DOCUMENT RESUME

ED 363 736 CE 064 965

AUTHOR	Appelbaum, Eileen; Batt, Rosemary
TITLE	High-Performance Work Systems: American Models of Workplace Transformation.
INSTITUTION	Economic Policy Inst., Washington, DC.
SPONS AGENCY	Alfred P. Sloan Foundation, New York, N.Y.
REPORT NO	ISBN-0-944826-59-8
PUB DATE	93
NOTE	94p.
AVAILABLE FROM	Public Interest Publications, P.O. Box 229, Arlington, VA 22210 ($12 plus shipping: $2 book rate, $3.50 UPS).
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	Administrative Organization; Change Strategies; *Employer Employee Relationship; *Job Performance; Job Training; Labor Force Development; *Models; Organizational Development; Organizational Effectiveness; Participative Decision Making; *Personnel Management; *Productivity; Public Policy; *Systems Approach; Teamwork; Unions; Work Environment

ABSTRACT

Rising competition in world and domestic markets for the past 2 decades has necessitated that U.S. companies undergo significant transformations to improve their performance with respect to a wide array of efficiency and quality indicators. Research on the transformations recently undertaken by some U.S. companies to boost performance revealed two distinct and coherent models of high-performance work systems: (1) a vision of "lean production" that relies more heavily on managerial and technical expertise and centralized coordination and decision making than conventional systems do; and (2) a U.S. version of "team production" that combines principles of Swedish sociotechnical systems with principles of quality engineering and that more thoroughly decentralizes management of work flow and decision making. Only a few organizations have yet achieved major transformations and performance improvements. Obstacles remain to be overcome: the continuing temptation of mass production, the ambiguous role of technology, high initial training costs, and managerial resistance to change. An interrelated set of public policies addressing the following issues must be developed: improving job training, increasing employee and union participation, increasing firms' commitments to stakeholders, building interfirm collaboration and quality standards, and ruling out the low-wage path. (Contains 107 references.) (MN)

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ISBN: 0-944826-59-8

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Acknowledgments

We would like to thank the Alfred P. Sloan Foundation, which provided generous financial support for the research, writing, publication and dissemination of this study. We are grateful for the encouragement of Arthur Singer of the Sloan Foundation, and for technical assistance from Jared Bernstein, Terrel Hale, and Stephanie Scott of the Economic Policy Institute. Peter Auer provided us with timely information. Michael Piore, Thomas Bailey, Paul Osterman, and David I. Levine gave us detailed comments on an earlier version of the manuscript, and Thomas Kochan and Kirsten Wever provided us with helpful suggestions and advice. We are, of course, responsible for any errors that remain.

Production and Layout:
Danielle Currier

ISBN 0-944826-59-8

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Executive Summary

For the last two decades, U.S. companies have faced sharply rising competition in world and domestic markets. American complacency with the traditional organization of production has been challenged by the loss of market share and jobs in a variety of industries and by the apparent success of firms in Europe and Japan that have adopted alternative approaches to organizing and managing work. Business as usual is no longer sufficient to make U.S. firms competitive.

The recent emergence of some examples of high-performance work systems in the U.S. is cause for guarded optimism.

The need to move away from the mass production principles of the past has led to a new vision of "transformed" work systems which are capable of delivering "high performance" on a wide array of indicators of efficiency and quality. The 1970s and 1980s were an important period of experimentation with principles and practices drawn from past experience with work reform in the U.S. or borrowed from production models adopted in other countries. By 1992, more than 80 percent of large U.S. businesses had one or another innovative practice in place somewhere in the firm.[1]

This paper looks at the transformations companies undertook, identifies the best-coherent high-performance models that have arisen out of the period of experimentation, and analyzes why some firms, despite adopting one or another new technique, have failed to increase their competitiveness.

The recent emergence of some examples of high-performance work systems in the U.S. is cause for guarded optimism that U.S. firms may be able to compete successfully in world markets and that U.S. workers may be employed in jobs providing opportunities for skill acquisition and middle-class wages. These best-practice firms have distilled and selectively adopted techniques and features of production models developed abroad, but they have combined them with uniquely American practices. The research

conducted for this report revealed two distinct and coherent models of high-performance work systems:

An American version of "lean production" which relies more heavily on managerial and technical expertise and on centralized coordination and decisionmaking than conventional systems.

An American version of "team production" which combines the principles of Swedish sociotechnical systems with those of quality engineering, and more thoroughly decentralizes the management of work flow and decisionmaking. However, a review of survey and case evidence shows that only a few organizations have achieved such major transformations and the accompanying performance improvements. In large measure, this is because the U.S. institutional environment provides virtually no support for moving from mass production to high-performance work systems, lacks a framework for reducing or sharing the high up-front costs of such a transformation, and is unable to overcome managerial resistance and worker and union ambivalence toward changes that realign power and responsibility.

To diffuse high-performance work systems more broadly requires public policies that address the issues that firms and workers cannot tackle on their own.

To diffuse high-performance work systems more broadly requires an interrelated set of public policies that address the issues that firms and workers cannot tackle on their own. While some of these initiatives may require government spending or changes in existing regulations, many require little in the way of government intervention beyond playing an initial role as "honest broker" to help the private sector establish training consortia or clearinghouses for sharing information. Recently, the Department of Labor established a high level Office of the American Workplace to begin addressing these concerns. We suggest that this office examine the role that public policy can play in the following areas:

Job Training. To support a workforce that produces continuous improvements in production processes means training must be expanded from focusing on disadvantaged workers to including the needs of front-line workers. Employees must be able to take advantage of formal training as needed throughout their lifetimes, and to integrate this process into the normal course of their working lives.

Employee and Union Participation. There is evidence that the current mass production system and accompanying labor law creates perverse incentives that discourage managers and unions from adopting more participative work systems. Policy alternatives to counter these incentives range from tying special tax breaks for firms with Employee Stock Ownership Plans to increased employee participation to mandating elected employee councils modelled after European works councils. However, these changes would not take the place of reforms needed in existing labor legislation to overcome the obstacles to participation which currently face unions. Unions enhance employee participation and help sustain high-performance work systems. Yet the lack of enforcement of current labor laws has created obstacles to union organizing, long delays in union elections, and managerial disregard—for the duty to bargain contracts—that drains union resources and deters unions from assuming leadership in partnership activities.

Perverse incentives discourage managers and unions from adopting more participative work systems.

Increasing Firm Commitment to Stakeholders. Retained earnings are the major source of investment by the firm in intangibles such as research and development, organizational redesign, or worker training. Yet, U.S. law and the operation of American capital markets penalize U.S. managers for reducing shareholder's dividends in order to use earnings in these ways. Policy measures that can reduce the focus on short-term stock price performance and increase the financial commitment of firms to all of their stake-

holders—employees, managers, directors, customers, etc.—range from taxing short-term capital gains at significantly higher rates than long-term gains to placing representatives of stakeholder constituencies on boards of directors, giving workers a larger role in deciding the policies of their pension funds, and giving longer-term shareholders more of a voice in formulating company goals.

It is important to limit the possibilities for predatory pricing behavior by firms following a low-wage strategy.

Building Interfirm Collaboration and Quality Standards. Total quality production depends upon reducing the arm's length relationships between firms—building strategic alliances between competing firms or vertical linkages among tiers of suppliers and customers. Efforts by state governments to facilitate network relationships among firms should be evaluated and further diffused, perhaps as part of an industrial extension program.

Ruling Out the Low-Wage Path. In the early stages, when the costs of moving to high-performance work systems are high, firms pursuing a high-performance strategy are especially vulnerable to competition from low-wage firms. It is important, therefore, to limit the possibilities for predatory pricing behavior by firms following a low-wage strategy. Many proposals that have been put forward in other contexts also have this effect. Such policies include a national health care plan; a universal family leave act; prorated pension and vacation benefits for part-time workers; mandated portable benefits for temporary workers; indexing of the minimum wage to one-half the average wage; elimination of tax code provisions that encourage firms to move production jobs out of the U.S.; and the development of international labor standards to accompany trade agreements.

Introduction

Sharply rising competition in world and domestic markets during the last two decades has put increasing pressure on U.S. firms to undertake innovations in their work systems. Management's complacency with the traditional organization of production has been challenged by the loss of market share and jobs in industries ranging from autos and apparel to aerospace and computer chips and by the virtual disappearance of the consumer electronics industry. Substantial evidence now exists that American firms can no longer remain competitive by organizing production along traditional mass production lines—using a work process based on the separation of conception and execution, the detailed division of labor into fragmented tasks, the routinization of work, and the use of equipment dedicated to the production of standardized products. The loss of jobs paying middle-class wages and the decline of workers' incomes are also well documented: the entry level real wage for high school graduates fell 26.5 percent for men and 15.5 percent for women between 1979 and 1991. For college graduates, entry level real wages increased modestly in the 1980s, but those gains have been wiped out since 1989 (Mishel and Bernstein 1992).

Substantial evidence now exists that American firms can no longer remain competitive by organizing production along traditional mass production lines.

There are many reasons why the old ways of doing things, which worked so well for American companies and workers in the past, are no longer adequate. Two, in particular, stand out. First, firms in the newly industrializing countries, and even in the less developed countries that pay a fraction of U.S. wages, are now able to compete successfully in price-conscious markets for standardized products. Second, the increased capacity for customization and diversity inherent in microprocessor-based process technologies has reduced the cost advantages of mass production and increased competition in quality-conscious markets.

As a result of these challenges, companies, unions, managers, workers, and communities have become aware of the necessity, if not the inevitability, of organizational restructuring to improve U.S. competitiveness and save jobs. Focus group discussions conducted by the National Association of Manufacturers and the Department of Labor suggest that CEO's, senior executives, and workers are all aware that the U.S. faces a critical transition. All of these groups share the view that firms must strive for higher quality standards and higher productivity, though perceptions differ with respect to how much change has already occurred and how deeply it has penetrated within companies (National Association of Manufacturers 1992).

U.S. firms have responded to intensified competition by initiating a wide range of cost-cutting and performance-enhancing strategies.

U.S. firms have responded to the intensified competition by initiating a wide range of cost-cutting and performance-enhancing strategies, sometimes attempting to undertake both simultaneously. The cost-cutting strategies usually combine a more flexible use of technology with the downsizing of employment through a variety of methods including replacing full-time permanent employees with part-time or temporary workers—an approach sometimes referred to as "flexible mass production." But downsizing and other cost-cutting measures are often not successful. For example, the American Management Association's 1992 survey of nearly 900 member companies (which in total employ 25 percent of the American workforce) found that while an attempt to realize productivity gains is the most commonly cited reason for downsizing, the results are usually disappointing: "companies that make cuts tend to do it again, and the results are quite likely to be negative—lower profits and declining worker productivity" (American Management Association 1992, p. 1). The Wyatt Company reports similar findings from its 1991 study of restructuring in 1,000 large U.S. firms during the preceding five years. While firms in this study overwhelmingly cited a

desire to reduce expenses, increase profits, and increase productivity as the reasons for restructuring, they still were unable to accomplish these goals. "[L]ess than half the companies achieved their expense reduction goals; less than one-third increased profitability; and less than one in four [increased productivity or achieved] other restructuring goals" (Wyatt 1991, p. vi).

The evidence suggests that the competitive challenges of the last two decades cannot be met through reforms at the margins of the mass production system. These changes make mass production somewhat more flexible, but leave work organization and decisionmaking essentially unchanged as firms continue to compete on the basis of price. A successful strategy for competitiveness in markets that expect quality, variety, service, and timeliness to be delivered in a cost effective manner requires that the production system be transformed, the relationship between employees and management realigned, and the institutional framework restructured. These are the markets in which most U.S. firms compete. A GrantThornton survey of 250 mid-sized U.S. manufacturers in December 1990 found that only 29 percent reported that price is their most important competitive factor, while 65 percent reported that they compete mainly on the basis of quality, service, or speed (GrantThornton 1991).

The challenge for American companies is to master the new sources of competitive advantage so they can continue to produce in the U.S. and remain profitable.

The challenge for American companies is to master these new sources of competitive advantage so they can continue to produce in the U.S. and remain profitable. They must replace mass production systems with new, high-performance work systems that achieve continuous improvements in quality as well as efficiency and that utilize new forms of organizational learning that mobilize the knowledge and problem-solving abilities of front-line employees. Many U.S. firms have responded to these challenges by adopting performance enhancing strategies. As a result, the last 20 years have

been an important period of experimentation, and numerous examples can be cited of firms that have made major changes in work organization, human resource practices, and industrial relations. Unions and workers have also recognized that firms will not survive and jobs will disappear unless fundamental changes in the organization of production occur. Today, more than 85 national unions are involved in employee participation (Bluestone and Bluestone 1992).

A growing minority of companies have made the commitment to substantially transform their production systems into high-performance work organizations.

This is not the first attempt at workplace reform in the U.S. Self-conscious efforts to improve work systems—to reduce the alienation, increase the commitment, and make better use of the intelligence and skills of the workforce—have occurred with some regularity since Elton Mayo's experiments at Western Electric's Hawthorne plant in the 1920s. As Tom Bailey (1992, p. 9) observes, "[s]ince the 1930s, there have been at least two depressingly similar cycles of enthusiasm and disillusionment, of earnest rhetoric and minimal action, of high profile plans and evaporating practice." These were the human relations movement in the 1930s and the social relations movement that started in the 1950s (see Bailey 1992, for a review). But two features distinguish the current period of work reorganization from previous attempts: the extent of experimentation with one or another innovative practice is more widely dispersed than in earlier periods, affecting more than 80 percent of large U.S. firms, and a growing minority of companies have made the commitment to substantially transform their production systems into high-performance work organizations.

The recent emergence of some examples of high-performance work systems in the U.S. is cause for guarded optimism about the ability of U.S. firms to compete successfully in world markets and the possibility that U.S. workers will be employed in jobs that provide opportunities for skill

acquisition and that pay middle- class wages. Best-practice American companies have distilled and selectively adopted techniques and features of production models developed abroad, but they have combined them with distinctly American practices including American applications of the principles of organizational psychology and American experiences with collective bargaining.

