PRODUCT QUALITY IMPROVEMENT THROUGH EMPLOYEE PARTICIPATION: THE EFFECTS OF UNIONIZATION AND JOINT UNION-MANAGEMENT ADMINISTRATION

WILLIAM N. COOKE*

This study investigates the effectiveness of employee participation in achieving product quality improvement in union versus nonunion settings and in programs unilaterally administered by management versus programs with joint union-management administration. An analysis of data from two surveys of manufacturing firm managers suggests that among unionized firms, those with jointly administered programs achieved significantly greater improvements in product quality than did those with more traditional, adversarial collective bargaining relationships (that is, with no participation programs), but those with programs administered solely by management fared no better than those with no programs. The gains associated with jointly administered programs in unionized firms were at least equal to the gains associated with participation programs in nonunion firms.

EMPLOYEE participation programs (defined here as work groups, teams, circles, or committees eliciting the input of employees and union representatives) have become widespread across American industry. Recent surveys suggest that since the late 1970s, roughly half of both unionized and nonunion firms in the private sector have established formalized participation programs (see, for example, G.A.O. 1987; Delaney et. al. 1989; Cooke and Meyer 1990). The general purpose underlying these efforts has been to improve company performance (primarily, product quality and worker productivity), labor-management relations, and the quality of work life. The primary focus of the present inquiry is the extent to which cooperative union-management relationships that embrace joint decision making and elicit employee participation in workplace decisions lead to greater or lesser

* The author is Professor and Associate Dean, College of Urban, Labor, and Metropolitan Affairs, Wayne State University. This research was supported in part by a grant from the W.E. Upjohn Institute for Employment Research and the Michigan Departments of Commerce and Labor. The author thanks Jack Fiorito, Elizabeth Bishop, and participants in the Wayne State University Labor and Workplace Research Workshop for many constructive comments.

Copies of the survey instruments are available on request. The data used for the estimations presented in this study are also available for purposes of replication, but other data are not, both because participants were promised confidentiality and because further analyses are being conducted.

LIMDEP (developed by William H. Greene) was used for making ordered probit estimations. Copies of computer printouts are available on request to the author at the College of Urban, Labor, and Metropolitan Affairs, Wayne State University, Detroit, MI 48202.

Industrial and Labor Relations Review, Vol. 46, No. 1 (October 1992). © by Cornell University.
0019-7939/92/4601 $01.00

improvements in product quality than those obtained (a) in more traditional union-management relationships and (b) in nonunion settings with and without formalized programs for employee participation.

I focus on product quality improvements because quality improvement has become very important if not essential to competitiveness and is a performance objective that managers, union leaders, and employees can readily embrace. Unlike efforts to increase productivity and efficiency or reduce labor costs, the pursuit of improved quality does not carry with it the high potential for labor-management conflict that is associated with speed-ups in production, changes in long-standing work rules, and displacement due to improved productivity and changes in job tasks. (Banks and Metzgar 1989; Hoyer and Huszczo 1988.)

The few cross-sectional empirical studies of this subject reported elsewhere present mixed findings about the effects of participation programs on quality improvements. Katz and others (Katz, Kochan, and Gobeille 1983; Katz, Kochan, and Weber 1985; Katz, Kochan, and Keefe 1987), looking at the auto industry in the late 1970s and very early 1980s, report that product quality improvements associated with more intensive QWL programs were no greater than those associated with less intensive QWL programs. Based on her 1984 analysis of unionized companies in Wisconsin, Voos (1987) reports that nearly all kinds of participation programs have positive effects on quality. In my 1989 study, I found that the effects of joint union-management participation programs on quality vary and that positive effects are dependent on a number of factors that shape the intensity of participation efforts.

The above investigations only compare the effects of different kinds of participation programs in unionized firms that have engaged in at least some participative activities. There are no published empirical analyses that compare product quality changes in unionized facilities having participation programs with product quality changes in unionized firms without such programs. No studies, furthermore, have compared the effects of programs jointly administered by management and unions with the effects of programs unilaterally administered by management. Nor are there any published reports that empirically estimate the effects of participation programs on quality improvements in unionized as compared to nonunion companies. Kelley and Harrison (1992) have examined, however, the influence of joint labor-management committees (LMCs) on efficiency—specifically, on machining efficiency per unit of output. Their conclusion, at odds with their *a priori* expectations, is that firms having LMCs have, on average, lower efficiency than firms (both unionized and nonunion) without LMCs.[1]

In this paper I examine the effects of worker participation on product quality in different environments using data from two surveys of managers at manufacturing firms conducted in 1986 and 1987. I begin, however, by developing a theoretical model of the effects of participation programs on quality improvements across unionized and nonunion manufacturing plants.

