workers Compared

In order to analyze the determinants of attitudinal outcomes in a multivariate framework, I formed indices of variables to simplify the data where possible, based on reliability and factor analysis. The definitions of all variables are found in Table 3.10, along with Cronbach's alpha reliability scales and the eigenvalues based on factor analysis.

To consider the effects of work organization and management structure, dummy variables were used for department (1 = customer services); management level (worker (omitted), first line supervisor, and middle manager; and membership in work groups (1 = self-directed team). Two types of competing organizational strategies were measured: job enhancement and downsizing. As discussed earlier, I relied on the Hackman and Oldham job diagnostics framework to measure job characteristics associated with self-directed teams. For managers, I included the size of the span of control which is highly correlated with the introduction of self-directed teams. Larger spans of control increase the workload of managers and are viewed by managers as a by-product of downsizing and streamlining of management ranks. There is a modest but significant correlation between increased spans of control and reported understaffing by managers ($r = .11$; $p < .04$).

Appropriate measures of downsizing and the effects of downsizing are difficult to conceptualize or operationalize in part because there are few measures that have been tested in the literature. I developed a series of measures which in theory would result from downsizing or which employees in qualitative interviews stated were the result of downsizing. The important question here concerns what is the relevant organizational unit of analysis? Are changes more likely to influence employee behavior if they occur at the corporate level, establishment-level, or work unit level? The answer is likely to vary by the type of industry and organization. An announced plant-wide shutdown, for example, should effect all plant employees equally, but is unlikely to seriously affect the workloads or perceptions of job security among corporate staff. In this case the corporation announced downsizing by attrition and early retirements across a several-state region.

I separated out two effects of downsizing: understaffing and loss of job security. With respect to understaffing, I hypothesize that the effects of downsizing should ripple randomly through the organization as employees leave or take early retirement and are not replaced. My hunch, therefore, is that workforce reductions at organizational units closest to the individual employee are the ones that will most effect his or her workload. I therefore measure changes in work group size on the assumption that as the remaining employees absorb the same workload as before, they should experience problems of understaffing. Measures of understaffing are significantly but modestly correlated with decreases in work group size in network ($r = .13, p < .05$)²². Managers of these groups are also likely to experience, or have to manage, the adverse effects of understaffing.

Perceptions of job security are likely to vary depending upon whether the certain districts are introducing labor-saving process improvements or whether the local market is contracting or expanding. I therefore asked employees to what extent their job security had declined “compared to several years ago.” In reality, however, measuring the effects of job insecurity is extremely difficult, and it is not possible to separate out the “objective” effects from employee perceptions. Perceptions are important, however, because they affect workers’ outlook and behavior at work.

To measure the effects of participation in off-line problem-solving, I used a scale of participation weighted by the number of monthly meetings attended by the employee. Training is the total sum of all the days of formal training reported by the employee (including technical, quality, basic, self-directed; and in addition for managers, general management, leadership, and labor relations training) and received in the two years prior to the survey. Compensation is measured by annual earnings brackets; and pay satisfaction is used as the employee’s relative assessment of her or his earnings because

²² A different dynamic occurred in customer services because office consolidations produced larger work groups at the same time that overall reductions were occurring. Changes in work group size did not effect work loads because call loads are assigned on an individual basis (eg., 900 calls per day per person).

external labor market wages were not available given the wide variation in regional location of the employees in the study²³.

Supervisory support is a scale of 5 items that measure the employee's evaluation of the kind of supervision received. It includes an assessment of the supervisor's ability to provide feedback and frequency of that feedback, support for employee participation and total quality, respect and fairness of treatment. The alpha reliability scale = .84; factor analysis produced 1 factor (eigenvalue = 2.48).

Industrial relations variables include measures of employee or co-worker relations, labor-management relations, and union membership. Although this is a unionized workplace, employees have the option to choose whether or not to become members of the union. Union membership serves as an indicator of support for the union as an organization. Demographic control variables include age, gender, race, company tenure, and years of education. A series of dummy variables provided controls for state location (for all employees). For network only, dummy variables were used for types of customers -- residential (omitted), small business, large business; and local geography -- suburban (omitted), urban, rural²⁴. Measures of variation in software technology (for customer services representatives) and modernization of plant and equipment (for network) were also included.²⁵

Three dependent variables were used: job satisfaction, overall satisfaction, and organizational commitment. Job satisfaction is a single-item question. Overall satisfaction is a seven-item scale that includes satisfaction with participation in decision-making, the job, promotion opportunities, pay, benefits, employment security, and the company in

²³ Note that there are no significant innovations in compensation or variations in systems across employees, so that compensation here measures the extent to which pay levels and pay satisfaction contribute to employee attitudes and behavior.

²⁴ Because customer service representatives serve the population of an entire state, and because those in the study were in residential services only, state level dummies captured variation in geographically-based service markets.

²⁵ Inclusion of measures of technology made no significant difference in the multivariate analyses, but did reduce the number of usable observations, so they were dropped in the full model reported here.

general (Cronbach's alpha = .80; eigenvalue = 2.60). Organizational commitment is a short three-item scale based on Lincoln and Kalleberg (1990). The reliability scale and factor analysis are low (Cronbach's alpha = .58; eigenvalue = .89).

Models of the determinants of job satisfaction, overall satisfaction, and organizational commitment are reported in Tables 3.11-3.16. The first three tables report the results of simple models testing the effects of work innovations (self-management and participation) while controlling for management and department position and demographic characteristics. In each case, participation in SDTs has a strong positive effect for all employees, while offline participation has no effect. Looking at sub-groups of employees, SDTs have a significant positive effect on workers' attitudes, a negative effect on firstline supervisors, and no effect on middle managers. This provides initial support for the hypotheses discussed earlier.

Turning to the full models (Tables 3.14-3.16), several patterns are noteworthy. First, with respect to all employees, the data support the Hackman and Oldham theory that job-enhancing characteristics of autonomy, significance, and identity have a significant positive effect on job satisfaction, overall satisfaction, and commitment. Workers obtain more enhanced jobs by moving into self-directed teams, which in effect, create jobs that have characteristics more similar to managerial jobs. Second, measures of downsizing, by contrast, have strong negative effect on employee attitudes, both through understaffing and through perceived loss of job security. As anticipated, departmental affiliation (in customer services) also has a negative effect on two out of the three dependent variables.

Third, participation in total quality has no effect. And finally, the overall model supports the idea that over and above the effects of work reorganization, a series of human resource (career advancement, compensation, and supervisory support) and industrial relations practices (employee and labor-management relations) provide a supportive work environment and enhance the quality of worklife for employees²⁶. The

²⁶ The lack of significance of training on employee attitudes is surprising, but probably has two explanations. First, the Bell system companies have historically provided high levels of training so that employees may take it for granted and variation within occupations is not great; second,

overall regression models explain 48 percent of the variation in overall satisfaction and 38 percent of the variation in organizational commitment.

Turning to the differences between workers, supervisors, and managers, several patterns are noteworthy. First, the differential effect of self-directed teams on workers and supervisors remains significant for job satisfaction. While the workers' satisfaction grows through job enhancement associated with self-management, supervisors' satisfaction with their jobs is negatively affected.

There are few studies that empirically test the effects of self-managed teams on both supervisors and workers. While the conventional wisdom is that supervisors will be adversely affected, some studies have found the opposite. Denison (1982), for example, studied manufacturing plants with and without self-managed teams and found that both workers and supervisors had higher levels of satisfaction in the team-based plants.

What is interesting and somewhat surprising in the current findings is that the negative effect on supervisors does not hold for measures of overall satisfaction, and the effect is actually positive (mildly significant, $p < .10$) for commitment. What this suggests is that while supervisors do not like the immediate effects on their jobs of self-directed teams, they demonstrate their commitment to the company by agreeing to participate in an innovation viewed by the company as positive and necessary for improving customer service and competitiveness.

Second, for managers and supervisors, the increased spans of control associated with self-directed teams have no significant effect. That is, though increased spans were hypothesized to increase managerial workloads, this change does not significantly affect managerial attitudes in this case.

In addition, the hypothesized positive affect of participatory programs on managers and supervisors is not born out in this model. Current participation in total quality does not positively affect managerial attitudes. In other specifications of the model, however, measures of cumulative participation did have some significant positive effects on

because of this, significant changes in training have not occurred; and third, the measures of training used in the study are relatively crude; more precise company data on the number of courses employees have taken in recent years were not available for analysis.

attitudinal measures for both supervisors and workers, but not for middle managers²⁷. This finding is interesting, and contrary to some research that shows that offline participation in problem-solving groups such as quality circles has short-term effects that do not last over time. Lawler and Mohrman (1987), for example, argued that there are “honeymoon” effects of quality circles so that the level of employee participation and positive results declined after an initial period of enthusiasm²⁸. Two interpretations are plausible: the cumulative measure may be picking up the effect of the longstanding QWL program; or there may be a behavioral change resulting from accumulated participation. With regard to the first explanation, by using cumulative measures in this case, we add the effect of the longstanding QWL program which has since been superseded by the total quality program. Because the QWL program focused on improving the quality of worklife and was not geared toward quality or performance improvements, it was viewed more as a benefit for employees, and both workers and supervisors may have gained from the improvements in communication and the breaking down of barriers between management and labor. Alternatively, one could imagine that those employees who have participated over time -- beginning with the QWL program and continuing with the total quality program -- have accumulated the kind of experience with participation so that it has become a truly effective tool for changing the nature of labor-management communications and joint problem-solving behavior. This change may translate into

²⁷ Cumulative participation was measured as the sum of different types of participation which employees “had ever” participated in. In this case, participative programs began in 1980 with QWL. Cumulative participation has a strong positive effect on supervisors’ job satisfaction and commitment ($p. < .05$), but not overall satisfaction; for workers, it has a mildly significant effect on job satisfaction ($p. < .10$), a strong effect on overall satisfaction ($p. < .01$), and no effect on commitment.

²⁸ In a longitudinal quasi-experiment, for example, Griffin (1988) found significant improvement in job attitudes in the first 18 months but not after 36; Ledford and Mohrman (1988) found more positive attitudes among current members of quality circles than among former members. A literature review by Van Fleet and Griffin (1989) also finds short term effects of quality circles, with no longterm effects.

higher levels of satisfaction at work. Both interpretations are plausible, and the data do not allow us to sort out these alternative possibilities.

To summarize the findings of this section, the data from this study support most of the hypothesized relationships between changing work organization, human resource, and industrial relations practices on the one hand, and the work-related attitudes of employees on the other. Job enhancement achieved through self-directed teams improves workers' satisfaction with their jobs, but the effect is stronger for network employees. For workers in general, working in customer services has a negative effect on job satisfaction compared to network, but does not affect overall satisfaction or commitment. Additionally, SDTs have a negative effect on supervisors' jobs. Surprisingly, however, supervisors' willingness to participate in SDT experiments enhances, or may be an indicator of, their commitment to help the company succeed. Middle managers' attitudes are not directly affected by the introduction of this work innovation.

The data provide mixed support for the hypothesized relationships between participation and employee attitudes. Workers are not positively affected by participation in total quality, but neither are supervisors and managers. Cumulative participation in joint problem-solving (from QWL total quality) does, however, positively affect both supervisors and workers.

Finally, after controlling for variation in department and managerial position, two strong findings emerge. First, job enhancement and downsizing strategies have competing positive and negative effects on the satisfaction and commitment of all employees, regardless of department, management position, state location, or variation in demographic characteristics. Second, there is considerable support for the idea that a combination of job design, human resource, and industrial relations practices that have come to be associated with "high performance work systems" do in fact benefit employees with respect to their satisfaction with their daily work lives and their sense of commitment to the organizations in which they work. This is the first piece of evidence needed to build a "mutual gains argument" -- that is, the argument that both employees and firms stand to gain from the introduction of high performance work systems. I turn now to the second

half of the equation, that firms also benefit through improvements in work quality and performance.

3.7 The Effects of Work Innovations on Costs, Quality, and Productivity: Evidence from Network and Customer Services Compared

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 SDTs. 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 data²⁹. It also compares these outcomes to employee perceptions of work group quality and quality improvement.

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

²⁹ The analysis is limited to workers because objective company performance measures for managers were not available at this time.

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.

This section uses the model presented in Figure 3.1 and uses the same definitions of variables those used in section 3.6. The hypothesized effects of innovations are also similar. To summarize briefly, there are three hypothesized effects of work innovations on performance and productivity.

Hypothesis 1: Self-directed teams should positively affect quality and customer service both directly and indirectly through changes in attitudes or work group processes associated with teams. Performance effects should be greater in network than in customer services because of the greater technological and organizational constraints in the latter case, as discussed in the previous sections. Small improvements in quality and customer service are also likely to result from participation in total quality because of its positive effect on employee cooperation and problem-solving.

Hypothesis 2: The productivity effects of SDTs on individual workers are uncertain. To the extent that workers absorb supervisory tasks, they may either reduce the amount of time devoted to productive activities or may increase overall work hours to accommodate the increased workload. In either case, hours per productive task may decline. Alternatively, the effects of group learning and problem-solving may create increased efficiencies that translate into higher productivity. Participation in total quality should negatively affect productivity based on the amount of time that workers are pulled away from productive work for meetings.

Hypothesis 3: Self-directed teams reduce indirect labor costs through the elimination of firstline supervisors. Total costs savings will be contingent on the size of the span

of control of supervisors. The effect of participation in total quality is likely to be insignificant.

I explore these hypotheses in the following sections. The first section analyzes and compares the determinants of subjective reports of work group quality, occupationally-specific objective data, and work process outcomes for workers in customer services. The next section does the same for network technicians. This is followed by an evaluation of savings in indirect labor costs associated with various levels of adoption of self-directed teams, which pertains to both network and customer services.

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 the customer services department. 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 versa³⁰.

Table 3.17 provides a simple comparison of the sales revenues, sales per access line, and percent objectives met for employees in self-directed teams versus traditional work groups.. The average monthly sales per employee in SDTs versus TWGs 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 SDTs and \$73.66 for TWGs, but the difference does not pass the test of significance at the 10% level of probability of error.

In order to test the performance model, I first analyzed the relationship between membership in self-directed or participatory groups and work group processes that both

³⁰ 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.

theory and qualitative interviews indicated should improve group performance. These include the absorption of quality control monitoring, group learning, and greater interaction with subject matter experts outside the group (I refer to the latter as cross-functional problem-solving. The results, presented in Table 3.18, show that membership in a self-directed team is a significant predictor of group learning and cross-functional interaction, while offline participation is 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 as dependent variables 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). 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 SDTs but only 17 percent of TWGs said that their work group quality was "much better" than it was two years earlier.

The comparative results of three performance models are found in Tables 3.19-3.21. In the short model, which assesses the relative impact of participatory and self-management on performance while controlling for demographic variation, membership in self-directed teams is the only significant predictor of both subjective measures as well as monthly sales revenues. In the second model which replicates the variables used in the attitudinal models, SDTs continue to be significant predictors of these three measures of performance. Membership in an SDT increases monthly sales by \$927.15. 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.

The third model includes the moderating effects of attitudes (job satisfaction and organizational commitment) and the three work group processes discussed above. While membership in SDTs continues to be a strong significant predictor in this equation, the job satisfaction and group teaching behavior also positively affect perceived group quality and quality improvement, but are not significant in the revenue equation. SDT membership raises monthly sales by \$972 in this specification.

These findings are quite robust under various specifications that were explored in this analysis. It is 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 line³¹.

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

³¹ For sales revenues, SDT volunteer (coef. = -79.50, p.<.08); for sales objectives; SDT volunteer (coef. = -1222.75, p.<.03); for RPAL, SDT volunteer (coef. = -8.56, p.<.03).

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 SDTs and TWGs in the first half of 1993; SDTs thereafter show greater improvement (see Table 3.22).

Network

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 SDTs 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 hours data. This may inflate hours overall, but should not systematically affect traditional groups differently than self-managed 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-managed, unless self-managed 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 17-month 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 3.22) are not significantly different for the two groups. The only consistent difference between SDTs and TWGs 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 SDTs 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 SDTs 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. SDTs also undertake more training in group problem-solving and decision-making. In fact, one would expect the number of hours taken by SDTs 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, SDTs 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 data, as shown in Table 3.23. In the full model which controls for job characteristics, human resource and industrial relations practices, demographic characteristics, and external environmental factors, SDTs 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, SDTs 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 SDTs.

The estimated extra hours are consistent with the SDT team statements in field interviews that they use one day per week to absorb supervisory tasks. If SDTs average 8 members per team (multiplied by 5.5 hours per month, or 7.5 hours per month of “non-productive” hours are included), then they use between 44 and 60 hours per month to do what supervisors did fulltime (on average, supervisors work 174 hours per month plus 11 hours of overtime, or a total of 185 hours per month)³². That is, network SDTs do the

³² Supervisory hours = (40 hrs/week * 4.3 wks/month) = 174 + 11 ot/mo. (on average) = 185 hours per month.

work of supervisors in 25-32 percent of the time that the supervisor used, depending upon which estimates are employed³³.

This is another example of how SDTs in network differ from those in customer services. In brief, network SDTs absorb many more supervisory tasks than do customer service SDTs 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, SDTs 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. Tables 3.25 and 3.28 present the analysis of work process and performance outcomes for network comparable to those reported for customer services above. Participation in SDTs is a significant and strong predictor of all three process variables (quality inspection, teaching, and cross-functional problem-solving). Offline participation is also positive (but less significant for teaching and cross-functional behavior, but mildly negative with respect to integrating quality inspections. In 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)³⁴. In the third model, the moderating

³³ $44/174 = 25.2$; $60/185 = 32.4$.

variables absorb the effects of the team dummy. Group teaching behavior predicts group quality while organizational commitment is a significant determinant of quality improvement.

Customer Services and Network Compared

The results of the performance models raise both methodological and theoretical questions. The first question is why the models do a better job of explaining objective data in customer services than in network. The second question is why, overall, the performance models do not do as good a job of predicting performance -- whether perceived or objective -- as they do of predicting attitudes.

With respect to the first question, my hunch is 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 weak³⁵. 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. Network technicians, by contrast, 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

³⁴ 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).

³⁵ 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.

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 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. More generally, measures of the state of plant and equipment in this industry are difficult to arrive at. Some evidence that this methodological problem is at work is evident if we return to Table 3.27. Unlike the attitudinal and behavioral models (or the performance models for customer services) in which state dummies are rarely significant, the effects of variation in state location are strong and highly significant and account for the majority of variation in the objective performance model; and the overall fit, at least for "missed appointments" is quite high ($r^2 = .49$).

With respect to the question of goodness of fit for the attitudinal versus performance model, the most obvious explanation is common method variance, discussed in section 3.3 above. Higher correlations between questionnaire answers from the same source are expected. If this were the explanation, however, we would expect the models of perceived performance to be quite similar to the satisfaction and commitment models -- and they are not.

There are two other plausible explanations. First, there are many dimensions of network quality and customer service that are not captured in traditional company measures, including a) direct customer satisfaction and survey responses; b) extent of

preventative maintenance; c) the actual quality of repairs completed; d) innovative approaches to solving problems; e) average cycle time in responding to service orders and customer problem reports. This suggests, as many observers have noted, that companies introducing new forms of work organization need to explore appropriate performance measures that capture anticipated results. Additionally, it is plausible that that different factors at work shape attitudes such as satisfaction or commitment on the one hand, and performance on the other. The job characteristics model may be appropriate for predicting attitudes, but models that capture the actual changes in work group processes and behavior are more likely to explain performance outcomes. Cohen et. al. (1994) have recently made this argument and found that work processes such as coordination and problem-solving expertise have significant positive effects on self-reported outcomes. The positive effects of internal group teaching and problem-solving behavior in my model are consistent with their findings, and suggest that this would be a productive avenue for future research.

Indirect Labor Costs

The use of SDTs 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. In theory, if workers absorb supervisory duties such as scheduling, monitoring, reporting, and/or quality control, the company may reduce the number of frontline supervisors, increase their span of control, and redesign their jobs so that they focus more on improving employee development, quality, and customer service. The amount of savings per year will depend upon the extent of adoption of SDTs and the average increase in the span of control of first line supervisors. In the current experiment, “coaches” of SDTs usually have responsibility for two groups rather than one -- either two SDTs, or full supervisory responsibility for a “traditional group” plus a 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 SDTs 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 SDTs 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 SDTs. 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 for the 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 found in the table below.

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-managed and the spans of control of supervisors triples (from 8-10 to 24-30), one-quarter of the supervisors may be surplus. If eventually all of the workforce becomes self-managed 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 below. They range from \$113-\$144 million at the conservative end to \$225-\$288 million at the high end.

<u>Estimated Cost Savings Associated With SDTs</u>		
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
<u>Supervisory Reductions:</u>		
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.		

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.

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 62-75% 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 line 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.

Part IV:
Conclusions

Part IV: Conclusions

Implications for Future Research

In this study, I have explored the development and transformation of work systems in the telecommunications industry in the pre- and post-divestiture periods. Through a detailed examination of the particular characteristics of the industry, I have found that current theories of work transformation and industrial performance that elaborate the shift from mass production to flexible production systems do not explain key aspects of work restructuring in this industry. Briefly stated, current theories posit two alternative, coherent strategies for competitiveness in the global economy: a high quality road based on high commitment or high performance human resource practices and a cost minimization strategy built on low wage, low commitment labor practices. I have found, by contrast, that work restructuring in telecommunications services involves complex and contradictory strategies that are not yet coherent and which do not appear to lead in the direction of either hypothesized ideal-typical model. This is true for two reasons: the first relates to the historical development of work systems in telecommunications services; the second concerns the thrust of new telecommunications technologies that have quite different implications for work reorganization than do flexible manufacturing technologies.

With respect to the first issue, I have argued that the Bell System developed a bureaucratic form of production that differed in significant ways from large scale manufacturing enterprises where the logic of mass production more firmly took root. The systemness of telecommunications network technology required highly standardized operating procedures developed and administered through a centralized top-down organization. In the post World War period, AT&T was able to reap scale economies and reduce unit costs in operator services by developing self-service technologies that shifted the labor content of operator jobs to customers through self-serve long distance, local, and credit card dialing. As the service market expanded, however, the costs of labor in other areas -- particular network construction and maintenance and customer service operations -- rose proportionately. The benefits associated with mass production -- either from the perspective of the learning curve or from the perspective of high volume driving down unit

costs -- could not be fully realized. Because network and customer service jobs could not be rationalized either through scientific management or machine pacing, AT&T attempted to increase productivity through management methods of exacting adherence to performance standards and by increasing the ratio of managers to workers. This management strategy coupled with the increase in accountability and reporting requirements of regulators led to a highly bureaucratic form of service production in the post World War II period.

This has meant that in the current period when firms face heightened and new forms of competition based on quality, costs, and customization, the central competitive problem for former Bell System companies is the inherited bureaucracy. From the perspective of former Bell companies, therefore, efforts at work restructuring have focused more on solving the central problems of bureaucracy (high cost and inefficiency) rather than solving the problems of mass production (poor quality). This argument is not meant to create a false dichotomy because clearly large mass production enterprises have their share of bureaucratic inefficiency. The argument is one of emphasis: in the Bell System, the bureaucracy problem -- defined as including an inefficient functional hierarchical structure, outmoded information systems embedded in a centralized bureaucracy, high ratios of managers-to-workers, and high relative labor costs -- has defined current approaches to organizational reform.

With respect to the second reason -- the role of technology -- unlike CNC and other forms of flexible manufacturing technologies that increase the competitiveness of decentralized and batch production units, advances in telecommunications technologies favor greater integration and organizational centralization. In manufacturing, there is a congruence between the decentralizing logic of new technologies and the organizational logic of work systems built on greater worker participation in decision-making. In telecommunications, by contrast, the decentralizing thrust of participatory work systems is at odds with new information systems that impose constraints of worker decision-making and have embedded in them prior organizational and customer service decisions. The difference in the role of technology in this industry, I have argued, is the result of the digitalization of the network, which provides unparalleled advances in the amount and

type of information that may be transmitted over one line. While market deregulation envisioned multiple providers in different service products (long distance, local telephone, entertainment, data information, fax, etc.), consumers prefer one-stop shopping in which integrated services may be purchased through one provider.

To compete on quality, costs, and customized services, I have argued that the Bell companies have adopted two competing approaches to organizational reform -- market-sensitive decentralization and centralized remote servicing. The first strategy utilizes job-enhancing strategies such as total quality, employee participation, and autonomous work groups first developed in manufacturing contexts and consistent with theories of high performance emphasizing the strategic use of human resources for competitiveness. Advances in software technology and systems reengineering, however, that lead to macro-level organizational consolidation, also offer improvements in quality and service that may swamp more micro-level, decentralized efforts. Software-driven expert systems and automatic call distribution systems decrease labor costs through increased machine pacing and routinization of work. Reengineering of information systems reduces the labor content of jobs, particularly lower skilled clerical work, while simultaneously improving quality and service by reducing customer response time. Thus these technologically-driven reforms that offer cost and quality advantages undermine components of the human resource strategy -- including greater worker autonomy and use of skill, flexible deployment, and employment security -- components that are considered central to the coherence of high performance work systems as elaborated in the context of flexible manufacturing.

I have argued that the historical and particular characteristics of the telecommunications industry and technology challenge current theories of work organization and internal labor markets. In the quantitative case study I argued that the particular conditions at the company in question, including the favorable labor-management climate, provided a better or best case test so that generalizations based on this case must be undertaken cautiously. Does this mean, therefore, that this study presents a unique case with limited broader implications? There are several reasons why this is not the case.

My focus on industry specifics grows out of theoretical assumptions as to the importance of the nature of work, technology, and product and labor market institutions in shaping work systems. There are a number of ways, however, in which historically-grounded research has implications that go beyond its point of departure. First, by examining an industry that on its face has characteristics quite similar to mass production manufacturing, this study raises doubts about theories of work transformation that have grown out of manufacturing contexts. If this case raises doubts, then it suggests that more refined and complex theories are likely to emerge from additional industry and occupation-specific research. This is an important direction for future investigation and the direction that many researchers are taking.