Our review of the evidence points to the emergence of two distinct and coherent models of high-performance work systems in the U.S.—an American version of lean production and an American version of team production. There is considerable overlap between the two models because they rely on similar applications of information technology and similar quality tools and techniques to improve performance. The models differ, however, in the extent to which front-line workers have responsibility for continuous improvement and in the extent to which workers or their representatives participate in joint decisionmaking processes off the shopfloor and at the plant and corporate levels. While both lean and team production systems can exist in either union or nonunion settings,[2] the fully developed American team production model, with workers represented on high-level corporate committees that plan and implement strategic goals, is more likely to be found in unionized firms.

The American versions of lean production and team production yield dramatic improvements in firm performance on a variety of measures.

The available evidence suggests that both models yield dramatic improvements in firm performance on a variety of measures, including productivity, defect rates, customer satisfaction, market share, profitability, and employee relations (see, for example, U.S. General Accounting Office 1991; Womack, Jones, and Roos 1990; Cutscher-Gershenfeld 1991; Klingel and Martin 1988). While the outcomes for firms in the two models appear to be quite similar, the case study evidence discussed in this report suggests that

outcomes for employees may be different. This evidence suggests that the American version of team production provides employees with greater autonomy, more employment security, and a greater guarantee of a share in any performance gains. These models are analyzed at length in Part II of this report, and are illustrated with examples drawn from U.S. companies.

The American version of team production provides employees with greater autonomy, more employment security, and a greater guarantee of a share in any performance gains.

Unfortunately, only a minority of companies have reorganized their production systems into high-performance work systems. Most firms have made only piecemeal changes. In Part III we examine how widespread high-performance work systems are and why organizational change is not more prevalent. We do this by analyzing the obstacles to change and the dilemmas facing firms, unions, managers, and front-line workers. Finally, in Part IV we discuss policy changes to develop an institutional framework that encourages and supports U.S. firms' movement away from the mass production principles of the past and toward a competitive path marked by high-performance work systems. This analysis suggests an important role for public policy in developing a new framework that can support transformed, high-performance work systems. A more hospitable institutional setting may enable nascent or newly emerging high-performance work systems at companies to survive the challenges posed by poor macroeconomic performance. The report concludes with a discussion of some of the more important policy levers that government can use to promote the development and diffusion of these systems.

American High-Performance Work Systems

To move away from mass production and create higher performing work systems, firms and unions have borrowed ideas from the American past and from around the globe. In our recent review of nearly 200 case studies

of workplace change in American firms (Appelbaum and Batt forthcoming 1994), we observed that managers and employees frequently combine particular practices drawn from very different production models to create something they hope will improve efficiency or quality.

It is now commonplace, for example, for American firms to benchmark their practices against those of "best-practice" companies in the U.S and abroad. In some instances, union leaders have accompanied corporate managers in visits to their European and Japanese counterparts to gather new ideas for improving production and human resource practices.

While the Japanese system of lean production has received the most attention in the popular press, it is not the only source of work innovation.

While the Japanese system of lean production has received the most attention in the popular press, it is not the only source of work innovation. Some strategies, like total quality management (TQM) via statistical control processes, originated in the U.S. in the 1920s at Bell Labs and were a central feature of war production in American companies during World War II before being adopted by the Japanese (Walton 1986, p. 8; Eidt 1992). The American Human Resource (HR) model, developed from the 1950s by firms such as IBM, Proctor and Gamble, Cummins Engine, Texas Instruments, and Hewlett Packard, continues to have an influential effect on work reorganization efforts. Following this model, managers draw on the principles of organizational psychology to build incentive programs designed to improve worker motivation and management-employee communication. Concepts of pay for performance, for example, grew out of this tradition. Gainsharing, a form of group-based sharing of productivity gains, originated in the steel industry with the United Steel Workers in the 1940s (Lesieur 1958).

In their search for better production methods, U.S. firms have isolated and experimented with the distinctive features of work systems developed in other national contexts. The current widespread interest in self-managed

teams (SMTs), for example, draws on the sociotechnical systems (STS) approach which emerged in Britain and Norway in the 1950s and first gained attention in the U.S. in the 1960s and 1970s (Trist 1981; Zagar and Rosow 1982). The Swedish version—exemplified by Volvo's Uddevalla plant, among others—emphasizes low-volume, customized production using autonomous teams of highly skilled craft workers. From Japanese lean production, American firms have copied quality circles, total quality engineering, and just-in-time (JIT) inventory systems. Italian and German industrial districts have offered examples of how networks of firms can collaborate in ways that enhance product innovation and provide flexibility—a model of "flexible specialization"—for responding to rapidly changing product demand. State governments have supported the development of such small firm networks as a vehicle for regional economic development (Bosworth 1992; Batt and Osterman 1993; Harrison 1993), and there is growing interest in expanding this model to larger companies on a more national scale (Nagel and Dove 1991). More recently, researchers and policymakers have focused attention on the German system of diversified quality production: on the critical role of a publicly-funded training system jointly administered by the government, unions, and firms (Osterman 1988; Berg 1993); on the centrality of works councils in representing employee voice in day-to-day production-level decisions; and on the representation of unions in the strategic decisionmaking of enterprises (Freeman 1991; Rogers and Wootton 1992; Kochan, Wever, and Berg 1993).[3]

Firms gather a "menu" of human resource policies and organizational tools from which to choose.

A common result is that firms gather a "menu" of human resource policies and organizational tools from which to choose.[4] The advantage of this "eclectic" approach is its potential for creating new types of human resource practices, for allowing more variety within the organization, and for

adapting production methods to the particular requirements of a product line or to the specific interests of workers and managers. The danger, however, is that firms may adopt particular practices or "pieces" of production systems that, taken out of context, do not produce the kind of ongoing improvements that they do in their original settings—as occurred with quality circles in the early 1980s (Drago 1988; Lawler and Mohrman 1987; Kochan, Katz, and Mower 1984) and may be happening with some applications of TQM (Gilbert 1992; Boyett, Kearney, and Conn 1992; Mathews 1992; McLagan 1991). These failures feed worker cynicism with workplace change and fuel management fadism as management searches for the latest "quick fix." The central questions are whether this menu approach adds up to a coherent whole, and whether, within the new production model, there are opportunities for organizational learning and continuous improvements in performance.

The danger is that particular practices taken out of context do not produce ongoing improvements.

Our review of the evidence—from academic case studies, consultants' reports, and our own interviews—points to the emergence from a sea of variation of two distinct and coherent types of high-performance work systems in the U.S. Both draw on quality engineering and management concepts, and both use incentives developed in the American Human Resource model. That is, they draw on similar management tools and techniques to improve performance. As a result, the demarcation between the two models tends to be fuzzy, and there can be considerable overlap in the practices employed in each.

The approaches differ, however, in the extent to which they locate the source of continuous improvement in their front-line workforce and, consequently, in their utilization of human resource practices such as: worker participation in decisionmaking; extensive training of nonmanagerial employees; and employment security that provides employees with the oppor-

tunity, capability, and motivation to contribute to upgrading quality and efficiency. They differ as well in the extent to which employee participation extends beyond the immediate work process and involves workers or their representatives in a broad range of operational and business decisions.

One model is an American version of lean production, perhaps best characterized by the influential Baldrige award criteria that emphasize top management-driven quality systems.[5] The second is a more decentralized system that we refer to here as "American team production." It combines the principles of Swedish sociotechnical systems and self-directed work with those of quality engineering.[6] Performance improvements in both cases appear impressive. These findings contradict the view held by many, and expressed most emphatically in *The Machine That Changed The World* (Womack, Jones, and Roos 1990), that the Japanese model of lean production is superior to all other production models and should be applied in every industry.[7]

The distinction between the two prevailing production models centers largely on differences in human resource and industrial relations policies rather than on differences in product markets or types of technology.

The distinction between these two models, in other words, centers largely on differences in human resource and industrial relations policies rather than on differences in product markets or type of technology. The American team production approach relies heavily on decentralized decisionmaking through collaborative teamwork and on joint labor-management structures that allow workers to be represented in decisionmaking at every level of the company—operational, tactical, and strategic. The American version of lean production is more centralized in its approach—tending to implement or mandate a set of human resource policies such as training in quality or employee involvement across the entire organization. This approach emphasizes some elements of total quality management more than others. It focuses, for example, on process management or reengineering of

work flows, data collection and performance measurement, and a centralized approach and "alignment of vision" between the goals of the company and those of the employees. Although quality theorists such as Edward Deming discuss the importance of employee involvement, American firms using this approach do not rely on innovations from front-line workers in the way envisioned by the more decentralized team production approach. Employee involvement, for example, usually takes the form of a selected subset of workers participating in problem-solving committees directed by first-line supervisors or other managers.

A number of researchers have noted that a dilemma exists in balancing decentralized decisionmaking and self-directed work teams on the one hand, and total quality management on the other: the bottom-up logic of the self-directed team approach and the top-down logic of TQM appear to be contradictory, because total quality principles do not challenge management to decentralize decisionmaking to the extent implied by the self-directed team production model (see, for example, Lawler, Mohrman, and Ledford in their recent survey of management practices, 1992, pp. 101-103; see also, Klein 1991). Total quality is easily adapted to the existing hierarchy without fundamental change in human resource and industrial relations practices. Companies are likely to resolve this contradiction by adopting one approach or the other, but not both. The risk of the decentralized approach is substantial variation in performance and insufficient coordination across the organization; that of the centralized approach is inadequate employee involvement and autonomy so that continuous improvements in performance do not materialize (on the latter point see Beaumont, Hunter, and Phayre 1993).

A dilemma exists in balancing decentralized decisionmaking and self-directed work teams on the one hand, and total quality management on the other.

Where unions have the organizational capacity and leadership to become involved in production decisions, they appear to provide an organi-

zational asset not available in nonunion settings. In the decentralized systems, joint union-management structures may serve to improve coordination and diffusion of high-performance work systems, to ensure consistency across work units, and to persuade or pressure resistant employees or managers to participate in ways that top management is unable to do through internal firm channels. It is of primary interest to the union, for example, to make sure that working conditions are equitable for all members—to spread innovations made by employees in one department or factory to all. In some of our interviews, managers indicated that unions have indeed played this role. In more centralized management systems, unions can provide a counterweight to ensure that human resource policies receive attention and financial resources comparable to that expended on technical process improvements.

Many of the best-practice cases of team produciton involve unionized workplaces.

In principle, both types of systems may exist in union or nonunion work settings. In reality, many of the best-practice cases of team production involve unionized workplaces; and managers in these companies argue that it is precisely the *combination* of human resource practices and partnership processes with unions that make the decisive difference. By contrast, the best-practice cases of lean production, as exemplified by the Baldrige winners, tend to be in nonunion settings.

Performance improvements for firms as measured by such indicators as decreases in waste or defect rates, reductions in customer complaints, improvements in time to get new designs to market, and increases in market share resulting from these two approaches appear to be similar. However, the evidence from the case studies suggests that the outcomes for employees in the two systems are likely to be different. Production based on decentralized team or collaborative work provides greater opportunity for employees to

exercise discretion and involves all workers in the process, not a minority who are selected to leave the production floor in order to participate in problem-solving. That selection process in itself often creates conflict and resentment between those selected and those left behind to "do the work." To be effective, however, this type of team production requires a set of supporting human resource, training, and industrial relations policies. Due process protections under law provide greater assurance to employees in unionized workplaces that they will not be penalized for speaking their mind even when their opinions contradict higher level managers. While we would like to believe that American workplaces are free of conflict, the fact is that particularly in the current period of managerial downsizing, managers lack job security and feel threatened by the power gained by lower level employees. Finally, no matter what the performance gains, collective bargaining backed by labor law remains the single most effective means for employees to ensure that they receive their fair share of productivity gains (Freeman and Medoff 1984).

To be effective, team production requires a set of supporting human resource, training, and industrial relations.

In addition, there is some evidence that in the intermediate term or long run, unions improve the likelihood that the shift to high-performance systems will be sustained. This is logical given the fact that once unions "buy into" the process, they create institutional relationships that are difficult to unravel.

In the following sections we examine these two alternative models in greater detail, with examples from American companies.

American Lean Production

The Malcolm Baldrige Award outlines a new American model of lean production and is designed to shape managerial behavior and improve firm performance. It encourages firms to focus on quality and customer service

and to reengineer their internal work systems backwards, beginning from the customer's perspective and requirements. Modeled after the Deming Award in Japan, it promotes an American-style lean production in the U.S., but without Japanese-style human resource and industrial relations institutions.

The American version of lean production differs from the Japanese version most notably with respect to human resource and industrial relations policies. A recent study comparing American Baldrige and Japanese Deming award winners, for example, found that the Deming winners have considerably higher levels of "mass participation" of workers in continuous improvement efforts (Gomez del Campo 1993). Further, whereas the Baldrige winners tend to use temporary or ad hoc cross-functional teams to solve particular problems, Deming winners use quality circles made up of permanent work groups so that all employees, rather than a selected sub-set, are involved in participative efforts. Employee suggestion systems are also of a different character: in the Japanese plants, "suggestions" are really improvements that the employee implements and then documents. In the U.S. companies, the "suggestions" are recommendations submitted to managers or engineers who may or may not act on them. The numbers of "suggestions" per employee are also radically higher at the Japanese plants, implying that employees make improvements as a normal part of the work day.

Baldrige winners tend to use temporary or ad hoc cross-functional teams to solve particular problems.

In addition, in the Japanese plants as well as at NUMMI, the well-known Japanese transplant, employment security provides the basis for employee participation in continuous improvement *kaizen* efforts. Employees have a commitment from the firms to a no-layoff policy; they also have protection against unjust dismissal through collective bargaining agreements. As a result, workers are able to contribute ideas for improvement without jeopardizing anyone's employment security and without putting themselves

at risk of recrimination if the ideas prove unpopular with management.

The Baldrige Criteria and Total Quality Management. It is important to understand the Baldrige Award because it has already affected the behavior of thousands of managers across the country. In the first five rounds since its inception in 1988, approximately 500 applicants have entered the competition.[8] Companies, however, often take two, three, or more years to prepare to enter the competition and put into place the kinds of management practices suggested by the Baldrige criteria. As a result, many more companies have been influenced by the Baldrige competition than the numbers of applicants indicate. In 1992, for example, 240,000 companies requested copies of the award criteria and application (Miller 1992, p. 1). Moreover, the award has increased networking and benchmarking among firms by requiring the winners to respond to requests for information. Baldrige winners have given hundreds of lectures and conferences to managers from other firms who are interested in replicating successful techniques (Main 1991).