Theory and Hypotheses

There are a number of competing theoretical propositions about the poten-

[1] Kelley and Harrison's measure of efficiency is a very narrow one, and their model specification has some obvious limitations. For instance, the authors examine only levels of, not changes in, machining efficiency across firms. The resulting potential for selection bias is substantial, since those firms having the greatest competitive need to improve performance are far more likely than other firms to establish LMCs, especially when the work force is unionized. It is very likely, therefore, that the negative correlation between the existence of LMCs and performance is largely attributable to selection bias. The authors, furthermore, fail to control for more adversarial or "relative power" choices that occur simultaneously or sequentially with the recent introduction of employee participation programs. This omission is surprising, since the authors report in a separate regression that LMCs have a positive and highly significant correlation with subcontracting. It is highly likely, therefore, that the estimated negative correlation between LMCs and performance includes the omitted variable effects of subcontracting (if not of other confrontational employer actions in unionized settings) on performance.

tial effects of employee participation on performance. There are also competing theoretical propositions about what unions bring to the employment context and, in turn, how they affect performance. In addition, there are some emerging but limited theoretical propositions about the linkage between union representation and employee participation. The implications that these diverse and competing propositions have with regard to the effectiveness of employee participation in improving product quality vary depending on the context—more cooperative versus more traditional union-management relationships, union settings versus nonunion settings. Further, some other key operational and labor relations choices affect both employee participation activities and efforts to improve quality. I therefore address the effects of these choices (namely, subcontracting out bargaining unit work, concession bargaining, capital investments, and reductions in force) as well.

Participation Effects

As I reported in an earlier study (1990b, Chap. 1), the effectiveness of employee participation programs in enhancing performance is a function of their net benefit or cost to both employees and management. The extent of the net benefit to employers and employees affects the commitment to employee participation and, in turn, the extent of improvements in performance. On the one hand, participation programs provide avenues for eliciting employee input in order to identify and resolve problems and minimize impediments to greater performance. By utilizing more fully the unique production experience, knowledge, and creativity of employees, organizations are expected to improve performance beyond what could be accomplished by more traditional autocratic management practices. In addition to improving performance, participation programs are expected to yield benefits to employees, giving them an incentive to participate and enhance performance. The literature identifies a number of *potential* benefits to employees, including increased intrinsic rewards from having a greater say in how work gets accomplished, heightened self-esteem and pride, improved working conditions, better employee-supervisor relationships, reduced grievances and quicker resolution of problems, greater employment security, and enhanced financial rewards from gainsharing and other incentive arrangements. (See Cooke 1990b, Chap. 1, for a review and synthesis of the literature identifying potential benefits and costs.)

Transforming organizations from more autocratic to more participative forms of management, however, is typically met with resistance from supervisors and managers, who often fear that participation programs will erode their status and authority and threaten their employment security. Such programs also have potential costs for employees, which consequently reduce employee commitment to participation and inhibit performance improvements. These potential costs include having to work harder (rather than more intelligently), displacement or loss of employment as a result of increased productivity and efficiency, and unwanted peer pressure (Cooke 1990b, Chap. 1).

Based on economic propositions concerning agency and transaction costs, Levin and Tyson (1990) similarly argue that employee participation can have either positive or negative effects on performance. Participation is expected to have positive effects on performance, on the one hand, if (a) employees have valuable information that managers do not have and (b) management provides financial incentives to employees to share that knowledge and utilize it effectively. Because teams or groups (not individuals) are financially rewarded for sharing and effectively utilizing employee knowledge, employees are also expected to monitor the work behavior of other team members and impose social sanctions on those who ignore or flout the norms governing participation and cooperation among employees.

Under transaction-theoretic notions, on the other hand, participation programs require greater communication among

production employees, supervisors, plant managers, union leaders, and various support group personnel. Transaction costs rise as more decision makers become involved in making and carrying out production decisions, and these added transaction costs reduce the net benefits associated with employee participation programs. Similarly, under agent-theoretic notions, participation programs are expected to increase the cost to supervisors and managers of monitoring employee participation, offsetting, at least in part, any gains from those programs.

Based on organizational sociological propositions about bureaucratic control, Kelley and Harrison (1992) also argue that employee participation can have either positive or negative effects on performance. On the one hand, formalized employee participation provides a mechanism that essentially reduces the consequences of over-specialization. It provides an avenue to tap more fully and formally the ideas of employees, which, in turn, lead to incremental improvements in performance. It also reduces reliance on informal accommodations with individuals seeking greater flexibility in exchange for informal problem solving that bends the bureaucratic rules—a kind of exchange that is viewed as threatening to the overriding principle of fairness that justifies bureaucratic rules, which are applicable to all employees. On the other hand, Kelley and Harrison conclude from their empirical investigation that the introduction of formalized employee participation can lead to its own set of bureaucratic rules and procedures that effectively inhibit the free flow of ideas and consequent improvements in performance.

In summary, whether one approaches the analysis of employee participation from a cost-benefit, agency-transaction cost, or bureaucratic control framework, there are theoretical reasons to believe that participation programs may or may not lead to improved performance. Under each framework, outcomes of participation depend on how well designed, structured, and administered the participation activities are.