Second, this study illustrates the value of research that is interdisciplinary in approach and combines historical, qualitative, and quantitative methods. The interdisciplinary approach allows researchers to move beyond the limits of viewing a problem from one particular angle. In this case, for example, the traditional approach in industrial relations of focusing on the shop floor and on non-management workers initially limited my conceptualization of restructuring to the work unit; by moving to an organization-wide perspective, I was able to conceptualize the contradictory changes occurring across different departments and levels of management -- a perspective that enriched the subsequent analysis and contribution to theory. This suggests that industrial relations research would benefit from going beyond the unionized workforce and the shop floor to examine the ways in which reorganization of the service and management side of organizations affects decisions on the manufacturing side. In addition, the combined use of historical and qualitative material contributed to a more rigorous and reliable quantitative study than would otherwise have been possible.

Third, bringing the perspective of workers back into industrial relations research enriches our understanding of the meaning of workplace change. While the performance effects of restructuring are central to understanding the viability of new work systems, so too are their effects on employee attitudes and wellbeing.

Fourth, this research raises a number of interesting questions or hypotheses to pursue across organizations and firms more generally. The most significant, I believe, is

the idea of uncoordinated and contradictory approaches to organizational reform. While I have outlined several specific ways that contradictions play out in this industry, some examples -- such as the contradiction between worker participation and loss of job security -- are notable across many industries, firms, and organizational contexts. What are the likely outcomes of this lack of reciprocity -- that is, when firms decrease their commitment to employees at the same time that they demand heightened employee commitment and effort? My results show that job enhancement and downsizing strategies have opposite effects on employee attitudes (satisfaction and commitment). The effect of the two strategies in the performance models is more ambiguous, significant in some cases but only indirectly through the effect on employee attitudes. The negative attitudinal effects of downsizing, however, may be swamped by the immediate cost-savings enjoyed by firms. The important question is to assess the long term quality and productivity implications of decreased employee commitment and demoralization. This study begins to address this issue, but much more research is needed.

This study also contributes to an emerging debate in the industrial performance literature over the relative effectiveness of decentralized and centralized forms of production systems and management methods. In other work I have argued for a distinction between decentralized "team-based" systems built around autonomous work groups and more centralized "lean" systems that draw on workers' input through off-line problem-solving but do not delegate authority (Appelbaum and Batt 1994). I have argued that both forms may produce performance gains, but that workers stand to gain more from team systems because of the associated job enhancement. In the auto industry, the debate has focused on the relative advantages of Saturn, where self-managed teams are a prominent feature of work organization, and NUMMI, where highly taylorized jobs are effectively combined with off-line participation by workers in joint problem-solving activities -- what Adler refers to as democratic taylorism. Adler contends that assembly-line production requires high levels of standardization, limiting the utility of autonomous teams.

The findings in this thesis with respect to these different forms of worker participation are quite surprising and provocative -- both supporting and refuting the

distinction between team-based and lean systems. Supporting the distinction is the empirical analysis that found no evidence that participation in off-line total quality improvement teams improved workers' attitudes or performance. Self-directed teams, by contrast, brought about significant mutual gains for firms and workers. Firms benefit from teams through higher sales revenues as well as improved customer service and quality, as reported by workers. The multivariate analysis of data in Part III demonstrates the significant differences in job characteristics, work group processes, perceived customer service quality, and objective sales revenue outcomes associated with teams. Firms also save on indirect labor costs.

Workers benefit as well, according to the survey data, because of the added job satisfaction and pride in work accomplishment associated with greater autonomy and relief from supervision, greater on-the-job learning through team-mates and better use of skills, and ability to more fully meet customer demands. Workers overwhelmingly said they liked their jobs better. These findings are robust, despite the fact that in this case, the shift to self-management was not accompanied by any benefits for workers in terms of reward or compensation structures. Instead, network technicians in teams gave up their right to temporary supervisors' pay as negotiated in the union contract.

Clearly first line supervisors are the losers, not only due to displacement, but due to the negative effects of teams on the job satisfaction of the remaining supervisors, as demonstrated in multivariate analyses in Part III. The results for the remaining supervisors and middle managers, however, are contingent upon how their jobs and responsibilities are redesigned: qualitative research in this study provided examples of how first line supervisors' jobs may be enhanced by eliminating the mundane monitoring tasks and increasing coordinating and managerial responsibilities. The use of self-managed teams as a basis for new work organization, therefore, appears to offer a win-win situation for firms, non-management workers, and even line managers under the certain conditions.

On the other hand, the evidence suggests that these self-directed team experiments are at odds with the team-based system I have previously discussed as well as the ideal-typical model in the STS literature in at least two ways. First, both the qualitative and quantitative evidence suggests that the dominant motivation for management interest in

self-directed teams is cost-cutting and downsizing. In the case of Bell companies, because first line supervisors comprise over fifty percent of the managerial workforce, firms that extensively implement self-managed teams would realize substantial cost reductions. While the theoretical literature does not emphasize this outcome, Part III of this study documents the dramatic indirect cost savings associated with autonomous team-based production. This reform is also consistent with the direction of some uses of new information technologies, which have extended electronic reporting into network craft and customer service operations over the last decade -- thereby reducing the monitoring tasks of supervisors which were their historic raison d'être.

This finding has quite broad implications. As U.S. firms tackle problems of bureaucracy and seek to reduce the size of managerial staff (which far exceeds the size of management in German and Japanese firms), they may view self-managed teams primarily as a tool to accomplish this objective. If firms establish team systems of work primarily as a means of cost-cutting, however, are the learning and performance improvements likely to be realized? In the current study, for example, while most of the teams were initiated in an environment of organizational downsizing, the company did provide considerable resources, training, and managerial support for the teams. That is, it was not motivated strictly by cost-cutting, and the company did not make a formal or explicit link between the elimination of management layers and the team program; the overwhelming majority of workers surveyed said their teams were not set up in response to a supervisor leaving or retiring. This case, therefore, does not directly test the effects of teams set up with the primary purpose of cost-cutting and downsizing -- a context that may produce quite different results.

A second contrast to the theoretical literature on teams concerns the redesign of jobs. I found that workers in network teams had chosen to increase task specialization -- in contrast to the STS notion that teams enhance variety and flexibility. Moreover, I found that a conflict existed between the team's need for a separate geographic area or "turf" over which it had full responsibility (the small business concept) and the management need for more flexible deployment of network technicians across larger geographic areas.

There were similar tensions in customer services where the consolidation of workers into megacenters reduces the ability of teams to create conditions conducive to “team or small business-like” environment. The use of expert systems also contrasts with the directive to increase autonomy and discretion, and the effect of new information systems in customer services is to create much more Taylorized and routinized jobs at the same time that workers absorbed supervisory tasks. This finding resonates with Adler’s concept of democratic Taylorism, but in the context of self-managed team-based organization. We are left with more questions than answers in this case because the industry, technology, and management choices over the reorganization of work continue to be in flux. The findings are suggestive, however, that new forms of work organization may be emerging that do not conform to prior dichotomies of broad versus narrow, high versus low skill, responsible versus Taylorized jobs. New forms of work organization and job design may combine what appear to be contradictory elements in new ways -- such as highly skilled and specialized jobs that are tightly monitored electronically, or semi-skilled jobs that are self-managed but highly routinized. The question for future research is to consider the implications of these new forms for firm performance and employee welfare.

Other findings with respect to teams raise additional questions. This study found strong positive subjective and objective performance outcomes for sales teams, as well as significant attitudinal and behavioral (or work process) effects for all teams. There was some support that both the attitudinal and work process effects, in turn, lead to better (self-reported) performance. That is, workers in teams perceive their performance to improve both because they like their jobs better and because they learn more from each other and use their skills more effectively. But what exactly occurs in autonomous work teams that leads to better outcomes? Is it on-going learning? Is it a sense of responsibility associated with small business “entrepreneurship?” Is it more creative problem-solving? How much does it depend on the nature of work, skill level, technology, and organizational context? Future research needs to address these questions more fully.

There are other issues raised by this research which I was unable to pursue to the extent I had originally intended and which I hope to pursue in the future. First, the role and strategic choices available for unions in workplace restructuring are an important but

less developed subtext in this research. I have argued that the history of labor-management relations in telecommunications was historically much more cooperative than in most industries, and that adversarialism has increased since divestiture. Unlike many industries in which labor has borne the brunt of restructuring, however, the extraordinarily cash-rich Bell System companies have been able to buy labor peace until now through generous severance packages, pension supplements, and tuition-aid for retraining outside of the industry. In other ways, however, the central issues in labor-management relations reflect broader themes in U.S. industrial relations. Industry-level pattern bargaining has been decentralized to enterprise-level, regional districts, and this trend has revealed the effects of historic variation in union militancy and led to greater variation in current strategic union approaches to restructuring. In Part II, I outlined these alternative approaches which range from increased militancy and adversarialism to joint collaboration in strategic decision-making. A quick scan across the regional Bell companies shows that where the regional union leadership has promoted participation in work innovations, workers have followed; where district leadership have taken a hands-off approach, so have members.

I then focused particular attention in Part III on a regional company characterized by high levels of historic and on-going labor-management collaboration. In this case study, I argued that the union used participation in quality and job-enhancing workplace innovations to help preserve jobs as well as the union's institutional security. Support for total quality built goodwill between management and labor. Self-managed teams not only improved workers' jobs, but by shifting the burden of downsizing to management ranks, the union improved the odds of job security for workers as well as sustained membership levels for its own institutional security. The more difficult questions, however, lie ahead. As companies take on macro-level restructuring, consolidation, and reengineering with anticipated job loss for non-management ranks, the dilemmas facing unions multiply. This thesis documents several joint efforts and collaborative relationships that have collapsed or are collapsing under the weight of anticipated force reductions and dislocations. The question remains as to how unions will balance collaboration and conflict in the coming period of further deregulation when greater forced reductions are anticipated with less

generous payouts over shorter time horizons. The direction for industrial relations in this industry therefore, as in others, remains highly uncertain.

Additional questions for future research concern the direction of change in the organization of work and demand for skill. With respect to the new technical workforce, for example -- in this industry as well as others -- we know extraordinarily little, with rare exceptions (e.g., Barley 1995). In the Bell System, computer and information systems specialists, on the one hand, and computer monitoring clerks, on the other, are replacing craft workers with electromechanical skills. These jobs are the critical technical jobs of the new telecommunications industry. What do the new jobs consist of? Why are they frequently defined as management? What is the ratio of specialists to clerks? How fast are technical skills changing, how do workers keep pace with these changes, and what do their career paths consist of?

A similar set of questions remains unanswered with respect to customer service positions. I have shown that the bulk of customer service positions (serving residential customers) increasingly resemble routinized operator or telemarketing jobs, in contrast to the universal or "one-stop shop" approach advocated by total quality experts and currently reserved for business customers. Job ladders in customer services, therefore, parallel product market segmentation, with the more experienced service representatives holding broad and varied jobs and serving large business clients. Is this the model for the future? Companies continue to debate the issue. A useful direction for future research is cross-firm and cross-industry comparisons as to the performance outcomes of different approaches to work organization and job design in customer services.

A third issue with respect to work reorganization concerns the implications for jobs and performance outcomes of process reengineering. While it is the current preferred management tool for macro-level reorganization, companies in telecommunications and across the country are spending hundreds of millions of dollars on this approach while little case evidence and no systematic evidence exists as to its effectiveness. Are workers in reengineered jobs more productive, and do they in fact require, as theorists argue, higher skills levels and broader problem-solving abilities than in the past? The minimal research on this issue conducted in this thesis suggests that process reengineering is much

more complex and difficult to implement than theorists initially portrayed; and like technology decisions, the direction and outcomes of process reengineering are contingent upon management objectives and managerial choice. The outcomes of reengineering for firm performance as well as the jobs of survivor workforces are far from clear.

The tumultuous changes in this industry, therefore, are likely to continue for some time with no clear models or coherent work systems emerging. This period of experimentation is likely to produce new forms of work organization and internal labor markets which have elements that appear quite contradictory or incongruent. The question is whether they will be able to offer sustainable competitiveness, and levels of productivity growth and employee welfare comparable to prior systems.

REFERENCES

REFERENCES

- Adler, Paul. 1993. "The Learning Bureaucracy: New United Motor Manufacturing, Inc." In Barry Shaw and Larry Cummings, eds., Research in Organizational Behavior 15:111-194. Greenwich, CT: JAI Press.
- Adler, Paul, and Robert Cole. 1993. "Designed for Learning: A Tale of Two Auto Plants." Sloan Management Review (Spring):85-94.
- Alleman, James. 1989. Perspectives on the Telephone Industry: The Challenge for the Future. New York: Harper and Row.
- Alic, John A. 1990. "Who Designs Work? Organizing Production in an Age of High Technology." Technology in Society 12:301-317.
- Althaus, Robert, and Arne Kalleberg. 1981. "Firms, Occupations, and the Structure of Labor Markets." In Ivan Berg's, ed., Sociological Perspectives on Labor Markets. New York: Academic Press, pp. 119-45.
- American Management Association (AMA). 1992. Downsizing and Assistance to Displaced Workers. New York: AMA.
- Andress, Frank J. 1954. "The Learning Curve as a Production Tool." Harvard Business Review January-February.
- Ancona, Deborah, and David Caldwell. 1992. "Bridging the Boundary: External Activity and Performance in Organizational Teams." Administrative Science Quarterly 37(December):634-665.
- Appelbaum, Eileen, and Rosemary Batt. 1994. The New American Workplace: Transforming Work Systems in the United States. Ithaca, NY: Cornell ILR Press.
- Appelbaum, Eileen, Thomas Bailey, Peter Berg, and Arne Kalleberg. 1994. "Cross Industry Employee/Employer Survey." Pilot Project Report on Apparel. Washington, DC: Economic Policy Institute.
- Appelbaum, Eileen, and Peter Berg. 1995. "Financial Market Constraints and Business Strategy in the U.S." Economic Policy Institute, Washington, DC: Manuscript.
- Aronson, Jonathon, and Peter Cowhey. 1988. "When Countries Talk: International Trade in Telecommunications Services." Lexington, MA: American Enterprise Institute/Ballinger.
- Arthur, Jeffrey B. 1991. "The Link Between Business Strategy and Industrial Relations Systems in American Steel Minimills." Industrial and Labor Relations Review 45, 3(April):488-506.

Bahr, Morton, and William Ketchum. 1993. "Workplace of the Future." Human Resource Management 32.

Bailey, Thomas. 1989. "Changes in the Nature and Structure of Work: Implications for Skill Requirements and Skill Formation." Technical Paper No. 9. November. Conservation of Human Resources, Columbia University.

Bailey, Thomas. 1992. "Discretionary Effort and the Organization of Work: Employee Participation and Work Reform Since Hawthorne." Manuscript. Paper prepared for the Alfred P. Sloan Foundation. August.

Baran, Barbara, and Jana Gold. 1988. "New Markets and New Technologies: Work Reorganization and Changing Skill Patterns in Three White Collar Service Industries." Prepared for the Carnegie Forum on Education and the Economy. Berkeley Roundtable on the International Economy. March.

Barley, Steve, ed. 1996. Between Technology and Society: Technical Work in the Emerging Economy. Ithaca, NY: Cornell University ILR Press.

Barnard, Chester. 1938. The Functions of the Executive. Cambridge: Harvard University Press.

Bishop, John. 1994. "The Incidence of and Payoff to Employer Training." Working Paper 94-17. Center for Advanced Human Resource Studies. Industrial and Labor Relations School, Cornell University.

Bolter, Walter. 1990. Telecommunications Policy for the 1990s and beyond. New York: M.E. Sharpe.

Baron, James and William Bielby. 1986. "The Proliferation of Job Titles in Organizations." ASQ 31(December):561-586.

Baron, James, Alison Davis-Blake, and William Bielby. 1986. "The Structure of Opportunity: How Promotion Ladders Vary Within and Among Organizations." ASQ 31(June):248-273.

Baron, James, P. Devereaus Jennings, and Frank Dobbin. 1988. "Mission Control? The Development of Personnel Systems in U.S. Industry." American Sociological Review 53(August):497-514.

Baron, James, and Pfeffer, Jeffrey. 1988. "Taking the Workers Back Out: Recent Trends in the Structuring of Employment." In Barry Straw and L.L. Cummings, eds., Research in Organizational Behavior 10:257-304. Greenwich, CT: JAI Press.

Barrick, M.R., and R.A. Alexander. 1992. "Estimating the benefits of quality circle intervention." Journal of Organizational Behavior 13:31-47.

Bartel, Ann. 1991. "Productivity Gains from the Implementation of Employee Training Programs." NBER Working Paper No. 3893. November.

- Batt, Rosemary, and Paul Osterman. 1993a. A National Policy for Workplace Training. Washington, DC: Economic Policy Institute.
- Batt, Rosemary, and Paul Osterman. 1993b. Workplace Training Policy: Case Studies from State and Local Experience. Washington, DC: Economic Policy Institute.
- Baumol, William, and J. Gregory Sidak. 1994. Toward Competition in Local Telephony. Cambridge, MA, and Washington, D.C.: MIT Press and The American Enterprise Institute for Public Policy Research.
- Becker, Gary. 1964. Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education. New York: NBER.
- Beekun, R.I. 1989. "Assessing the Effectiveness of Sociotechnical Interventions: Antidote or Fad?" Human Relations 10:877-897.
- Beer, M., B. Spector, P. Lawrence, D. Mills, and R. Walton. 1985. Human Resource Management. New York.
- Berg, Peter, Eileen Appelbaum, Thomas Bailey, and Arne L. Kalleberg. 1995. "The Performance Effects of Modular Production in the Apparel Industry." Economics Policy Institute, Washington, DC. Unpublished manuscript.
- Berggren, Christian. 1992. Alternatives to Lean Production: Work Organization in the Swedish Auto Industry. Ithaca, NY: Cornell University ILR Press.
- Berggren, Christian. 1994. "NUMMI vs. Uddevalla." Sloan Management Review (Winter):37-49.
- Bielby, William, and James Baron. 1983. "Organization, Technology, and Worker Attachment of the Firm." In Donald Treiman and Robert Robertson's, eds., Research In Social Mobility. Greenwich, CT: JAI Press.
- Blinder, Alan, ed. 1991. Paying for Productivity. Washington, DC: The Brookings Institution.
- Bradley, Stephen, and Jerry Hausman. 1989. Future Competition in Telecommunications. Boston, MA: Harvard Business School Press.
- Bradley, Stephen, Jerry Hausman, and Richard Nolan. 1993. Globalization, Technology, and Competition: The Fusion of Computers and Telecommunications in the 1990s. Boston, MA: Harvard Business School Press.
- Brock, Gerald W. 1981. The Telecommunications Industry: The Dynamics of Market Structure. Cambridge, MA: Harvard University Press.

- Brooks, John. 1976. Telephone: The First Hundred Years. New York: Harper and Row.
- Brown, Clair, Michael Reich, and David Stern. 1991. "Skills and Security in Evolving Employment Systems: Observations from Case Studies." Unpublished manuscript. July.
- Cappelli, Peter, and Nikolai Rogovsky. 1994. "What Drives Commitment, 'Citizenship,' and Performance: Employee Involvement or Task-Level Job Design?" Wharton School, University of Pennsylvania. Unpublished manuscript.
- Cappelli, Peter, and Peter Sherer. 1991. "The Missing Role of Context in OB: The Need for a Meso-Level Approach." In L.L. Cummings and Bary Staw, eds., Research in Organizational Behavior 13. Greenwich, CT: JAI Press.
- Cappelli, Peter, and Harbir Singh. 1992. "Integrating Strategic Human Resources and Strategic Management." In David Lewin, Olivia Mitchell, and Peter Sherer, eds., Research Frontiers in Industrial Relations and Human Resources.
- Child, F. 1985. "Managerial Strategies, New Technology and the Labour Process." In D. Knights, H. Willmott, and D. Collinson, eds., Job Redesign. Gower Press.
- Clifton, Jean. 1995. "Response to Increased Competitiveness: The Nynex Case." ILR School. Cornell University. Unpublished manuscript.
- Cohen, Jeffrey. 1992. The Politics of Telecommunications Regulation: The States and the Divestiture of AT&T. Armonk, NY: M.E. Sharpe.
- Cohen, Susan G. 1993. "Designing Effective Self-Managing Work Teams." CEO Publication G 93-9 (229). Center for Effective Organizations, School of Business Administration, University of Southern California.
- Cohen, Susan, and Gerald Ledford. 1991. "The Effectiveness of Self-Managing Teams: A Quasi - Experiment." CEO Publication G91-6., Center for Effective Organizations, School of Business Administration, University of Southern California. March.
- Cohen, Susan and Gerald Ledford. 1994. "A Predictive Model of Self-Managing Work Team Effectiveness." CEO Publication T 94-28 (271). Center for Effective Organizations, School of Business Administration, University of Southern California.
- Cole, Robert. 1989. Strategies for Learning: Small Group Activities in American, Japanese, and Swedish Industry. Berkeley, CA: University of California Press.
- Coll, Steve. 1986. The Deal of the Century: The Break Up of AT&T. New York, NY: Atheneum.
- Colling, Trevor, and Anthony Ferner. 1992. "The Limits of Autonomy: Devolution, Line Managers, and Industrial Relations in Privatized Companies." Journal of Management Studies 29(2):209-227.

Commission on the Skills of the American Workforce. 1990. America's Choice: High Skills or Low Wages! Rochester, NY: The National Center on Education and the Economy.

Commission on the Skills of the American Workforce. 1991. America's Choice: High Skills or Low Wages! Supporting Materials. Vol. 2. Rochester, NY: The National Center on Education and the Economy.

Cook, T.D., and D.T. Campbell. 1979. Quasi-Experimentation. Chicago: Rand McNally and Co.

Cooke, William. 1992. "Employee Participation, Group-based Pay Incentives, and Company Performance: A Union-Nonunion Comparison." College of Urban, Labor, and Metropolitan Affairs, Wayne State University. Unpublished manuscript.

Cooke, William N. 1992. "Product Quality Improvement Through Employee Participation: The Effects of Unionization and Joint Union-Management Administration." Industrial and Labor Relations Review 46(1) (October):119-134.

Coon, Horace. 1939. American Tel and Tel: The Story of a Great Monopoly. New York: Longmans, Green, and Co.

Cordery, John L., and Toby D. Wall. 1985. "Work Design and Supervisory Practice: A Model." Human Relations 38(5):425-441.

Cordery, J. L., W. S. Mueller, and L.M. Smith. 1991. "Attitudinal and Behavioral Effects of Autonomous Group Working: A Longitudinal Field Study." Academy of Management Journal 34(2):464-76.

Costanza, Anthony J. 1989. "Participatory Action Research: A View from the ACTWU." American Behavioral Scientist 32(5) (May-June):566-573.

Cotton, John L. 1993. Employee Involvement: Methods for Improving Performance and Work Attitudes. Newbury Park: Sage Publications.

Cotton, John, David Vollrath, Kirk Froggatt, Mark Lengnick-Hall, and Kenneth Jennings. 1988. "Employee Participation: Diverse Forms and Different Outcomes." Academy of Management Review 13(1):8-22.

Cowan, Alison Leigh, and James Barron. 1992. "Executives the Economy Left Behind." New York Times November 22.

Crandall, Robert. 1991. After the Breakup: U.S. Telecommunications a More Competitive Era. Washington, D.C.: The Brookings Institution.

Crandall, Robert, and Kenneth Flamm. 1989. Changing the Rules: Technological Change, International Competition, and Regulation in Communications. Washington, D.C.: The Brookings Institution.

Crane, Donald. 1990. "Patterns of Industrial Peace: Case Studies of Cooperative, Collective Bargaining Relationships." Research Monograph No. 102. Atlanta, GA: Georgia State University Business Press.

Crosby, Philip. 1979. Quality is Free. NY: Mentor Books.

Cummings, Thomas G. 1978. "Self-Regulating Work Groups: A Socio-Technical Synthesis." Academy of Management Review July:625-634

Cummings, Thomas G., and Walter H. Griggs. 1977. "Worker Reactions to Autonomous Work Groups: Conditions for Functioning, Differential Effects, and Individual Differences." Organization and Administrative Sciences 7(4) Winter:87-100.

Cummings, T.G., and E.F. Huse. 1989. Organizational Development and Change. St Paul, MN: West.

Cutcher-Gershenfeld, Joel. 1991. "The Impact on Economic Performance of a Transformation in Workplace Relations." Industrial and Labor Relations Review 44(2):241-260.

CWA. 1985. "Technological Change: Challenges and Choices." Prepared by Communications Workers of America, Training Department, Development and Research Department and the Occupational Safety and Health Program.

Danielian, N.R. 1939. A.T.& T.: The Story of Industrial Conquest. New York: Vanguard Press.

Darbishire, Owen. 1993. "Structure, Strategy, and Bargaining: The Case of the Telecommunications Industry in Britain and America." MS thesis, Cornell University.

Dertouzos, Michael, Richard Lester, and Robert Solow. 1988. Made in America. The MIT Commission on Industrial Productivity. Cambridge, MA: MIT Press.

Deming, Edward. 1984. Out of the Crisis. Cambridge, MA: MIT Press.

Denison, D.R. 1982. "Sociotechnical Design and Self-Managing Work Groups: The Impact on Control." Journal of Organizational Behavior 3:297-314.

Doeringer, Peter, and Michael Piore. 1971. Internal Labor Markets and Manpower Analysis. Lexington, MA: D.C. Heath.