Many firms use the Baldrige criteria as a 'road map' for success.

Many firms use the Baldrige criteria as a "road map" for success (Garvin 1991, Main 1991). Many companies have begun doing "mock" applications as part of their annual performance evaluations, and some are using application submissions to get feedback from the Baldrige examiners.[9] Many other companies have begun their own internal quality awards. In 1990, for example, Westinghouse required all 90 corporate divisions to compete for the George Westinghouse Total Quality Awards, internal prizes modeled after the Baldrige (Main 1990). IBM, whose Rochester, Minnesota facility won the Baldrige Award in 1990, recently announced the award of cash and equipment grants to nine U.S. colleges and universities, which will work with IBM in an effort to accelerate the teaching, research, and use of these TQM

principles (*Corporate Giving Watch*, December 1992, p. 3).

Baldrige examiners judge companies by criteria which fall into seven categories and twenty-eight sub-categories of items, each of which receives a point value which in total adds up to 1,000 points.[10] The point value of each category clearly signals to managers which areas are most valued or considered most critical to developing a high-quality, high-performance system.

The Baldrige criteria adopt a version of total quality management that emphasizes the strategic role of top management and quality management systems in improving competitiveness.

The Baldrige criteria adopt a version of total quality management that emphasizes the strategic role of top management and quality management systems in improving competitiveness.[11] Consistent with the TQM adage that 85 percent of problems reside with management and 15 percent with employees, 85 percent of the Baldrige points reward improvements in management methods and processes. These include 30 percent for customer service (including marketing, product development, and cycle time); 23 percent for top management leadership, strategy, and management of information systems; and 32 percent for process management and operational results. By comparison, only 15 percent of the criteria reward improvements in human resource practices.

In the customer service category, the emphasis is on improved methods for incorporating customer feedback into marketing and product development, particularly through methods such as customer surveys and focus groups. Closer attention to customer demand is required by rapid advances in technologies and the proliferation of differentiated products that make it more important for companies to anticipate accurately the demand for their products. Customer surveys provide constant feedback, while customer focus groups help create customer loyalty. A key objective measure of quality and customer service is cycle time (both quality and speed are often by-products of the same source—for example, the integration of engineering and

manufacturing). To achieve this type of quality service, the Baldrige model draws on other elements of the TQM approach for improving internal management and production processes. Under the TQM approach, top management provides leadership; develops a strategic plan; ensures quality engineering processes; gets feedback through data collection, performance measurement, and management information systems; and, measures operational results.

The remaining 15 percent of the formula rewards improvements in human resource development and management: overall human resource management counts 2 percent; employee involvement receives 4 percent; education and training, 4 percent; employee performance and recognition, 2.5 percent; and finally, employee well-being and morale, 2.5 percent. The Baldrige award provides no special incentive for the involvement and empowerment of front-line workers per se, but rather suggests that companies involve different categories of employees according to company goals or occupational responsibilities.[12]

Measures that employees would consider central to their well-being include employment security, wage growth, promotions, due process guarantees, conflict resolution procedures, or employee voice.

Recommended measures of well-being and morale include: "satisfaction, safety, absenteeism, turnover, attrition rate for customer-contact personnel, grievances, strikes, and worker compensation" (U.S. Department of Commerce, 1992 Baldrige Award Criteria 1992, p. 19). With the exception of employee satisfaction, these indicators also have cost and productivity implications.

The important omissions are notable. There is no mention of those measures that employees would consider central to their well-being: employment security, wage growth, promotions, due process guarantees, conflict resolution procedures, or employee voice. In the entire 35-page instruction booklet the award criteria mention the role of unions only once, in a footnote

concerning human resource planning (U.S. Department of Commerce, 1992 Baldrige Award Criteria 1992, p. 17; this comment is repeated in the introduction, p. 4).

The Baldrige Award criteria, therefore, provide a model of lean production that improves firm performance by combining total quality marketing and production processes with more traditional hierarchical organization and employment policies such as careful selection of new employees, training, and performance evaluation drawn from the American Human Resource model.

The Baldrige Award criteria provide a model of lean production that improves firm performance by combining total quality marketing and production processes with more traditional hierarchical organization.

While industrial relations issues and human resource practices are slighted in the Baldrige Award criteria, most Baldrige *winners* pay careful attention to some human resource policies. They tend to be more selective in hiring practices, invest more substantially in training in quality, group process, and job skills, and are more likely to tie compensation to performance in a variety of ways than are conventionally-managed companies. Despite the low weight assigned to worker participation in the award *criteria*, the award winners tend to make use of quality circles, problem-solving teams, or cross-functional teams.[13] These team structures mobilize the information and knowledge that hourly workers have in order to make process improvements, and are an important form of employee involvement; but they are different from production or work teams and they do not involve employee participation in management. They are parallel structures which coexist with the "normal bureaucratic organization and hierarchical authority, but leave these arrangements untouched" (Hill 1991, p. 549).

The Baldrige Winners.[14] There is a diversity in management practices among the Baldrige winners that is greater than among the Deming winners (Gomez del Campo 1993), but Baldrige winners share certain

characteristics. Most discovered the total quality teachings of Deming, Philip Crosby, and others earlier than other American firms and experimented for several years with refining those principles to fit the peculiar characteristics of their own industries and organizational cultures. Many were spurred by a profit crisis or decline in product market share that led top executives to make a single-minded commitment to quality and customer service and to make radical changes in production processes to achieve those ends.

Baldrige winners discovered total quality and experimented with refining those principles to fit the particular characteristics of their own industries and organizational cultures.

The following case studies of Baldrige winners focus on the experience of two companies, Marlow Industries and the IBM plant in Rochester, Minnesota.[15] Headquartered in Dallas, Texas, Marlow is a small privately-held corporation which employs 160 people and supplies half of the world market in thermoelectric coolers. The IBM Rochester plant employs a workforce of 8,000 in the design, development, and manufacturing of the AS/400 computer and hard disk storage devices.

Marlow Industries. Raymond Marlow, the founder and current President of Marlow Industries, launched the Total Quality Management System in 1986 soon after hearing of the statistical process control techniques required by Hughes Aircraft of its "Blue Ribbon Suppliers." In meetings with representatives from Texas Instruments, Marlow learned about the total quality principles of Crosby and organized a group of small companies, the "Texas Quality Consortium," in order to share the costs of TQM training. Once some of his senior management and department heads had gone through the TQM training, Marlow brought them together in a Total Quality Management Council to spearhead quality as a philosophy within the company. That council was later expanded to include all senior management as permanent members and rotating members from the customer and supplier base.

Marlow took the quality philosophy to all employees to gain their

commitment to the company's pledge of quality. The TQM Council sets up "Quality Improvement Teams" and other ad hoc committees to make improvements in such areas as cost of quality, safety, communications, and employee recognition. The TQM Council also oversees and approves the goals and resources for "action teams"—problem-solving teams at the corporate, departmental, and production levels of the firm. Employees received recognition for their quality contributions through monthly awards of $100 plus a color TV. The Total Quality Management Council also conducts an "Employee Quality Survey," to get feedback on the extent to which employees adopt the quality values of senior management.

Training plays a central role in efforts to empower employees.

Training plays a central role in efforts to empower employees. Through a "Professional Qualification System," supervisors develop job skills training and annual re-certification procedures. The company also provides training in team-building, problem-solving, and eight quality tools (pareto, flow, yield, and attribute charts; scatter plots and histograms; and, cause and effect diagrams). Training increased from an average of 32 hours per employee per year in 1990 to 55 hours (2.7 percent of employee hours) in 1991.

Marlow's top managers participate in formulating annual, five-year strategic business plans which include goals for capital investment, quality, operations, human resources, training, and implementation. The quality assurance program is built around international (ISO 9001) standards for design control, reliability, documentation control, statistical techniques, audits, and supplier control. An extensive information management system collects over 500 data/information points to measure, daily operations as well as progress toward the "strategic quality initiative."

Taken together the TQM program has produced dramatic results.

Between 1988 and 1991, productivity per employee improved by 56 percent and manufacturing yields increased by 61 percent. The company reduced its number of critical suppliers from 204 in 1988 to 100 in 1991. During the same period, the company registered a 66 percent decline in cycle time and a 49 percent drop in cost of quality.

IBM Rochester. The IBM story builds on a corporate history of commitment to quality which made it a leader in the development of modern quality assurance concepts such as stress testing, indirect poor-quality cost, and process qualification. Increased competition from new entrants in the 1980s led the company to refocus on quality and incorporate the ideas of Deming, Crosby, J. M. Juran, and Kaoru Ishikawa into its management processes. The IBM Rochester plant went through four phases of quality programs. Beginning in 1981, top management drew on the work of Crosby to develop a "Zero Defects" program that focused heavily on cost reductions in manufacturing, a program designed to fit with IBM's corporate strategy of becoming a low-cost producer. A second program, initiated in 1984, emphasized efficiency and process effectiveness by paying more attention to the complete product cycle.

IBM has a history of commitment to quality that has made it a leader in the development of modern quality assurance concepts.

A crisis in a new development project ushered in a third period of innovation in 1986. This time the focus was on improving responsiveness to customers and reducing development cycle time. One of the primary goals of this effort was on reducing the development cycle time of a new computer system by about half—to two or three years. The development project, known as "Silverlake," was for the AS/400 system. Led by the director of the development lab, Tom Furey, it concentrated on changing the plant from a "technology-driven" to a "market-driven" organization.

To help lead and communicate the change process, Furey created a

"Rochester Management Board" composed of eighteen top managers from across the plant who met biweekly to discuss major decisions. Furey communicated his vision with employees through roundtable discussions.

A central obstacle to quality was that management lacked information about its product markets and its customers. Furey helped elevate planning, market research, and forecasting to the status of engineering and programming. To incorporate customer feedback into the planning process, Furey developed a cross-functional customer satisfaction team to respond to customer problems. The marketing department also adopted new methodologies for identifying market segments by industry and establishment size, targeting growth markets, and analyzing how to prioritize new customer demands for product development. Additionally, the plant developed a more open-door policy with its suppliers and customers which fostered better communication and feedback on products and services.

To incorporate customer feedback into the planning process, IBM developed a cross-functional customer satisfaction team to respond to customer problems.

At the same time, Furey shifted from a sequential to a "parallel" development process to reduce product development cycle time. The parallel process involved designing the product and concurrently testing for defects using computer simulation. Manufacturing built a number of prototypes, rather than having engineering construct just one. This allowed manufacturing to move down the learning curve, engineering to focus on refining the design, and software development to begin ahead of its normal schedule.

IBM chose the Rochester plant to represent the company in the 1989 Baldrige competition, and this initiated the fourth phase of the plant's quality effort. The goal was to integrate quality efforts into a comprehensive plan through the Baldrige application process.

IBM Rochester's human resource or empowerment strategy has focused on getting its managerial staff to delegate more responsibility to

technical employees; together these groups comprise roughly 60 percent of the workforce. This was done by redesigning the performance planning, counseling, and appraisal system to clarify employee responsibilities and establish more objective standards for annual employee evaluations. Technical staff are involved in setting their own performance goals and schedules. They participate in technical training programs, prepare a career development plan, and are encouraged to publish professional papers and reports.

The results of the AS/400 project are impressive. The project cycle time was halved to 28 months, rework and scrap declined by 55 percent, and engineering changes dropped by 45 percent.

The American model of team-based high performance incorporates a real redistribution of power and authority in the workplace.

American Team Production

The American model of team-based high performance begins with sociotechnical job design and the use of self-directed teams, but incorporates an eclectic set of ideas from other sources: just-in-time inventories from the Japanese, total quality and statistical process control from Deming via Japan, incentive and compensation structures developed in the American HR model, and a uniquely American form of labor-management partnership growing out of the American experience with collective bargaining and joint Quality of Worklife (QWL) activities. It incorporates a real redistribution of power and authority in the workplace. Among the cases we examined, this model is most fully articulated at the Xerox facilities in Webster, New York; at GM's Saturn plant in Spring Hill, Tennessee; and at some of Corning's plants—the new or "greenfield" catalytic converter plant in Blacksburg, West Virginia and the converted or "brownfield" specialty cellular ceramics (SCC) plant in Corning, New York.[16]

Many other companies have adopted important elements of this model

with notable results. Ford, for example, has active joint steering committees at almost all of its locations, makes extensive use of voluntary problem-solving teams led by facilitators who may be managers or hourly workers, applies just-in-time and quality principles, and has begun to promote natural work teams as the basic production unit (Banas 1988; Smith 1986; Sheridan 1990; Templin 1992). More recently, service sector firms and unions such as BellSouth and AT&T, in conjunction with the Communications Workers of America (CWA) and the International Brotherhood of Electrical Workers (IBEW), have begun experimenting with this approach.

Because of their intimate knowledge of the work process, workers rather than managers or engineers are best equipped to organize work with a given type of technology.

In the following sections, we outline the main features of this model, which include a sociotechnical organization of work; employee participation in human resource issues such as selection of work unit participants, training, and compensation systems; industrial relations built around joint labor-management decisionmaking structures; and total quality principles involving the use of such techniques as quality process improvement, just-in-time inventory systems, and statistical process control.

Sociotechnical Work Systems and Self-Directed Teams. The idea that autonomous teamwork improves performance comes from the sociotechnical systems movement that began in the 1950s. Continuous improvement is expected to come from two sources: decisionmaking autonomy for employees and treating work as a system rather than a set of individual jobs. The assumption is that because of their intimate knowledge of the work process, workers rather than managers or engineers are best equipped to organize work with a given type of technology. Employees are more likely to come up with process innovations if they can look across a work system rather than at a narrow job—hence the importance of working in teams rather than individually (Simmons and Mares 1983). Continuous improve-

ment, therefore, does not depend solely on technology, on the one hand, or human or social relations on the other (e.g., human resource practices to improve morale or job satisfaction); rather it depends on the fit between human and technical systems. Once teams of workers design a work process, they can become the source of continuous improvement if given the discretion and incentives to do so.

The high-performance plants at Xerox, Saturn, and Corning all take a sociotechnical systems approach to technology and work organization, involving production workers in the selection of machinery and designing of work systems to integrate human and technical requirements. Employees have used their understanding of the work process to optimize the technical system, organizational structure, and quality of worklife. In each case, employees in conjunction with managers and union officials have borrowed and experimented with ideas from a broad array of sources.