Union Representation Effects

Unencumbered by the interests, goals, and countervailing power of unions, nonunion employers are free (within market and legal constraints, and also within any constraints imposed by union threat effects) to set the terms and conditions of employment that they believe will maximize performance and profitability. This is not to suggest, however, that nonunion employers completely ignore the interests and work norms of employees and are unconstrained in setting work rules governing compensation and other terms and conditions of employment. (See Foulkes 1980.) Uncertainty regarding the kinds and extent of constraints facing nonunion employers is, in fact, one important reason that many researchers have asked whether union representation has, on net, independent negative or positive effects on company or market performance.

A wealth of literature, grounded variously on notions of monopoly-like price-theoretic behavior, negative production-function effects, union malfeasance effects, and hostile labor-management climate effects, views unions as having largely negative effects. (Addison and Hirsch 1987; Allen 1986; Faith and Reid 1987; Boal 1990.) If unions do tend to place restrictions on employers, it would not be surprising to find that they impede the optimal design and administration of participation programs, and thus vitiate the improvements in product quality achievable through participation programs. For example, when unions are involved, teams or committee activities may focus less on improving performance than on furthering the immediate interests of union members by informally negotiating concessions from management that could not be attained through regular collective bargaining channels. In addition, union leaders may signal members to relax their efforts at participation or may temporarily suspend participation activities by holding programs "hostage" until other collective bargaining demands are met, internal union political disputes over cooperation are resolved, or labor-management conflicts are settled (Hammer and Stern 1986).

In contrast to the above arguments are arguments that unions have positive collective voice and shock effects (Freeman and Medoff 1984; Clark 1980). The "collective voice" argument is that unions communicate legitimate interests of members to management, a function that leads to better management practices. In nonunion establishments, this positive collective voice cannot be orchestrated as effectively. By negotiating better or more suitable terms and conditions of employment and more effective governance systems, union members become more productive and have less reason to quit than unrepresented employees. These benefits offset higher union compensation and related price-theoretic effects. The notion underlying the shock effects thesis is simply that unionization forces employers to be more professional and competitive than they would be absent the monopoly-like effects of union representation.

If unions do have positive collective voice effects via negotiations and contract administration, they may enhance the value of participation programs. Drawing on his experience at Xerox, Costanza (Vice President of the ACTWU) makes the following observations about the advantages of jointly administered participation programs in unionized firms vis-à-vis programs solely administered by management in nonunion firms. First, in a nonunion firm, the only information workers receive through the participation program is provided by managers, and it consists only of what managers believe workers need to know to make the program effective. In unionized firms, where employees are more protected in voicing opinions, employees and union leaders are better able to obtain additional information management may be hesitant to provide or fail to recognize as important. Second, once needed information is provided, union leaders and members often differ with management in their interpretations of that information, and they are in a better position to challenge management interpretations than are nonunion employees. The airing of different interpretations, in turn, leads to more thorough problem identification and treatment of alternative solutions. Third, union leaders generally have access to high levels of management when the ideas and proposals of employee work groups or teams are ignored or blocked by their immediate supervisors or middle management. In nonunion establishments, employee access to high levels of management is generally much more limited. Fourth, when management turnover is high, unionized firms provide a more stable environment for pursuing participation than do nonunion firms. Union leaders and members, that is, have a means for insisting that successful ground rules for participation are honored, as well as for socializing new managers regarding the accepted policies and philosophy underlying participation.

Eaton and Voos (1991) make some of the same basic arguments as Costanza, but they also argue that as advocates for the general welfare of their members, union leaders address other interests and concerns important to employees, interests and concerns that nonunion employers are less likely to address effectively. Among these concerns is protection against arbitrary or inequitable treatment, managerial reprisal, and job loss. In firms in which unions jointly implement and administer participation programs, unions, furthermore, are likely to shape programs so that the quality of work life is addressed along with issues of performance. Eaton and Voos argue that because the presence of a union improves protections for workers, employees in unionized firms are more willing than those in nonunion firms to become actively involved in and committed to participation program activities, which consequently enhances performance.

In settings where unions do not jointly administer programs, however, the positive effects described above may not be observed. First, some unions are denied involvement by employers, and others choose not to be involved (Verma and McKersie 1987; Eaton 1990). Although unions in such cases may monitor employee participation activities, they do not provide direct input into participation programs, and union members, following the lead of their reluctant leaders, may participate in the programs only grudgingly or not at all. The hypothesized

positive effects of direct union input, therefore, will not be tapped.

Second, in some cases unions believe that management's purpose behind participation programs is to undermine the union. For instance, it is sometimes alleged that employers attempt to co-opt union leaders (Hoyer and Huszczo 1988) and undermine traditional roles of unions and collective bargaining by by-passing agreements to obtain changes in scheduling, assignments, and job classifications or by usurping grievance procedures and union authority in resolving grievances (IAM Research Report 1982; UBC Bulletin 1983). If union leaders perceive a participation program in that light, probably they will aim to undermine if not destroy the program (Banks and Metzgar 1989; Eaton and Voos 1991).