- Donaldson, L. 1985. "Entrepreneurship Applied to Middle Management: A Caution." Journal of General Management 10(4):5-20.
- Drago, Robert. 1988. "Quality Circle Survival: An Exploratory Analysis." Industrial Relations 27(3) (Fall):336-51.
- Drucker, Peter. 1988. "The Coming of the New Organization." Harvard Business Review 66(1):45-53.
- Dunlop, John T. 1958. Industrial Relations Systems. New York: Holt, Rinehart, and Winston.
- Dunlop, John T. 1966. "Job Vacancy Measures and Economic Analysis." In The Measurement and Interpretation of Job Vacancies: A Conference Report. National Bureau of Economic Research. New York: Columbia University Press.
- duRivage, Virginia L. 1992. New Policies for the Part-Time and Contingent Workforce. Armonk, NY: M.E. Sharpe.
- Dyer, Lee. 1984. "Strategic Human Resource Management Research." Industrial Relations 23(2):156-69.
- Dyer, Lee, ed. 1988 Human Resource Management: Evolving Roles and Responsibilities. Washington, DC: BNA Books.
- Eaton, Adrienne E. 1990. "The Role of the Local Union in a Participative Program." Labor Studies Journal 15(1) (Spring):33-53.
- Eaton, Adrienne, and Paula Voos. 1992. "Union and Contemporary Innovations in Work Organization, Compensation, and Employee Participation." In Lawrence Mishel and Paula Voos, eds., Unions and Economic Competitiveness. Armonk, NY: ME Sharpe, Inc., pp.175-215.
- Eaton, Adrienne, Paula Voos, and Kim Dong-one. 1995. "Voluntary and Involuntary Aspects of Employee Participation in Decision-Making." In David Lewin, Daniel Mitchell, and Mahmood Zaidi, eds., Handbook of Human Resource Management. JAI Press. Forthcoming.
- Elbaum, Bernard. 1984. "The Making and Shaping of Job and Pay Structures in the Iron and Steel Industry." In Paul Osterman, ed., Internal Labor Markets. Cambridge, MA: MIT Press, pp. 71-108.
- Emery, F. E. and E. Thorsrud. 1977. Democracy at Work: The Report of the Norwegian Industrial Democracy Program. Leiden, Netherlands: Martinus Nijhoff.
- Evans, David, ed. 1983. Breaking Up Bell: Essays on Industrial Organization and Regulation. New York and Amsterdam: Elsevier Science Publishing.

Fischer, Claude. 1987. "Technology's Retreat: The Decline of Rural Telephony, 1920-1940." Social Science History 11:295-327.

Fisher, Anne. 1991. "Morale Crisis: Job satisfaction among middle managers is hitting new lows. What's an employer to do?" Fortune November 18, pp. 70-80.

Federal Communications Commission. 1938. Proposed Report - Telephone Investigation. Report to the United States Congress.

Federal Communications Commission. 1939. Report on the Investigation of the Telephone Industry in the United States. Report to the United States Congress.

Federal Communications Commission. 1980. Statistics on Common Carrier's. Washington, DC: U.S. GPO.

Federal Communications Commission. 1992/3. Statistics of Communications Common Carriers. Washington, D.C.: U.S. Government Printing Office.

Ford, R. N. 1969. Motivation Through Work Itself. New York: American Management Association.

Freeman, Richard B. and Joel Rogers. 1993. "Who Speaks for Us? Employee Representation in Nonunion Labor Market." In Bruce E. Kaufman and Morris M. Kleiner eds., Employee Representation: Alternatives and Future Directions, Madison, WI: Industrial Relations Research Association.

Fried, Y. 1991. "Meta-Analytic Comparison of the Job Diagnostic Survey and Job Characteristics Inventory as Correlates of Work Satisfaction and Performance." Journal of Applied Psychology 76:690-697.

Fried, Y. and G.R. Ferris. 1987. "The Validity of the Job Characteristics Model: A Review and Meta-analysis." Personnel Psychology 40:287-322.

Frost, Ann. 1992. "Supervisory Adjustment to Employee Involvement: The Relative Importance of Individual Characteristics and Organizational Context." MIT Sloan School of Management. Unpublished manuscript.

Fulop, Liz. 1991. "Middle managers: victims or vanguards of the entrepreneurial movement?" Journal of Management Studies 28(January)(1):25-43.

Gerhart, Barry. 1987. "How Important are Dispositional Factors as Determinants of Job Satisfaction? Implications for Job Design and Other Personnel Programs." Journal of Applied Psychology 72:366-373.

Gerhart, Barry, Harvey Minkoff, and Bay Olsen. 1994. "Employee Compensation: Theory, Practice, and Evidence." Center for Advanced Human Resource Studies Working Paper No. 95-04. ILR School, Cornell University.

Gerhart, Barry, and George Milkovich. 1992. "Employee Compensation Research and Practice." In M.D. Dunnette and L.M. Hough eds. Handbook of Industrial and Organizational Psychology 2nd Edition, Volume 3. Palo Alto, CA: Consulting Psychologists Press, Inc.

Gerhart, Barry, George Milkovich, and Brian Murray. 1992. "Pay, Performance, and Participation." Research Frontiers in Industrial Relations and Human Resources. Madison, WI: IRRA Press, 193-238.

Gerhart, Barry, Charlie Trevor and Mary Graham. 1996. "New Directions in Compensation Research: Synergies, Risk and Survival." In Gerald Ferris, ed., Research in Personnel/Human Resources. Forthcoming.

Gladstein, Deborah L. 1984. "Groups in Context: A Model of Task Group Effectiveness." Administrative Science Quarterly 29:499-517.

Glick, W.H., G.D. Jenkins, and N. Gupta. 1986. "Method Versus Substance: How Strong are Underlying Relationships Between Job Characteristics and attitudinal outcomes?" Academy of Management Journal 29:441-464.

Goodman, Paul. 1982. "The Rushton Quality of Work Life Experiments: Lessons to be Learned." In Robert Zager and Michael Rosow, eds., The Innovative Organization: Productivity Programs in Action. Elmsford, New York: Pergamon, pp. 222-259.

Goodman, Paul S., Rukmini Devadas, and Terri L. Griffith Hughson 1988. "Groups and Productivity: Analyzing the Effectiveness of Self-Managing Teams." In J.P. Campbell, R.J. Campbell, and Associates, eds., Productivity in Organizations: New Perspectives From Industrial and Organizational Psychology. San Francisco, CA: Jossey-Bass, pp. 295-325.

Goulden Joseph. 1968. Monopoly. New York: G.P. Putnam's Sons.

Griffin, R.W. 1988. "Consequences of Quality Circles in an Industrial Setting: A Longitudinal Assessment." Academy of Management Journal 31(2):338-358.

Guest, Robert. 1982a. "Tarrytown: Quality of Work Life at a General Motors Plant." In Robert Zager and Michael Rosow, eds., The Innovative Organization: Productivity Programs in Action. New York: Pergamon Press, pp. 88-108.

Guest, Robert 1982b. "The Sharonville Story: Worker Involvement at a Ford Motor Company Plant." In Robert Zager and Michael Rosow, eds., The Innovative Organization: Productivity Programs in Action. Elmsford, New York: Pergamon, pp. 88-106.

- Hacker, Sally L. 1979. "Sex Stratification, Technology and Organizational Change: A Longitudinal Case Study of AT&T." Social Problems 26(5):539-557.
- Hackman, J. Richard. 1982. "A Set of Methods for Research on Work Teams." Technical Report No. 1, Group Effectiveness Research Project, School of Organization and Management, Yale University.
- Hackman, J.R. 1983. "The Design of Work Teams." In J. Lorsch, ed., Handbook of Organizational Behavior. Englewood Cliffs, New Jersey: Prentice Hall, pp. 70-74.
- Hackman, J. Richard, and Edward Lawler. 1971. "Employee Reactions to Job Characteristics." Journal of Applied Psychology Monograph 55: 259-286.
- Hackman, J. Richard, and Greg R. Oldham. 1975. "Development of the Job Diagnostic Survey." Journal of Applied Psychology 60(2):159-170.
- Hackman, J. Richard, and Greg R. Oldham. 1976. "Motivation Through the Design of Work: Test of a Theory." Organizational Behavior and Human Performance 16: 250-279.
- Hackman, J. Richard, and Greg R. Oldham. 1980. Work Redesign. Reading, MA: Addison-Wesley Publishing Company.
- Hackman, J.R. 1990. Groups That Work (and those that don't). San Francisco: Jossey-Bass.
- Hammer, Tove, and Bob Stern. 1986. "A Yo-Yo Model of Cooperation: Union Participation in management at Rath Packing Company." Industrial and Labor Relations Review, 39(3) (April):337-349.
- Hammer, Tove Helland. 1988. "New Developments in Profit Sharing, Gainsharing, and Employee Ownership." In John Campbell, Richard, Campbell, and Associates, eds., Productivity in Organizations: New Perspectives from Industrial and Organizational Psychology. San Francisco, CA: Jossey-Bass, pp. 328-366.
- Hammer, Michael. 1990. "Reengineering Work: Don't Automate, Obliterate." Harvard Business Review(July-August):104-112.
- Hammer, Michael, and James Champy. 1992. Reengineering Work: A Manifesto for Business Revolution. New York: Warner Books.
- Hartmann, Heidi, and Robert Spalter-Roth. 1989. Women in Telecommunications: An Exception to the Rule. Paper prepared for the Institute for Women's Policy Research.
- Havlovic, Stephen. 1991. "Quality of Work Life and Human Resource Outcomes." Industrial Relations, 30 (3) (Fall): 469-479.
- Herzberg, F. 1966. Work and the Nature of Man. Cleveland: World.

- Herzenberg, Stephen, John Alic, Ken Freeman, Frank Gallo, Margare' Hilton, and Howard Wial. 1995. Services Matter: Real Jobs in A Virtual Economy, Office of Technology Assessment, U.S. Congress. Forthcoming. Fall.
- Heskett, James. L., W. Earl Sasser Jr., and Christopher W. L. Hart. 1990. Service Breakthroughs: Changing the Rules of the Game. New York: The Free Press.
- Hill, Stephen. 1991. "Why Quality Circles Failed But Total Quality Management Might Succeed." British Journal of Industrial Relations 29(4) (December):541-568.
- Howard, Ann, and Douglas Bray. 1988. Managerial Lives in Transition: Advancing Age and Changing Times. New York: Guilford Press.
- Huber, Peter. 1987. The Geodesic Network: 1987 Report on Competition in the Telephone Industry. Antitrust Division, U.S. Department of Justice. January.
- Huber, Peter. 1989. "The Technological Imperative for Competition." In Stephen Bradley and Jerry Hausman, eds., Future Competition in Telecommunications. Boston: Harvard Business School Press, pp.105-122.
- Hyatt, Joshua. 1990. "Surviving on Chaos." May, pp. 60-71.
- Hyman, Leonard, and Wolfgang Streeck, eds. 1988. New Technology and Industrial Relations. New York, NY: Basil Blackwell Inc.
- Hyman, Leonard, Richard Toole, and Rosemary Avellis. 1989. The New Telecommunications Industry: Evolution and Organization. 2nd Ed. Vol. II. NY: Public Utilities Reports, Inc., and Merrill Lynch, Pierce, Fenner, and Smith, Inc.
- Ichniowski, Casey, Kathryn Shaw, and Giovanna Prennushi. 1993. "The Effects of Human Resource Management Practices on Productivity." Columbia University. Manuscript. June 10. Forthcoming Industrial Relations, 1995.
- Ishikawa, Kaoru. 1985. Total Quality Control: The Japanese Way. Englewood Cliffs, NJ: Prentice Hall, Inc.
- Jacoby, Sanford. 1984. "The Development of Internal Labor Markets." In Paul Osterman, ed., Internal Labor Markets. Cambridge, MA: MIT Press, pp. 23-70.
- Jacoby, Sanford. 1985. Employing Bureaucracy. New York: Columbia University Press.
- Jaikumar, Ramchandran. 1986. "Postindustrial Manufacturing." Harvard Business Review November-December.

Johnson, Leland. 1982. Competition and Cross-Subsidization in the Telephone Industry. Santa Monica, CA: Rand Corporation. December.

Juran, J.M., and Frank Gyra. 1988. Juran's Quality Control Handbook. Fourth Edition. New York: McGraw Hill.

Kanter, Rosabeth Moss. 1982a. "The Middle Manager as Innovator." Harvard Business Review 59(July-August):95-105.

Kanter, Rosabeth Moss. 1982b. "Power and Entrepreneurship in Action: Corporate Middle Managers." In P.L. Stewart and M.G. Cantor, eds., Varieties of Work. Beverly Hills, CA: Sage, pp. 153-172.

Kanter, Rosabeth Moss. 1983. The Change Master. Innovation for Productivity in the American Corporation. New York: Simon and Shuster.

Kanter, Rosabeth Moss. 1984. "Variations in Managerial Career Structures in High-Technology Firms: The Impact of Organizational Characteristics on Internal Labor Market Patterns." In Paul Osterman, ed., Internal Labor Markets. Cambridge, MA: MIT Press.

Kanter, R.M. 1989. "New Managerial Work." Harvard Business Review. Nov./Dec.: 90.

Katz, Harry. 1985. Shifting Gears: Changing Labor Relations in the U.S. Auto Industry. Cambridge, MA: MIT Press.

Katz, Harry C., Thomas A. Kochan, and Kenneth R. Gobeille. 1983. "Industrial Relations Performance, Economic Performance, and the Quality of Working Life Efforts: An Inter-Plant Analysis." Industrial and Labor Relations Review 37:3-17.

Katz, Harry C., Thomas A. Kochan, and Jeffrey H. Keefe. 1987. "Effects of Industrial Relations on Productivity: Evidence from the Automobile Industry." Brookings Papers on Economic Authority 3:32-56.

Katz, Harry C., Thomas A. Kochan, and Mark R. Weber. 1985. "Assessing the Effects of Industrial Relations Systems and Efforts to Improve the Quality of Working Life on Organizational Effectiveness." Academy of Management Journal 28:509-526.

Katz, Harry C. and Jeffrey Keefe. 1992. "Collective Bargaining and Industrial Relations Outcomes: The Causes and Consequences of Diversity." In David Lewin, Olivia Mitchell, and Peter Sherer, eds., Research Frontiers in Industrial Relations-1992-IRRA Research Volume. Madison, WI: IRRA.

Katzell, Raymond, and Daniel Yankelovich. 1975. Work, Productivity, and Job Satisfaction: An Evaluation of Policy-Related Research. NY: Harcourt Brace Jovanovich.

Kaufman, Roger. 1992. "The Effects of IMPROSHARE on Productivity." Industrial and Labor Relations Review 45(2):311-22.

Keefe, Jeffrey. 1991. "Numerically Controlled Machine Tools and Worker Skills." Industrial and Labor Relations Review 44(3):503-519.

Keefe, Jeffrey, and Rosemary Batt. 1995. "Restructuring Telecommunications Services in the United States." Paper prepared for the 10th World Congress of the International Industrial Relations Association, Washington, D.C. May 31-June 4, 1995.

Keefe, Jeffrey, and Harry Katz. 1990. "Job Classifications and Plant Performance in the Auto Industry." Industrial Relations 29(1) (Winter):111-118.

Keefe, Jeffrey, and Karen Boroff. 1994. "Telecommunications Labor Management Relations After Divestiture." In Paula Voos, ed., Contemporary Collective Bargaining in the Private Sector. Madison, WI: Industrial Relations Research Association.

Kern, Horst, and Michael Schumann. 1984. "The Impact of Technology on Job Content and Work Organizations." Munich: Beck.

Kerr, Clark. 1954. "The Balkanization of Labor Markets." In E. Wright Bakke, ed., Labor Mobility and Economic Opportunity. Cambridge, MA: MIT Press.

Keller, John. 1992. "Some AT&T Clients Gripe That Cost Cuts Are Hurting Service." Wall Street Journal. January 24, p. A1.

Kelley, M.R. 1986. "Programmable Automation and the Skill Question: A Reinterpretation of the Cross-national Evidence," Human Systems Management 6:223-241.

Kelley, M.R. 1990. "New Process technology, Job Design and Work Organization: A Contingency Model," American Sociological Review (April):191-208.

Kelley, M.R. and H. Brooks. 1991. "External Learning Opportunities and the Diffusion of Process Innovations to Small Firms: The Case of Programmable Automation," Technological Forecasting and Social Change 39(April):103-125.

Kelley, Maryellen R. 1992. "Productivity and Information Technology." Working paper 92-2 School of Urban and Public Affairs, Carnegie-Mellon University. January

Kelley, Maryellen and Bennett Harrison. 1992. "Unions, Technology, and Labor-Management Cooperation." Unions and Economic Competitiveness. In Lawrence Mishel and Paula Voos, eds., Unions and Economic Competitiveness. Armonk, NY:M.E. Sharpe.

Kemp, Nigel J., Toby D. Wall, Chris W. Clegg, and John L. Cordery. 1983. "Autonomous Work Groups in a Greenfield Site: A Comparative Study." Journal of Occupational Psychology 56:271-288.

- Klein, Janice. 1984. "Why supervisors resist employee involvement." Harvard Business Review (September-October):87-95.
- Klein, Janice. 1989. "Why Supervisors Resist Employee Involvement." Harvard Business Review 62(September-October):87-95.
- Klein, Janice. 1991. "A Reexamination of Autonomy in Light of New Manufacturing Practices." Human Relations 44(1):21-33.
- Klein, Janice. 1993. "Teams." In J. Klein and J. Miller eds., The American Edge. New York: McGraw Hill, Chapter 4.
- Kling, Jeff. 1993. "High Performance Work Practices and Firm Performance." Background material for the Conference on the Future of the American Workplace. U.S. Department of Labor. Draft.
- Kochan, Thomas, Harry Katz, and Robert McKersie. 1986. The Transformation of American Industrial Relations. New York: Basic Books.
- Kochan, Thomas, Harry Katz, and Nancy Mower. 1984. Worker Participation and American Unions: Threat or Opportunity? Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.
- Kochan, Thomas, and Michael Useem, eds., 1992. Transforming Organizations. NY: Oxford University Press.
- Kochan, Thomas, and Paul Osterman. 1994. The Mutual Gains Enterprise: Forging a Winning Partnership Among Labor, Management, and Government. Boston, MA: Harvard Business School Press.
- Kohl, George. 1993. "Information Technology and Labor: A Case Study of Telephone Operators." Workplace Topics 3(1):101-111.
- Kotter, John. 1982. The General Managers. New York: Free Press.
- Kraus, Constantine Raymond, and Alfred W. Duerig. 1988. The Rape of Ma Bell: The Criminal Wrecking of the Best Telephone System in the World. Secaucus, New Jersey: Lyle Stuart Inc.
- Lawler, E.E. 1986. High Involvement Management: Participative Strategies for Improvement Organizational Performance. San Francisco: Jossey-Bass.
- Lawler, E.E., J.R. Hackman, and S. Kaufman. 1973. "Effects of job Redesign: A field Experiment." Journal of Applied Social Psychology (3):49-62.

Lawler, Edward E. III, Gerald Ledford, and Susan A. Mohrman. 1989. Employee Involvement in America: A Study of Contemporary Practice. Houston, Texas: American Productivity and Quality Center.

Lawler, Edward E. III, and Susan A. Mohrman. 1987. "Quality Circles: After the Honeymoon." Organizational Dynamics 15 (Spring):42-54.

Lawler, Edward E., III, Susan A. Mohrman, and Gerald Ledford. 1992. Employee Involvement and TOM: Practice and Results in Fortune 5000 Companies. San Francisco, CA: Jossey-Bass.

Lawler, Edward. 1994. "Total Quality Management and Employee Involvement: Are they Compatible?" Academy of Management Executive 8(1):68-76.

Lazear, Edward. 1992. "Compensation, Productivity, and the New Economics of Personnel." In David Lewin, Olivia Mitchell, and Peter Sherer, eds., Research Frontiers in Industrial Relations and Human Resources. Madison, Wisconsin: IRRA Press.

Leana, Carrie, Roger Ahlbrandt, and Audrey Murrell. 1992. "The Effects of Employee Involvement Programs on Unionized Workers' Attitudes, Perceptions, and Preferences in Decision Making." Academy of Management Journal 35(4):861-873.

Ledford, Gerald, Edward E. Lawler III, and Susan A. Mohrman. 1988. "The Quality Circle and Its Variations." In John Campbell, Richard Campbell, and Associates, eds., Productivity in Organizations. San Francisco: Jossey-Bass, pp. 255-294.

Ledford, Gerald, and Susan A. Mohrman. 1988. "Attitudinal effects of employee participation groups: How strong, how persistent?" Paper presented at the Academy of Management Annual Meeting, Anaheim, CA.

Levine, David, and Laura D'Andrea Tyson. 1990. "Participation, Productivity, and the Firm's Environment." In Alan Blinder, ed., Paying for Productivity. Washington, DC: Brookings Institution.

Leigh Cowan, Allison, and James Barron. 1992. "Executives the Economy Left Behind." New York Times (November).

Likert, Rensis. 1967. The Human Organization: Its Management and Value. New York: McGraw-Hill.

Lincoln, James, and Arne Kalleberg. 1990. Culture, Control, and Commitment: A Study of Work Organization and Work Attitudes in the United States and Japan. Cambridge, MA: Cambridge University Press.

Lipartito, Kenneth. 1989. The Bell System and Regional Business: The Telephone in the South, 1877-1920. Baltimore, MD: The John Hopkins University Press.

- Locke, E.A. 1969. "What is Job Satisfaction?" Behavior and Human Performance 4:309-336.
- Locke, Richard M. 1992. "The Demise of the National Union in Italy: Lessons for Comparative Industrial Relations Theory." Industrial and Labor Relations Review 45(2):229-49.
- Locke, Edwin, and David M. Schweiger. 1979. "Participation in Decision-Making: One More Look." In Barry M. Staw and Larry L. Cummings, eds., Research in Organizational Behavior 1:265-339.
- Loher, Brian T., Raymond A. Nee, Nancy L. Moeller, and Michael P. Fitzgerald. 1985. "A Meta-Analysis of the Relation of Job Characteristics to Job Satisfaction." Journal of Applied Psychology 70(2):280-289.
- Lynch, Lisa, ed. 1994. Training and the Private Sector: International Comparisons. Chicago and London: University of Chicago Press.
- MacDuffie, John Paul. 1995. "Human Resource Bundles and Manufacturing Performance: Organizational Logic and Flexible Production Systems in the World Auto Industry." Industrial and Labor Relations Review 48, 2(January):197-221.
- MacDuffie, John Paul. 1991. "Beyond Mass Production: Flexible Production Systems and Manufacturing Performance in the World Auto Industry." Ph.D. Dissertation, Sloan School of Management, MIT.
- MacDuffie John Paul and J. Krafcik. 1992. "Integrating Technology and Human Resources for High-Performance Manufacturing." In Thomas Kochan and Michael Useem, eds., Transforming Organizations. New York: Oxford University Press.
- MacDuffie, John Paul, and Michael Maccoby. 1986. "The Organizational Implications of New Technologies: Remote Work Centers at AT&T Communications." JFK School of Government, Harvard University. Discussion Paper Series. September.
- Manz, C.C. 1986. "Self-Leadership: Toward an Expanded Theory of Self-Influence Processes in Organizations." Academy of Management Review 11(3):585-600.
- Manz, C.C. 1990. "Beyond Self-managing Work Teams: Toward Self-Leading Teams in the Workplace." Organizational Change and Development 4:273-299. JAI Press.
- Manz, C.C. 1992. "Self-Leading Work teams: Moving Beyond Self-Management Myths." Human Relations 45(11):1119-1140.
- Manz, C.C., and H.P. Sims. 1986. "Leading Self-Managed Groups: A Conceptual Analysis of a Paradox." Economic and Industrial Democracy 7:141-165.
- Manz, C.C. and H.P. Sims. 1987. "Leading Workers to Lead Themselves: The External Leadership of Self-Managing Work Teams." Administrative Science Quarterly 32:106-128.

Manz, C.C., D.E. Keating and A. Donnellon. 1990. "Preparing for an Organizational Change to Employee Self-Management: The Managerial Transition." Organizational Dynamics 19(2):15-26.

Marks, M.L., P.H. Mirvis, E.J. Hackett, and J.F. Grady. 1986. "Employee Participation in a Quality Circle Program: Impact on Quality of Work Life, Productivity, and Absenteeism." Journal of Applied Psychology 71:61-69.

Maslow, Abraham. 1954. Motivation and Personality. New York: Harper.

McGregor, D. 1957. "The Human Side of Enterprise." Management Review 46(11):22-28, 88-92.

McKenney, James and Edward Nyce. 1989. "The Role of the Large Corporation in the Communications Market." In Bradley and Hausman, eds., Future Competition in Telecommunications. Boston, MA: Harvard Business School Press, pp. 225-252.

Miller, Katherine, and Peter Monge. 1986. "Participation, Satisfaction, and Productivity: A Meta-Analytic Review." Academy of Management Journal 29(4):727-753.

Mintzberg, H. 1973. The Nature of Managerial Work. New York: Harper and Row.

Mishel, Lawrence, and Jared Bernstein. 1994. The State of Working American 1994-95. Armonk, NY: M.E. Sharpe.

Mitchell, Daniel, David Lewin, and Edward Lawler III. 1990. "Alternative Pay Systems, Firm Performance, and Productivity." In Alan Blinder, ed., Paying For Productivity, Washington, DC: The Brookings Institution.

Mitchell, T.R. 1985. "An Evaluation of the Validity of Correlational Research Conducted in Organizations." Academy of Management Review 10:192-205.

Neuman, G.A., J.E. Edwards, and N.S. Raju. 1989. "Organizational Development Interventions: A Meta-Analysis of their Effects on Satisfaction and other Attitudes." Personnel Psychology 42:461-489.

Newton, T., and T. Keenan. 1991. "Further Analyses of the Dispositional Argument in Organizational Behavior." Journal of Applied Psychology 76:781-787.

Noble, David. 1984. Forces of Production: A Social History of Industrial Automation. New York: Knopf.

Norwood, Stephen. 1990. Labor's Flaming Youth: Telephone Operators and Worker Militancy, 1878-1923. Urbana and Chicago: University of Illinois Press.