The high-performance plants at Xerox, Saturn, and Corning involve production workers in the selection of machinery and the design of work systems to integrate human and technical requirements.

At Xerox as early as 1978, for example, some managers began looking at human resource issues from the point of view of sociotechnical job redesign, did benchmarking with firms in Norway, and drew on the knowledge of outside consultants who had been trained at Tavistock, the British institute best known for its elaboration of STS principles. About the same time, Xerox officials used their corporate relationship with Fuji-Xerox of Japan, which won the Deming prize in 1980, to establish internal benchmarks for manufacturing cost, quality, and design time. By 1982, the co-managers of Xerox's "Joint Process Architecture"—a union-management initiative to improve production methods—visited Japanese companies to observe their manufacturing methods and human resource practices.

A similar process occurred at Saturn and Corning from the mid-1980s on. Workers and the union participated in every phase of the design and

construction of the Saturn plant. A committee of plant managers, supervisors, union leaders, production workers, skilled workers, GM managers, and UAW leadership known as the Group of 99 participated in a series of fact-finding missions. Teams from the Group of 99 visited 49 GM plants and 60 benchmark companies all over the world (including Xerox's Webster complex) to develop a new production system that could compete effectively (LeFauve and Hax 1992). The integration of technical and social work-organization is an organizing principle at Saturn that extends to the electronic data systems that track information on everything from human resources and the flow of materials to financial data, manufacturing, product engineering, marketing, and service. At Corning, where plant managers have responsibility for the plant as a cost center and the freedom to make operational decisions, the managers, workers, and union at particular plants jointly agreed to convert to a high-performance work system, and worked out the details for the particular plant "architecture."

Work teams at the Corning and Saturn plants have substantial autonomy, not only over work-related decisions but also human resource issues.

In these three cases, the basic production unit is a team or collaborative work group, but the composition and degree of autonomy varies both within and across the three sites. The key concept is that front-line employees participate fully in shaping their areas of responsibility based on the type of product, technology, and preferences of those involved. Work teams at the Corning and Saturn plants have substantial autonomy, not only over work-related decisions but also human resource issues, as we detail below. Work groups at Xerox show more variation in composition and discretion.

At the Corning SCC plant, teams work autonomously without shift supervisors. They also cross-train, rotate across semiskilled jobs, and communicate directly with engineers and other "support staff" (human resource, clerical, sales, and marketing individuals) to solve production line

problems or coordinate production deadlines and deliveries. They regularly receive business information in order to better understand the plant's competitive position.

At Saturn, the basic work unit is a 6 to 15 member team that is self-managed and has the responsibility and authority to address work flow, quality, and human resource issues. Teams elect their own leaders, who remain working members of the unit. Interrelated teams form modules, which are then integrated into three business units. Each business unit has a joint labor-management "Decision Ring" or committee to address plant-level operational issues. There are also Decision Rings at the module level. Other joint structures are the Manufacturing Action Council which covers the manufacturing and assembly complex and the Strategic Action Council which does long-range planning at the corporate level.[17]

At the Xerox Webster plant, business teams are allowed to make their own decisions about how to get the work done.

The basic work unit at the Xerox Webster plant is the Business Area Work Group (BAWG), a group of 35 to 60 people that includes all employees—production, maintenance, managers, engineers, union representatives—responsible for producing a specific output (Lazes et al. 1991). As long as production quotas, schedules, and quality standards are met, these small business teams are allowed to make their own decisions about how to get the work done. The BAWGs use a variety of participatory practices and tools—including problem-solving and quality improvement teams; just-in-time application projects to improve the velocity of paper through offices and materials through plants; production design teams; task forces for new product development; and study teams to tackle longer term problems (Lazes et al. 1991; Lazes and Constanza 1984). The BAWGs also have the authority to establish self-managed work teams. These are voluntary, and are established if 80 percent of workers in a work group want it and the managers agree.

As a result, while employee participation in the BAWG decisionmaking structure is high, the degree of worker self-management varies. Autonomous work groups, semi-autonomous work groups, and work groups with supervisors co-exist in the same facility.[18]

The organizational structure at both Corning and Saturn is flat. Xerox retained its traditional structure throughout the 1980s, but created a leaner organization by increasing the training and responsibilities of front-line employees and decreasing reliance on engineering and support staff. More recently, it has undertaken a restructuring effort that levels its hierarchy and reduces production level job classifications, such as machining from twenty-five to five broad brands.

Corning teams undertook job analyses to develop a new set of job classification and a three-tiered skill hierarchy which is the basis for a pay-for-skills compensation system.

Human Resource Policies: Hiring, Compensation, Training. While the STS approach provides workers with the discretion to improve the work process, their participation in setting human resource policies provides the incentive to do so. At the Corning SCC plant, the self-managed teams came up with a set of disciplinary rules governing appropriate behavior on the job and help in the selection of new entrants to the team by participating in job interviews and fully explaining to new applicants what is entailed in autonomous team production. By gaining full exposure to how the system works, job applicants who are not interested in self-managed work tend to self-select out of the hiring process. The fit between incumbent and new team members has worked better as a result.

Corning teams also undertook job analyses to develop a new set of job classifications and a three-tiered skill hierarchy (from mechanical understanding to more analytical and problem-solving) which is the basis for a pay-for-skills compensation system. All team members must learn basic competence in four types of jobs through which they rotate regularly. Within two

years, they must reach competence in all jobs at the second tier level; beyond that, members specialize and together decide who is next in line to receive training in what particular skill areas. The union and management negotiated the pay formula associated with the pay-for-skill system so that it is comparable to wage rates in other local Corning plants. Additionally, the SCC employees (both managers and workers) receive five to seven percent of their wages through a gainsharing plan (linked to achieving plant-level performance goals) and a profit-sharing plan (linked to corporate performance).

Teams at Saturn do their own hiring and are responsible for developing and administering policies regarding absenteeism and replacement of absent workers. Wages at Saturn are set at 80 percent of the industry wage, paid as an annual salary rather than an hourly wage, with workers receiving an additional 20 percent if performance goals including goals for customer satisfaction are met, and with the possibility of up to another 20 percent if goals are exceeded.

Training budgets are extensive. . . at Corning, the plant manager budgets 15 percent of worker time for training.

At Xerox, workers are generally not involved in the hiring process. An exception is that trades people participate in interviewing new workers who may be joining them on the "mod squads" to be sure the person is qualified.

The union and management have negotiated a gainsharing plan that allows workers to share the rewards of performance gains and have jointly developed a training program. Gainsharing is based on workers meeting quality, cost, scheduling, safety, and attendance goals. Training budgets at all three worksites are extensive. In the set-up phase at Corning, training costs ran as high as 23 percent of payroll. Now that the new organization is functioning smoothly, the plant manager budgets 15 percent of worker time for training. Initial training of workers at Saturn is extensive, despite the fact that the workforce consists entirely of experienced auto industry workers.

Workers at Saturn devise individual training goals, and are expected to spend five percent of their time (92 hours annually) in training activities.

Training has always been extensive at Xerox, which has a highly developed internal training capability. The company puts all production workers through a qualifications course, and has a four-year apprenticeship program for the skilled trades. Since 1980, training for front-line workers in problem-solving techniques, quality practices, and how to present material or facilitate a meeting has been an integral part of the strategic shift to joint partnership around employee involvement and quality of worklife programs and the establishment of problem-solving teams. A few years later, despite the crisis it faced, the company put everyone through 40 hours or more of this training. Xerox spent $9 million for trainers in 1985, and employee time spent in training in a three-year period had a value of $70 million (Marshall and Tucker 1992, p. 97).

A distinctly American form of 'partnership' between plant management and the union has emerged at Xerox, Saturn, and Corning.

Industrial Relations. A distinctly American form of "partnership" between plant management and the union has emerged at Xerox, Saturn, and Corning, with an emphasis on developing a "shared business vision" and joint union-management committees at each level of the organization. Shopfloor participation, while important, is viewed as insufficient to gain the full involvement of the workforce in the organization. Production and problem-solving teams are most effective at refining a given production process and improving "conformance" quality—that is, improving conformance to specifications and reducing defects. To go beyond these incremental changes requires joint cooperative processes and "architectures" that involve workers or their representatives in broader operational and strategic issues. Officials at these three companies credit worker and union representation on joint

policy committees with improving the planning process and the quality of the decisions that have been made. In addition to providing a vehicle for tapping knowledge, sharing information, and obtaining a buy-in on decisions from both sides, the joint committees are an important expression of mutual respect.

At Saturn, the partnership between the union and the corporation encompasses strategic planning at the corporate level through the Strategic Action Council which meets weekly to deal with relations with dealers, suppliers, and stockholders and to address long-range business issues. In addition, union and management partnerships are responsible for tactical planning, and operational planning and performance in most areas of plant operation through Decision Rings, Problem Resolution Circles, and partnering by the union and management in middle management positions (LeFauve and Hax 1992). Business Unit Leaders (plant managers) are partnered with elected union Executive Board members. This partnering of a union member with a manager in hundreds of staff and line positions may be the most innovative aspect of Saturn's governance system (Rubinstein, Bennett, and Kochan 1993).

At Saturn, the partnership between the union and the corporation encompasses strategic planning at the corporate level.

At Xerox's Webster complex, major elements of the Amalgamated Clothing and Textile Workers Union (ACTWU)/Xerox joint process structure include the executive and policy committee that meets semi-annually to set overall strategic goals, the joint planning committee which meets quarterly as a steering committee to determine how the overall strategy should be deployed, and the plant advisory committees which meet monthly to decide how to implement the strategy. In addition to the plant manager, union leader, and other management and union representatives, the advisory committee also includes shopfloor workers.

The structure of the joint committees at these three companies—with approximately equal numbers of representatives coming from management and the union—as well as the negotiating process involved are an extension of, rather than an alternative to, collective bargaining. They grow out of the American experience with bargaining at the plant and local level. The collective bargaining process is expanded as joint decisionmaking creates implicit contracts that are often made explicit in memos and company documents. Negotiating, itself, has become an ongoing process.

Central to the kind of flexibility inherent in the labor contracts at Xerox, Saturn, and Corning is a strong commitment to employment security.

Central to the kind of flexibility inherent in these labor contracts is a strong commitment to employment security. This commitment makes economic sense for firms when they have invested heavily in training workers and where multi-skilling allows for more flexible internal deployment. Workers at Xerox's Webster plants have had employment security since the 1983 contract, though they may be transferred to different BAWGs and even different plants in the Webster complex as necessary. The Saturn contract guarantees workers employment security, providing that there will be no layoffs except in the case of a catastrophic event (Fraser 1992). The commitment to employment security at Saturn is exemplified by a recent example. When the fourteen-member door team suggested rearranging machinery to improve quality and productivity, the suggestion reduced the number of workers required to twelve. Management transferred the two people who were no longer required to another part of the plant (*Business Week* August 17, 1992).

Quality. Quality is a central focus of organizational transformation at all three companies. Xerox won the Baldrige Award in 1989 and Corning was a finalist. Quality tools and techniques extend far beyond the control of

variance. Corning began introducing Total Quality concepts in 1982, making statistical process control (SPC) available to plant managers to use as they determined it was appropriate. The Corning SCC plant incorporates SPC responsibilities into the jobs of front-line production teams, as does Saturn; and SPC has been an important quality tool at Xerox since 1983. As noted above, problem- solving and self-directed teams are at the heart of the very substantial performance gains reported by all three companies.

Xerox adopted just-in-time production as a key element of the third strategic shift in its production system in 1988, and "time-based competitiveness" as part of its fourth shift in 1993 (Argona 1992). Just-in-time production techniques were also an integral part of the high-performance systems put in place in the late 1980s at Saturn and Corning. In addition to tight management of buffers and "pull" production and scheduling which minimizes inventories, steps have been taken at all of the companies to minimize set-up time, streamline supplier relationships, distribute the workload within teams or work groups and across the plant more evenly, reduce equipment downtime, and improve the throughput of materials.

A critical feature of the quality programs in all three companies has been the role of the union in creating the kind of 'mass participation' in quality efforts needed to make them successful.

All three companies have also built customer feedback into the quality control system; and customer satisfaction ("internal" as well as "external" customers) drives design changes in products and delivery systems. For example, Saturn's on-line tracking system tracks all repairs at dealerships, quickly picking up any problems that have made it out of the factory.

A critical feature of the quality programs in all three companies has been the role of the union in creating the kind of "mass participation" in quality efforts needed to make them successful. At Corning, for example, management initiated a total quality program in 1982 and put all employees through training, but it did not really take hold until the late 1980s after the company

and the union negotiated an agreement that embodied a shared vision and a partnership structure for the union in business decisions and planning.

At Xerox, the process occurred in reverse: "Team Xerox," the joint process first ratified in the 1980 collective bargaining agreement, laid the groundwork for the "Leadership Through Quality" program introduced by top management in the mid-1980s. As with total quality management in general, the training was "cascaded down" from top management to lower levels of management and employees. When total quality training finally reached the shopfloor and skilled trades, workers found that, while the terminology was different, they had already mastered these skills. The total quality processes introduced at Xerox already had a firm basis for success in the prior training and activities of shopfloor workers. At the prodding of the union, what started as a top-down mandate for change was blended with the employee involvement and joint process commitment already in place. The slogan at Xerox became "Total Quality Through Employee Involvement."

The total quality processes introduced at Xerox had a firm basis for success in the prior training and activities of shopfloor workers.

Do High-Performance Systems Achieve Results?

One element of the explanation for the reluctance of U.S. firms to overcome the obstacles to change and embrace broad-based efforts at organizational transformation must surely lie in the fragmentary or self-interested nature of the evidence that supports claims of high performance. With few exceptions, careful studies of what has been accomplished by far-reaching changes in management methods and work organization, or of the role played by clusters of innovation or by particular practices—employee participation, quality management, training, compensation—have not yet been undertaken. Exceptions include studies of the auto industry which find

that lean production systems outperform more traditional mass production models (MacDuffie 1991; Womack et al. 1990), and empirical studies of Xerox which document the gains of team production (Cutcher-Gershenfeld 1991; Klingel and Martin 1988).