Implicit in the Cooke (1990b) and Eaton-Voos (1991) theses is that unions seek to balance the company's need to enhance performance, on the one hand, with their own interest in improving the terms and conditions of employment, on the other. One can readily imagine that, given time and resource constraints, tradeoffs in the emphasis and focus of participation activities will be made. It follows that in seeking to improve quality, the objective for labor and management is to improve quality at a rate at least equal to that of their strongest competitors. Anything less jeopardizes the firm's ability to compete effectively; and anything more reduces the time and resources that can be allocated for other participation activities designed to improve selected terms and conditions of employment.

These competing theoretical considerations lead to two sets of competing but testable hypotheses about the effect of participation programs on improving quality in unionized and nonunion firms. First, it is hypothesized that to the extent that union representation provides an effective collective voice not available in nonunion firms, quality improvements achieved through participation programs undertaken in unionized firms will exceed those achieved in comparable nonunion firms. To the extent, however, that union representation limits management's ability to optimize the contribution of employee participation, quality improvement will be greater in nonunion firms than in unionized firms.

Second, a hypothesis from the collective voice thesis is that unionized firms in which participation programs are jointly administered achieve greater quality improvements from participation than unionized firms in which programs are administered solely by management. To the extent, however, that joint administration of participation programs leads to further restrictive union behavior, management-controlled programs are hypothesized to yield greater quality improvements than jointly administered programs. Based strictly on the shock effects thesis, however, it is hypothesized that quality improvements achieved in unionized firms through management-controlled participation efforts are equal to those achieved through jointly administered programs.

Other Operational and Labor Relations Choices

In addition to establishing participation programs in response to market conditions, employers also have made a variety of operational and labor relations decisions to become more competitive. Key among these are investing in capital, subcontracting out bargaining unit work, and negotiating concessions. These decisions have been made at or about the same time as decisions to create or revitalize avenues for participation. As I have discussed elsewhere (Cooke 1989; Cooke 1990b, Chap. 2), subcontracting out bargaining unit work and negotiating concessions are adversarial relative power options exercised by employers. Whether they are made prior to, after, or at the same time as decisions to increase participation, there is reason to believe that these operational and labor relations decisions (with the exception of the decision to invest in capital) can have negative effects on improving quality.

Because jointly administered participation programs require fairly high levels of trust and commitment between unions and

employers not required in more traditional relationships, any activity by either party that undermines trust and commitment also undermines the process of joint decision making. In the framework I developed in the studies cited above, the cost of cooperation and employee participation to union leaders will rise if they are perceived by members as having been co-opted by management, since that perception will heighten political conflict over leadership roles, reduce member commitment to the union, and increase the uncertainty of reelection (Cooke 1990b, Chap. 1). Because subcontracting and concession bargaining threaten the economic well-being of employees and because the union leadership is not able to block these decisions through negotiations, distrust of management is heightened and commitment to joint efforts is reduced by those actions, with a consequent reduction in the potential gains from joint participation efforts. Although employees and union leaders in traditional adversarial relationships can be expected to have negative reactions to subcontracting and concession bargaining, these management actions only reinforce the confrontational nature of collective bargaining in such environments, rather than undermine an atmosphere of trust. It is hypothesized, therefore, that subcontracting out work and concession bargaining have greater negative effects on achieving improvements in quality in unionized firms with joint participation programs than in unionized firms without joint programs. Similarly, because it is customary for nonunion management to have wide latitude in making operational decisions, employees in nonunion firms (even those with participation programs) are not expected to react as negatively to subcontracting as employees in unionized firms with joint participation programs.

Product quality is likely to be enhanced, on the other hand, by management decisions to invest in new technologies and automation. First, newer computer-aided technologies and innovations facilitate more exacting quality control. Second, capital investments, even if they result in the displacement of some employees, signal employees, union leaders, and plant managers that company executives are making a long-term commitment to the competitive strength of the firm. Because participation programs provide for greater employee input into the application and utilization of new capital equipment, it is hypothesized that quality improvements attributable to capital investments are greater in firms with participation programs (whether or not the firm is unionized and whether programs are jointly or unilaterally controlled) than in firms without participation programs.

Control Variables

Two potentially important determinants of improvements in quality are organizational size and changes in employment levels. First, any efforts by management to improve performance, either through more traditional means or through participation programs, are likely to be constrained by the size of the firm. The larger the organization, the more complicated and inefficient become communication and control linkages. It is therefore more difficult to improve the production process in large organizations than in smaller organizations, all else equal. Hence, it is hypothesized that the larger the organization, the less able the firm will be to improve product quality.

Second, substantial reductions in employment due to permanent layoff are demoralizing to those who remain with the firm but who feel that their jobs are not secure—a group that may include not only nonsupervisory employees but some supervisors and managers as well. This demoralization prevents them from being fully attentive to improving quality. Substantial reductions in force are also likely to disrupt quality control as employees are reassigned or transferred. One might argue, however, that because the inability of the parties to improve performance (including product quality) may lead to further reductions in employment, the direction of causality between changes in product quality and changes in employment is open to question. Reduction in employment enters the models, therefore, only as an important control variable.