- Oi, Walter. 1962. "Labor as a Quasi-Fixed Factor." Journal of Political Economy 70(December):538-555.
- Ondrack, D.A., and M.G. Evans. 1987. "Job Enrichment and Job Satisfaction in Greenfield and Redesign QWL Sites." Group and Organization Studies 12:5-22.
- Osterman, Paul. 1982. "Employment Structures in Firms." British Journal of Industrial Relations 20(3):349-361.
- Osterman, Paul, ed. 1984. Internal Labor Markets. Cambridge, MA: MIT Press.
- Osterman, Paul. 1987. "Choice Among Alternative Internal Labor Market Systems." Industrial Relations February:46-67.
- Osterman, Paul. 1988. Employment Futures: Reorganization, Dislocation, and Public Policy. New York and Oxford: Oxford University Press.
- Osterman, Paul. 1994a. "How Common Is Workplace Transformation and How Can We Explain Who Adopts It?" Industrial and Labor Relations Review 2(47):173-188.
- Osterman, Paul. 1994b. "Internal Labor Markets: Theory and Change." In Clark Kerr and Paul Staudohar, eds., Labor Economics and Industrial Relations: Markets and Institutions. Cambridge, MA: Harvard University Press, pp., 303-339.
- Pasmore, W.A. and J. Sherwood. 1978. Sociotechnical Systems: A Sourcebook. San Diego: University Associates.
- Pasmore, W.A., C. Francis, and J. Haldeman. 1982. "Sociotechnical Systems: A North American Reflection on Empirical Studies of the Seventies." Human Relations 35:1179-1204.
- Pearce, J. A. and E.C. Ravlin. 1987. "The Design and Activation of Self-Regulating Work Groups." Human Relations 40(11):751-781.
- Peters, Thomas. 1987. Thriving on Chaos. London: Macmillan.
- Peters, Thomas, and Nancy Austin. 1985. A Passion for Excellence. London: Collins.
- Peters, Thomas, and R.H. Waterman. 1982. In Search of Excellence. New York: Harper and Row.
- Pfeffer, Jeffrey, and Yinon Cohen. 1984. "Determinants of Internal Labor Markets in Organizations." ASQ 29:550-572.
- Piore, Michael. 1968. "On-the-Job Training and Adjustment to Technological Change." Journal of Human Resources 3(Fall):435-449.

- Piore, Michael, and Charles Sabel. 1984. The Second Industrial Divide. New York: Basic Books.
- Register, Clayton Dale. 1991. "A Study of Self Managed Teams in the United States Telecommunications Industry." Manuscript submitted to the Alfred P. Sloan School of Management.
- Rice, A. 1958. Productivity and Social Organization: the Ahmedabad Experiment. London: Tavistock.
- Roach, Stephen. 1991. "Services Under Siege - The Restructuring Imperative." Harvard Business Review (September-October):82-91.
- Roberts, Karlene H., and William Glick. 1981. "The Job Characteristics Approach to Task Design: A Critical Review." Journal of Applied Psychology 66(2):193-217.
- Roethlisberger, F.J., and William J. Dickson. 1939. Management and the Worker. Cambridge, MA: Harvard University Printing Office.
- Rosenberg, Nathan. 1994. "Telecommunications: complex, uncertain, and path dependent," Chapter 11 in Exploring the Black Box: Technology, Economics, and History. Cambridge, England. Cambridge University Press, pp. 203-231.
- Rousseau, D.M. 1977. "Technological Differences in Job Characteristics, Employee Satisfaction and Motivation: A Synthesis of Job Design Research and Socio-Technical Systems Theory." Organizational Behavior and Human Performance 19:18-42.
- Rubinstein, Saul, Michael Bennett, and Thomas Kochan. 1993. "The Saturn Partnership: Reinventing the Local Union." In Bruce Kaufman and Morris Kleiner, eds., Employee Representation: Alternatives and Future Directions. Madison, WI.: IRRA Press.
- Ryan, Paul. 1984. "Job Training, Employment Practices, and the Large Enterprise: The Case of Costly Transferable Skills." In Paul Osterman, ed., Internal Labor Markets. Cambridge, MA: MIT Press.
- Sabel, Charles. 1990. "Skills Without a Place." Massachusetts Institute of Technology. Unpublished Manuscript.
- Salancik, G., and J. Pfeffer. 1978. "A Social Information Processing Approach to Job Attitudes and Task Design." Administrative Science Quarterly 23:224-253.
- Schacht, John, 1985. The Making of Telephone Unionism 1920-1947. New Jersey: Rutgers University Press.
- Schawb, D.P., and L.L. Cummings. 1976. "A Theoretical Analysis of the Impact of Task Scope on Employee Performance." Academy of Management Review 1:23-35.

Schlesinger, Leonard, and James Heskett. 1991a. "Breaking the Cycle of Failure in Services." Sloan Management Review 32(Spring):17-28

Schlesinger, Leonard, and James Heskett. 1991b. "The Service-Driven Company." Harvard Business Review 69 (Sept. Oct.):73-81.

Schlesinger, Leonard, and James Heskett. 1991c. "Enfranchisement of Service Workers." California Management Review(Summer):83-100.

Schlesinger, Leonard, Davis Dyer, Thomas Clough, and Diane Landau. 1987. Chronicles of Corporate Change. Lexington, MA: Lexington Books.

Schlesinger, Leonard, and Janice Klein. 1987. "The First-Line Supervisor: Past, Present, and Future." In Jay Lorsch, ed., Handbook of Organizational Behavior. Englewood Cliffs, NJ: Prentice-Hall.

Schweiger, D.M., and C.R. Leana. 1986. "Participation in Decision Making." In E.A. Locke, ed., Generalizing from Laboratory to Field Studies. Lexington, MA: DC Heath, pp. 147-166.

Scott, William G. 1992. Chester I. Barnard and the Guardians of the Managerial State. University Press of Kansas.

Scoville, J.G. 1969. "A Theory of Jobs and Training." Industrial Relations (October):387-393.

Seashore, Stanley. 1981. "Quality of Working Life Perspective. The Michigan Quality of Work Program: Issues of Measurement, Assessment, and Outcome Evaluation. In Andrew Van de Ven and William Joyce, eds., Perspectives on Organization Design and Behavior. New York: John Wiley and Sons, 89-134.

Shuster, Jay, and Patricia Zingheim. 1992. The New Pay: Linking Employee and Organizational Performance. New York: Lexington Books, Macmillan.

Singer, J.N. 1974. "Participative Decision-Making About Work." Sociology of Work and Occupations 1:347-371.

Spalter-Roth, Roberta and Heidi Hartmann. 1992. Women in Telecommunications: Exception to the Rule of Low Pay for Women's Work. Paper prepared for Institute for Women's Policy Research.

Spector, P.E. 1986. "Perceived Control by Employees: A Meta-Analysis of Studies Concerning Autonomy and Participation at Work." Human Relations 39:1005-1016.

Staw, B.M., N.E. Bell, and J.A. Clausen. 1986. "The Dispositional Approach to Job Attitudes: A Lifetime Longitudinal Test." Administrative Science Quarterly 31:56-77.

Staw, B.M. and J. Ross. 1985. "Stability in the Midst of Change: A Dispositional Approach to Job Attitudes." Journal of Applied Psychology 70:469-480.

Steers, R.W., R. Mowday, and L. Porter. 1982. Employee Involvement -- The Psychology of Commitment, Absenteeism, and Turnover. New York: Academic Press.

Stone, Alan. 1989. Wrong Number: The Breakup of AT&T. New York: Basic Books.

Strauss, George, and Tove Hammer. 1987. Worker Participation in the United States. Geneva, Switzerland: International Labour Organization.

Straw, Ronnie, and Charles Heckscher. 1984. "QWL: New Working Relationships in the Communications Industry." Labor Studies Journal 8(Winter):103-117.

Studstrom, E., K.P. DeMeuse, and D. Futrell. 1990. "Work teams: Applications and Effectiveness." American Psychologist 45:120-133.

Susman, G.I. 1976. Autonomy at Work: A Sociotechnical Analysis of Participative Management. New York: Praeger.

Taylor, F.W. 1947. Scientific Management. New York: Harper and Brothers.

Temin, Peter. 1987. The Fall of the Bell System: A Study in Prices and Politics. Cambridge: Cambridge University Press.

Terpstra, D.E. 1981. "Relationship between methodological rigor and reported outcomes in Organization Development research." Journal of Applied Psychology 66:541-543.

Teske, Paul. 1990. After Divestiture: The Political Economy of State Telecommunications Regulation. SUNY Series in Public Administration. Albany, NY: State University of New York Press.

Thomas, Robert J. 1993. What Machines Can't Do: Politics and Technology in the Industrial Enterprise. University of California Press. In Press

Tichy, N., C. Fombrun, and M. Devanna. 1982. "Strategic Human Resource Management." Sloan Management Review 2:47-61.

Trist, Eric. 1991. "The Sociotechnical Perspective: The Evolution of Sociotechnical Systems as a Conceptual Framework and as an Action Research Program." In Andrew Van de Ven and William Joyce, eds., Perspectives on Organization Design and Behavior. New York: John Wiley and Sons, pp. 19-75.

Trist, E.L. and K.W. Banforth. 1951. "Some Social and Psychological Consequences of the Long Wall Method of Goal Getting." Human Relations 4:3-38.

Trist, Eric, and Hugh Murray. 1990. The Social Engagement of Society Science: A Tavistock Anthology: The Socio-Psychological Perspective. Philadelphia: University of Pennsylvania Press.

U.S. Congress. 1993. Pulling Together for Productivity: A Union-Management Initiative at U S West, Inc. Office of Technology Assessment. September.

U.S. Department of Health, Education and Welfare. 1972. Work in America. Cambridge, MA: MIT Press.

U.S. Department of Labor, Bureau of Labor-Management Relations and Cooperative Programs. 1985. Quality of Work Life: AT&T and CWA Examine Process After Three Years. Washington, DC: GPO.

Vallas, Steven Peter. 1993. Power in the Workplace: The Politics of Production at AT&T. Albany: State University of New York Press.

Vietor, Richard. 1989. "AT&T and the Public Good: Regulation and Competition in Telecommunications, 1910-1987" In Bradley and Hausman. eds., Future Competition in Telecommunications. Boston, MA: Harvard Business School Press, pp. 27-103.

Vroom, V.H. 1964. Work and Motivation. New York: Wiley.

Wachter, Michael, and Richard Wright. 1990. "The Economics of Internal Labor Markets." Industrial Relations 29(Spring):240-262.

Wagner, J.A., and R.Z. Gooding. 1987. "Effects of Societal Trends on Participation Research." Administrative Science Quarterly 32:241-262.

Walker, C.R. 1950. "The Problem of the Repetitive Job." Harvard Business Review 28:54-58.

Wall, Toby, Nigel Kemp, Paul Jackson, and Chris Clegg. 1986. "Outcomes of Autonomous Work Groups: A Long-Term Field Experiment." Academy of Management Journal 2:280-304.

Walters, Roy. 1982. "The Citibank Project: Improving Productivity through Work Redesign." In Robert Zager and Michael Rosow, eds., The Innovative Organization: Productivity Programs in Action. Elmsford, New York: Pergamon, pp. 109-124.

Walton, Richard. 1982. "The Topeka Work System: Optimistic Visions, Pessimistic Hypotheses, and Reality." In Robert Zager and Michael Rosow, eds., The Innovative Organization: Productivity Programs in Action. Elmsford, New York: Pergamon, pp. 260-287.

Walton, Richard. 1985. "From Control to Commitment in the Workplace." Harvard Business Review. March-April:77-84.

Weitzman, L. Martin, and Douglas L. Kruse. 1990. "Profit-Sharing and Productivity." In Alan Blinder, ed., Paying for Productivity: A Look at the Evidence. Washington, DC: Brookings Institute, pp. 95-140.

Welbourne, Theresa. 1994. "The Role of Distributive and Procedural Justice in Predicting Gainsharing Satisfaction." School of Industrial and Labor Relations, Center for Advanced Human Resource Studies, Cornell University. Working paper number 94-02.

Wenders, John. 1987. The Economics of Telecommunications: Theory and Policy. Cambridge, MA: Ballinger.

Wilms, Wellford, Alan Hardcastle and Deone M. Zell. 1994. "Cultural Transformation at NUMMI" Sloan Management Review (Fall):99-113.

Womack, James, Daniel Jones, and Daniel Roos. 1990. The Machine That Changed the World. New York: Rawson Associates.

U.S. DOL (Department of Labor). 1990. Outlook for Technology and Labor in Telephone Communications. U.S.DOL, Bureau of Labor Statistics. Bulletin 2357.

Zachary, Pascal. 1993. "Like Factory Workers, Professionals Face Loss of Jobs to Foreigners." Wall Street Journal March 17, p.1.

Zimmerman, Charles, and John W. Enell. 1988. "Service Industries." In J.M. Duran and Frank Gryna., eds., Juran's Quality Control Handbook. Fourth Edition. New York: McGraw Hill, pp. 33.1-72.

Zipkin, Paul H. 1991. "Does Manufacturing Need a JIT Revolution?" Harvard Business Review, (January-February)40-50.

Zuboff, Shoshana. 1988. In the Age of the Smart Machine: The Future of Work and Power. New York: Basic Books.

Tables for Part II

Table 2.1: Internal Labor Market Theory

Dimensions	External Labor Market Models		Internal Labor Market Models	
	Craft	Secondary	Industrial	Salaried
Job Definition/ Skill	Specialized expertise/ High skill, high portability	Narrow, repetitive/ Low skill, high portability	Narrow, rigidly-defined/ Job-specific, low portability	Broad, problem-solving/ High skill, mod. portability
Deployment/ Promotion	High interfirm mobility/ Horizontal careers	High interfirm mobility/ Dead-end careers	High intrafirm mobility/ Seniority-based promotions through rigid hierarchies	High intrafirm mobility/ Flexible deployment across functions based on merit & personal networks
Training	Public, private, or union-sponsored apprenticeship	Individually-provided minimal training	Company-provided on-the-job training	Company-provided informal & formal training
Job Security	Skill-based occupational security	No security	No formal job security; seniority-based layoffs	Firm-based employment security pledge
Wage Rules	Wages tied to skills, credentials	Wages set at legal minimum	Wages tied to job	Wages tied to merit & individual person
Commitment	To Occupation	To Individual	To firm & union	To firm

Table 2.2
Job Ladders in Network Occupations

	Engineering	Cable (Long Lines/Construction)	Customer Premise (Install & Repair)
Entry Level	Inside Crafts: Frame Attendants	Outside Crafts: Craft Helpers	Install Residential Repair Residential Install Business Repair Business
2nd Grade	Switching Techs	Linemen Cable Splicers	PBX Installers PBX Repair Special Services
3rd Grade	Engineering Assistants-----		

**Table 2.3
Job Ladders in Service Occupations**

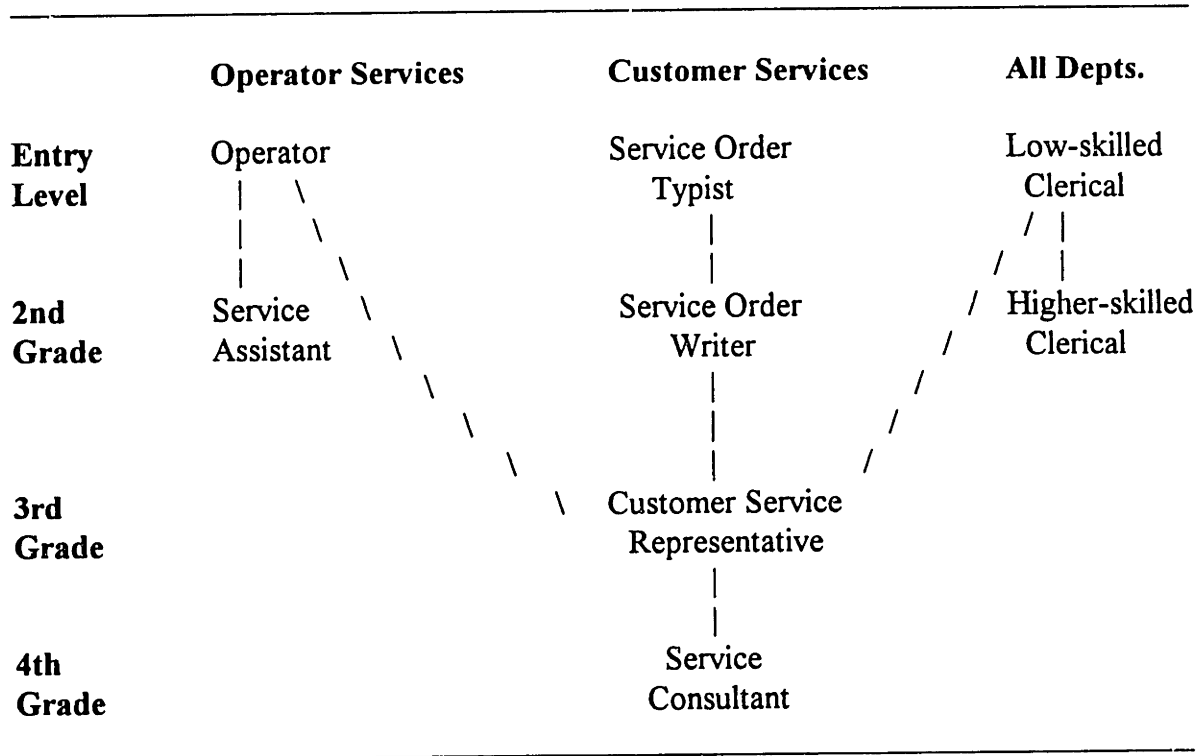


Table 2.4
Growth of Managerial Workforce at AT&T:
1950-1990*

	1950	1960	1970	1980	1984	1990
AT&T Bell						
Managers	70,630	105,833	169,401	248,562	111,432	115,851
Non-managers	446,129	466,795	574,534	589,939	267,568	137,920

Total	523,251	580,405	772,980	847,768	379,000	253,773
Managers as a % of total	13.5%	18.2%	21.9%	29.3%	29.4%	45.7%
Ratio of Managers to Nonmanagers	1:6.3	1:4.4	1:3.4	1:2.4	1:2.4	1:1.2
% Change over prior decade:						
Managers		+49.9%	+60.1%	+46.7%	-55.2%	+ 4.0%
Non-managers		+ 4.6%	+23.1%	+ 2.7%	-54.5%	-48.5%

Total		+10.9%	+33.2%	+ 9.7%	-55.3%	-33.0%

*Source: Bell System Statistical Manual 1950-1980, June, 1982, AT&T Comptrollers' Office. NY:AT&T, pp. 701-708, In Keefe (1994), Table 1. The figures for 1950 to 1980 are for the Bell System, excluding Bell Labs (research and development) and Western Electric manufacturing). The 1984 and 1990 figures represent AT&T's total U.S. operations following divestiture, including manufacturing but excluding NCR.

Table 2.5: Comparison of Theoretical & Bell System Labor Market Models: Craft and Clerical Positions

Dimensions	Craft Labor Markets		Secondary Labor Markets	
	Craft Model	Craft in Bell System	Clerical Model	Clericals in Bell System
Labor Market	External	Internal	External	Internal
Job Definition/ Skill	Specialized expertise/ High skill, high portability	Specialized expertise/ High skill, low portability	Narrow, repetitive/ Low skill, high portability	Mod. broad, diversified/ Mod. skill, mod. portability
Deployment/ Promotion	High interfirm mobility/ Horizontal careers	Mod intrafirm mobility/ Short vertical careers	High interfirm mobility/ Dead-end careers	High intrafirm mobility/ Long vertical & flexible careers
Training	Public, private, or union-sponsored apprenticeship	Company-provided formal and on-the-job training	Individually-provided minimal training	Company-provided on the job training
Job Security	Skill-based occupational security	Implicit lifetime security	No security	Implicit lifetime security
Wage Rules	Wages tied to skills, credentials	Wages tied to job	Wages set at legal minimum	Wages tied to job
Commitment	To Occupation	To Company & union	To Individual	To company & union

Table 2.6: Comparison of Theoretical & Bell System Labor Market Models: Industrial and Salaried Positions

Dimensions	Industrial Labor Markets		Salaried Labor Markets	
	Industrial Manufacturing	Operators in Bell System	Salaried Model	Managers in Bell System
Labor Market	Internal	Internal	Internal	Internal
Job Definition/Skill	Narrow, rigidly-defined/ Job-specific, low portability	Narrow, rigidly-defined/ Job-specific, low portability	Broad, problem-solving/ High skill, mod. portability	Narrow, specialized/ High skill, mod. portability
Deployment/Promotion	High intrafirm mobility/ Seniority-based promotions through rigid hierarchies/ Low turnover	Mod. intrafirm mobility/ Seniority-based promotions through flexible hierarchies/ Mod-high turnover	High intrafirm mobility/ Flexible deployment across functions based on merit & personal networks	High intrafirm mobility/ Seniority-based promotions through rigid hierarchies/ Low turnover
Training	Company-provided on-the-job training	Company-provided formal & on-the-job training	Company-provided informal & formal training	Company-provided informal & formal training
Job Security	No formal job security; seniority-based layoffs	Implicit lifetime security	Firm-based employment security pledge	Implicit lifetime security
Wage Rules	Wages tied to job	Wages tied to job	Wages tied to merit & individual person	Wages tied to job
Commitment	To firm & union	To firm & union	To firm	To firm

Table 2.7
Telecommunications Services
Business Strategy and Production Organization

Components	Old System	New System
Capital Market	Regulated by FCC, State PUCs	Partially regulated: sensitive to stock market
Pricing Mechanism	Regulated: Cross-subsidized (local/long dist.) (resident/business)	Partially regulated: More competitive "Incentive-based" "Cost-based"
Product Market	Standardized: Voice	Differentiated: Voice, data, video, image
Technology	Lead, copper transmission; Analog, mechanical switching	Fiber optic transmission; Digital switching
Competitive Advantage	Low cost, scale economies	Cost, quality, customer service
Business Strategy	Universal public service, "Engineering driven"	Segmented service markets, "Market driven"
Management Structure	Vertical Bureaucratic Centralized	Horizontal Entrepreneurial Dual: regional/local
HR/IR	Centralized	Dual: regional/local

Tables for Part III:

Attitudinal and Performance Effects
Of Work Innovations

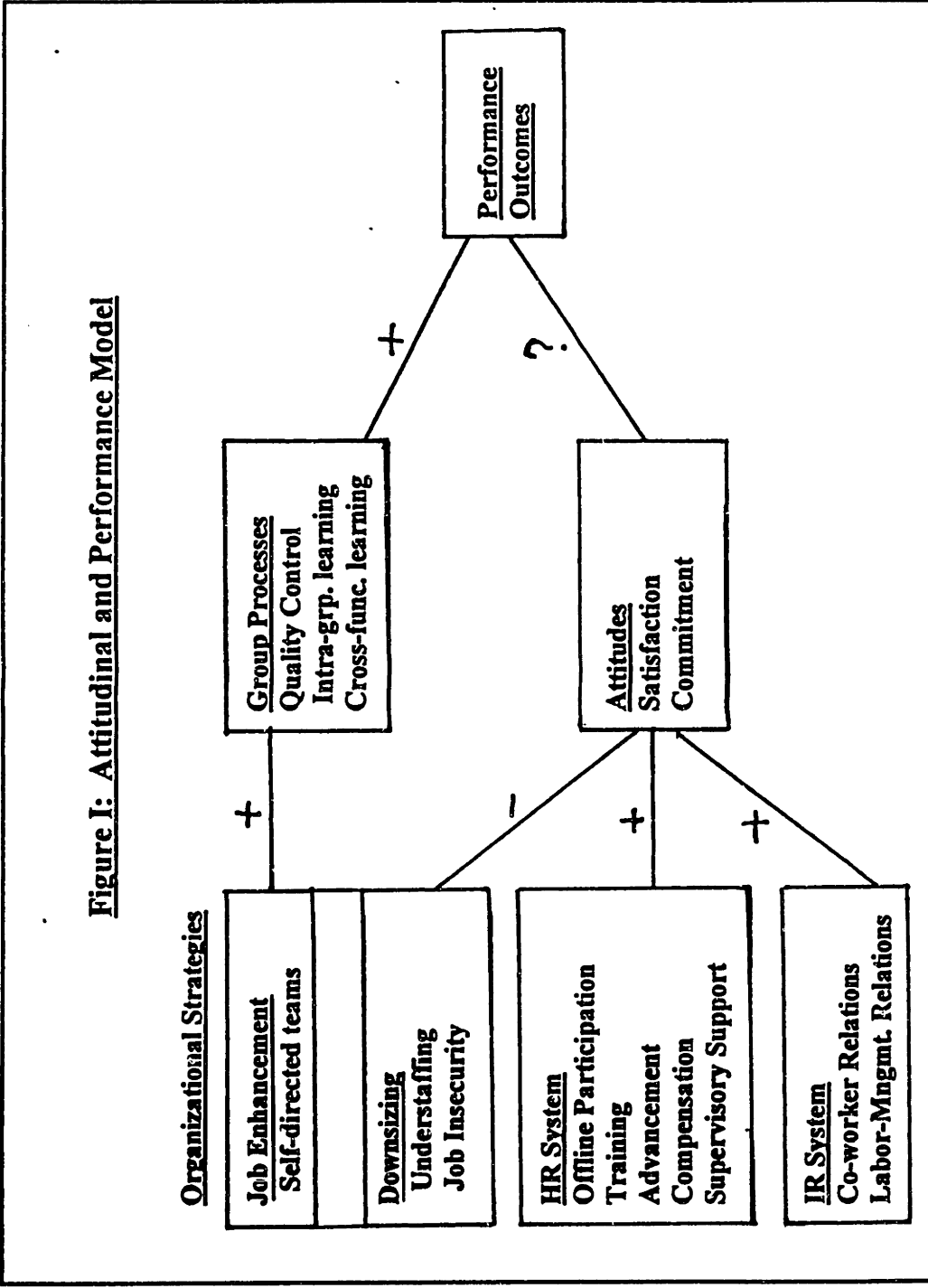


Figure I: Attitudinal and Performance Model

Table 3.1a
Survey Participants:
By Department, Job Category, and
Association With Traditional (TWG) or Self-Directed (SDT) Groups
(Numbers)

Job Category	<u>Both</u> <u>Depts.</u>	<u>Network</u>			<u>Customer Services</u>		
		<u>All</u>	<u>TWG</u>	<u>SDT</u>	<u>All</u>	<u>TWG</u>	<u>SDT</u>
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:							
-----	----	-----	-----	-----	-----	-----	-----
Total	1,191	748	373	375	443	264	179