A comprehensive review of the effects of participation on productivity (Levine and Tyson 1990) concluded that "the size and strength of the effect [of participation on performance] are contingent on the form and content of participation." Four features of a firm's human resource practices and industrial relations system affect how participatory arrangements influence performance—whether the gains from improvements in productivity are shared with workers (gainsharing), whether workers have employment security, whether the firm has adopted measures to build group cohesiveness, and whether there are guaranteed individual rights for employees.

Most of the evidence of improved performance currently available is self-reported by firm managers.

The lack of systematic evidence on the outcomes of high-performance work systems is in part a product of the newness of the emergence of the coherent models described in this section—just five years have elapsed since the first Baldrige Award, even less time since the transformations at Corning or the production of the first Saturn car. Most of the evidence of improved performance currently available is self-reported by firm managers, though it should be noted that the Baldrige Award has stringent requirements with respect to measurement and record keeping on an array of performance measures. However, due to confidentiality requirements, the federal agency that oversees the award is unwilling to release aggregate data for independent analysis (Garvin 1991).

With these caveats in mind, performance gains reported by companies that have transformed the production process appear to be impressive. Managers report improvements in quality—reductions in cycle time, defects,

and waste; improvements in customer satisfaction; and some report improvements in productivity and gains in market share or return on investment. In a 1990 study of 20 companies that were high scorers on the Baldrige Award in either 1988 or 1989, the General Accounting Office (GAO) found that adopting quality management practices embodied in the award led to improvements in corporate performance, including financial performance (U.S. GAO 1991). Response rates on many questions were quite low, however, averaging only nine companies per answer.

Performance gains reported by companies that have transformed the production process appear to be impressive.

Among the Baldrige winners, Milliken reported a significant increase in on-time delivery and a 50 percent reduction in defects in goods over 10 years. Motorola developed methods for measuring quality in white-collar settings, and improved quality ten-fold between 1981 and 1986. Solectron Corporation reported a 50 percent improvement in the average product rejection rate between 1987 and 1991. The Wallace Company increased sales 69 percent between 1987 and 1990, and raised market share from 10 to 18 percent. Granite Rock cut truck loading time by 70 percent and met a quality standard for its ready-mix concrete of just 3.4 defective loads per million.

Among firms with team production systems, defects in component parts at Xerox dropped from 10,000 parts per million in 1980 to 360 in 1989. Corning reported that scrap was down 46 percent and productivity was up 30 percent in its transformed plants. Return on investment, which had slipped in the 1980s, increased to 15 percent in 1991, putting Corning back in the top quartile of Fortune 500 companies. While it is too early to report on improvements in productivity or quality performance at Saturn, there is already evidence of accomplishment in terms of dealers' performance and customer satisfaction. J. D. Power and Associates ranked Saturn second in dealer satisfaction, just behind Lexus and ahead of Infiniti; and third in 1991

total new vehicle gross profit per dealership, behind Lexus and Infiniti. In terms of owners' overall satisfaction, Saturn ranked well ahead of the industry, in sixth place behind cars that compete in the luxury segment, and in first place among the top five basic small performers.

Thus the available evidence suggests that high-performance firms perform well in terms of efficiency and quality, though one can hope that future research will provide an independent assessment of firm performance in transformed and untransformed plants on a consistent set of outcome measures. More importantly, the types of outcome measures used to evaluate the success of work systems must be expanded to include the impact on *all* stakeholders—including shareholders, suppliers, customers, unions, managers, and front-line employees.

Despite the accumulating evidence that companies investing in work reorganization realize high payoffs, changes have been slow to spread in the U.S.

Obstacles to Change

Despite the accumulating evidence that companies investing in work reorganization, involving front-line workers in decisionmaking, and upgrading worker skills realize high payoffs in improving productivity, efficiency, and increasing their ability to get products to market quickly, these changes have been slow to spread in the U.S. There are many reasons for this. Many firms find it difficult to undertake fundamental organizational changes and have succumbed to the temptation to take the low-wage path. Further, new technology does not dictate what companies should do—computers and information technologies can be used either to upgrade workers' skills or to deskill them. Finally, firms and managers have incentives to resist change, while change poses challenges for unions and workers as well. These obstacles to change are analyzed in this section.

Moreover, as we discuss in the next section, the institutional frame-

work of the U.S.—its training system, capital markets, labor law—is adapted to the old organization of production and does not provide appropriate supports for the emerging high-performance work systems. Introducing public policy alterations to this framework is an important condition for transforming American firms into companies that can offer workers middle-class wages and still compete effectively in world markets.

Unfortunately, most firms have undertaken only piecemeal or marginal changes in production systems to date.

How Widespread Are High-Performance Workplaces?

Unfortunately, most firms have undertaken only piecemeal or marginal changes in production systems to date. The results of a 1990 study of the Fortune 1000 companies (Lawler, Mohrman, and Ledford 1992), in which 313 large firms participated, are typical of the recent survey evidence (for a review of this evidence, see Appelbaum and Batt forthcoming 1994). This survey found that only 23 firms (7 percent) could be classified as "high users," meaning they made above-average use of employee involvement and training practices. In contrast, two-thirds of firms in the study have at least one quality circle and nearly half have at least one self-directed team. In most, however, less than 20 percent of employees are involved in participatory practices.

The Osterman 1992 survey, in which 694 establishments participated, is the first representative sample of establishments to be surveyed about work organization and human resource practices (Osterman 1993). 37 percent of Osterman's sample had 50 percent or more of core employees involved in any two of the following practices: self-directed teams, job rotation, quality circles, or total quality management. This is substantially higher than other estimates of the extent of workplace reorganization and is an intriguing finding, although the fact that a large proportion of the workforce is reported to be involved in any two such practices does not necessarily indicate the

existence of a coherent transformed work system. The general conclusion that emerges is that the number of companies making use of these practices is large, but it remains unclear whether these firms are adopting any coherent set of practices.

Most of the surveys find that employee involvement programs generally use so-called "parallel structures"—problem-solving groups such as quality circles or cross-functional task forces—that do not threaten existing hierarchical authority relationships within the firm. For example, about two-thirds of the Fortune 1,000 firms had at least one quality circle in operation in 1990, up from 60 percent in 1987, but less than 20 percent of employees in these firms participated in these activities. The percentage of these firms with at least one self-directed team rose sharply, from just under one-third to just under one-half. The number of firms with more than 20 percent of their workers in self-managed teams was still quite low, however, rising only from 7 percent in 1987 to 10 percent in 1990 (Lawler, Mohrman, Ledford 1992).

Most surveys find that employee involvement programs generally use so-called 'parallel structures' that do not threaten existing hierarchical authority relationships within the firm.

The Osterman survey is an exception. Osterman found that self-directed teams were more prevalent and more extensively used than quality circles. In his survey, 55 percent of establishments had at least one team, 41 percent had at least one quality circle; 41 percent of establishments made extensive use of teams, while 27 percent made extensive use of quality circles. A third of firms made some use of total quality management, and a quarter made extensive use of this practice (Osterman 1993).

It is difficult to use these surveys to estimate how many American workers are affected by employee involvement, work reorganization, or total quality programs because the surveys share three sources of bias. First, firms that have introduced new practices are the most likely to respond to surveys; response bias leads to an overstatement of the extent of workplace change.

Second, with few exceptions, the focus is disproportionately on large firms. Since we would expect large firms to be more likely than small companies to have made these changes,[19] conclusions about the incidence of organizational changes drawn from the surveys probably *overstate* the extent of such changes among U.S. firms. Changes made at large firms, however, affect more workers than similar changes made at smaller firms. As a result, conclusions drawn from the surveys may *understate* the proportion of American workers affected by these changes.

Surveys suggest that between 10 and 25 percent of workers are employed in firms that have made significant changes in work organization and have been affected by these changes.

The third source of bias is that, to date, the surveys have only interviewed plant managers, human resource managers, or other executives.[20] It is probable that employees at other levels of the organization—middle-level managers, supervisors, and front-line workers—have different assessments of the nature and extent of efficiency- or quality-enhancing practices. Often, the manager interviewed in the survey is the individual with responsibility for implementing the program or practice. Such individuals are not disinterested observers of how widespread or how successful such programs and practices have been, and may be overly optimistic in assessing the incidence and results at their companies.

With these caveats in mind, the surveys suggest that between 10 and 25 percent of workers are employed in firms that have made significant changes in work organization and have been affected by these changes. Based on a review of practices at member firms of the American Society for Training and Development (ASTD), however, Anthony Carnevale estimates that "[o]nly 13 percent of American employers have organized employees in high performance work systems that deemphasize hierarchy and emphasize collaboration and teamwork. Those systems encompass a meager 2 percent of U.S. workers" (Carnevale 1992).

The Continuing Temptation of Mass Production

Many U.S. firms have responded to the pressures for change coming from increased competition by attempting to make mass production more flexible. These changes have been introduced in small and medium-sized firms engaged in such operations as metal stamping, injection of molded plastic parts, or high-volume machining, in large firms producing at high volumes for mass consumption markets and in service activities organized on mass production principles. Flexible mass production retains hierarchical management structures, old power relations between managers and workers, separation of conception and execution, relatively high use of low-skilled workers, and the routinization of work. However, it now includes the use of less dedicated, more flexible technology (programmable machine tools, management information systems for scheduling the delivery of raw materials); the cross-training of skilled workers in the context of a general deskilling of production workers; and the use of subcontracting, outsourcing, and contingent employment contracts to achieve flexibility in responding to market turbulence and variations in demand (so-called numerical flexibility).

Flexible mass production includes the use of less dedicated, more flexible technology, the cross-training of skilled workers in the context of a general deskilling of production workers, and the use of contingent employment contracts to achieve flexibility.

Examples also exist of firms that have "backed into" team production as a cost containment measure—requiring workers to perform administrative tasks (scheduling holidays, tracking punctuality and attendance, communicating announcements from management) in order to reduce the number of supervisors; or have organized workers into "teams" whose main purpose seems to be to motivate workers to work harder (rather than smarter) by setting up competition among teams for rewards.

What all of these measures have in common is that they do not threaten the basic organization or power structure of the firms. They attempt to

improve competitiveness through somewhat better use of technology and skilled workers and by driving down the wages and benefits of front-line workers. The focus of change is on driving down payroll costs rather than on improving quality and efficiency.

But this strategy does not appear to be a successful one for the competitiveness of domestic enterprises in the long run, particularly if competitors in other advanced industrial economies have adopted more fundamental changes in the use of technology and the organization and management of work. Flexible production, whether in mass or lower volume industry segments, still competes primarily on the basis of price. Yet, the lower limits to which wages can be pushed in advanced industrial economies are well above wages paid in other parts of the world. In addition, productivity gains achieved by shrinking the company and closing the least efficient facilities may give the firm an immediate boost, but they do not set the stage for continuous improvement and further performance gains. Nor do they improve the firm's ability to respond quickly to changes in market demand or to compete in quality-conscious markets.

Flexible production, whether in mass or lower volume industry segments, still competes primarily on the basis of price.

The inability of a weakened trade union movement and a largely deregulated labor market to rule out this low-wage path to competitiveness may favor the adoption of flexible forms of mass production over more fundamental organizational change.

The Ambiguous Role of Technology

While many firms have turned to contingent employment contracts and flexible mass production in response to intensified competition, others have experimented increasingly with workplace innovations. Both approaches have led firms to replace dedicated equipment with more flexible

technologies. But the technology, quite clearly, has not dictated the outcome.

The role of technology in organizational transformation is, thus, ambiguous. Not all transformed production systems involve the implementation of new technology and, indeed, alternatives to mass production predated the widespread use of microprocessor-based technologies (Trist 1981; Piore and Sabel 1984). One might argue that the virtue of transformed organizations is that the new forms of work organization make the most intelligent use of whatever technology is in place. Nevertheless, the shift in process technology, from electro-mechanical to computer and information technologies, has facilitated increases in variety and improvements in quality; increased the product areas in which customization is a cost-effective option; and provided communication and information management capabilities that support the decentralization of large companies and the creation of interfirm networks of small ones. This technology has also made possible reductions in time-to-market by accelerating various stages of the production process, from product design and process engineering to throughput of the final product. Microprocessor technologies have replaced equipment dedicated to producing a particular component, part, or product with equipment that can easily be reprogrammed to produce highly diversified outputs. They have also made it possible for small firms to be cost effective while producing small batches and for large firms to achieve high volume production by introducing a variety of customized, quality-competitive products. In services, microprocessor-based computer and communications technologies have made possible a wide range of new services and have altered the production process in industries largely untouched by electromechanical automation.

The shift in process technology has facilitated increases in variety and improvements in quality but there is no technological imperative driving organizational transformation.

But there is no technological imperative driving organizational transformation. As Shoshana Zuboff (1988) observed, the new technologies

can be used either to "automate" or to "informate." That is, they can be used to increase flexibility in some aspects of the production process (scheduling deliveries, controlling inventories, for example) while perpetuating and even intensifying the standardization, specialization, and fragmentation of the work process; or they can be used to transform organizations and fundamentally restructure work.

Individual firms face numerous difficulties as they attempt to transform their production systems.

Dilemmas Facing Individual Firms and Managers

Barriers for Firms. Individual firms face numerous difficulties as they attempt to transform their production systems. These include the high initial training costs (in excess of 15 percent of payroll) that may be associated with the adoption of innovative work organization practices, the high cost to small firms of training workers at all, the lack of a clearinghouse for sharing information on innovative practices, and the absence of accounting standards for measuring quality or valuing investments in research or human capital.

In addition, there are the difficulties associated with firm "boundary" problems—problems of interfirm coordination as well as what economists refer to as externalities or market imperfections. Examples include the recruiting by one firm of workers trained by another or the problems of integrating into a participative work system employees and equipment that belong, say, to the telephone company but that are located on a customer's premises and are essential to its performance.

Finally, there are the problems created by the recent rise of the "market for corporate control," which requires a firm's top officers to satisfy the demands of portfolio investors who invest in firms with high dividend payout rates.[21] This make it difficult for companies to use their earnings for investments in difficult-to-measure activities like training or research and

development. The proportion of after-tax corporate profits distributed as dividends by U.S. firms, which was already 45 percent in the 1950s and 1960s, rose to 60 percent in the 1980s and to 72 percent in 1990 as profits fell and dividends climbed (Lazonick 1992, p. 459). Present corporate governance structures in U.S. companies make it difficult for top management to make intra-firm commitments to the development of new production processes or to long-term employment relations and to make inter-firm commitments to stable, collaborative network relationships with suppliers. Yet, many researchers have argued these are essential characteristics of high-performance production systems (Brown, Reich, and Stern 1991; Brown, Reich, Stern, and Ulman forthcoming 1993; Levine 1992; Levine and Tyson 1990; Helper 1991; Helper and Levine 1992).