Data Collection and Model Specification

Data were collected from two samples of manufacturing firms. For the first sample, managers from 350 large unionized manufacturing plants located nationwide were surveyed in 1986. Responses from 194 plant managers were received.[2] For the second sample, managers from 300 Michigan manufacturing firms employing fewer than 1,000 employees in 1987 were randomly selected and surveyed in 1988. Responses were received from managers in 70 unionized firms and 61 nonunion firms.[3]

Given differences in the samples and data collected, two models are specified. In the first model, estimates are made using data from the unionized sector, and hence hypotheses about differences between union and nonunion environments are not tested. In the second model, estimates of union and nonunion differences are made. Because concession bargaining can occur only in unionized firms, however, the hypothesis about union concession effects is not tested in Model 2.

Dependent Variables

In both samples, respondents were asked to assess changes in product quality. In the nationwide sample, respondents were asked in 1986 to indicate the extent to which product quality had changed between the 1976–80 period and the 1981–85 period. The response choices were "much higher," "modestly higher," "about the same," "modestly lower," and "much lower." Because less than 3% of the respondents reported that quality had declined, the dependent variable for Model 1 is rescaled as defined in Table 1. In the Michigan sample, respondents were asked in 1988 to indicate the extent to which product quality had changed between 1981 and 1987. The response choices were "much improvement," "modest improvement," "about the same," "modestly worse," and "much worse." Because less than 3% of the respondents reported that quality had worsened, the dependent variable for Model 2 is rescaled as defined in Table 2.

Managerial perceptions, not objective measures, are thus employed as indicators of changes in product quality. This approach has the advantage that it can be consistently applied across firms producing a wide range of products. The alternative of constructing objective measures of quality change that are comparable across a range of products would be very difficult, if not impossible. It is also true, however, that the respondents' subjective evaluations may not correspond well with actual changes in product quality. To the extent that they do not, the estimations will be biased. It is assumed, of

---

[2] A randomly selected sample of 430 unionized manufacturing companies listed in *A Directory to Collective Bargaining Agreements: Private Sector, 1982* was matched with Dun's Marketing Services, DMI historical files. The *Directory*, published by Microfilming Corporation of America in 1983, is based on collective bargaining agreements (affecting 900 or more employees) filed with the U.S. Bureau of Labor Statistics. Approximately 1,800 agreements in manufacturing are listed.

Of these companies, 350 establishments were located and contacted; usable survey responses were obtained from 194 facilities. Little is known about the 156 nonrespondents to the survey. All were fairly large unionized plants in manufacturing in 1982. Overrepresented in the present sample, however, are companies with joint programs; only 30% of the nonrespondents reported that they have some kind of formalized joint program.

[3] Initially, 300 small manufacturing firms with 75 to 1,000 employees were randomly selected from a population of 1,119 manufacturers located in five highly industrialized counties in Michigan (drawn from *Picks Michigan Manufacturers Directory*, 1988). Advance telephone calls were made to solicit participation in the survey and to identify key respondents. Twenty-three firms refused to participate, 17 were not in manufacturing at selected sites, 7 had closed, and 3 were duplicate observations. These 50 were replaced by another 50 randomly selected firms.

Based on company size categories, there appears to be no obvious bias in the sample of respondents, either in comparison to nonrespondents or in comparison to the given population. With respect to union status, the final sample has a slight over-representation of unionized firms (53% of respondents in comparison to 47% of nonrespondents). No information is available, however, on the union status of the sampling population. With respect to industry make-up, approximately one-half of the respondents are from the fabricated metal and machinery industries, which is close to the proportion of companies in the sampling population that are in these two industrial classifications (45%). Aside from size, union status, and industry, comparisons cannot be readily made.

Table 1. Variable Definitions, Model 1.

Variable	*Definition*
ΔQUALITY	Perceived extent of change in product quality between the period 1976–1980 and 1981–1985. Equals 0 if "about the same" or "modestly worse," 1 if "modestly higher," and 2 if "much higher."
UNION (PART JNT)	Equals 1 if plant has a jointly administered team-based or committee-based participation program, 0 otherwise.
UNION (PART NJNT)	Equals 1 if plant has a team-based participation program administered solely by management, 0 otherwise.
SUBCONT (JNT)	Equals 1 if any bargaining unit jobs have been contracted out since 1975 and UNION (PART JNT) equals 1, 0 otherwise.
SUBCONT (OTHER)	Equals 1 if any bargaining unit jobs have been subcontracted out since 1975 and UNION (PART JNT) equals 0, 0 otherwise.
CONCESS (JNT)	Equals 1 if any rounds of negotiation since 1975 are characterized as union concession bargaining and UNION (PART JNT) equals 1, 0 otherwise.
CONCESS (OTHER)	Equals 1 if any rounds of negotiation since 1975 are characterized as union concession bargaining and UNION (PART JNT) equals 0, 0 otherwise.
INVEST (PART)	Equals 1 if any capital expenditures on new technologies or automation have been made since 1975 and plant has a participation program, 0 otherwise.
INVEST (NO PART)	Equals 1 if any capital expenditures on new technologies or automation have been made since 1975 and plant does not have a participation program, 0 otherwise.
SIZE	Average employment level during 1983, 1985.[a]
DOWNSIZE	Equals 1 if average employment level in 1983, 1985 is greater than 10 percent lower than 1979, 1980, 1981 average, 0 otherwise.