Table 3.1b
Survey Participants:
By Department, Job Category, and
Association With Traditional (TWG) or Self-Directed (SDT) Groups
(Percentages*)

Job Category	<u>Both</u> <u>Depts.</u>	<u>Network</u>			<u>Customer Services</u>		
		<u>All</u>	<u>TWG</u>	<u>SDT</u>	<u>All</u>	<u>TWG</u>	<u>SDT</u>
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:							
-----	----	-----	-----	-----	-----	-----	-----
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 3.2
Survey Participants:
Percent of Employees in Each Category Who
Are Currently Participating in "Off-Line" Participation

Job Category	<u>All</u>	<u>TWG</u>	<u>SDT</u>
Middle Managers			
Network	74.8	78.8	71.2
Cust. Serv.	35.3	55.6	12.5
-----	----	----	----
All Middle Mangrs	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
<u>Workers:</u>			
Network	17.6	15.4	19.8
Cust. Serv.	23.0	22.7	23.6
-----	----	----	----
All Workers	19.6	18.9	21.1

Table 3.3a
Correlations of Selected Job Characteristics in Network:
Workers in Traditional, Participatory, and Self-Directed Groups Compared

<u>Job Dimension</u>	<u>Traditional Groups(TWG)</u>	<u>Participatory Groups(PWG)</u>	<u>Self-Directed Teams(SDT)</u>
Sample size	N=153	N = 74	N = 150
<u>Job Characteristics:</u>			
Job Autonomy:			
Control over tasks	-0.2267 ***	-0.1277 **	0.3038 ***
Control over tools	-0.0903 *	-0.1163 **	0.1609 ***
Control over pace	-0.1594 ***	0.0113	0.1316 **
<u>Autonomy (3-item) index:</u>	-0.1952 ***	-0.0971 *	0.2462 ***
Have increased control over:			
Task assignments	-0.1445 ***	-0.0763	0.1935 ***
Pace of work	-0.0788	-0.0872	0.1418 ***
Job's Use of Skills	-0.0029	-0.0696	0.0867 *
Job Variety	0.1440 ***	0.0296	-0.1553
<u>Customer Service Responsibilities:</u>			
Have adequate authority to meet customer needs:	-0.2005 ***	0.0247	0.1970 ***
Work rules get in way of meeting customer needs!!	-0.0185	0.0775	-0.0576
Have increased control over meeting customer needs	-0.1284 **	-0.0172	0.1665 ***

- ! Yes/no questions
- !! Questions with 5 point scale.
- * Significant correlation at 10% level
- ** Significant correlation at 05% level
- *** Significant correlation at 01% level

Table 3.3b
Correlations of Selected Work Group Characteristics in Network:
Workers in Traditional, Participatory, and Self-Directed Groups Compared

<u>Job Dimension</u>	<u>Traditional Groups (TWG)</u>	<u>Participatory Groups (PWG)</u>	<u>Self-Directed Teams (SDT)</u>
Sample size	N=153	N = 74	N = 150
<u>Work Group Composition</u>			
Tenure of members (yrs.)	0.0909 *	0.0281	-0.1462 ***
Work group size	0.2723 ***	0.0707	-0.3320 ***
# members gone in 2 yrs.	0.0329	0.0059	-0.0697
# members replaced in 2 yrs.	0.1800 ***	-0.0753	-0.1221 **
Increase in group size	0.0525	-0.0386	-0.0050
<u>Work Group Supervision</u>			
Tenure of supervisor (yrs)	0.1494 ***	-0.0495	-0.1244 **
Supr. attends group meetings!	0.3518 ***	0.1665 ***	-0.4938 ***
Supervision has decreased!	-0.1958 ***	-0.0552	0.2395 ***
Work group chooses leader	-0.4545 ***	-0.1711 ***	0.5965 ***
Frequency of group meetings	-0.1637 ***	-0.0007	0.1750 ***
<u>Work Group Responsibilities</u>			
Setting work group goals	-0.3153 ***	-0.0882 *	0.3937 ***
Assigning daily tasks	-0.3434 ***	-0.1894 ***	0.4899 ***
Setting lunch, rest breaks	-0.2092 ***	-0.0764	0.2729 ***
Scheduling vacations	-0.2750 ***	-0.1455 ***	0.4256 ***
Dealing with absences	-0.2357 ***	-0.0996 *	0.3153 ***
Doing quality inspections	-0.3070 ***	-0.1472 ***	0.4163 ***
Doing safety inspections	-0.2201 ***	-0.1252 ***	0.3231 ***
Deciding who gets training	-0.1460 ***	-0.0700	0.1951 ***
<u>Work Group "Internal" Relations!!</u>			
Members often teach each other!!	-0.2771 ***	-0.0156	0.2794 ***
Members often rely on each other to solve problems!!	-0.1500 ***	-0.0583	0.1698 ***
Members often rely on supervisor to solve problems!!	0.1307 **	0.0717	-0.2334 ***
Members have "good" relations!!	-0.0694	-0.0764	0.1155 ***
Members' relations have improved in last 2 yrs.!!	-0.1135 **	-0.0337	0.1569 ***
<u>Work Group Cross-func. Relations</u>			
Have authority to directly contact managers!	-0.0875	-0.1176 **	0.1845 ***
Frequency of interaction with:!!			
Managers outside dept.	-0.1895 ***	-0.1179 ***	0.2819 ***
Work groups outside dept.	0.0287	0.0764	-0.1141 **
Relations with other depts.!!	-0.1919 ***	-0.0013	0.2098 ***
Relations with other depts. have improved in last 2 yrs.!	-0.0981 *	0.0418	0.1057 *

Table 3.3c
Correlations of Selected HR/IR Practices in Network:
Workers in Traditional, Participatory, and Self-Directed Groups Compared

Job Dimension	<u>Traditional</u> Groups (TWG) N=153	<u>Participatory</u> Groups (PWG) N = 74	<u>Self-Directed</u> Teams (SDT) N = 150
Sample size			
<u>Human Resource Practices</u>			
Participation (Off-line):			
# monthly meetings	-0.1247 ***	0.4073 ***	-0.1177 ***
Training (days):			
Technical	0.0020	0.0479	-0.0416
Quality	-0.0844	0.0751	0.0514
Basic (reading, math)	-0.0885 *	0.0177	0.0474
SDT training	-0.2117 ***	-0.1180 **	0.3204 ***
Total training in 2 yrs.	-0.1274 ***	0.0256	0.1110 ***
Advancement			
Skills very useful for future jobs in co.!!	-0.0482	0.0023	0.0343
Have real opportunity to improve skills!!	-0.1249 **	0.0852	0.0621
Would accept promotion!	-0.0678	0.1650 ***	-0.0687
Transfer oppor. have improved	0.0092	0.0332	0.0089
Training oppor. have improved	-0.1117 **	0.0249	0.0953
Promo. oppor. have improved	0.0188	-0.0646	0.0537
Compensation			
Yearly earnings	0.1106 **	-0.0072	-0.1013 *
Support from immediate supervisor!!			
Encourages my participation	0.0500	-0.0156	-0.0740
Gives adequate time to meet	-0.1463 ***	-0.0927	0.1917 ***
Knows enough to evaluate me	0.1003 *	0.0160	-0.1349 ***
Gives frequent feedback	0.0401	0.0554	-0.1088 **
Treats workers with respect	0.1122 **	-0.0306	-0.0900
Puts quality first	0.0716	0.0494	-0.1306 **
<u>Suprvsr support: (6-item index):</u>	0.0890	0.0191	-0.1299 **
<u>Industrial Relations</u>			
Management & craft relations:			
Are "good"!!	-0.0763	0.0162	0.0299
Have improved in last 2 yrs.	-0.0442	0.0418	0.0269
Management & union relations:			
Are "good"!!	-0.0904	-0.0553	0.1700 ***
Have improved in last 2 yrs.	0.0244	-0.0513	0.0370
Extent of local union participation:			
In QWL	-0.1110 **	0.0995	0.0619
In Quality	-0.1013 *	0.0673	0.0949 *
In SDTs	-0.1943 ***	0.0099	0.1934 ***

Table 3.3d
Correlations of Selected Job and Individual Characteristics in Network:
Workers in Traditional, Participatory, and Self-Directed Groups Compared

<u>Job Dimension</u>	<u>Traditional Groups (TWG)</u>	<u>Participatory Groups (PWG)</u>	<u>Self-Directed Teams (SDT)</u>
Sample size	N=153	N = 74	N = 150
<u>Dimensions of Downsizing</u>			
Workload:			
Unrealistic objectives!!	-0.0147	-0.0168	-0.0052
Too much overtime!!	-0.0862	0.0373	0.0674
Frequent understaffing!!	-0.1082 **	0.0594	0.0621
Increased workload!	-0.0158	-0.0026	0.0092
Employment security:			
"Feel less secure in job than 2 years ago"!!	-0.0438	0.0118	0.0051
Force to relocate to retain job	0.0984 *	-0.0796	-0.0265
<u>Working Conditions</u>			
Technology			
% old cable	-0.0524	-0.0465	0.1101 *
% new plant	0.0913	0.1070 *	-0.1791 ***
Technology is adequate	-0.0509	0.0172	0.0285
Hrs. of daily driving time	0.0341	-0.0487	0.0134
Frequency of being pulled from turf	0.1284 **	0.0312	-0.1576 ***
Frequency of work in high crime area	-0.0556	0.0841	-0.0404
State			
Number 1	-0.0132	-0.0032	0.0170
Number 2	0.0165	-0.0124	0.0213
Number 3	0.0106	0.1259 **	-0.0676
Number 4	-0.0132	0.0182	-0.0098
Number 5	-0.0414	-0.0063	0.0110
Number 6	-0.0284	-0.0642	0.0655
Number 7	-0.0575	-0.0764	0.1304 **
Number 8	0.0807	0.0391	-0.1350 ***
Number 9	0.0272	-0.0758	0.0337
Service Market			
% Residential	0.0173	0.0337	-0.0566
% Small business	0.0037	0.0128	0.0110
% Large business	0.0143	-0.0611	0.0197
Location			
% rural	-0.0695	0.022	0.0636
% suburban	0.1003 *	0.0201	-0.1421
% urban	-0.0313	-0.0077	0.0603
<u>Demographic Characteristics</u>			
Gender	-0.0316	0	0.0492
Race	0.0212	0.0216	-0.0134
Age	0.0385	-0.1372 ***	0.0789
Education	-0.1208 **	0.1455 ***	-0.0173
Company tenure	0.0124	-0.0986	0.0742
Union membership	-0.0559	0.0533	0.0381

Table 3.3e
Correlations of Selected Job-Related Attitudes in Network:
Workers in Traditional, Participatory, and Self-Directed Groups Compared

<u>Job Dimension</u>	<u>Traditional Groups (TWG)</u>	<u>Participatory Groups (PWG)</u>	<u>Self-Directed Teams (SDT)</u>
Sample size	N=153	N = 74	N = 150
<u>Assessment of top management:!!</u>			
Commits sufficient resources	0.0132	0.0061	-0.0167
Gives clear strategic direction	-0.1112 ***	0.0079	0.1189 ***
Considers employees interests	-0.0942 *	0.0296	0.0784
Is committed to quality	.0703	-0.0355	0.1055 **
<u>Top Management: Overall Assessment (4-item scale)</u>			
	-0.0885	0.0052	0.0911
<u>Satisfaction with:!!</u>			
Participation in decisions	-0.1748 ***	0.0235	0.1660 ***
Job	-0.0366	-0.0621	0.1231 **
Career opportunities	-0.0027	-0.0143	0.0542
Employment security	0.0249	0.0445	-0.046
Benefits	-0.0778	0.0800	0.0391
Pay	-0.0332	-0.0028	0.0501
Company in general	-0.0258	0.0135	0.0579
<u>Overall satisf. index (7-items):</u>	-0.0726	-0.0210	0.0702
<u>Organizational Commitment!!</u>			
Is willing to work harder	-0.1059 **	0.0853	0.0797
Feels loyal to company	-0.0197	0.0698	0.0086
Is proud to work for company	-0.0605	0.0830	0.0291
Overall commit. scale (3 items)	-0.0645	0.0825	0.0442
Days absent in 1993	0.1403 ***	-0.0497	-0.106 **
<u>Perceptions of Performance:</u>			
Work group quality is good	-0.0560	-0.1265 ***	0.1513 ***
Work group quality has improved in 2 years	-0.0692	-0.0998 *	0.1343 ***
Grp frequently uses quality tools	-0.0161	0.0897	-0.0143
Performance measured on work group (not individual) basis	-0.1977 ***	-0.0816	0.2661 ***
Internal measures used to judge performance	-0.0421	0.1097 **	-0.0308

Table 3.4a
Correlations of Selected Job Characteristics in Customer Services:
Workers in Traditional, Participatory, and Self-Directed Groups Compared

<u>Job Dimension</u>	<u>Traditional Groups (TWG)</u>	<u>Participatory Groups (PWG)</u>	<u>Self-Directed Teams (SDT)</u>
Sample size	N = 108	N = 93	N = 73
<u>Job Characteristics:</u>			
<u>Job Autonomy:</u>			
Control over tasks	0.0047	-0.0858	0.1085 *
Control over tools	0.0487	-0.0838	0.0259
Control over pace	-0.0831	0.0161	0.0816
<u>Autonomy index (3-item scale):</u>	-0.0142	-0.0569	0.0829
 <u>Have increased control over:</u>			
Task assignments	-0.1775 ***	0.0701	0.1208 *
Pace of work	-0.1309 **	0.0336	0.0737
 Job's Use of Skills	 -0.0306	 0.0240	 0.0254
 <u>Customer Service:</u>			
Have adequate authority to meet customer needs:	-0.0616	-0.0176	0.1057 *
Work rules get in way of meeting customer needs!!	0.1197 *	0.0464	-0.1122 *
Have increased control over meeting customer needs	-0.1539 ***	0.1005 *	0.0929

Table 3.4b
Correlations of Work Group Characteristics in Customer Services:
Workers in Traditional, Participatory, and Self-Directed Groups Compared

Sample size	<u>Job Dimension</u>	<u>Traditional Groups (TWG)</u> N = 108	<u>Participatory Groups (PWG)</u> N = 93	<u>Self-Directed Teams (SDT)</u> N = 73
<u>Work Group Composition</u>				
	Tenure of members (yrs.)	0.0206	0.0624	-0.1181 *
	Work group size	0.0426	0.0302	-0.1456 **
	# members gone in 2 yrs.	-0.0441	0.0428	-0.0497
	# members replaced in 2 yrs.	0.0659	0.0321	-0.1565 **
	Increase in group size	0.2184 ***	0.0239	-0.2661 ***
<u>Work Group Supervision</u>				
	Tenure of supervisor (yrs)	0.0223	0.0945	-0.1522 **
	Supr. attends group meetings!	0.1899 ***	0.2117 ***	-0.4690 ***
	Supervision has decreased!	-0.1858 ***	0.0175	0.1889 ***
	Work group chooses leader	-0.1258 **	-0.1839 ***	0.3388 ***
	Frequency of group meetings	-0.1069 *	-0.0421	0.2154 ***
<u>Work Group Responsibilities:</u>				
	Setting work group goals	-0.2325 ***	-0.1189 *	0.4501 ***
	Assigning daily tasks	-0.3045 ***	-0.1095 *	0.5038 ***
	Setting lunch, rest breaks	0.0569	-0.0807	0.0565
	Scheduling vacations	0.0803	-0.0354	-0.0604
	Dealing with absences	0.0403	-0.0846	0.0647
	Doing quality inspections	-0.1088 *	0.0223	0.1776 ***
	Doing safety inspections	-0.1072 *	-0.1189 *	0.2054 ***
	Deciding who gets training	-0.1181 *	-0.1259 **	0.2917 ***
<u>Work Group "Internal" Relations!!</u>				
	Members often teach each other!!	-0.0234	-0.1458 ***	0.1848 ***
	Members often rely on each other to solve problems!!	-0.0212	-0.0387	0.0888
	Members often rely on supervisor to solve problems!!	0.1153 *	0.0651	-0.2402 ***
	Members have "good" relations!!	0.0584	-0.0178	0.0257
	Members' relations have improved in last 2 yrs.!!	-0.0599	-0.0571	0.0943
<u>Work group Cross-functional relations</u>				
	Have authority to contact managers!	-0.0754	-0.1046 *	0.2139 ***
	Frequency of interaction with:			
	Managers outside dept.	-0.1087 *	0.0313	0.1895 ***
	Work groups outside dept.	-0.0173	-0.0616	0.0887
	Have "good" relations with employees in other depts.!!	0.0459	-0.0533	-0.0028
	Relations with other depts. have improved in last 2 yrs.!	-0.0950	-0.0121	0.0999

Table 3.4c
Correlations of Selected HR/IR Practices in Customer Services:
Workers in Traditional, Participatory, and Self-Directed Groups Compared

<u>Job Dimension</u>	<u>Traditional Groups (TWG)</u> N = 108	<u>Participatory Groups (PWG)</u> N = 93	<u>Self-Directed Teams (SDT)</u> N = 73
Sample size			
<u>Human Resource Practices</u>			
Off-line Participation:			
# monthly meetings	-0.2965 ***	0.4106 ***	-0.1793 ***
Training (days):			
Technical	0.0701	-0.0115	-0.0800
Quality	-0.0116	0.0415	-0.0761
Basic (reading, math)	-0.0545	0.0457	0.0161
SDT training	-0.2948 ***	-0.1541 **	0.5210 ***
Total training in 2 yrs.	-0.0388	-0.0013	0.0281
Advancement			
Skills very useful for future jobs in co.!!	-0.1166 *	0.0187	0.1337 **
Have real opportunity to improve skills!!	-0.0976	-0.0141	0.0906
Would accept promotion!	-0.1684 ***	0.1490 **	0.0068
Transfer oppor. have improved	0.0060	0.0591	-0.0203
Training oppor. have improved	-0.0763	0.0158	0.0850
Promo. oppor. have improved	0.0076	0.0167	-0.0696
Compensation			
Yearly earnings	-0.0858	0.0589	0.0385
Support from immediate supervisor:!!			
Encourages my participation	-0.0879	0.0141	0.0990
Gives adequate time to meet	-0.0617	-0.0301	0.1098 *
Knows enough to evaluate me	-0.0894	-0.0604	0.1288 **
Gives frequent feedback	-0.0292	0.0003	0.0506
Treats workers with respect	-0.0239	-0.0133	0.0385
Puts quality first	-0.0459	-0.0363	0.0303
<u>Supervisory support Index (6-items):</u>	-0.0732	-0.0229	0.0855
<u>Industrial Relations</u>			
Management & craft relations:			
Are "good"!!	-0.0078	-0.0032	0.0334
Have improved in last 2 yrs.	-0.1163 *	0.0727	0.0918
Management & union relations:			
Are "good"!!	-0.0876	0.0823	0.0174
Have improved in last 2 yrs.	-0.1259 *	0.0262	0.0948
Extent of local union participation:			
In QWL	-0.0050	0.1363 **	-0.1324 **
In Quality	-0.0456	0.1389 **	-0.1135 *
In SDTs	-0.0412	0.0646	-0.0033

Table 3.4d
Correlations of Job and Individual Characteristics in Customer Services:
Workers in Traditional, Participatory, and Self-Directed Groups Compared

<u>Job Dimension</u>	<u>Traditional Groups (TWG)</u>	<u>Participatory Groups (PWG)</u>	<u>Self-Directed Teams (SDT)</u>
Sample size	N = 108	N = 93	N = 73
<u>Dimensions of Downsizing:</u>			
<u>Workload:</u>			
Unrealistic objectives!!	0.0707	0.0162	-0.0634
Too much overtime!!	0.0826	-0.0015	-0.0963
Frequent understaffing!!	0.0811	0.0211	-0.0651
Increased workload!	0.0616	-0.0730	0.0152
<u>Employment security:</u>			
"Feel less secure in job than 2 yrs ago"	0.0011	0.0576	-0.0469
Was forced to relocate to retain job	0.0660	0.0606	-0.0867
<u>Working Conditions</u>			
Shift	-0.0109	0.1108 *	-0.0418
<u>Technology</u>			
Regional negotiations system	0.0537	0.0229	-0.1153 *
Technology is adequate	-0.0640	-0.0549	0.1296 **
<u>State</u>			
Number 1	-0.0296	-0.0920	0.1580 ***
Number 2	0.0177	0.0169	0.0151
Number 3	-0.0025	0.0200	-0.0367
Number 4	-0.0390	0.0629	-0.0284
Number 5	0	0	0
Number 6	0.0053	0.0778	-0.1187 **
Number 7	-0.0853	-0.0636	0.1748 ***
Number 8	0	0	0
Number 9	0.0456	-0.043	-0.0557
<u>Demographic Characteristics</u>			
Gender	-0.0738	0.0719	0.0432
Race	-0.0381	0.0377	0.0820
Age	-0.0075	0.1182 *	-0.0293
Education	-0.0440	0.1777 ***	-0.1266 **
Company tenure	-0.0140	0.0332	0.0399
Union membership	-0.0247	0.0947	-0.0439

! Yes/no questions

!! Questions with 5 point scale.

* Significant correlation at 10% level

** Significant correlation at 05% level

*** Significant correlation at 01% level

Table 3.4e
Correlations of Selected Outcomes in Customer Services:
Workers in Traditional, Participatory, and Self-Directed Groups Compared

Sample size	<u>Job Dimension</u>	<u>Traditional Groups (TWG)</u> N = 108	<u>Participatory Groups (PWG)</u> N = 93	<u>Self-Directed Teams (SDT)</u> N = 73
<u>Assessment of top management:!!</u>				
	Commits sufficient resources	0.0205	-0.0707	0.0189
	Gives clear strategic direction	-0.0260	-0.0477	0.0397
	Considers employees interests	-0.0094	-0.0383	0.0445
	Is committed to quality	-0.0240	-0.0035	0.0213
	<u>Overall Assessment of top management (4-item scale):</u>	-0.0148	-0.0448	0.0381
<u>Satisfaction with:!!</u>				
	Participation in decisions	0.0403	-0.0628	0.0068
	Job	-0.0342	-0.0246	0.0627
	Career opportunities	-0.0232	0.0307	-0.0183
	Employment security	-0.0909	-0.0971	0.1392 *
	Benefits	0.0047	-0.0609	0.0139
	Pay	-0.0335	0.0362	0.0068
	Company in general	-0.1068 *	-0.0236	0.0890
	<u>Overall satisf. index (7 items):</u>	-0.0528	-0.0478	0.0704
<u>Organizational Commitment!!</u>				
	Is willing to work harder	-0.0682	0.0990	0.0090
	Feels loyal to company	-0.0454	-0.0956	0.2142 ***
	Is proud to work for company	-0.1217 **	-0.0616	0.1558 **
	<u>Overall commit. scale (3 items):</u>	-0.0834	-0.0260	0.1125 *
	Days absent in 1993	0.0214	0.0100	-0.0097
<u>Perceptions of Performance:</u>				
	Work group quality is good	-0.1272 **	-0.0419	0.1922 ***
	Work group quality has improved in 2 years	-0.1069 *	-0.0119	0.1485 **
	Grp frequently uses quality tools	0.0444	0.0084	-0.0144
	Performance measured on work group (not individual) basis	-0.0719	0.0420	-0.0550
	Internal measures used to judge performance	-0.0181	0.0288	0.0053

Table 3.5
Determinants of Job Characteristics of All Workers

<u>Variable</u>	<u>Job</u> <u>Autonomy</u>	<u>Task</u> <u>Significance</u>	<u>Task</u> <u>Identity</u>	<u>Task</u> <u>Variety</u> (Ntwk.only)
<u>Organizational</u>				
<u>Characteristics</u>				
Self-management	.490*** (.076)	.179** (.080)	.083 (.083)	-.668*** (.226)
Participation	.036 (.043)	.053 (.046)	-.132*** (.048)	.030 (.156)
Department (cust. serv.)	-.745*** (.112)	-.210* (.118)	-.507*** (.127)	---
<u>Demographic</u>				
<u>Characteristics</u>				
Age	.011 (.008)	.012 (.009)	.009 (.009)	-.014 (.031)
Gender (female)	.033 (.104)	.143 (.110)	.410*** (.118)	-4.117*** (.331)
Race	.064 (.106)	-.173 (.111)	-.023 (.115)	.931** (.431)
Tenure	-.002 (.009)	-.001 (.009)	.007 (.110)	-.099*** (.037)
Education (years)	.029 (.030)	-.112*** (.031)	.007 (.033)	-.171 (.112)
Union membership	-.030 (.106)	.046 (.111)	-.325 (.116)	.388 (.397)
Constant	1.990*** (.526)	---	---	9.522*** (1.968)
Adjusted R-square	.169	.016!	.026!	.362
Sample Size	N = 747	N = 742	N = 660	N = 406

! "Pseudo R-squared" of ordered probit model.

Table 3.6
SDT-Volunteers as Predictors of Job Characteristics

<u>Variable</u>	<u>Job</u> <u>Autonomy</u>	<u>Task</u> <u>Signif.</u>	<u>Task</u> <u>Identity</u>	<u>Task</u> <u>Variety</u> (Nt.only)	<u>Offline</u> <u>Partic.</u>
<u>SDT Volunteer</u>	.088 (.158)	.024 (.159)	-.031 (.158)	-.688 (.491)	.175* (.098)
<u>Department</u>	-.623*** (.222)	-.065 (.227)	-.615*** (.224)	---	.093 (.138)
<u>Demographic</u>					
<u>Characteristics</u>					
<u>Age</u>	.004 (.017)	.008 (.017)	.025 (.017)	-.031 (.058)	.002 (.011)
<u>Gender (female)</u>	-.111 (.215)	.231 (.219)	.369* (.216)	-4.30 (.642)	.031 (.134)
<u>Race</u>	.018 (.198)	-.035 (.200)	-.140 (.201)	.420 (.857)	.100 (.123)
<u>Tenure</u>	-.005 (.017)	-.011 (.017)	-.007 (.017)	-.123 (.060)	-.008 (.010)
<u>Education (years)</u>	.067 (.054)	-.154*** (.054)	-.022 (.054)	.024 (.197)	.046 (.034)
<u>Union membership</u>	-.203 (.204)	-.069 (.204)	-.357 (.203)	.498 (.732)	-.150 (.126)
<u>Constant</u>	2.029** (.910)	---	---	9.209*** (3.261)	.341 (.565)
<u>Prob > chi2</u>	---	.211	.049	---	---
<u>Adjusted R-square</u>	.069	.016!	.025!	.383	.024
<u>Sample Size</u>	N = 223	N = 221	N = 222	N = 115	N = 223

! "Pseudo'R-squared" for ordered probit model.