We are not suggesting that individual firms can never successfully transform their production systems in the absence of a supportive institutional environment. Clearly, as the evidence in this paper demonstrates, this is not the case. But we would argue that it has proven inordinately expensive and unnecessarily difficult for U.S. companies to make the transformation. As a result, transformed work systems have tended to arise when three conditions are present: a crisis threatens the product line or market share, the company has the resources to gamble on a high- risk strategy, and top management is willing to take that risk. Such crisis conditions, however, have often had the opposite effect—causing a company to downsize or outsource production and renege on the commitments it has made to its hourly workers and middle managers on gainsharing or employment security.

Transformed work systems have tended to arise when a crisis threatens the product line or market share, the company has the resources to gamble on a high-risk strategy, and top management is willing to take that risk.

Managerial Resistance to Change. Several factors account for managerial inertia and resistance to organizational change in the U.S. First, the incentive structure in U.S. firms rewards what Stephen Smith (1991) has

termed "managerial opportunism": managers gain recognition, for example, for appropriating the ideas of their subordinates; or promotions depend on improving the bottom line in the short run. They may move on to other positions before the long-run implications of the strategies they have adopted make themselves felt. Unless corporations restructure the reward system, managers may be reluctant to implement employee involvement and decisionmaking.

Sharing power, authority, responsibility, and decisionmaking is uncharted territory for most U.S. managers, and many are reluctant to cede power to workers on and off the shopfloor.

Second, sharing power, authority, responsibility, and decisionmaking is uncharted territory for most U.S. managers, and many are reluctant to cede power to workers on and off the shopfloor. This is particularly true in view of the widespread downsizing and reductions in managerial ranks undertaken by many firms. Companies that wish to reorganize work systems must define new roles for managers—more than just "coaching"—which give them new responsibilities for coordinating across functions, improving quality, or responding more directly to customers or suppliers.

Third, as we discussed above, earlier rounds of work reform and employee involvement were "ideological" in the sense that they were intended to improve worker attitudes and avoid unionization and only indirectly to affect firm performance. For that reason, training, job enlargement, and other workplace innovations were seen as discretionary actions by management that could be cut back in times of crisis to reduce costs. It is only since 1980 that some managers have come to see organizational transformation as part of the firm's competitive strategy, and not as a tactical tool for dealing with workers. Disagreement on this point among managers continues to be prevalent and in some cases may account for the failure of successful transformations to diffuse from one site to another even within a company.

Finally, as the earlier sections have shown, most workplace innova-

tions consist of practices borrowed piecemeal from one or another alternative to mass production. Managers themselves are often uncertain as to what is required in a transformed production system in order to achieve continuous improvements in quality and efficiency.

Union and Worker Ambivalence Toward Partnership

Many unions now recognize the value of participating in decision-making. As the central conflict between labor and management has shifted from wage bargaining to job saving, unions have recognized the need to represent members' interests by taking a proactive rather than reactive stance to corporate decisions that affect the ability of the company to remain profitable in an increasingly competitive environment. Long-term management decisions with respect to capital investments, product development, technology, and work organization determine the viability of a facility. If unions are not involved early on in the decisionmaking process, they have few future opportunities to shape the course of events. In addition, worker participation at the workplace in problem-solving teams often results in cost savings and quality improvements that save jobs. A growing number of examples exist of employee committees that have identified sufficient production improvements to prevent the out-sourcing of work or to bring new work in-house.

Many of the best-known examples of high-performance production systems are occurring in unionized plants.

Joint labor-management programs have been established at approximately half of all unionized workplaces (Cooke 1991). As we have shown above, many of the best-known examples of high-performance production systems are occurring in unionized plants such as Corning, Saturn, Xerox, Levi Strauss, NUMMI, and AT&T. An increasing number of unions have had positive experiences working on joint committees focused on specific issues such as training or health and safety (Mitchell, Lewin, and Lawler 1990).

Participation by unions on these committees is less problematic than is participation in quality-oriented committees, however, because the subject of joint participation is clearly delineated and unlikely to impinge on collective bargaining issues.

Many employees also genuinely like participating in problem-solving, self-directed teams, and other workplace programs that draw on their ideas and input, according to case studies (Adler 1992) as well as occasional surveys of workers such as a recent survey of AT&T employees jointly administered by AT&T and Communication Workers of America (CWA).

***The locus of debate within unions has largely shifted from whether to participate to* under what conditions *and* how.**

The locus of debate within unions, therefore, has largely shifted from whether to participate to *under what conditions* and *how*. These questions continue to pose daunting dilemmas for unions. A union local at a large manufacturing plant that recently won a quality award refused to participate in the quality efforts when invited to do so because management unilaterally set the terms and conditions of participation and retained the right to select the employees who would participate. Under these conditions, participation was not attractive to the union. The question of *how* to participate also poses problems. Participation puts major new demands on the administrative, leadership, and technical capabilities of unions in a period of dramatically reduced organizational and financial resources. Few unions have currently developed the necessary capabilities to assume "partnership" responsibilities.

The Concerns of Unions and Members. Union members may be called on to make decisions about two different levels of participation: whether to support *worker participation* in management-led committees such as problem-solving teams, and whether the *union* should participate in joint union-management structures. Two interrelated principles guide union decisions on these questions: the welfare of members and the institutional

integrity of the union. The two are closely linked because the institutional strength of the union determines how well it can represent the interests of members in the long run. Workers' welfare rests on improvements in working conditions, employment security, and income growth. Decisions by union members to participate depend largely on their ability to negotiate two types of guarantees: that workers will share in the gains from work reorganization and that the union's security is preserved and its ability to organize new members is unimpeded.

For union members, however, work restructuring and the pruning of middle management have sometimes amounted to increased burdens and speed-up of hourly employees who have been poorly prepared by the company to undertake new responsibilities. In other cases, participation may be used to provide managers with access to workers' tacit knowledge, which may then be used to reorganize work at foreign subsidiaries or elsewhere, at the cost of the jobs of the original workers (Richardson 1992).

Work restructuring and the pruning of middle management have sometimes amounted to increased burdens and speed-up of hourly employees.

Self-directed teams provide greater autonomy for workers, but management of workers by their peers introduces the potential for new kinds of conflicts, including the illegitimate use of peer pressure to intensify work or carry out management by stress. Conflict resolutions among workers and between workers and managers is likely to be more complex under these circumstances than in a more traditional setting. Some of these issues may be resolved through contract language that builds in mechanisms for gainsharing, employment security, and retraining and placement of workers displaced by technology or by process and quality improvements.

For unions, worker involvement in management-led committees raises two concerns that relate to their institutional integrity. First, in nonunion settings, companies have used employee involvement programs to

discourage union organizing, and the National Labor Relations Board (NLRB) has determined that such committees, with management-appointed members, constitute illegal company unions. Second, in unionized settings, unions are concerned about their ability to uphold collective bargaining principles. Even some unionized companies have attempted to use quality of worklife (QWL) or other committees to undermine or marginalize the union.

Even under the best of circumstances, legitimate concerns arise regarding the use of informal labor-management committees in decentralized worksites.

Quality or process improvement teams in which management selects volunteers to participate pose even larger concerns than QWL committees. These teams focus on ways of changing working conditions and the skill content of jobs (for which the union has negotiated specific wage rates). These are issues of mandatory bargaining under current labor law. Even under the best of circumstances—where management does not intend to undermine the bargaining relationship and the union selects participants—legitimate concerns arise regarding the use of informal labor-management committees in decentralized worksites. These committees engage in ongoing negotiations that may reach agreements contravening broader contract agreements. Workers representing their own interests at one site may not be aware of the adverse affects of their decision on workers in another unit. The union, however, has the legal responsibility to represent all workers. Unions also are concerned about the potential for joint work-site committees allowing management to engage in "whipsawing," a process in which locals are made to compete against each other or are compelled to match changes made at other sites.

These dilemmas have led some unions to negotiate joint structures and oversight committees at several levels of the organization. The 1992 contract between AT&T and its unions, the Communication Workers of America (CWA) and the International Brotherhood of Electrical Workers (IBEW), which established the "Workplace of the Future," takes this approach, as do

the collective bargaining agreements between Xerox and the Amalgamated Clothing and Textile Workers (ACTWU) and Saturn and the United Automobile Workers (UAW). This kind of structure, however, requires unions to reorganize internally and to strengthen leadership and administrative capabilities at several levels. It requires large investments by the union in training staff to monitor decentralized agreements and to develop technical expertise to analyze and contribute to new technological and organizational strategies. Moreover, it requires shifting power in decision making to lower levels of union leaders. Work team leaders, QWL facilitators, and worker representatives on operations and strategic management committees can threaten the authority of elected union leadership if they are not fully integrated into a revamped union organizational structure.

Even where unions have developed joint structures and capabilities, mutual trust depends from the union perspective on management agreeing to remain, at a minimum, neutral with respect to union organizing at existing nonunion company work sites. Finally, the involvement of union leaders in operational and strategic management decisions, and the performance of traditional management responsibilities on the shopfloor by workers in self-managed teams, raises legal questions. In 1980 the U.S. Supreme Court ruled that employees performing managerial work were not covered under the National Labor Relations Act.[22] How this ruling applies to participatory workplaces will have to be clarified.

Even where unions have developed joint structures and capabilities, mutual trust depends from the union perspective on management agreeing to remain, at a minimum, neutral with respect to union organizing.

In nonunion settings, moreover, the question of how workers are to be represented in power sharing activities is a difficult one. The legality of the paternalistic solutions favored by some companies, especially those that have adopted the American HR approach, has been challenged by the December 1992 ruling of the NLRB in the Electromation case.[23] The issue is whether

workers' interests are represented in labor-management committees when management selects the workers who will participate.

The Role of Public Policy

Institutional Barriers to Change

Institutions neither require nor support change--which may account for both the diversity we observe as well as the difficulty firms face in making changes.

In the U.S. context, no "institutional imperative" shapes the transformation of firms' production systems. In a sense, the institutional framework in the U.S. can be characterized as permissive—institutions neither require nor support change—which may account for both the diversity we observe as well as the difficulty firms face in making such changes. U.S. labor law, in which wages and working conditions are the only mandatory areas of collective bargaining and business decisions are management prerogatives, is hostile to the development of high-performance work systems.

Unlike their German counterparts, U.S. firms are under no legal mandate to share company information with employees or to allow employee representatives to participate in corporate decisions about the choice of new technology (Turner 1991). Unlike their Japanese or Swedish counterparts, U.S. firms do not have access to an infrastructure of organizations capable of diffusing new ideas and work practices, such as the Japan Federation of Employers' Associations, the Japanese Union of Scientists and Engineers (JUSE), or the technical department of the Swedish Employers' Confederation (SAF) (Cole 1982). Unlike their counterparts in Italian industrial districts, employees and owners of small U.S. firms cannot rely on local governments to provide collective services such as day-care centers, low-cost worker housing, training institutions, or marketing consortia for firms that reduce costs and encourage labor-management compromise (Trigilia 1990).

The weakness of U.S. trade unions means that U.S. firms are not constrained, as are those in Germany or Sweden, to seek out high-skill solutions to problems of competitiveness. Rather, companies in the U.S. continue to view low-wage alternatives as viable. Moreover, firms that choose to pursue a high-skill alternative face formidable difficulties in obtaining skilled workers in view of the lack of national training standards or programs for training and retraining the 70 percent of workers without a college degree. These difficulties have become all the more acute as the nature of organizational innovation has changed over time, from partial measures designed to improve employee satisfaction and increase productivity to more costly and wide-reaching measures intended to lead to continuous improvement.

The fact that change is likely to be undertaken as a response to crisis conditions explains in part why reforms tend to be adopted piecemeal--the few best-practice cases are exceptions to the rule.

The lack of an institutional framework external to firms that shapes opportunities, constrains behavior, or supports the diffusion of successful innovations within companies leads to certain patterns of change in the U.S. The absence of an infrastructure that supports change means that major organizational transformations are more likely to occur in response to crisis conditions than as a result of the implementation of a vision. In the absence of a crisis, such changes are likely to be both difficult and slow.

The fact that change is likely to be undertaken as a response to crisis conditions explains in part why reforms tend to be adopted piecemeal—the few best-practice cases are exceptions to the rule. Organizational and industrial relations theorists are well aware that major changes in work reorganization and employee involvement are most successful when they include employment security, gainsharing or other pay backs for workers, and participatory structures that encourage cooperation backed by an independent

role for worker voice and interest representation. However, firms that adopt work reforms in crisis conditions are often unable to make such commitments. Indeed, as they attempt to reform work organization they may be simultaneously engaged in more direct cost-cutting measures, such as subcontracting out work and laying off workers, that demoralize employees and undermine trust. Thus, firms that undertake organizational change may find they do not achieve the anticipated gains from such innovations. They may jettison programs rather than explore problems in the contradictory strategies they are pursuing. Many examples also exist of successful experiments disbanded when a stable group of employees who have been working together become redundant or are transferred during downsizing and restructuring.

The lack of an institutional infrastructure to shape developments means that major organizational change is overly dependent on the personalities and commitment of key individuals.

Furthermore, the lack of an institutional infrastructure to shape developments means that major organizational change is overly dependent on the personalities and commitments of key individuals—the CEO, plant manager, workers in particular units, or local and national union officials. Lacking union research centers, employers' associations, or other organizations to guide the transformation of production and the reorganization of work, managers in the U.S. turn to consultants. They come under the influence of one guru or another who is an expert in one or another management fad. Thus, U.S. companies end up adopting fragments of production models—sociotechnical systems, lean production, diversified quality production, or flexible specialization—that were developed in other institutional contexts. Such production models may be implemented successfully in one or another company without the support of external institutions; but it takes a leadership dedicated to change and a very large commitment of financial and other corporate resources to make this happen.

In the absence of an institutional setting that reduces or shares some

of the costs of moving to high-performance production systems, it may be unprofitable in the short run for individual firms to undertake the change to more efficient forms of organization. The design of a transformed organization and the training of employees that is required in order to implement the changes impose high costs on individual firms, in terms of money, management time, and time spent in training by workers. All of these costs are incurred in advance of the gains from higher quality and/or lower cost in a transformed system. These up-front costs hinder the ability of all but the most convinced or most desperate firms to change.