[a] Plant size information was obtained through Dun's Marketing Services, DMI data base. These data were collected for years 1977 through 1983 and 1985. The figures appear to be rough approximations of total plant employment, and there are missing data. I base the variables SIZE and DOWNSIZE on data for only those years with no missing figures. Specifically, when 1985 data are missing, 1983 figures are utilized, and when 1983 data are missing, 1985 figures are utilized. The 1979–81 average annual employment for these years is used when all three years are available, but when one or two of these years are missing, the average annual employment for the year(s) available is used.

course, that informed managers generally can provide reasonably accurate assessments of quality improvements, if any, and that when they cannot provide such assessments, they will decline to respond. In fact, about 4% of the respondents to the Michigan survey and 10% of the respondents to the nationwide survey chose not to answer the relevant questions about changes in quality. Finally, it is worth noting that respondents were not asked to attribute any perceived changes in product quality to particular activities or factors (such as participation programs). Given the multiplicity of factors that could affect product quality, little reliance could be placed on the answers to such a question.

As described, the dependent variables are constructed as ordinal scales. Under the assumption that the true unobserved continuous scale is standardized normal, the equations are estimated using ordered probit maximum likelihood, an estimator that yields consistent and asymptotically efficient estimates under fairly general conditions (Amemiya 1981). The right-hand-side variables are treated as exogenous variables in reduced-form single equations.

Participation Programs

In the nationwide survey, respondents were first asked to report if their firms had in place any of a number of programs listed (QWL, quality circles, work teams, productivity committees, industrial relations committees for general problem-solving, and gainsharing, profit sharing, or stock ownership programs tied to employee involvement activities). Respon-

Table 2. Variable Definitions, Model 2.

Variable	*Definition*
ΔQUALITY	Perceived extent of change in product quality between 1981 and 1987. Equals 0 if "about the same" or "modestly worse," 1 if "modest improvement," and 2 if "much improvement."
NONUNION (PART)	Equals 1 if firm is nonunion and has a work group participation program, 0 otherwise.
UNION (PART JNT)	Equals 1 if firm is unionized and has a jointly administered work group participation progam, 0 otherwise.
UNION (PART NJNT)	Equals 1 if firm is unionized and has a work group participation program administered by management, 0 otherwise.
UNION TRAD	Equals 1 if firm is unionized and has no participation program, 0 otherwise.
SUBCONT (JNT)	Equals 1 if firm has subcontracted out any hourly jobs since 1981 and UNION (PART JNT) equals 1, 0 otherwise.
SUBCONT (OTHER)	Equals 1 if firm has subcontracted out any hourly jobs since 1981 and UNION (PART JNT) equals 0, 0 otherwise.
INVEST (PART)	Equals 1 if firm made "substantial" expenditures on new technologies and/or automation since 1981 and firm had participation program, 0 otherwise.
INVEST (NO PART)	Equals 1 if firm made "substantial" expenditures on new technologies and/or automation since 1981 and firm did not have participation program, 0 otherwise.
SIZE	Average employment level in 1987.
DOWNSIZE	Equals 1 if employment level in 1987 was greater than 10 percent lower than in 1981, 0 otherwise.

dents were also asked which of these programs, if any, were jointly administered with unions. In the final sample, 57% reported having jointly administered programs, 6% reported having programs administered solely by management, and 37% reported having no participation programs. Among those having joint programs, 70% identified teams, circles, or other employee involvement programs as their most important participation efforts; all others identified union-management productivity or general problem-solving committees as most important.

In the Michigan survey, respondents were asked if they "have in place any formalized programs that engage hourly employees in work teams, whose purpose is to meet regularly to identify and resolve work place problems, inefficiencies, or related issues (e.g., quality circles, QWL, or employee involvement groups)." In the final sample, 63% of nonunion firms and 32% of unionized firms were reported to have such formalized programs. Respondents were also asked: "[If] unionized, do you have any kind of joint labor-management committee whose purpose is to address problems with the labor-management relationship or climate, or company performance-related issues?" Twenty-five percent answered yes to this question. In the final sample, 16% of the respondents are in unionized firms having joint participation programs (teams or committees or both), 10% are in unionized firms with programs solely administered by management, 31% are in unionized firms without participation programs, 24% are in nonunion firms with participation programs, and 18% are in nonunion firms without participation programs.