Table 3.7
SDT-Volunteers as Predictors of Job Attitudes

<u>Variable</u>	<u>Job</u> <u>Satisfaction</u>	<u>Overall</u> <u>atisfaction</u>	<u>Overall</u> <u>Commitment</u>
<u>SDT Volunteer</u>	-.006 (.160)	-.108 (.123)	.041 (.132)
<u>Department</u>	-.236 (.226)	-.102 (.173)	-.214 (.186)
<u>Demographic Characteristics</u>			
Age	.011 (.017)	-.004 (.013)	.006 (.014)
Gender (female)	-.101 (.219)	.075 (.168)	.332* (.180)
Race	-.201 (.202)	-.212 (.154)	-.163 (.166)
Tenure	.016 (.017)	-.008 (.013)	-.010 (.013)
Education (years)	.012 (.055)	-.010 (.042)	.003 (.045)
Union membership	-.325 (.209)	-.281* (.158)	-.319* (.170)
Constant	---	4.035*** (.707)	3.931*** (.759)
Prob > chi2	.497	---	---
Adjusted R-square	.012!	.001	.009
Sample Size	N = 221	N = 222	N = 222

! "Pseudo'R-squared" for ordered probit model.

Table 3.8
Correlations of Selected Job Characteristics Among Managers:
Middle Managers and Firstline Supervisors Compared

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

Table 3.9
Correlations of Selected Job-Related Attitudes Among Managers:
Middle Managers and Firstline Supervisors Compared

	Middle Managers of:		1st Line Supervisors of:	
	<u>PWGs</u>	<u>SDTs</u>	<u>PWGs</u>	<u>SDTs</u>
<u>Attitudes toward SDTs:!!</u>				
Support use of SDTs	0.1709	0.4423 ***	0.0450	0.3914 ***
SDTs improve quality and customer service	0.0831	0.2410 ***	-0.1025	0.1634 *
SDTs require more cooperation	0.0835	0.0843	-0.0723	0.1174
SDTs' increase ownership'	0.2392	0.2516 ***	-0.1208	0.0472
SDTs cost less	0.1229	0.1384	-0.0621	0.103
SDTs absorb supr. function	0.0558	0.2336 ***	0.0266	0.0249
SDTs free up supr.' time	0.0093	0.2206 ***	-0.0217	0.1665 *
SDTs have better attendance	-0.0381	0.0969	-0.1285	0.0794
SDTs create friction between SDTs & non-SDTs	0.0882	-0.2502 ***	0.1416	-0.0366
SDTs create friction within work groups	0.0222	-0.1554 *	0.0829	-0.0416
Management treats SDTs as privileged groups	-0.0826	-0.1476 *	-0.0333	0.0288
SDTs cost too much	-0.0663	-0.2899 ***	0.2468 **	-0.1476
SDTs don't improve performance as anticipated	0.0046	-0.2388 ***	0.1224	-0.1827 *
SDTs undermine supervisor's authority	0.1357	-0.3272 ***	-0.0197	-0.1516
<u>Satisfaction w/ Top Management</u>	0.1320	0.0305	0.0592	0.0602
<u>Assessment of Supervisor</u>	-0.1130	-0.0297	0.1399	0.0434
<u>Satisfaction with:!!</u>				
Participation in decisions	0.1541	0.0416	-0.0010	-0.0099
Job	0.0851	-0.0070	0.0637	-0.154 *
Career opportunities	0.1132	-0.0030	0.0982	-0.0194
Employment security	0.0933	0.1321 *	0.0685	-0.1783 **
Benefits	-0.0151	0.0805	0.0368	-0.0616
Pay	0.0900	0.0232	0.0458	-0.1149
Company in general	0.2228 **	0.0146	0.0843	0.0029
<u>Overall sat. index (7 items)</u>	0.1516 *	0.0614	0.0751	-0.1166
<u>Organizational Commitment!!</u>				
Is willing to work harder	0.1529	-0.0101	0.0594	0.0379
Feels loyal to company	0.0703	-0.0771	0.0254	0.0444
Has values similar to those of company	0.2614 **	0.0944	0.0813	-0.0016
Is proud to work for company	0.1024	0.0631	0.0907	0.0096
<u>Overall commit. scale (4 items)</u>	0.2290 **	0.0698	0.100	0.0183
Days absent in 1993	0.1891 **	0.0288	0.1274	0.0927
<u>Demographic Characteristics</u>				
Gender	-0.0763	0.0859	-0.0204	0.1078
Race	0.1610	0.0411	0.0957	-0.0280
Age	0.1484	-0.0174	-0.1558 *	-0.0426
Education	0.0198	-0.0003	0.0599	-0.1114
Company tenure	-0.1024	0.1232 *	-0.1633 *	0.0343

Table 3.10
Definition of Variables
Managers and Workers in Network and Customer Services

Dependent Variables

Job Satisfaction

"Considering everything, how satisfied are you with your job?"
 (1 = very dissatisfied to 5 = very satisfied)

Overall Satisfaction: is a scale formed from the following 7 items.

- "Considering everything, how satisfied are you with:
- a. with your involvement in decisions that affect your job?
 - b. your job?
 - c. your opportunities for getting a better job in this company?
 - d. your employment security
 - e. your total benefits program (health insurance, pension, etc.)?
 - f. the pay you get for your job?
 - g. this company?

(all: 1 = very dissatisfied to 5 = very satisfied)

Cronbach's alpha = .80; Eigenvalue = 2.58.

Organizational Commitment: is a scale formed from the following 3 items.

"I am willing to work harder than I have to in order to help this company succeed."

"I feel very little loyalty to this company."

"I am proud to be working for this company."

(all: 1 = strongly disagree to 5 = strongly agree)

Cronbach's alpha = .58; Eigenvalue = .89.

Independent Variables

Management Structure

Department: is a dummy variable:

1 = customer services

0 = network

Management Level: is a series of dummy variables:

Worker: 1 = non-management employee, else 0 (omitted in equations)

1st level supervisor: 1 = firstline supervisor, else 0

Middle manager: 1 = 2nd and 3rd level manager, else 0

Organizational Strategies

Self-directed teams: is a dummy variable:

For workers: 1 = employee is member of SDT, else 0

For management: 1 = supervisor or manager oversees SDT, else 0

Job Design Variables

Job Autonomy: is a scale formed from the following 3 items:

"Please tell us how much personal influence you have over the following things:

a. Deciding what tasks or work assignments you do.

b. Deciding what tools or procedures you use.

c. Controlling the pace or speed at which you work."

(1 = none to 5 = complete)

Cronbach's alpha = .81; 1 factor solution, eigenvalue = 1.63

Significance

"My job makes good use of my knowledge and skills."
(1 = strongly disagree to 5 = strongly agree)

Identity

"How often do work rules get in the way of meeting customer needs?"
(1 = almost always to 5 = never)

Downsizing Variables

Span of Control: For management employees only:

"How many employees report to you directly?"

- 1 = none (recoded to zero)
- 2 = 1-5 (recoded to 3)
- 3 = 6-10 (recoded to 8)
- 4 = 11-15 (recoded to 13)
- 5 = 16-20 (recoded to 18)
- 6 = 21 or more (recoded to 23)

Understaffing

"How often do you find you have too few employees to handle the workload of meeting customer needs."
(1 = never to 5 = almost always)

Less Job Security

"To what extent do you agree or disagree with this statement: 'I feel less secure in my job now than I did several years ago.'"
(1 = strongly disagree to 5 = strongly agree)

Human Resource Management

Participation (Off-line): is a scale formed from the following:

"How many monthly meetings do you currently attend for any of the following types of problem-solving teams or committees:

1. Quality action team
 2. Cross-functional team
 3. Other problem-solving
- (Number)

Training: is the number of total days of training in 2 years from any of the following types of training:

"Please consider the following types of training and indicate how much off-the-job training provided by this company you have received in the last 2 years."

1. Technical training
 2. Basic skills training (math, reading, etc.)
 3. Quality training
 4. Self-directed team training
- (for each category)
- 0 = no training
 - 1 = 1-2 days (recoded to 1.5)
 - 2 = 3-5 days (recoded to 4)
 - 3 = 6-10 days (recoded to 8)
 - 4 = 11-20 days (recoded to 15)
 - 5 = 20 days or more (recoded to 22)

Advancement Opportunity

"I am given a real opportunity to improve my skills in this company" (1 = very dissatisfied to 5 = very satisfied)

Compensation

Earnings

"What are your annual earnings (including overtime)?"

- 1 = under 20,000 (recoded to 15,000)
- 2 = 20,000 - 29,999 (recoded to 25,000)
- 3 = 30,000 - 39,999 (recoded to 35,000)
- 4 = 40,000 - 49,999 (recoded to 45,000)
- 5 = 50,000 - 59,999 (recoded to 55,000)
- 6 = 60,000 - 79,999 (recoded to 70,000)
- 7 = 80,000 - 99,999 (recoded to 90,000)
- 8 = over 100,000 (recoded to 110,000)

Pay Satisfaction

"How satisfied are you with the fairness of your pay?"

(1 = very dissatisfied to 5 = very satisfied)

Supervisor Support: is a scale composed of the following 5 items:

"To what extent does your immediate supervisor or coach provide your work group with the support it needs in the following areas:

- a. Encourages me to participate in solving problems which affect my work;
- b. Knows enough about my work to accurately evaluate my performance;
- c. Gives me feedback frequently enough so that I know how I am performing;
- d. Treats employees with respect;
- e. Puts quality above other objectives such as budgets or schedules.

(1 = almost never to 5 = almost always)

Cronbach's alpha = .84; Eigenvalue = 2.48.

Industrial Relations

Work Group Relations

"In general, how would you describe relations between co-workers in your work group?"

(1 = very poor to 5 = very good)

Labor-Management Relations

"In general, how would you describe relations in your workplace between management and craft employees?"

(1 = very poor to 5 = very good)

Union Affiliation

"Are you a member of the union?"

(0 = no; 1 = yes)

Demographics

Age

"What is your age?"

- 1 = Under 25 (recoded to 21.5)
- 2 = 26-30 years old (recoded to 28)
- 3 = 31-35 years (recoded to 33)
- 4 = 36-40 years (recoded to 38)
- 5 = 41-45 years (recoded to 43)
- 6 = 46-50 years (recoded to 48)
- 7 = 51-55 years (recoded to 53)
- 8 = 56 years or older (recoded to 58)

Gender

"What is your gender?"
(0 = male, 1 = female)

Race

"What is your race/ethnicity?"
(recoded to 0 = white, non-Hispanic; 1 = other race or ethnic group)

Tenure

"What is your length of company service (tenure)?"
1 = Less than 1 year (recoded to .5 years)
2 = 1-5 years (recoded to 3 years)
3 = 6-10 years (recoded to 8 years)
4 = 11-15 years (recoded to 13 years)
5 = 16-20 years (recoded to 18 years)
6 = 21-25 years (recoded to 23 years)
7 = over 25 years (recoded to 28 years)

Education

"What was the highest level of schooling you completed?"
1 = some high school (recoded to 10 years)
2 = high school diploma or equivalent (recoded to 12 years)
3 = post-high school vocational or technical training institute (recoded to 13 years)
4 = some college (recoded to 13 years)
5 = 2 year college degree (recoded to 14 years)
6 = 4-year college degree (recoded to 16 years)
7 = some post-college or graduate training (recoded to 17 years)
8 = masters degree or higher (recoded to 18 years)

Table 3.11
Short Model: Determinants of Job Satisfaction:
All Employees, Managers, and Workers Compared

<u>Variable</u>	<u>All</u> <u>Employees</u>	<u>Middle</u> <u>Managers</u>	<u>1st Line</u> <u>Supervisors</u>	<u>All</u> <u>Workers</u>
<u>Management Structure</u>				
1st Level Supervisor	.158* {.090}	---	---	---
Middle Manager	.517*** {.112}	---	---	---
Department(cust. serv.)	-.378*** (.092)	.202 (.230)	-.202 (.249)	.547*** (.119)
<u>Organizational Strategies</u>				
Self-management	.154** (.065)	-.024 (.166)	-.354* (.189)	.286*** (.080)
Participation	-.008 (.015)	.006 (.019)	-.031 (.063)	-.042 (.032)
<u>Demographic Characteristics</u>				
Age	.013* (.007)	.011 (.019)	.026 (.025)	.016* (.009)
Gender (female)	.152* (.088)	.164 (.243)	.553** (.243)	.109 (.111)
Race	-.179** (.094)	.181 (.361)	-.339 (.248)	-.259*** (.111)
Tenure	-.005 (.008)	.009 (.023)	-.010 (.026)	-.006 (.009)
Education (years)	.028 (.022)	-.004 (.048)	-.111** (.058)	-.003 (.032)
Union membership	---	---	---	.163 (.111)
Constant	---	---	---	---
Pseudo R-squared	.023	.007	.037	.032
Prob > chi2				
Sample Size	N = 1130	N = 184	N = 144	N = 741

Table 3.12
Short Model: Determinants of Overall Satisfaction:
All Employees, Managers, and Workers Compared

<u>Variable</u>	<u>All</u> <u>Employees</u>	<u>Middle</u> <u>Managers</u>	<u>1st Line</u> <u>Supervisors</u>	<u>All</u> <u>Workers</u>
<u>Management Structure</u>				
1st Level Supervisor	.266*** {.063}	---	---	---
Middle Manager	.414*** {.077}	---	---	---
Department (cust. serv.)	-.045 (.064)	.248* (.153)	.192 (.157)	-.140* (.083)
<u>Organizational Strategies</u>				
Self-management	.112** (.046)	.100 (.111)	-.199* (.118)	.176*** (.057)
Participation	-.012 (.010)	-.004 (.013)	-.062 (.040)	.002 (.023)
<u>Demographic</u>				
<u>Characteristics</u>				
Age	.005 (.005)	.004 (.013)	.000 (.016)	.008 (.006)
Gender (female)	.175*** (.061)	.430*** (.161)	.363** (.153)	.096 (.078)
Race	-.122* (.066)	.079 (.244)	-.391*** (.156)	-.145* (.078)
Tenure	-.010 (.006)	-.001 (.015)	-.007 (.017)	-.012* (.007)
Education (years)	-.022 (.015)	.009 (.032)	-.077** (.036)	-.019 (.022)
Union membership	---	---	---	-.091 (.079)
Constant	3.431*** (.294)	2.899*** (.848)	4.839*** (.812)	3.444*** (.391)
Adjusted R-squared	.038	.070	.169	.016
Sample Size	N = 1134	N = 185	N = 144	N = 744

Table 3.13
Short Model: Determinants of Organizational Commitment:
All Employees, Managers, and Workers Compared

<u>Variable</u>	<u>All</u> <u>Employees</u>	<u>Middle</u> <u>Managers</u>	<u>1st Line</u> <u>Supervisors</u>	<u>All</u> <u>Workers</u>
<u>Management Structure</u>				
1st Level Supervisor	.329*** (.065)	---	---	---
Middle Manager	.455 (.079)	---	---	---
Department (cust. serv.)	.104 (.046)	.562*** (.143)	.182 (.153)	-.062 (.089)
<u>Organizational Strategies</u>				
Self-management	.118*** (.047)	.109 (.103)	.015 (.115)	.129** (.061)
Participation	-.006 (.011)	-.003 (.012)	-.044 (.039)	-.006 (.024)
<u>Demographic</u>				
<u>Characteristics</u>				
Age	.014*** (.005)	.027** (.012)	-.005 (.016)	-.014** (.007)
Gender (female)	.231*** (.063)	.150 (.150)	.241* (.149)	.288*** (.083)
Race	-.067 (.067)	.112 (.227)	-.224 (.152)	-.065** (.084)
Tenure	-.005 (.006)	-.008 (.014)	-.003 (.016)	-.006 (.007)
Education (years)	-.020 (.016)	.045 (.030)	-.049 (.035)	.023 (.024)
Union membership	---	---	---	-.066 (.084)
Constant	3.477*** (.300)	3.463*** (.787)	5.240*** (.791)	2.992*** (.416)
Adjusted R-squared	.072	.132	.074	.027
Sample Size	N = 1136	N = 186	N = 144	N = 744

Table 3.14: Full Model: Determinants of Job Satisfaction,
All Employees, Managers, and Workers Compared

<u>Variable</u>	<u>All</u> <u>Employees</u>	<u>Middle</u> <u>Managers</u>	<u>1st Line</u> <u>Supervisors</u>	<u>All</u> <u>Workers</u>
<u>Management Structure</u>				
Department	-.325*** (.120)	.144 (.329)	-.716* (.379)	-.395*** (.162)
1st Level Supervisor	-.159 {.120)	---	---	---
Middle Manager	.044 {.172)	---	---	---
<u>Organizational Strategies</u>				
Self-directed teams	.044 (.077)	.261 (.208)	-.694*** (.281)	.098 (.098)
<u>Job Design</u>				
Autonomy	.185*** (.040)	.104 (.148)	.247 (.175)	.172*** (.048)
Significance	.516*** (.040)	.708*** (.127)	.702*** (.142)	.519*** (.050)
Identity	.120*** (.045)	.074 (.147)	-.048 (.179)	.168*** (.053)
<u>Downsizing</u>				
Span of control	---	-.014 (.017)	.008 (.026)	---
Understaffing	-.153*** (.037)	-.240** (.123)	-.149 (.133)	-.114*** (.044)
Less job security	-.103*** (.041)	-.410*** (.159)	-.083 (.163)	-.090* (.049)
<u>Human Resource Policies</u>				
Participation	.014 (.018)	-.000 (.024)	.115 (.085)	.049 (.043)
Training	.001 (.003)	.006 (.008)	.005 (.009)	.006 (.005)
Advancement Opportunities	.090*** (.036)	.169 (.106)	.302** (.130)	.057 (.044)
<u>Compensation</u>				
Earnings	-.000 (.000)	-.000* (.000)	.000* (.000)	-.000 (.000)
Pay satisfaction	.153*** (.036)	-.039 (.103)	.148 (.131)	.185*** (.045)
Supervisor Support	.097** (.046)	.212 (.162)	.441*** (.153)	.055 (.058)
<u>Industrial Relations</u>				
Employee Relations	.095* (.053)	.165 (.226)	-.066 (.215)	.123** (.061)
Labor-management relations	.093* (.052)	.098 (.207)	.301 (.219)	.085 (.063)
Union membership	---	---	---	-.194 (.133)
Pseudo R-squared	.219	.244	.340	.232
Prob > chi2	0.000	0.000	0.000	0.000
Sample Size	N = 972	N = 170	N = 119	N = 626

! Controls for service markets, location, and demographics not shown.

Table 3.15
Full Model: Determinants of Overall Satisfaction,
All Employees, Managers, and Workers Compared

<u>Variable</u>	<u>All</u> <u>Employees</u>	<u>Middle</u> <u>Managers</u>	<u>1st Line</u> <u>Supervisors</u>	<u>All</u> <u>Workers</u>
<u>Management Structure</u>				
Department	-.035 (.059)	.048 (.144)	.217 (.154)	-.126 (.080)
1st Level Supervisor	.039 (.060)	---	---	---
Middle Manager	.044 (.084)	---	---	---
<u>Organizational Strategies</u>				
Self-directed teams	.052 (.038)	.182** (.091)	.009 (.119)	.049 (.049)
Job Design				
Autonomy	.105*** (.020)	.106 (.068)	.125 (.075)	.085*** (.024)
Significance	.195*** (.019)	.333*** (.053)	.078 (.057)	.196*** (.024)
Identity	.057*** (.022)	.004 (.065)	.119 (.075)	.058** (.026)
Downsizing				
Span of control	---	-.007 (.007)	-.007 (.011)	---
Understaffing	-.050*** (.018)	-.096* (.052)	-.016 (.057)	-.044** (.022)
Less job security	-.199*** (.020)	-.233*** (.053)	-.310*** (.061)	-.182*** (.024)
<u>Human Resource Policies</u>				
Participation	.005 (.009)	.011 (.011)	-.015 (.037)	.041* (.022)
Training	-.001 (.002)	-.002 (.003)	-.002 (.004)	.000 (.002)
Advancement Opportunities	.128*** (.018)	.065 (.049)	.158*** (.055)	.116*** (.022)
Compensation				
Earnings	.000 (.000)	-.000 (.000)	.000 (.000)	-.000 (.000)
Supervisor Support	.083*** (.023)	.157** (.070)	.243*** (.064)	.054*** (.029)
<u>Industrial Relations</u>				
Employee Relations	.022*** (.026)	.112 (.096)	.150* (.092)	.051* (.030)
Labor-management relations	.089*** (.026)	-.018 (.091)	.159* (.094)	.112*** (.032)
Union membership	---	---	---	-.080 (.066)
Adjusted R-squared	.482	.533	.558	.472
Sample Size	N = 978	N = 170	N = 119	N = 632

! Controls for service markets, location, and demographics not shown.

Table 3.16
Full Model: Determinants of Organizational Commitment,
All Employees, Managers, and Workers Compared

<u>Variable</u>	<u>All</u> <u>Employees</u>	<u>Middle</u> <u>Managers</u>	<u>1st Line</u> <u>Supervisors</u>	<u>All</u> <u>Workers</u>
<u>Management Structure</u>				
Department	.121* (.067)	-.416*** (.161)	.108 (.160)	-.014 (.093)
1st Level Supervisor	.131** {.067)	---	---	---
Middle Manager	.153* {.095)	---	---	---
<u>Organizational Strategies</u>				
Self-directed teams	.063* (.043)	.129 (.103)	.212* (.125)	.044 (.057)
<u>Job Design</u>				
Autonomy	.055** (.023)	.017 (.076)	.158** (.079)	.029 (.028)
Significance	.180*** (.022)	.248*** (.061)	.141** (.060)	.189*** (.028)
Identity	.105*** (.025)	-.036 (.073)	.052 (.080)	.130*** (.031)
<u>Downsizing</u>				
Span of control	---	-.000 (.008)	-.008 (.012)	---
Understaffing	-.041** (.020)	.016 (.058)	-.111* (.060)	-.022 (.025)
Less job security	-.029 (.022)	-.058 (.060)	-.036 (.065)	-.036 (.028)
<u>Human Resource Policies</u>				
Participation	.004 (.009)	-.002** (.012)	.018 (.039)	.017 (.025)
Training	.001 (.002)	.001 (.003)	-.001 (.004)	.001 (.003)
Advancement Opportunities	.097*** (.020)	.059 (.055)	-.002 (.058)	.121*** (.025)
<u>Compensation</u>				
Earnings	-.000 (.000)	-.000 (.000)	.000 (.000)	.000 (.000)
Pay satisfaction	.096*** (.020)	.112** (.053)	.208*** (.059)	.074*** (.026)
Supervisor Support	.086*** (.026)	.124 (.078)	.108 (.068)	.092*** (.034)
<u>Industrial Relations</u>				
Employee Relations	.016 (.030)	-.005 (.108)	.026 (.097)	.041 (.036)
Labor-management relations	.062** (.029)	.032 (.103)	.007 (.099)	.054 (.037)
Union membership	---	---	---	-.115 (.077)
Adjusted R-squared	.379	.330	.398	.377
Sample Size	N = 975	N = 170	N = 119	N = 629

! Controls for service markets, location, and demographics not shown.

Table 3.17
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 N = 223	Self-Directed N = 87	Traditional N = 136
<u>Average Monthly Sales</u>			
Revenues	\$5,312.36	\$5,783.69***	\$5,010.85
RPAL*	75.39	78.09	73.66
<u>Percent Objectives Met</u>			
Percent Sales Met	105.74	108.73	104.51
Percent RPAL Met	105.33	109.33***	103.04

* Revenues Per Access Line (RPAL)

** SDTs and TWGs are significantly different at p.<.05.

*** SDTs and TWGs are significantly different at p.<.01.

Table 3.18
Determinants of Work Group Tasks and Processes in Customer Services:
Participatory and Self-Directed Groups Compared

<u>Variable</u>	<u>Quality</u> <u>Inspections</u>	<u>Intra-Group</u> <u>Teaching</u>	<u>Cross-Func.</u> <u>Relations</u>
<u>Organizational Strategies</u>			
Self-management	.273 (.177)	.569*** (.155)	.425*** (.151)
Participation	.274* (.161)	-.289** (.129)	-.194 (.129)
<u>Demographic Characteristics</u>			
Age	.019 (.018)	.004 (.016)	.013 (.016)
Gender (female)	.341 (.317)	-.583** (.277)	-.009 (.271)
Race	-.439** (.213)	-.356** (.185)	.132 (.191)
Tenure	-.011 (.018)	-.001 (.016)	-.004 (.015)
Education	-.063 (.073)	-.045 (.062)	.111* (.061)
Union membership	-.113 (.233)	-.137 (.203)	-.016 (.202)
<u>Constant</u>	---	---	---
Prob > chi2	0.102	0.000	0.120
Adjusted R-squared	.040!	.042!	.021!
Sample Size	N = 206	N = 209	N = 210

! Note: R2 for these models is "pseudo R2" of ordered probit.