Finally, the decision to pursue a low-wage, low-skill competitive strategy on the part of some U.S. firms raises several further obstacles to success for those firms that wish to implement more innovative approaches in production processes, work organization, and employee involvement. First, firms attempting to make fundamental changes can be undermined in the short run, before the performance improvements made possible by these changes have materialized, by low-wage competitors. Given the very high start-up costs of organizational change in the U.S. context, firms are especially vulnerable in the initial stages, when they are trying to establish a new production system. Predatory pricing by low-wage competitors can threaten the survival of the transformed firms, or at least of the innovations they have adopted. There is some fragmentary, but alarming, evidence to suggest that this is, indeed, happening (Luria 1992).

The decision to pursue a low-wage, low-skill competitive strategy on the part of some U.S. firms raises several further obstacles to success for those firms that wish to implement more innovative approaches.

Yet another problem is that the lack of legal, bargained, or cultural restrictions on the ability of most U.S. firms to lay off workers makes it difficult for transformed firms, which rely on mutual trust, to honor their commitments to employment security during periods of recession. Competitors who have not adopted a high-commitment model of work organization

will reduce costs during a recession by laying off workers, putting firms that have promised employment security under pressure to renege.

Finally, unions engaged in a rear guard action to protect jobs and wages at companies pursuing an intensification of mass production and a low-wage path exhibit an understandable uncertainty about the intentions of firms pursuing alternative forms of work organization. Unions fear that if they give up traditional means of exercising power—job control, grievance procedures, and the threat of undermining production by "working to rule"—they will be unable to compel companies to uphold their commitments to worker participation in management and other new forms of sharing power in decisionmaking. Thus, to the extent that firms adopt low-wage paths to competitiveness, the obstacles facing firms that attempt high-skill, high-commitment alternatives will increase.

Publicly-supported interfirm consortia in research and development or technical assistance and training spread the costs associated with high-performance work systems.

Public Policies for High Performance

The evidence from this research report as well as a growing number of others is that the American business landscape is populated by many firms that continue to pursue the low-wage path, many others that struggle with piecemeal adoption of reforms without the necessary institutional supports, and a small number of best-practice firms that have fully transformed their production systems. To move beyond the current landscape and diffuse high-performance work systems more broadly requires an interrelated set of public policies addressing the issues that firms and workers cannot tackle alone.

Economists generally agree that dealing with externalities and market imperfections is an appropriate role for the government to play. A labor force that possesses a high level of skills reduces training costs and improves the

efficiency of all firms. Publicly-supported interfirm consortia that achieve economies of scale in research and development or technical assistance and training spread the costs associated with high-performance work systems. While a few of these initiatives require some government spending or alterations in existing regulations, many require little in the way of direct financial outlays by the government or intervention beyond playing an initial role as "honest broker" to help the private sector establish these institutions.

We have grouped policy options into five areas. They include policies to improve training institutions, enhance employee participation, increase the commitment of firms to their stakeholders, support interfirm collaboration, and rule out the low-wage path. Rather than providing detailed prescriptions, we outline here a number of principles and policy alternatives for achieving these goals.

Job Training. Considerable evidence now exists that front-line employees currently receive less training than is required to support high-performance work systems (Kochan and Osterman 1991). Broad support from communities, firms, workers, and unions now exists for federally-supported policies to enhance training for a broad cross-section of the U.S. population. Unlike past efforts that centered on disadvantaged workers and were viewed as social welfare programs, current support for training initiatives grows out of concerns about U.S. competitiveness and creating high-wage, high-performance jobs. The outlines of a national policy for workplace training are developed in other EPI reports (Batt and Osterman 1993; Lynch 1993); we briefly review our recommendations here.

In addition to apprenticeship programs focused on youth and the school-to-work transition, training for high-performance work systems must

Unlike past efforts that centered on disadvantaged workers, current support for training initiatives grows out of concerns about U.S. competitiveness and creating high-wage, high-performance jobs.

reach the 75 percent of the current American workforce that does not have at least a college degree. Building a technically-trained workforce requires programs that are workplace-centered so that training can occur on state-of-the-art technology and be integrated into work reorganization efforts. Thus, throwing dollars at worker training is unlikely to produce performance gains unless firms simultaneously undertake organizational changes that redefine jobs, so that employees use both their newly-acquired skills and problem-solving capabilities.

Small- and medium-sized firms rarely have training budgets, are responsible for the majority of new job creation, and are a plausible constituency for targeting training initiatives.

To support a workforce that produces continuous improvements in production processes requires training opportunities that go beyond individual programs—*training systems* that have a strong local institutional base and that can evolve and respond flexibly to new demands on labor from changing technologies or products. Employees must be able to return again and again to formal training as needed throughout their lifetime and to integrate this process into the normal course of their working lives.

Such a systemic effort at publicly-supported training runs the risk of creating large subsidies to firms for training they would undertake anyway in the normal course of doing business. In order to avoid such subsidies, training programs should be administered as grants or contracts with targeting and performance criteria.[24] States administering such contracts may establish appropriate criteria. One alternative is to target firms and workers most in need and unlikely to have the resources to undertake training on their own. Small- and medium-sized firms rarely have training budgets, are responsible for the majority of new job creation, and are a plausible constituency for targeting training initiatives. Currently, most private training dollars go to managerial rather than front-line workers (Carnevale and Goldstein 1990; minority workers and women are the least likely to receive training (Lynch

1989). States should provide targets or incentives to reach these underserved constituencies.

Another alternative is to require larger firms to provide matching funds, to demonstrate how publicly-funded training supplements existing efforts, or to show how higher performance standards will be met through public subsidies. States could also target particular types of training related to high performance: training in advanced technologies such as computer-numerically-controlled equipment, in processes such as statistical process control, or in training to enhance total quality and collaborative team work. States such as Illinois and California have already developed some of these alternatives (Batt and Osterman 1993).

Training programs should build in occupational certification requirements that may be administered on a state-by-state basis.

In order to enhance system-building and create a strong institutional constituency, state-administered training programs may provide incentives for creating training networks among small firms in conjunction with community organizations, trade unions, community colleges, and local employment offices. Within the workplace, labor-management training committees provide another vehicle for building institutional support for training, for ensuring that training programs meet the needs of the workforce, and for monitoring programs to ensure quality and accountability.

A second risk in the creation of workplace-centered training is that the training will tend to be specific to the particular workplace or firm in which it is given, and therefore not provide employees with more general or portable skills that enhance employment security more broadly. To guard against this, training programs should build in occupational certification requirements that may be administered on a state-by-state basis. The development of occupational skill criteria and the accreditation of training programs offered

by community colleges, technical schools, vendors, and in-house training staff reduce the costs to firms of identifying appropriate training curricula and increase the portability of worker credentials.

Promoting Employee and Union Participation. There is ample evidence of the existence of perverse incentives that discourage managers from adopting more participative work systems (Smith 1991; Wever and Allen 1992). A number of policy alternatives exist to counter these incentives. The most direct route, put forth by a number of researchers and policymakers is to mandate elected employee councils modelled after European works councils at establishments with over fifty employees (Rogers and Wcotten 1992; Freeman and Rogers forthcoming 1993). These councils could replace existing employee involvement programs that, as in the *Electromation* case, violate American labor law because they are essentially company unions. Legislation could clarify the rights, responsibilities, and sanctions available to such councils, including their involvement in issues of work reorganization, training, health and safety, and conflict resolution.

Employee councils should not be seen as an alternative to union representation, but as an immediate solution to increasing participation in union as well as nonunion workplaces.

Alternatively, Congress could build on existing legislation that provides special tax treatment to firms with Employee Stock Ownership Plans (ESOPs) under ERISA (Levine 1992). Support for ESOPs grew in the 1980s in part because some thought that giving employees stock in a company would increase their sense of ownership in firms, and hence their participation in performance improvements. But the empirical evidence suggests that meaningful employee participation only occurs when real structures are in place to provide a vehicle for participation (Levine and Tyson 1990, Eaton and Voos 1992). Tying ESOP tax subsidies to the creation of employee councils and of worker representation on the boards of companies would help establish this critical link.

Employee councils should not be seen as an alternative to union representation, but as an immediate solution to increasing participation in union as well as nonunion workplaces. Trade union leaders play an active role in employee councils in Germany, and such councils have a legal responsibility to enforce union contracts at the work site. A strong trade union movement is viewed as a necessary condition for the success of the employee councils (Knuth 1991; Kochan, Wever, and Berg forthcoming 1993). Indeed, as employee councils develop in nonunion worksites, they may seek the leadership and technical assistance of unions in order to represent the interests of workers more effectively.

A major obstacle to greater participation is lack of employment security both at the individual level due to 'employment-at-will' and more generally due to firm restructuring and downsizing.

These policies would not take the place of reforms needed in existing labor legislation to overcome the obstacles to participation facing unions. The case studies in this report clearly demonstrate that, where firms respect the institutional integrity of unions and where unions have the resources and capability, unions enhance employee participation and help diffuse and sustain higher performance work systems. The lack of enforcement of current labor laws has created obstacles to union organizing, long delays in union elections, and managerial disregard for the duty to bargain contracts even after unions win an election that drains union resources and deter them from assuming the kind of leadership role required in partnership activities. Additionally, given the increasingly widespread use of self-managed teams, current interpretations of labor law (e.g., *Yeshiva*) that exclude from coverage workers with some supervisory responsibilities must be reconsidered. Indeed, there is no reason to exclude from protective labor legislation lower level supervisors and managers who are not confidential employees and whose working conditions, degree of employment security, and work respon-

sibilities increasingly resemble those of front-line employees.

A major obstacle to greater participation is lack of employment security both at the individual level due to "employment-at-will" and more generally due to firm restructuring and downsizing. The U.S. is the only advanced industrialized country in which employers may hire and fire "at-will." But this employment-at-will doctrine has been increasingly challenged in courts over the last decade through tort law, and unjustly-fired employees have won large awards. As a result, one state (Minnesota) has already passed legislation prohibiting unjust dismissal with broad support from the business community; and as of 1991, seventeen other states were also considering such legislation (Tomkins 1988; Hahn and Smith 1990; Krueger 1991). As in other areas, these state initiatives set an example for the federal government.

The broader issue of employment stabilization must be addressed by macroeconomic policies as well as by labor market policies.

The broader issue of employment stabilization must be addressed by macroeconomic policies as well as by labor market policies that support the adoption of high-performance work systems and enhance the viability of small and medium-sized locally-tied firms through regional economic development strategies. In addition to policies discussed in more detail below, the latter include the development of officially sanctioned clearinghouses to determine and promote best-practice in process technologies and associated work organizations and to reduce uncertainties not only for firms planning to implement them (Cole 1989), but for financial institutions that would otherwise be reluctant to lend to companies for this purpose. Such a clearinghouse would help overcome the inherent bias in capital markets against hard-to-monitor investments in human capital. Imperfect information about the impact of such investments in intangibles leads to underinvestment in training and participation. Additionally Congress could re-examine the criteria for the Malcolm Baldrige National Quality Award and give greater

weight to human resource and industrial relations innovations that promote employee participation.

Increasing Firm Commitment to Stakeholders. Both U.S. law and the operation of American capital markets favor the interests of a firm's shareholders over those of other stakeholders—its employees, managers, directors, suppliers, customers, and the community in which it is located. Moreover, shareholder value tends to be narrowly defined as current stock price (Porter 1992). Managers who sacrifice short-term stock price for other goals face the threat of a hostile takeover, a shareholder revolt that replaces top management, or a law suit. This may happen, for example, if a firm increases retained earnings in order to invest in intangibles such as research and development, organizational redesign, or worker training and thereby reduces dividends, causing a sell-off of the stock and a short-term decline in its price. Retained earnings are the major source of investment in new technology and organizational change. Yet, managers are penalized for using them to maximize long-term shareholder value.

The rise since the 1950s of the 'market for corporate control' prevents corporate managers from making financial commitments to the long-term development of their companies.

The problem is especially acute in the U.S. In contrast to the German or Japanese systems, in which the dominant investors in a firm are corporations or institutions that hold large stakes and are permanent owners, more than 85 percent of the stock of publicly traded companies in the U.S. is owned by individuals or by institutional investors that act as agents for individuals (Porter 1992). The goal of institutional investors that act as agents for individuals (e.g., pension funds and mutual funds), and who are evaluated on a quarterly or annual basis by the appreciation of the stocks in their funds, is rapid appreciation of their shares in relation to some stock index. Thus, both individuals and institutional investors in the U.S. are transient owners, ready

to move to another company in search of higher short-term gains.

This leads American investors into speculative behavior that erodes the concept of ownership in the corporate sector and has had a profound effect on corporate governance, especially with respect to corporate control (Crotty and Goldstein forthcoming 1993). The rise since the 1950s of the "market for corporate control" prevents corporate managers from making financial commitments to the long-term development of their companies and from recognizing their obligations to all stakeholders, not just investors. Both the focus on short-term performance and the rise of the market for corporate control inhibit the shift to high-performance work systems. First, they undermine the ability of large shareholders to act as 'patient' capitalists. Second, they reduce the ability of managers to invest in research and development, new process technology, new work organization, and training. Finally, they undermine the ability of the firm to undertake long-term employment contracts with its employees (Lazonick 1992).

Policy measures to reduce the focus on short-term stock price performance and to increase the financial commitment of firms to all of their stakeholders have been proposed.

A number of policy measures to reduce the focus on short-term stock price performance and to increase the financial commitment of firms to all of their stakeholders, not just the owners of stocks and bonds, have been proposed (Crotty and Goldstein forthcoming 1993). These include taxing short-term capital gains at significantly higher rates than long-term capital gains; subjecting securities transactions to a modest trading tax to weaken incentives for speculation and churning; adopting or strengthening state laws regulating hostile takeovers to protect the rights of employees, restricting "greenmail," placing representatives of stakeholder constituencies on boards of directors, and giving longer term shareholders more of a voice. Workers should have a larger role in deciding the policies of their pension funds; managers of pension funds should be encouraged to engage in long-term

shareholding and to take a more active role in the companies in which they hold stakes. Finally, all of a company's stakeholders—its employees, suppliers, customers, and community—should be represented among the outside directors on its board of directors.