The models are specified to account for the effects of bundles of activity as hypothesized and described. The effects of joint decision making and employee participation in these samples, in particular, are empirically inseparable. Nor are the attributes of joint decision making and employee participation randomly distributed, since joint decision making can occur only in unionized settings. Union-management relationships characterized by joint decision making and employee participation, furthermore, are assumed to be substantially different from more

traditional union-management relationships.

Models 1 and 2 are specified as follows:

(1)

$$\begin{aligned}\Delta\text{QUALITY} = {} & a_1 + b_1\text{UNION (PART JNT)} \\ & + b_2\ \text{UNION (PART NJNT)} \\ & + b_3\ \text{SUBCONT (JNT)} \\ & + b_4\ \text{SUBCONT (OTHER)} \\ & + b_5\ \text{CONCESS (JNT)} \\ & + b_6\ \text{CONCESS (OTHER)} \\ & + b_7\ \text{INVEST PART)} \\ & + b_8\ \text{INVEST (NO PART)} \\ & + b_9\ \text{SIZE} + b_{10}\ \text{DOWNSIZE}\end{aligned}$$

(2)

$$\begin{aligned}\Delta\text{QUALITY} = {} & a_1 + b_1\ \text{NONUNION (PART)} \\ & + b_2\ \text{UNION (PART JNT)} \\ & + b_3\ \text{UNION (PART NJNT)} \\ & + b_4\ \text{UNION TRAD} \\ & + b_5\ \text{SUBCONT (JNT)} \\ & + b_6\ \text{SUBCONT (OTHER)} \\ & + b_7\ \text{INVEST (PART)} \\ & + b_8\ \text{INVEST (NO PART)} \\ & + b_9\ \text{SIZE} + b_{10}\ \text{DOWNSIZE}\end{aligned}$$

Due to missing data on one or more variables, the final samples include responses from 155 plants in the nationwide sample and 103 plants in the Michigan sample.[4] Variable definitions are provided in Tables 1 and 2.

Results

The ordered probit estimations of each equation are reported in Tables 3 and 4. The estimated magnitudes of the significant coefficients are reported in Table 5. Under the assumption that the true unobserved underlying scale of ΔQUALITY is standardized normal, and evaluating the effects of a given variable while holding all other variables at their means, I estimate the average changes in the probabilities of being in higher or lower ΔQUALITY response categories. (See the footnote to Table 5 for the formula.)

Table 3. Model 1: Ordered Probit Estimates of Perceived Changes in Quality.

Variable	*Coefficient and Standard Error*	*Proportion or Mean*
UNION (PART JNT)	1.054** (.459)	.57
UNION (PART NJNT)	.261 (.541)	.06
SUBCONT (JNT)	−.621*** (.258)	.23
SUBCONT (OTHER)	.382 (.286)	.21
CONCESS (JNT)	−.588** (.344)	.41
CONCESS (OTHER)	.048 (.297)	.23
INVEST (PART)	.386* (.256)	.43
INVEST (NO PART)	.575** (.325)	.21
SIZE	−.00005** (.00003)	2248
DOWNSIZE	−.126 (.188)	.42
INTERCEPT	.099 (.336)	
Mu(1)	0	
Mu(2)	1.341*** (.136)	
Log-Likelihood	−153.360	
χ^2 (10 d.f.)	21.798***	
N	155	

The dependent variable is ΔQUALITY, with the following ordered categories and proportion of outcomes represented by each category: 0 = about the same or modestly lower (31%); 1 = modestly higher (46%); 2 = much higher (23%).

* Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level.

Estimates from both samples provide support for the central proposition that workplaces with employee participation achieve greater improvements in quality than more traditional workplaces. With respect to unionized firms, the results from both equations indicate that estab-

[4] In the nationwide sample, change-in-quality responses are missing in 15 cases, employment level data are missing in another 23 cases, and the proportion of employees represented is missing in 1 case. In the Michigan sample, 5 firms were excluded because they started operations after 1981 and 2 firms were excluded because of inconsistent responses. Change-in-quality responses are missing in 7 cases, employment level data are missing in 9 cases, and responses to various other survey questions are missing in another 6 cases.

Table 4. Model 2: Ordered Probit Estimates of Perceived Changes in Quality.