Table 3.19: Model I
Determinants of Performance of Customer Service Representatives:
Subjective and Objective Measures Compared

<u>Variable</u>	<u>Perceived</u> <u>Quality</u>	<u>Perceived</u> <u>Improvement</u>	<u>Monthly</u> <u>Sales</u>
<u>Organizational Strategies</u>			
Self-management	.679*** (.171)	.416*** (.157)	729.6** (328.3)
Participatory management	-.113 (.088)	-.025 (.083)	98.5 (176.6)
<u>Demographic Characteristics</u>			
Age	-.008 (.017)	-.004 (.016)	-47.0 (33.8)
Gender(female)	-.315 (.309)	.428 (.283)	-255.3 (591.8)
Race	-.056 (.200)	.161 (.191)	185.1 (393.7)
Tenure	.007 (.017)	-.005 (.016)	83.1 (33.3)
Education (years)	.114* (.070)	.100 (.065)	111.1 (136.7)
Union membership	.324 (.219)	-.095 (.210)	50.0 (441.1)
<u>Constant</u>	---	---	3,924.47* (2241.94)
Prob > chi2	.003	.180	
Adjusted R-squared	.057!	.023!	.028
Sample Size	N = 208	N =202	N = 209

! Note: R2 for these models is "pseudo R2" of ordered probit.

Table 3.20: Model II
Determinants of Performance of Customer Service Representatives:
Subjective and Objective Measures Compared

<u>Variable</u>	<u>Perceived</u> <u>Quality</u>	<u>Perceived</u> <u>Improvement</u>	<u>Monthly</u> <u>Sales</u>
<u>Organizational Strategies</u>			
Self-directed teams	1.018*** (.231)	.465** (.205)	943.92** (402.09)
Job Design			
Autonomy	-.327*** (.105)	-.059 (.095)	26.14 (187.58)
Significance	.132 (.099)	.222** (.092)	456.74*** (181.68)
Identity	.225* (.121)	-.071 (.112)	-105.78 (218.51)
Downsizing			
Understaffing	.159 (.117)	.015 (.107)	-168.96 (212.59)
Less job security	-.164 (.109)	.004 (.096)	110.87 (188.73)
<u>Human Resource Policies</u>			
Participation	-.006 (.170)	-.079 (.156)	-67.06 (308.14)
Training	.007 (.011)	.011 (.010)	5.47 (19.41)
Advancement Opportunities	-.037 (.089)	.119 (.082)	-360.17 (161.89)
Compensation			
Earnings	.000 (.000)	-.000 (.000)	-.000 (.000)
Pay satisfaction	.144 (.102)	.100 (.094)	-549.02*** (182.91)
Supervisor Support	.076 (.139)	-.076 (.132)	555.01** (258.60)
<u>Industrial Relations</u>			
Work group relations	.269* (.167)	.403*** (.158)	-291.36 (310.44)
Labor-management relations	-.076 (.150)	.077 (.135)	37.19 (263.12)
Union membership	.688** (.288)	-.043 (.271)	-269.22 (525.60)
<u>Constant</u>	---	---	5,335.73 (3,393.75)
Prob > chi2	0.001	0.000	
Adjusted R-squared!	.166	.138	.190
Sample Size	N = 170	N = 167	N = 170

! Note: R2 for perceived performance models is "pseudo R2" of ordered probit.

Table 3.21: Model III
Determinants of Performance of Customer Service Representatives:
Subjective and Objective Measures Compared

<u>Variable</u>	<u>Perceived</u> <u>Quality</u>	<u>Perceived</u> <u>Improvement</u>	<u>Monthly</u> <u>Sales</u>
<u>Organizational Strategies</u>			
Self-directed teams	1.055*** (.252)	.400* (.221)	971.76** (435.85)
Job Design			
Autonomy	-.362*** (.114)	-.136 (.102)	45.87 (201.45)
Significance	.154 (.116)	.092 (.105)	420.92** (211.65)
Identity	.208 (.129)	-.128 (.118)	-165.32 (232.56)
Downsizing			
Understaffing	.145 (.122)	.028 (.111)	-195.30 (221.93)
Less job security	-.190* (.115)	.058 (.100)	102.33 (197.12)
<u>Attitudinal Variables</u>			
Job Satisfaction	.048 (.115)	.299*** (.105)	64.24 (207.10)
Commitment	-.251 (.160)	.161 (.145)	-75.31 (290.68)
<u>Group Process Variables</u>			
Quality Monitoring	.015 (.163)	-.037 (.148)	234.78 (290.24)
Intra-grp. Teaching	.198** (.104)	.205** (.097)	-162.10 (188.24)
Cross-funct. interaction w/subject matter experts	.001 (.112)	.079 (.104)	-26.71** (203.79)
<u>Constant</u>	---	---	5,990.12* (3,668.12)
Prob > chi2	0.001	0.000	
Adjusted R-squared!	.207	.138	.178
Sample Size	N = 165	N = 167	N = 165

! Note: R2 for perceived performance models is "pseudo R2" of ordered probit.
!! HR/IR, demographic, and control variables not shown.

Table 3.22
 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 N = 223	Traditional N = 136	Self-Directed N = 87
<u>Average Monthly Sales</u>			
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

** SDTs and TWGs are significantly different at p. < .05.

*** SDTs and TWGs are significantly different at p. < .01.

Table 3.23
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
<u>Productivity</u>			
Prod. hrs./task	2.36	2.37	2.35
Work hrs./task	2.81	2.80	2.82
<u>Quality</u>			
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
<u>Hours of Work</u>			
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

** SDTs and TWGs are significantly different at p. < .05.

*** SDTs and TWGs are significantly different at p. < .01.

Table 3.24
Determinants of Performance of Network Crews:
Hours of Work and Productivity Analysis

<u>Variable</u>	<u>Productive</u> <u>Work Hours</u>	<u>Overtime</u> <u>Hours</u>	<u>Productive</u> <u>Hours/Task</u>	<u>Total Work</u> <u>Hours/Task</u>
<u>Organizational Strategies</u>				
Self-directed teams	-1.988** (.876)	5.480** (2.618)	.044 (.079)	.146* (.076)
Job Design				
Autonomy	-.791 (.491)	.856 (1.509)	.029 (.045)	-.020 (.043)
Significance	.475 (.421)	-2.807** (1.267)	-.040 (.038)	-.055 (.036)
Identity	.265 (.502)	-1.355 (1.444)	-.040 (.043)	-.089** (.040)
Multiskilling	.050 (.181)	.518 (.547)	.006 (.015)	.007 (.015)
Downsizing				
Understaffing	.420 (.365)	-1.575 (1.099)	-.018 (.034)	-.087 (.032)
Less job security	.085 (.422)	1.255 (1.269)	.022 (.038)	.038 (.037)
<u>Human Resource Policies</u>				
Participation	-.728 (.477)	.286 (1.428)	.011 (.044)	.001 (.043)
Training	.037 (.044)	-.048 (.137)	.002 (.004)	-.000 (.004)
Advancement Opportunities	-.300 (.404)	.228 (1.212)	.037 (.037)	.056 (.035)
Compensation				
Earnings	-.000 (.000)	.001*** (.000)	-.000 (.000)	.000* (.000)
Pay satisfaction	-.432 (.381)	-.525 (1.148)	-.084 (.035)	-.074 (.033)
Supervisor Support	-.035 (.485)	2.175 (1.459)	-.007 (.047)	.040 (.043)
<u>Industrial Relations</u>				
Work group relations	.693 (.557)	.314 (1.632)	.016 (.051)	.073 (.049)
Labor-management relations	.818* (.469)	1.661 (1.388)	-.040 (.043)	-.027 (.041)
Union membership	.766 (1.254)	-3.578 (3.796)	.250 (.114)	.255 (.107)
<u>Constant</u>	152.01*** (7.285)	-48.72** (21.14)	1.794*** (.628)	1.674*** (.591)
Adjusted R-square	.108	.357	.125	.168
Sample Size	N = 182	N = 183	N = 174	N = 186

Table 3.25
Determinants of Work Group Tasks and Processes in Network:
Participatory and Self-Directed Groups Compared

<u>Variable</u>	<u>Quality</u> <u>Inspections</u>	<u>Intra-Group</u> <u>Teaching</u>	<u>Cross-func.</u> <u>Relations</u>
<u>Organizational Strategies</u>			
Self-management	.931*** (.181)	.908*** (.151)	.727*** (.149)
Participation	-.097* (.134)	.236** (.117)	.327** (.116)
<u>Demographic Characteristics</u>			
Age	-.008 (.021)	.000 (.018)	-.008 (.018)
Gender (female)	.317 (.438)	-.369 (.391)	-.058 (.373)
Race	.205 (.314)	-.181 (.274)	.184 (.280)
Tenure	-.014 (.022)	-.021 (.019)	.001 (.019)
Education	.010 (.074)	.019 (.065)	-.034 (.065)
Union membership	-.348 (.207)	.041 (.235)	-.035 (.238)
<u>Constant</u>	---	---	---
Prob > chi2	0.000	0.000	0.000
Adjusted R-squared	.079!	.066!	.054!
Sample Size	N = 221	N = 219	N = 222

! Note: R2 for these models is "pseudo R2" of ordered probit.

Table 3.26: Model I
Determinants of Work Quality of Network Crews:
Subjective and Objective Measures Compared

<u>Variable</u>	<u>Perceived</u> <u>Quality</u>	<u>Perceived</u> <u>Improvement</u>	<u>Missed</u> <u>Appointments</u>	<u>Multiple</u> <u>Dispatches</u>
<u>Organizational Strategies</u>				
Self-management	.289* (.159)	.482*** (.152)	-.039 (.157)	.210 (.495)
Participatory management	.190** .094	.015 (.086)	.118 (.089)	.037 (.282)
<u>Demographic Characteristics</u>				
Age	-.027 (.019)	-.014 (.018)	-.004 (.019)	-.047 (.060)
Gender(female)	-.468 (.401)	-.295 (.405)	.067 (.406)	1.133 (1.281)
Race	.052 (.298)	-.567** (.295)	-.085 (.293)	-.873 (.925)
Tenure	.008 (.020)	-.010 (.019)	.002 (.020)	.029 (.063)
Education (years)	.049 (.071)	-.087 (.067)	-.025 (.070)	.031 (.221)
Union membership	.294 (.256)	.519 (.248)	.150 (.252)	.172 (.796)
<u>Constant</u>	---	---	1.660*** (1.181)	9.153** (3.725)
Prob. > chi2	.047	.004	---	---
Adjusted R-square	.037!	.043!	.028	-.017
Sample Size	N = 220	N =219	N = 209	N = 209

! Note: R2 for model is "pseudo R2" of ordered probit.

Table 3.27: Model II
Determinants of Work Quality of Network Crews:
Subjective and Objective Measures Compared

<u>Variable</u>	<u>Perceived</u> <u>Quality</u>	<u>Perceived</u> <u>Improvement</u>	<u>Missed</u> <u>Appointments</u>	<u>Multiple</u> <u>Dispatches</u>
<u>Organizational Strategies</u>				
Self-directed teams	.562** (.233)	.561*** (.209)	.069 (.140)	-.005 (.580)
Job Design				
Autonomy	-.194 (.135)	-.035 (.120)	-.008 (.081)	.157 (.336)
Significance	.069 (.111)	.240** (.101)	.041 (.068)	.155 (.279)
Identity	.171 (.127)	.128 (.115)	-.079 (.077)	-.369 (.317)
Multiskilling	.042 (.048)	-.034 (.044)	.003 (.029)	-.012 (.119)
Downsizing				
Understaffing	-.036 (.098)	-.041 (.089)	.045 (.060)	.146 (.246)
Less job security	.068 (.112)	-.018 (.104)	-.117* (.069)	-.124 (.285)
<u>Human Resource Policies</u>				
Participation	.281* (.170)	-.029 (.145)	-.094 (.095)	-.276 (.393)
Training	-.004 (.012)	-.004 (.011)	-.018** (.007)	-.046 (.030)
Advancement Opportunities	.083 (.107)	-.147 (.098)	.022 (.065)	-.137 (.270)
Compensation				
Earnings	.000 (.000)	-.000 (.000)	.000* (.000)	.000** (.000)
Pay satisfaction	-.030 (.101)	-.049 (.093)	-.112* (.062)	-.039 (.257)
Supervisor Support	.140 (.129)	.277** (.114)	.014 (.077)	-.005 (.318)
<u>Industrial Relations</u>				
Work group relations	.577*** (.150)	.205 (.134)	-.070 (.089)	-.373 (.366)
Labor-management rel.	-.077 (.128)	-.167 (.115)	.029 (.075)	.343 (.311)
Union membership	.657* (.345)	.542* (.305)	-.097 (.208)	-.718 (.860)

**Table 3.27 Continued: Control Variables
Determinants of Work Quality of Network Crews:
Subjective and Objective Measures Compared**

<u>Variable</u>	<u>Perceived Quality</u>	<u>Perceived Improvement</u>	<u>Missed Appointments</u>	<u>Multiple Dispatches</u>
<u>Demographic</u>				
<u>Characteristics</u>				
Age	-.027 (.024)	.005 (.023)	-1.047*** (.015)	.078 (.064)
Gender(female)	-.495 (.671)	.122 (.668)	.787** (.404)	5.058*** (1.683)
Race	-.260 (.407)	-.576 (.385)	.091 (.240)	-.042 (1.004)
Tenure	-.012 (.027)	-.043* (.026)	-.039** (.017)	-.105 (.071)
Education (years)	.052 (.094)	-.066 (.086)	.007 (.058)	-.069 (.242)
<u>Geographic Dummy Variables</u>				
State 1	-.891* (.478)	-.647 (.416)	-1.328*** (.289)	-2.548** (1.193)
State 2	-1.028** (.506)	-.320 (.461)	.586* (.311)	1.759 (1.283)
State 3	.683 (.569)	.418 (.502)	-1.189*** (.347)	-1.608 (1.436)
State 4	.138 (.328)	.186 (.303)	-1.756*** (.203)	-2.241*** (.837)
State 5	-.199 (.319)	-.021 (.290)	-1.756*** (.197)	-2.385*** (.815)
State 6	.516 (.330)	.612** (.300)	-1.155*** (.199)	-3.774*** (.821)
State 7	.411 (.380)	-.365 (.343)	-1.581*** (.234)	-3.706*** (.969)
<u>Service Market Dummies</u>				
Rural Market	-.149 (.233)	.265 (.215)	.052 (.143)	-.707 (.593)
Urban Market	-.045 (.272)	.413* (.249)	.073 (.167)	.456 (.689)
Large business customers	.382 (.925)	-1.342* (.813)	-.680 (.544)	-3.196 (2.250)
Residential customers	-.785* (.449)	-.734* (.425)	.002 (.269)	-.633 (1.111)
<u>Constant</u>	---	---	1.266 (1.138)	8.335* (4.700)
Prob. > chi2	.004	.001		
Adjusted R-square	.177!	.143!	.489	.202
Sample Size	N = 185	N = 184	N = 186	N = 186

! Note: R2 for model is "pseudo R2" of ordered probit.

Table 3.28: Model III
Determinants of Work Quality of Network Crews:
Subjective and Objective Measures Compared

<u>Variable</u>	<u>Perceived</u> <u>Quality</u>	<u>Perceived</u> <u>Improvement</u>	<u>Missed</u> <u>Appointments</u>	<u>Multiple</u> <u>Dispatches</u>
<u>Organizational Strategies</u>				
Self-directed teams	.153 (.261)	.185 (.236)	.113 (.160)	.098 (.663)
Job Design				
Autonomy	-.151 (.132)	-.047 (.120)	-.003 (.081)	.152 (.335)
Significance	.000 (.129)	.152 (.116)	.033 (.079)	-.079 (.328)
Identity	.111 (.133)	.054 (.118)	-.082 (.080)	-.428 (.332)
Multiskilling	.023 (.046)	-.076* (.043)	.001 (.028)	-.046 (.118)
Downsizing				
Understaffing	-.003 (.101)	-.045 (.092)	.038 (.064)	.186 (.255)
Less job security	.117 (.115)	-.006 (.107)	-.127* (.071)	-.135 (.294)
<u>Attitudinal Variables</u>				
Job Satisfaction	.143 (.126)	.053 (.114)	-.050 (.078)	.260 (.323)
Commitment	.111 (.145)	.356*** (.133)	-.140 (.090)	.249 (.372)
<u>Group Process Variables</u>				
Quality Monitoring	.156 (.171)	.172 (.156)	-.034 (.105)	.114 (.437)
Intra-grp. Teaching	.214** (.096)	.128 (.088)	.010 (.059)	-.191 (.245)
Cross-func. relations w/subject matter experts	.011 (.101)	.116 (.094)	-.055 (.062)	-.063 (.259)
<u>Constant</u>	---	---	1.551 (1.181)	8.282* (4.908)
Prob > chi2	.005	.000	---	---
Adjusted R-squared	.189!	.165!	.482	(.320)
Sample Size	N = 183	N = 182	N = 184	

! Note: R2 for model is "pseudo R2" of ordered probit.

!! HR/IR, demographic, and control variables not shown.

Appendices

Survey Instruments

network manager

MIT WORK INNOVATIONS SURVEY

JOB CHARACTERISTICS AND SKILL REQUIREMENTS

1. What is your job title? _____
2. How long have you been in your present job title?
 - 1 [] Less than 1 year
 - 2 [] 1-5 years
 - 3 [] 6-10 years
 - 4 [] 11-15 years
 - 5 [] 16-20 years
 - 6 [] 21 years or more
3. How many employees report directly to you?
 - 1 [] None
 - 2 [] 1-5
 - 3 [] 6-10
 - 4 [] 11-15
 - 5 [] 16-20
 - 6 [] 21 or more
4. Has your span of control increased over the last 2 years? yes no
 - 4a. If yes to question 4, how many additional employees do you now directly supervise?
 - 1 [] 1-2
 - 2 [] 3-5
 - 3 [] 6-9
 - 4 [] 10 or more
5. Please circle your pay grade: PG: 1-2 3 4 5 6 7 8
6. What is the highest level of schooling you have completed?
 - 1 [] some high school
 - 2 [] high school diploma or equivalent
 - 3 [] post-high school vocational or technical training institute
 - 4 [] some college
 - 5 [] 2 year college degree
 - 6 [] 4-year college degree
 - 7 [] some post-college or graduate training
 - 8 [] masters degree or higher
7. Think of a person who has about the same education that you have, but without the experience you have in your current job. About how long would it take to train such a person to do your job reasonably well (including formal and on-the-job training)?
 - 1 [] 1 - 5 days
 - 2 [] 2 weeks - several weeks
 - 3 [] 2 months - 5 months
 - 4 [] 6 months - 1 year
 - 5 [] a few years
 - 6 [] 5 years or more
8. Have the skills needed for your job changed over the last 2 years? yes no

8a. If yes to question 8, has your job become

- 1 more complex or difficult
- 2 less complex or difficult
- 3 equally complex or difficult, but requires different types of skills

8b. If your job requires new skills, what are the most important new ones?

1. _____ 2. _____

9. How many hours a day do you normally work? _____ hours

10. If you are a manager, how many indirect reports do you have?

- 1 None
- 2 1-20
- 3 21-50
- 4 51-100
- 5 101-200
- 6 more than 200
- 7 other (specify number) _____

11. As part of your regular job, about how many hours a week you spend doing the following tasks?

- _____ scheduling (daily, overtime, weekly, vacations, etc.)
- _____ quality inspection and monitoring
- _____ safety inspection and reporting
- _____ coaching, training employees (technical, safety, quality, etc.)
- _____ responding to daily crises or problems
- _____ long term planning
- _____ paperwork (completing reports, checking attendance)

12. In the past year, have you received comp (compensatory) time or overtime pay?
_____ yes _____ no

THE CUSTOMERS AND AREAS YOU SERVE

1. Please estimate the percent of time spent by employees under your management in serving these different customers:

Residential	_____ % of time
Small Business	_____ % of time
Large Business	_____ % of time
<hr/>	
Total	100%

2. Please estimate the percent of time spent by your employees in the following areas:

Urban area _____ % of your time

Suburban area _____ % of your time

Rural area _____ % of your time

Total 100%

3. What state do you serve?

1 [] Alabama

2 [] Florida

3 [] Georgia

4 [] Kentucky

5 [] Louisiana

6 [] Mississippi

7 [] North Carolina

8 [] South Carolina

9 [] Tennessee

4. About what percent of the lines in your territory are lead or air core? _____ % of lines

5. What percent of the plant in your territory is interfaced (service area interface, crossbox)? _____ %

6. About how many total hours of overtime do your employees work each month? _____ hours/month

INFLUENCE OVER WORK DECISIONS

1. Please tell us how much personal influence you have over the following things:

	Complete	A Lot	Some	A Little	None
a. Deciding what tasks or work assignments you do.	1	2	3	4	5
b. Deciding what tools or procedures you use.	1	2	3	4	5
c. Controlling the pace or speed at which you work.	1	2	3	4	5

2. In your daily work, have any of the following conditions changed in the last 2 years (1 = yes, they have increased; 2 = yes, they have decreased; 3 = no, they are about the same)?

	Increased	Decreased	The Same
a. Your authority to make changes to meet customer needs	1	2	3
b. Your workload	1	2	3
c. Your control over the pace or speed at which you work	1	2	3
d. Your influence over what tasks or work assignments you do	1	2	3
e. The amount of supervision you receive	1	2	3

3. How often do you experience the following conditions at work?

	Almost Always	Quite frequently	Some- times	Seldom	Almost Never
a. Rules and procedures get in the way of meeting customer needs	1	2	3	4	5
b. Unrealistic work objectives	1	2	3	4	5
c. Needing to take work home or work more overtime work than I want to work	1	2	3	4	5
d. Too few employees to handle the workload	1	2	3	4	5

PARTICIPATION IN DECISION-MAKING GROUPS

1. Have you or are you currently participating in any of the following:
(you may check more than one)

- 1 Quality action team
- 2 Inter-departmental or cross-functional team (a group of people from different departments)
- 3 QWL team or committee
- 4 Other problem-solving team

2. If you currently participate in any of these groups, all together how many meetings do you typically attend in one month? _____ number

3. If you currently attend such meetings, how long does the typical meeting last? _____ minutes

GROUP WORK

1. How often do you hold meetings with your direct subordinates to discuss work-related issues (such as rules and procedures, safety, quality, and performance)?

- 1 Once per day
- 2 Once per week
- 3 Once per month
- 4 Rarely
- 5 Never

1a. If you hold meetings, how long does a typical meeting last? _____ Minutes per meeting

2. How often do you interact with supervisors or managers outside of your department in order to solve problems or get your work done?

- 1 daily
- 2 a few times a week
- 3 occasionally
- 4 rarely

3. Do self-directed teams report to you either directly or indirectly? _____ yes _____ no

a. If yes to question 3, was work performance or appraisal used as a criteria in selecting team members? _____ yes _____ no _____ I don't know

b. If yes to question 3, how were team members selected?

1 [] They were already members of the same work group

2 [] Management selected volunteers from different work groups to form an SDT

3 [] The union selected volunteers from different work groups to form an SDT

4 [] Management and the union jointly selected volunteers from different work groups to form an SDT

5 [] Other (specify) _____

6 [] I do not know

4. Do you support the use of self-directed teams in your workplace? _____ yes _____ no

5. Below are some commonly cited advantages of SDTs. In your experience or observation, how true have you found these statements to be (skip this question if you have no knowledge of SDTs).

	Almost Always	Quite frequently	Some- times	Seldom	Almost Never
a. SDTs help workers provide better quality and customer service	1	2	3	4	5
b. Being a member of an SDT requires employees to work together more closely	1	2	3	4	5
c. Being a member of an SDT allows workers to take more ownership of their work	1	2	3	4	5
d. SDTs cost less for the same amount of work	1	2	3	4	5
e. SDTs absorb the functions of first line supervisors we have lost.	1	2	3	4	5
f. SDTs free up supervisors' time to focus on more important issues.	1	2	3	4	5
g. SDT members have better attendance records	1	2	3	4	5

6. Below are some of the criticisms of SDTs. In your experience or observation, how frequently have the following problems occurred? (skip this question if you have no knowledge of SDTs).

	Almost Always	Quite frequently	Some- times	Seldom	Almost Never
a. SDTs create friction between workers who <u>do</u> and <u>do not</u> participate in the teams.	1	2	3	4	5
b. They create friction <u>within teams</u> because workers end up "bossing" each other.	1	2	3	4	5
c. Management treats SDTs as privileged groups.	1	2	3	4	5
d. They cost too much.	1	2	3	4	5
e. They do not improve performance to the extent anticipated.	1	2	3	4	5
f. They undermine the authority of 1st line supervisors.	1	2	3	4	5

TRAINING

1. We want to understand how much off-the-job training provided by this company you have received in the last 2 years. Please check the box that shows the amount of training your received.

Type of training	Number of full days of training					
	None	1-2 Days	3-5 Days	6-10 Days	11-20 Days	Over 20 Days
a. Technical: (specify) _____						
b. Basic skills (reading, math, etc.)						
c. Quality training						
d. General Management training						
e. Training in Leadership/Facilitation						
f. Training in Labor Relations						

2. How much do you agree or disagree with the statement,
"I am given a real opportunity to improve my skills in this company"

- 1 [] strongly agree
- 2 [] somewhat agree
- 3 [] neither agree nor disagree
- 4 [] somewhat disagree
- 5 [] strongly disagree

3. Do you feel that your training is adequate for you to do your current job? yes no

a. If not, what additional training do you need?

- 1 Technical (specify type) _____
- 2 Basic skills (math, reading, etc.)
- 3 Quality
- 4 Self-directed team training
- 5 Other (specify) _____

4. When you have a question or problem to solve on the job, how often do you rely on any of the following sources for solving problems?