Building Interfirm Collaboration and Quality Standards. Transformed production systems require new forms of interfirm cooperation and coordination. Total quality production depends upon reducing the arm's length relationships between firms— building strategic alliances between competing firms or vertical linkages among tiers of suppliers and customers (Grabher 1991; Campbell 1992). Some state governments have already taken an active role in facilitating network relations among firms to enhance research and development, the adoption of new technologies, and the provision of related technical training; others have encouraged public-private partnerships to provide export promotion. These efforts should be evaluated and further diffused, perhaps as part of an industrial extension program. A system of state or regional-level industrial extension programs would provide a vehicle for disseminating information and providing guidance to firms on the adoption of new work organization and human resource practices. Industrial extension programs could also provide assistance to firms in meeting quality standards.

Some governments have already taken an active role in facilitating network relations among firms to enhance research and development, the adoption of new technologies, and the provision of related technical training.

The ability of firms to meet quality standards could be enhanced through the establishment of a third-party registration system, in which the federal government certifies auditing companies as qualified to rate the ability of suppliers to comply with their customers' quality standards. This would facilitate the customer's ability to take quality as well as price into account in choosing suppliers. Many European countries have government certified auditing companies, which audit companies that wish to demonstrate that they

meet the quality standards of the International Standards Organization in Geneva. The certified auditing companies then issue "registrations" to those suppliers that qualify (Holusha, December 23, 1992). The American National Standards Institute, a private industry group, and the American Society for Quality Control, an association of corporate quality-control executives, have begun issuing registrations in the U.S.; but no government agency has been authorized to bring the standards in line with total quality principles or to certify these or other auditing organizations.

It may be unprofitable for an individual firm to transform its production system if it can be undermined in the short run by firms following a low-wage strategy.

Ruling Out the Low-Wage Path. Many proposals that have been put forward in other contexts also have the effect of limiting the excesses of predatory pricing behavior by firms following a low-wage strategy. Such policies include a national health care plan; a national family leave act; the prorating of pension, vacation, and other benefits for part-time workers; the provision of mandated portable benefits for temporary workers; the indexing of the minimum wage; the elimination of tax code provisions and foreign aid program abuses that encourage firms to move production jobs out of the U.S.; and the development international labor standards to accompany trade agreements (Rothstein 1993).

These policies are "preventive" (Sengenberger 1990) because they make it more difficult for firms to follow a competitive strategy based on low wages. As discussed earlier in this paper, it may be unprofitable for an individual firm to transform its production system—despite the potential efficiencies of team-based production, total quality management, and more participatory structures—if it can be undermined in the short run by firms following a low-wage strategy. Ruling out the worst excesses of such behavior removes an important obstacle to organizational transformation in firms that wish to pursue this path.

Conclusion

U.S. firms face numerous obstacles to the implementation of transformed production systems. These include dilemmas facing unions, perverse incentives for managers, and the barriers to diffusion that arise from an outmoded institutional framework. An industrial strategy adopted by the federal government should include measures to support the transformation of production processes in U.S. firms and promote a more efficient combination of the factors of production. Competition among national economies in the coming decades will be waged not only in the domain of critical new product technologies, but in the domain of process technology and work organization as well. Government policy has a key role to play.

Competition among national economies will be waged not only in the domain of critical new product technologies but in the domain of process technology and work organization.

Glossary

Personnel Policies/Practices

1. **Employment security:** Company policy designed to prevent layoffs.

2. **Hiring partly based on employee input:** This involves management consulting with and obtaining employee input about hiring new employees.

3. **Realistic job preview or portrayal to potential job hires:** Instead of attempting to persuade potential new hires of the desirability of a job, both the undesirable and the desirable parts of the job are stressed in the hiring process. This gives potential new employees a realistic portrayal of the job in order to increase self-selection and prepare new hires for unpleasant conditions.

4. **Suggestion system:** A program that elicits individual employee suggestions on improving work or the work environment.

Pay/Reward Systems

1. **All-salaried pay systems:** A system in which all employees are salaried, thus eliminating the distinction between hourly and salaried employees.

2. **Knowledge/skill-based pay:** An alternative to traditional job-based pay that sets pay levels based on how many skills employees have or how many jobs they potentially can do, not on the job they are currently holding. Also called pay for skills, pay for knowledge, and competency-based pay.

3. **Profit sharing:** A bonus plan that shares some portion of company profits with employees. It does not include dividend sharing.

4. **Gainsharing:** Gainsharing plans are based on a formula that shares some portion of gains in productivity, quality, cost effectiveness, or other performance indicators. The gains are shared in the form of bonuses with all employees in an organization (such as a plant). It typically includes a system of employee suggestion committees. It differs from profit sharing and an Employee Stock Ownership Plan in that the basis of the formula is some set of local performance measures, not company profits. Examples include the Scanlon Plan, the Improshare Plan, the Rucker Plan, and various custom- designed plans.

5. **Individual incentives:** Bonuses or other financial compensation tied to short-term or long-term individual performance.

6. **Work group or team incentives:** Bonuses or other financial compensation tied to short-term or long-term work group, permanent team, or temporary team performance.

7. **Non-monetary recognition awards for performance:** Any non-monetary reward (including gifts, publicity, dinners, etc.) for individual or group performance.

8. **Employee Stock Ownership Plan (ESOP):** A credit mechanism that enables employees to buy their employer's stock, thus giving them an ownership stake in the company; the stock is held in trust until employees quit or retire.

Employee Involvement Innovations/Programs

1. **Survey feedback:** Use of employee attitude survey results, not simply as an employee opinion poll, but rather as part of a larger problem-solving process in which survey data are used to encourage, structure, and measure the effectiveness of employee participation.

2. **Job enrichment or redesign:** Design of work that is intended to increase worker performance and job satisfaction by increasing skill variety, autonomy, significance and identity of the task, and performance feedback.

3. **Quality circles or problem-solving teams:** Structured type of employee participation groups in which groups of volunteers from a particular work area meet regularly to identify and suggest improvements to work-related problems. Management provides group problem-solving training to facilitate this process. The goals of QCs are improved quality and productivity; there are no direct rewards for circle activity. The groups' only power is to suggest changes to management.

4. **Employee participation groups other than quality circles:** Any employee participation groups, such as task teams or cross-functional teams, that do not fall within the definitions of either self-managing work teams or quality circles. These groups typically involve employees from different work, department, or functional areas.

5. **Union-management quality of worklife (QWL):** Joint union-management committees, usually existing at multiple organizational levels, alongside the established union and management relationships and collective bargaining committees. However, QWL committees usually are prohibited from directly addressing contractual issues such as pay. Rather, they are charged with developing changes that improve both organizational performance and employee quality of worklife.

6. **Joint partnership processes (structures, architectures):** Joint labor-management committees that address broad issues at the plant, enterprise, corporate, or organizational level that affect the viability of the firm or organization. The focus is on strategic goals and on policy and planning to meet those goals.

7. **Self-managing work teams:** Also termed autonomous work groups, semi-autonomous work groups, self-regulating work teams, or simply work teams. The work group (in some cases, acting without a supervisor) is responsible for a whole product or service, and makes decisions about task assignments and work methods. The team may be responsible for its own support services such as maintenance, purchasing, and quality control and may perform certain personnel functions such as hiring and firing team members and determining pay increases.

8. **Employee councils:** Elected bodies of employees, with representatives chosen from every occupational grouping, that receive information and engage in joint decisionmaking with management on operational issues at the plant or work site level. Issues addressed may include training, occupational safety and health, deployment of technology, and operating procedures.

Source: Adapted from Lawler, Mohrman, and Ledford 1992, pp. 145-46.

Endnotes

1. Elsewhere (Appelbaum and Batt forthcoming 1994) we have documented these innovations in management methods, work organization, human resource practices, and industrial relations, and have analyzed the means by which different organizational strategies achieve continuous improvements in performance.

2. For example, several divisions of Hewlett Packard, a nonunion firm, have adopted the American team production model; while the unionized AT&T Transmission Systems Unit, which won the Baldrige Award, has adopted the American lean production system.

3. Space does not permit us to discuss these alternatives in more detail here. For a more in-depth analysis, see Appelbaum and Batt (forthcoming 1994).

4. We describe a wide range of management methods, types of work organization, and human resource and industrial relations practices in the glossary of terms in the appendix to this report.

5. Since 1988, the National Institute of Standards and Technology (NIST) of the Department of Commerce and the American Society for Quality Control (ASQC) have administered the Malcolm Baldrige National Quality Award. It is modeled after Japan's Deming Award for quality. Since then, many states, industry associations, and publications have begun similar though less comprehensive quality awards so that even more firms have become involved in or influenced by "the quality movement."

6. By self-directed teams we mean groups of workers who have substantial discretion over the work process, make changes in production methods as needed, and take on many of the tasks traditionally carried out by front-line supervisors such as allocating and coordinating work between different employees as well as scheduling. Clearly there is a range of variation in the optimal degree of autonomy that groups have, and this is likely to depend on the nature of the work as well as the preferences of the particular group of employees. In the extreme, such teams are truly autonomous and have no supervisors, as in the Volvo plant at Uddevalla, Sweden, where the ratio of managers to employees is approximately 1:60 (Hancke 1993). In most U.S. cases, the ratio is considerably larger, supervisors act as "coaches," and teams are more accurately described as "semi-autonomous." In this report, we use the term self-directed or self-managed to include this range of variation in the autonomy of groups.

7. "Lean production," write James Womack, Daniel Jones, and Daniel Roos, "is a superior way for humans to make things. ... It follows that the whole world should adopt lean production, and as quickly as possible" (p. 225).

8. Since 1988, seventeen companies have won awards in three categories: manufacturing (Motorola, Westinghouse Commercial Nuclear Fuel Division, Milliken and Company, Xerox Business Products, Cadillac Motor Company, IBM Rochester, Solectron, Zytec, AT&T Network Systems Group/ Transmission Systems Business Unit, and Texas Instruments' Defense Systems & Electronics Group); services (Federal Express, AT&T Universal Card, and the Ritz-Carlton Hotel in Atlanta); and small business (Globe Metallurgical, Wallace, Marlow Industries, and Granite Rock).

9. One company described the Baldrige feedback process as "the best consulting bargain around" (Gomez del Campo 1993).

10. The seven categories are customer focus and satisfaction (300 points), leadership (90 points), information and analysis (80 points), strategic quality planning (60 points), management of process quality (140 points), quality and operational results (180 points), and human resource development and management (150 points).

11. In reality, there are many different versions of TQM, some emphasizing the link to customers and robust product design, some the importance of strong managerial role and leadership (Juran and Gyrna 1988), some the cost of nonconformance (Crosby 1979), and some the importance of employee involvement (Deming 1984).

12. In a footnote to the section on employee involvement and empowerment of front-line workers, the Baldrige criteria state: "Different involvement goals and indicators may be set for different categories of employees, depending on company needs and on the types of responsibilities of each employee category" (U.S. Department of Commerce 1992).

13. Solectron Corporation has taken a "team-focused" approach to employee involvement and has trained most workers in problem-solving methods and statistical process control. Motorola uses problem-solving teams throughout the company to establish quality goals. The Wallace Company uses teams and has empowered "associates" to make decisions not exceeding $1,000 without consulting a supervisor. Zytec Corporation uses cross-functional design teams and several departments are self-managed.

14. Information on the Baldrige winners here and below comes from case studies conducted by the bureau administering the Baldrige Award in the U.S. Department of Commerce, by the U.S. Department of Labor, by the American Productivity and Quality Center, and by Guillermo del Campo Gomez (1993).

15. We draw heavily on the case studies of Gomez (1993) for these profiles.

16. For the following analysis of these cases, we draw on a combination of case materials and

interviews with participants. For Xerox, we rely largely on March 1993 interviews with Xerox manager Nick Argona and Amalgamated Clothing & Textile Workers Union (ACTWU) representative Tony Constanza, co-managers of the "Joint Process Architecture" that initiated organizational changes at Xerox; also interviews with Peter Lazes, consultant on the transformation process at Xerox in the 1980s. For Saturn, we rely on September 1992 interviews with Dick Tracey, former GM and Saturn manager, currently at the Industrial Technology Institute; also LeFauve and Hax 1992; Fraser 1992; and Rubinstein, Bennett, and Kochan forthcoming 1993. Information on Corning comes from our on-site visit and interviews in October 1992.

17. Work units at Saturn "are self-directed and empowered with the authority, responsibility, and resources necessary to meet their day to day assignments and goals including producing to budget, quality, housekeeping, safety and health, maintenance, material and inventory control, training, job assignments, repairs. scrap control, vacation approvals, absenteeism, supplies, record keeping, personnel selection and hiring, work planning, and work scheduling" (Rubinstein, Bennett, and Kochan, 1993).

18. An example of autonomous work groups at Xerox are the "mod squads" -- autonomous groups of electricians, painters, and carpenters who have cut costs by 30 percent by eliminating 3 or 4 steps and layers of employees as the teams took over advising, engineering, drafting of blue prints, and supplier relationships.

19. Osterman does not find large firms more likely than smaller firms to make extensive use of these practices.

20. We know of no broad-based survey of lower level managers or employees concerning their perceptions of changes in work organization and human resource and industrial relations practices.

21. The "market for corporate central" refers to the ability of present or potential stockholders to exercise control over the investment decisions of corporate managers, most notably though not exclusively through the threat of a hostile takeover of the company (Lazonick 1992).

22. This decision came in the 1980 NLRB v. Yeshiva University case. While that case applied specifically to academic faculties, it is uncertain whether it applies as well to blue- collar or other hourly workers performing managerial functions.

23. In December 1992, the NLRB found that the "action committees" set up by Electromation Inc., a nonunion company in Elkhart, Indiana, to deal with issues ranging from bonuses to the treatment of employee absenteeism violated the 1935 National Labor Relations Act, which bars companies from setting up management-dominated committees. At Electromation, managers determined the purposes and goals of the committees, fixed their size and membership from a list of volunteers,

and included a management representative (Victor 1993).

24. Countries such as France that have imposed a "pay-or-play" system based on a straight training tax have found that small firms usually end up subsidizing larger firms. Small firms without the resources to do the training end up paying the tax which goes into a public fund; small firms also lack the slack time on production lines to train workers and the administrative capability to access the public fund.

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