	Almost Always	Quite frequently	Some- times	Seldom	Almost Never
a. The formal training you receive from this company	1	2	3	4	5
b. Company operating procedures/tariffs	1	2	3	4	5
c. Your supervisor or manager	1	2	3	4	5
d. Your co-workers	1	2	3	4	5

MANAGEMENT COMMITMENT TO QUALITY

1. How would you rate top management in the following areas:

	Very Good	Good	Fair	Poor	Very Poor
a. Commits sufficient resources so that each department can accomplish its objectives	1	2	3	4	5
b. Gives employees a clear picture of the direction in which the company is headed	1	2	3	4	5
c. Considers employee interests when introducing new technology or work processes	1	2	3	4	5
d. Shows by its actions that quality is a top priority.	1	2	3	4	5

2. How much does your immediate supervisor or manager provide you with the support you need in the following areas?

	Almost Always	Quite frequently	Some- times	Seldom	Almost Never
a. Encourages me to participate in solving problems which affect my work	1	2	3	4	5
b. Knows enough about my work to accurately evaluate my performance	1	2	3	4	5
c. Gives me feedback frequently enough so that I know how I am performing	1	2	3	4	5
d. Treats employees with respect	1	2	3	4	5
e. Puts quality above other objectives such as budgets or schedules.	1	2	3	4	5

EMPLOYMENT ADVANCEMENT AND SECURITY

1. How useful do you think your present job skills will be for future jobs that you expect to hold in this company?

- | | |
|-----------------------|-----------------------|
| 1 [] very useful | 3 [] a little useful |
| 2 [] somewhat useful | 4 [] not useful |

2. Have opportunities in any of the following areas changed in the last 2 years (1 = yes, they have improved; 2 = yes, they have declined; 3 = no, they are about the same)?

	Improved	Declined	About the Same
a. Opportunities to transfer to other locations, departments, or job titles?	1	2	3
b. Opportunities for training and skill development	1	2	3
c. Opportunities for promotion	1	2	3

3. Would you accept a promotion to a higher level management position if given the opportunity?
 yes no

4. If you are a 1st level supervisor, have you thought seriously of returning to craft?
 yes no

UNION INVOLVEMENT IN WORKPLACE ISSUES

1. To what extent has the local union actively supported the following initiatives? (If you have no knowledge of this, please circle 5 = does not apply).

	A Lot	Some	A Little	None	Does Not Apply
a. QWL	1	2	3	4	5
b. Quality	1	2	3	4	5
c. SDTs	1	2	3	4	5

2. How much does the success of the following initiatives depend on union support and participation?

	A Lot	Some	A Little	None	Does Not Apply
a. QWL	1	2	3	4	5
b. Quality	1	2	3	4	5
c. SDTs	1	2	3	4	5

3. In your opinion, should the union be actively involved in the Excellence Through Quality initiative? yes no

EMPLOYEE SATISFACTION AND COMMITMENT

1. Considering everything, how satisfied are you with:

	Very satisfied	Somewhat satisfied	Neither satisfied nor dissatisfied	Somewhat dissatisfied	Strongly dissatisfied
a. Your involvement in decisions that affect your job	1	2	3	4	5
b. Your job	1	2	3	4	5
c. Your opportunities for getting a better job in this company	1	2	3	4	5
d. Your employment security	1	2	3	4	5
e. Your total benefits program (health insurance, pension, etc.)	1	2	3	4	5
f. The pay you get for your job	1	2	3	4	5
g. This company	1	2	3	4	5

2. How much do you agree or disagree with the following statements:

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
a. My work gives me a feeling of personal accomplishment.	1	2	3	4	5
b. My job makes good use of my skills and abilities.	1	2	3	4	5
c. I am willing to work harder than I have to in order to help this company succeed.	1	2	3	4	5
d. I feel very little loyalty to this company.	1	2	3	4	5
e. I find that my values and this company's values are very similar.	1	2	3	4	5
f. I am proud to be working for this company.	1	2	3	4	5

3. Do you participate in the company's profit-sharing program? yes no

4. To what extent do you agree or disagree with this statement: "I feel less secure in my job now than I did several years ago."

- 1 [] strongly agree
- 2 [] somewhat agree
- 3 [] neither agree nor disagree
- 4 [] somewhat disagree
- 5 [] strongly disagree

5. How many days were you absent from work in 1993? days

6. In the last 3 years, have you had to change location or job title due to reorganization or consolidation? yes no

PERFORMANCE

1. To what extent do you use quality tools in your daily work?

- 1 [] Almost always
- 2 [] Quite frequently
- 3 [] Sometimes
- 4 [] Seldom
- 5 [] Almost never

2. On average, what is the quality of services provided by the work group(s) you supervise?

- 1 [] excellent
- 2 [] good
- 3 [] fair
- 4 [] poor
- 5 [] very poor

3. On average, how does the current quality of services provided by the work group(s) you supervise compare to their quality two years ago?

- 1 [] much better
- 2 [] somewhat better
- 3 [] about the same
- 4 [] somewhat worse
- 5 [] much worse

4. The following questions concern performance along standard measures. This information is not to identify any individual, but to understand whether there is a general relationship between work innovations and performance.

a. If you work in Network I&M, would you please share with us the performance of the work group you supervise on the following measures for the month of November, 1993?

_____ % repeat reports _____ average dispatches/tasks per day

b. If you work in an IMC, would you please share with us your performance on the following measures for the month of November, 1993?

_____ service orders with errors _____ # of abandoned calls
 _____ duration time _____ # of troubles screened

5. In general, how would you describe relations between the following groups and individuals.

	Very Good	Good	Fair	Poor	Very Poor
a. Employees in your department	1	2	3	4	5
b. Employees in different departments	1	2	3	4	5
c. Management and craft employees	1	2	3	4	5
d. Management and the union	1	2	3	4	5

6. In general, have relations between the following groups and individuals changed in the last 2 years (1 = yes, they have improved; 2 = yes, they have declined; 3 = no, they are about the same)?

	Improved	Declined	About the Same
a. Employees in your department	1	2	3
b. Employees in different departments	1	2	3
c. Management and craft employees	1	2	3
d. Management and the union	1	2	3

7. How often are you measured on internal measures of performance rather than measures of doing the best job for the customer?

- 1 Almost always
 2 Quite frequently
 3 Sometimes
 4 Seldom
 5 Almost never

BACKGROUND INFORMATION

Your cooperation in answering the following questions will be greatly appreciated. These responses will not be used to identify you personally. They will be used to study how different groups of people respond to the questionnaire items.

1. What is your gender? _____ female _____ male

2. What is your race/ethnicity?

- 1 Afro-American 4 Hispanic
 2 American Indian 5 White (non Hispanic)
 3 Asian 6 Other

3. What is your age?

- 1 Under 25 5 41 - 45
 2 26 - 30 6 46 - 50
 3 31 - 35 7 51 - 55
 4 36 - 40 8 56 years or older

4. Since you were 16 years old, about how many years have you worked for pay? _____ years

5. What is your length of company service (tenure)?

- | | |
|------------------------|---------------------|
| 1 [] Less than 1 year | 4 [] 11 - 15 years |
| 2 [] 1 - 5 years | 5 [] 16 - 20 years |
| 3 [] 6 - 10 years | 6 [] 21 - 25 years |
| | 7 [] Over 25 years |

6. What are your annual earnings (including bonuses)?

- | | |
|-----------------------|-----------------------|
| 1 [] under 40,000 | 4 [] 80,000 - 99,999 |
| 2 [] 40,000 - 59,999 | 5 [] over 100,000 |
| 3 [] 60,000 - 79,999 | |

THANK YOU VERY MUCH FOR YOUR PARTICIPATION
PLEASE RETURN THE SURVEY IN THE ENCLOSED STAMPED ENVELOPE BY
FRIDAY, MARCH 4, 1994

MIT Work Innovations Study, P.O. BOX 440492, West Somerville, MA 02144

networkcraft

MIT WORK INNOVATIONS SURVEY

JOB CHARACTERISTICS AND SKILL REQUIREMENTS

1. What is your job title? _____
2. How long have you been working in your present job title?
 - 1 [] Less than 1 year
 - 2 [] 1-5 years
 - 3 [] 6-10 years
 - 4 [] 11-15 years
 - 5 [] 16-20 years
 - 6 [] 21 years or more
3. What state do you work in?
 - 1 [] Alabama
 - 2 [] Florida
 - 3 [] Georgia
 - 4 [] Kentucky
 - 5 [] Louisiana
 - 6 [] Mississippi
 - 7 [] North Carolina
 - 8 [] South Carolina
 - 9 [] Tennessee
4. What level of formal education do you feel is needed by a person to do your job?
 - 1 [] some high school
 - 2 [] high school diploma or equivalent
 - 3 [] post-high school vocational or technical training
 - 4 [] some college
 - 5 [] 4-year college degree
 - 6 [] some post-college or graduate training
 - 7 [] masters degree or higher
5. Think of a person who has about the same education that you have, but without your work experience. About how long would it take to train such a person to do your job reasonably well?
 - 1 [] Less than 1 week
 - 2 [] 1 week - 4 weeks
 - 3 [] 1 month - 3 months
 - 4 [] 3 - 6 months
 - 5 [] 6 months - 1 year
 - 6 [] more than a 1 year
6. Have the skills needed for your job changed over the last 2 years? yes no
 - a. If yes to Question 6 : Has your job become
 - 1 [] more complex or skilled
 - 2 [] less complex or skilled
 - 3 [] equally complex or skilled, but requires different types of skills
 - b. If your job now requires different skills, what are the most important ones?
 1. _____
 2. _____

INFLUENCE OYER WORK DECISIONS

1. Please tell us how much personal influence you have over the following things:

	Complete	A Lot	Some	A Little	None
a. Deciding what tasks or work assignments you do.	1	2	3	4	5
b. Deciding what tools or procedures you use.	1	2	3	4	5
c. Controlling the pace or speed at which you work.	1	2	3	4	5

2. In your daily work, have any of the following conditions changed in the last 2 years (1 = yes, they have increased; 2 = yes, they have decreased; 3 = no, they are about the same)?

	Increased	Decreased	The Same
a. Your authority to make changes to meet customer needs	1	2	3
b. Your workload	1	2	3
c. Your control over the pace or speed at which you work	1	2	3
d. Your influence over what tasks or work assignments you do	1	2	3
e. The amount of supervision you receive	1	2	3

3. How often are the following conditions adequate for you to perform your job well?

	Almost Always	Quite frequently	Some-times	Seldom	Almost Never
a. The cooperation you get from other work groups	1	2	3	4	5
b. The cooperation you get from other departments	1	2	3	4	5
c. The authority you have to change things to meet customer needs	1	2	3	4	5
d. The technology or plant you work with	1	2	3	4	5

THE CUSTOMERS AND AREAS YOU SERVE

1. On average, about how much time per day do you spend driving to and from your work assignments (your "shield time")? _____ hour(s) per day

2. The following is a list of different types of installation and repair jobs. Please check the ones you do on a regular basis.

- | | |
|---|--------------------------------------|
| 1 [] aerial cable (incl. air pressure) | 7 [] network terminating wire |
| 2 [] buried cable (incl. air pressure) | 8 [] digital central office |
| 3 [] aerial service wire | 9 [] digital subscriber pair gain |
| 4 [] buried service wire | 10 [] public CPE - COCOT |
| 5 [] building entrance cable | 11 [] basic or nonbasic inside wire |
| 6 [] intrabldg. network cable | 12 [] other (describe) _____ |

3. Please estimate the percent of time you spend serving these different customers:

Residential	_____ % of your time
Small Business	_____ % of your time
Large Business	_____ % of your time
<hr/>	
Total	100%

4. Please estimate the percent of your time you spend in the following areas:

Urban area	_____ % of your time
Suburban area	_____ % of your time
Rural area	_____ % of your time
<hr/>	
Total	100%

5. How often must you work in locations that you feel are unsafe or high crime areas?

- 1 [] almost always
- 2 [] quite frequently
- 3 [] occasionally
- 4 [] rarely
- 5 [] never

6. About what percent of the lines you work with are lead or air core cable? _____ percent of lines

7. About what percent of the plant you work with is interfaced (i.e. serving area interfaced, crossbox)? _____ percent interfaced

8. How often are you pulled from your own "turf" to work in another area?

- 1 [] daily
- 2 [] a few times a week
- 3 [] a few times a month
- 4 [] rarely
- 5 [] never

9. About how many hours of overtime do you work each month? _____ hours per month

10 How often do you experience the following conditions at work?

	Almost Always	Quite frequently	Some- times	Seldom	Almost Never
a. Rules and procedures get in the way of meeting customer needs	1	2	3	4	5
b. Unrealistic work objectives	1	2	3	4	5
c. More overtime work than I want to work	1	2	3	4	5
d. Too few employees to handle the workload	1	2	3	4	5

GROUP WORK

1. How often does your work group meet to discuss work-related issues (such as rules and procedures, safety, quality)?

- 1 [] Once a day
- 2 [] Once a week
- 3 [] Once a month
- 4 [] Rarely
- 5 [] Never

2. When your work group meets, how much time is typically spent per meeting? _____ minutes

3. Does a supervisor or "coach" usually attend these meetings? _____ yes _____ no

4. Does your work group choose a member to serve as a coordinator or leader?

- 1 [] No, we have no coordinator or leader
- 2 [] Yes, the position is rotated among group members
- 3 [] Yes, one member acts as an ongoing coordinator/leader

5. How often do members of your group routinely teach or help one another with short cuts, problem-solving, or ways to improve how you work?

- 1 [] almost always
- 2 [] frequently
- 3 [] occasionally
- 4 [] rarely
- 5 [] never

6. How long have you been a member of your work group? _____ years

7. How long has your current supervisor or coach worked with your work group? _____ years

8. The following questions concern membership and turnover in your work group.

- a. How many members does your work group have? _____ number
- b. How many members have left or retired in the last 2 years? _____ number
- c. How many new members have come into your work group in the last 2 years? _____ number
- d. How many supervisors or coaches have you had in the last 2 years? _____ number

9. How often do you interact with non-management employees outside of your department to get your work done?

- 1 daily
- 2 a few times a week
- 3 a few times a month
- 4 rarely
- 5 never

10 In your daily activities, who is primarily responsible for handling the following tasks? (1 = primarily higher management; 2 = primarily the supervisor or coach; 3 = the responsibility is shared by both the supervisor/coach and the work group; 4 = primarily the work group).

	Primarily higher management	Primarily coach or supervisor	Shared by supervisor & wk group	Primarily work group
a. Set work group goals	1	2	3	4
b. Assign daily tasks to group members	1	2	3	4
c. Determine daily lunch and rest breaks	1	2	3	4
d. Handle vacation scheduling	1	2	3	4
e. Deal with absences by group members	1	2	3	4
f. Perform quality inspections and reports	1	2	3	4
g. Perform safety inspection and reports	1	2	3	4
h. Decide the training that group members receive	1	2	3	4

11 Below are commonly cited advantages of self-directed teams (SDTs). In your experience or observation, how often have you found the following to be true (skip this question if you have no knowledge of SDTs).

	Almost Always	Quite frequently	Some- times	Seldom	Almost Never
a. SDTs help workers provide better quality and customer service	1	2	3	4	5
b. Being a member of an SDT requires employees to work together more closely	1	2	3	4	5
c. Being a member of an SDT allows workers to take more ownership of their work	1	2	3	4	5

12 Do you have the authority to solve problems by directly contacting supervisors or managers outside your group or in other departments? yes no

12a. If yes to question 12, how often do you interact directly with supervisors or managers outside of your department to solve problems or get your work done?

- 1 [] daily
- 2 [] a few times a week
- 3 [] a few times a month
- 4 [] rarely

13 Below are some of the criticisms of SDTs. If your experience or observation, how frequently have the following problems occurred? (skip this question if you have no knowledge of SDTs).

	Almost Always	Quite frequently	Some- times	Seldom	Almost Never
a. SDTs create friction between workers who <u>do</u> and <u>do not</u> participate in the teams.	1	2	3	4	5
b. SDTs create friction <u>within teams</u> because workers end up "bossing" each other.	1	2	3	4	5
c. Management treats SDTs as privileged groups.	1	2	3	4	5

14 Is your work group a self-directed team (SDT)? yes no

15 If you are not in an SDT, would you volunteer for one if given the opportunity? yes no

16 If you are a member of a self-directed team, please answer the following questions. Otherwise, skip to the next section, question 1.

a. In what year did the team get started? Year

b. Was your work performance or appraisal used as a criteria in your eligibility to join a self-directed team? yes no I don't know

c. Did your team get started when your supervisor left or retired? yes no

15d. How were self-directed team members selected?

- 1 We were already members of the same work group
- 2 Management selected us from different work groups to form an SDT
- 3 The union selected us from different work groups to form an SDT
- 4 Management and the union selected us from different work groups to form an SDT
- 5 Other (specify) _____

15e. How much self-directed training have you received?

- | | |
|--|---|
| 1 <input type="checkbox"/> no training | 4 <input type="checkbox"/> 6-10 full days |
| 2 <input type="checkbox"/> 1-2 full days | 5 <input type="checkbox"/> 11-20 full days |
| 3 <input type="checkbox"/> 3-5 full days | 6 <input type="checkbox"/> more than 20 full days |

15f. Would you like to return to a traditionally-supervised group? yes no

PARTICIPATION IN DECISION-MAKING GROUPS

1. Have you or are you currently participating in any of the following: (you may check more than 1):

- 1 Quality action team
- 2 Inter-departmental or cross-functional team (a group of people from different departments)
- 3 QWL team or committee
- 4 Other problem-solving team

2. If you currently participate in any of these groups, all together how many meetings do you typically attend in one month? _____ number

2a. How long does the typical meeting last? _____ minutes

TRAINING

1. Please consider the following types of training and indicate how much off-the-job training provided by this company you have received in the last 2 years.

a. Technical training

- | | |
|--|---|
| 1 <input type="checkbox"/> no training | 4 <input type="checkbox"/> 6-10 full days |
| 2 <input type="checkbox"/> 1-2 full days | 5 <input type="checkbox"/> 11-20 full days |
| 3 <input type="checkbox"/> 3-5 full days | 6 <input type="checkbox"/> more than 20 full days |

b. Basic skills training (math, reading, etc.)

- | | |
|--|---|
| 1 <input type="checkbox"/> no training | 4 <input type="checkbox"/> 6-10 full days |
| 2 <input type="checkbox"/> 1-2 full days | 5 <input type="checkbox"/> 11-20 full days |
| 3 <input type="checkbox"/> 3-5 full days | 6 <input type="checkbox"/> more than 20 full days |

c. Quality training

- 1 [] no training
 2 [] 1-2 full days
 3 [] 3-5 full days
 4 [] 6-10 full days
 5 [] 11-20 full days
 6 [] more than 20 full days

2. Do you feel that your training is adequate for you to do your current job? yes no

a. If not, what additional training do you need?

- 1 [] Technical (specify type) _____
 2 [] Basic skills (math, reading, etc.)
 3 [] Quality
 4 [] Self-directed team training
 5 [] Other (specify) _____

3. When you have a question or problem to solve on the job, how often do you rely on any of the following sources for solving the problem?

	Almost Always	Quite frequently	Some- times	Seldom	Almost Never
a. The formal training you receive from this company	1	2	3	4	5
b. Company operating procedures/tariffs	1	2	3	4	5
c. Your supervisor or coach	1	2	3	4	5
d. Your fellow employees	1	2	3	4	5

MANAGEMENT COMMITMENT TO QUALITY

1. How would you rate top management in the following areas:

	Very Good	Good	Fair	Poor	Very Poor
a. Commits sufficient resources so that each department can accomplish its objectives	1	2	3	4	5
b. Gives employees a clear picture of the direction in which the company is headed	1	2	3	4	5
c. Considers employee interests when introducing new technology or work processes	1	2	3	4	5
d. Shows by its actions that quality is a top priority.	1	2	3	4	5

4. Would you accept a promotion to a 1st level supervisor position if given the opportunity?
 yes no

UNION INVOLVEMENT IN WORKPLACE ISSUES

The following questions apply to union involvement in workplace issues. (Where you have no knowledge of a particular item, please circle "5 = does not apply").

1. To what extent has your local union actively supported the following initiatives?

	A Lot	Some	A Little	None	Does Not Apply
a. QWL	1	2	3	4	5
b. Quality	1	2	3	4	5
c. SDTs	1	2	3	4	5

2. How much does the success of the following initiatives depend on union support and participation?

	A Lot	Some	A Little	None	Does Not Apply
a. QWL	1	2	3	4	5
b. Quality	1	2	3	4	5
c. SDTs	1	2	3	4	5

3. To what extent do the following initiatives improve working conditions?

	A Lot	Some	A Little	None	Does Not Apply
a. QWL	1	2	3	4	5
b. Quality	1	2	3	4	5
c. SDTs	1	2	3	4	5
d. Partnerships Training/Retraining	1	2	3	4	5

4. To what extent do the following initiatives improve job security?

	A Lot	Some	A Little	None	Does Not Apply
a. QWL	1	2	3	4	5
b. Quality	1	2	3	4	5
c. SDTs	1	2	3	4	5
d. Partnerships Training/Retraining	1	2	3	4	5

5. In your opinion, should the union be actively involved in the Excellence Through Quality initiative? yes no

EMPLOYEE SATISFACTION AND COMMITMENT

1. Considering everything, how satisfied are you with:

	Very satisfied	Somewhat satisfied	Neither satisfied nor dissatisfied	Somewhat dissatisfied	Strongly dissatisfied
a. Your involvement in decisions that affect your job	1	2	3	4	5
b. Your job	1	2	3	4	5
c. Your opportunities for getting a better job in this company	1	2	3	4	5
d. Your employment security	1	2	3	4	5
e. Your total benefits program (health insurance, pension, etc.)	1	2	3	4	5
f. The pay you get for your job	1	2	3	4	5
g. This company	1	2	3	4	5

2. How much do you agree or disagree with the following statements:

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
a. My work gives me a feeling of personal accomplishment.	1	2	3	4	5
b. My job makes good use of my skills and abilities.	1	2	3	4	5
c. I am willing to work harder than I have to in order to help this company succeed.	1	2	3	4	5
d. I feel very little loyalty to this company.	1	2	3	4	5
e. I find that my values and this company's values are very similar.	1	2	3	4	5
f. I am proud to be working for this company.		2	3	4	5

3. How many days were you absent from work in 1993? _____ days

4. In the last 3 years, have you had to change location or job title due to reorganization or consolidation? _____ yes _____ no

5. To what extent do you agree or disagree with this statement: "I feel less secure in my job now than I did several years ago."

- 1 [] strongly agree
- 2 [] somewhat agree
- 3 [] neither agree nor disagree
- 4 [] somewhat disagree
- 5 [] strongly disagree

PERFORMANCE

1. In your opinion, what is the quality of services provided by your work group?

- 1 [] excellent
- 2 [] good
- 3 [] fair
- 4 [] poor
- 5 [] very poor

2. How does the current service quality provided by your work group compare to that of 2 years ago?

- 1 [] much better
- 2 [] somewhat better
- 3 [] about the same
- 4 [] somewhat worse
- 5 [] much worse

3. To what extent do you use quality tools in your daily work?

- 1 [] Almost always
- 2 [] Quite frequently
- 3 [] Sometimes
- 4 [] Seldom

4. The following questions concern standard performance measures. This information is not to identify any individual, but to understand the relationship between innovations and performance.

a. Do you measure performance on an individual or work group basis?
_____ individual _____ group

b. If you work in Network I&M, would you please share with us your performance on the following measures for the month of November, 1993?

_____ % repeat reports _____ average dispatches/tasks per day

c. If you work in an IMC, would you please share with us your performance on the following measures for the month of November, 1993?

_____ service orders with errors _____ # of abandoned calls
_____ duration time _____ # of troubles screened

5. How often do you feel that internal measures of performance are used to judge your work rather than measures of doing the best job for the customer?

- 1 [] Almost always
- 2 [] Quite frequently
- 3 [] Sometimes
- 4 [] Seldom
- 5 [] Almost never

6. In general, how would you describe relations between the following groups and individuals.

	Very Good	Good	Fair	Poor	Very Poor
a. Co-workers in your work group	1	2	3	4	5
b. Employees in different departments	1	2	3	4	5
c. Management and craft employees	1	2	3	4	5
d. Management and the union	1	2	3	4	5

7. In general, have relations between the following groups and individuals changed in the last 2 years (1 = yes, they have improved; 2 = yes, they have declined; 3 = no, they are about the same)?

	Improved	Declined	About the Same
a. Co-workers in your work group	1	2	3
b. Employees in different departments	1	2	3
c. Management and craft employees	1	2	3
d. Management and the union	1	2	3

BACKGROUND INFORMATION

Your cooperation in answering the following questions will be greatly appreciated. These responses will not be used to identify you personally, but only for statistical analysis.

1. What is your gender? _____ female _____ male

2. What is your race/ethnicity?

- 1 [] Afro-American
- 2 [] American Indian
- 3 [] Asian
- 4 [] Hispanic
- 5 [] White (non Hispanic)
- 6 [] Other

3. What is your age?

- | | |
|----------------|-------------------------|
| 1 [] Under 25 | 5 [] 41 - 45 |
| 2 [] 26 - 30 | 6 [] 46 - 50 |
| 3 [] 31 - 35 | 7 [] 51 - 55 |
| 4 [] 36 - 40 | 8 [] 56 years or older |

4. Since you were 16 years old, about how many years have you worked for pay? _____ years

5. What is the highest level of schooling you have completed?

- 1 [] some high school
- 2 [] high school diploma or equivalent
- 3 [] post-high school vocational or technical training institute
- 4 [] some college
- 5 [] 2 year college degree
- 6 [] 4-year college degree
- 7 [] some post-college or graduate training
- 8 [] masters degree or higher

6. Are you a member of the union? _____ yes _____ no

7. What is your length of company service (tenure)?

- | | |
|------------------------|---------------------|
| 1 [] Less than 1 year | 4 [] 11 - 15 years |
| 2 [] 1 - 5 years | 5 [] 16 - 20 years |
| 3 [] 6 - 10 years | 6 [] 21 - 25 years |
| | 7 [] Over 25 years |

8. What are your annual earnings (including overtime)?

- | | |
|-----------------------|-----------------------|
| 1 [] under 20,000 | 4 [] 40,000 - 49,999 |
| 2 [] 20,000 - 29,999 | 5 [] 50,000 - 59,999 |
| 3 [] 30,000 - 39,999 | 6 [] over 60,000 |

THANK YOU VERY MUCH FOR YOUR PARTICIPATION
PLEASE RETURN THE SURVEY IN THE ENCLOSED STAMPED ENVELOPE BY
FRIDAY, MARCH 4, 1994

MIT Work Innovations Study, P.O. BOX 449492, West Somerville, MA 02144