Variable	*Coefficient and Standard Error*	*Proportion or Mean*
NONUNION (PART)	1.013** (.522)	.22
UNION (PART JNT)	1.130** (.454)	.17
UNION (PART NJNT)	.416 (.424)	.11
UNION TRAD	.362 (.345)	.32
SUBCONT (JNT)	.288 (.676)	.07
SUBCONT (OTHER)	.419 (.318)	.16
INVEST (PART)	.103 (.356)	.31
INVEST (NO PART)	.228 (.323)	.24
SIZE	−.002** (.001)	168
DOWNSIZE	−.570** (.278)	.26
INTERCEPT	.602 (.420)	
Mu(1)	0	
Mu(2)	1.096*** (.184)	
Log-Likelihood	−99.082	
χ^2 (10 d.f.)	25.298***	
N	103	

The dependent variable is ΔQUALITY, with the following ordered categories and proportion of outcomes represented by each category: 0 = about the same or modestly worse (22%); 1 = modest improvement (35%); 2 = much improvement (42%).
** Statistically significant at the .05 level; *** at the .01 level.

lishments with jointly administered programs achieve quality improvements substantially greater than those achieved through either management-controlled programs or traditional collective bargaining relationships that exclude direct participation activities. In both equations, UNION (PART JNT) reaches significance at the .05 level (using two-tailed tests) and UNION (PART NJNT) is insignificant. In the nationwide sample, when UNION (PART JNT) equals 1, the likelihood of achieving much higher quality is .395 and the likelihood of achieving no improvement is .141. (See Table 5.) When participation programs are controlled by management (that is, when UNION [PART NJNT] equals 1), these likelihoods are reversed. In the Michigan sample, when UNION (PART JNT) equals 1, the likelihoods of achieving much improvement, on one hand, and no improvement, on the other, are .628 and .078, respectively. When participation programs are controlled by management (that is, when UNION [PART NJNT] equals 1), the likelihood of achieving much improvement is reduced nearly in half to .348 and the likelihood of achieving no improvement increases threefold to .241.

Estimation of Model 2 also yields statistically significant evidence that nonunion firms utilizing participation programs achieve substantially greater quality improvements than their nonunion counterparts not utilizing participation programs. When NONUNION (PART) equals 1, the likelihood of achieving much improvement in quality is .595 and the likelihood of achieving no improvement is .097. These results indicate that the likelihood of achieving much improvement is three times greater and the likelihood of not achieving any improvement is four times lower when nonunion firms have employee participation than when they do not.

A comparison of the results for unionized firms with those for nonunion firms indicates that unionized firms with jointly administered employee participation programs achieve quality improvements at least equal to those achieved by nonunion firms with participation programs. The estimates also indicate that unionized firms that either have no participation programs or have programs unilaterally administered by employers obtain no greater or lesser quality improvements than nonunion firms without participation programs.

Partial support for other hypotheses about the effects of subcontracting, concession bargaining, and capital investments is also obtained. Subcontracting out bargaining unit work and concession bargaining are negatively associated with

Table 5. Estimates of the Magnitudes of Effects of Salient Variables on Likelihoods of ΔQUALITY.

	Prob (Y) =		
Variable	*0*	*1*	*2*
Nationwide Sample			
UNION (PART JNT) = 1	.141	.464	.395
UNION (PART NJNT) = 1	.391	.465	.144
Union traditional (omitted) = 1	.490	.241	.269
SUBCON (JNT) = 1	.224	.673	.103
No subcon (omitted) = 1	.243	.497	.260
CONCESS (JNT) = 1	.391	.467	.142
No concess (omitted) = 1	.195	.490	.315
INVEST (PART) = 1	.231	.498	.271
INVEST (NO PART) = 1	.178	.485	.337
No invest (omitted) = 1	.364	.476	.160
Michigan Sample			
UNION (PART JNT) = 1	.078	.294	.628
UNION (PART NJNT) = 1	.241	.411	.348
UNION TRAD = 1	.256	.416	.348
NONUNION (PART) = 1	.097	.308	.595
Nonunion trad (omitted) = 1	.386	.403	.211

Note: Estimates are made by holding all other variables at their means. Formally:

$$\text{Prob}(Y = 0) = \text{Prob}(\beta' X_i + \epsilon_i < 0) = \Phi(-\beta' X_i)$$
$$\text{Prob}(Y = 1) = \text{Prob}(\beta' X_i + \epsilon_i < \text{Mu}_2) = \Phi(\text{Mu}_2 - \beta' X_i) - \Phi(-\beta' X_i)$$
$$\text{Prob}(Y = 2) = \text{Prob}(\beta' X_i + \epsilon_i > \text{Mu}_2) = 1 - \Phi(\text{Mu}_2 - \beta' X_i)$$

quality improvements, but only in unionized firms with jointly administered participation programs. The estimated coefficients of SUBCONT (JNT) and CONCESS (JNT) in Model 1 are statistically significant at the .01 and .05 levels, respectively. These results are consistent with the hypotheses that subcontracting and concession bargaining, on average, generate distrust and diminish union leader and member commitment to participation activities, with consequent negative effects on quality improvement.

It is worth underscoring that the magnitude of these effects is not trivial. Subcontracting, for instance, reduces the likelihood of achieving "much higher" product quality from .260 to .103. It appears, however, that subcontracting does not increase the likelihood that no gains are achieved, but instead increases the likelihood of achieving modest improvements at the expense of achieving much higher improvements. Concessionary negotiations appear to have an even greater negative effect. The likelihood of achieving much improvement is reduced from .315 to .142 and the likelihood of achieving no improvements rises from .195 to .391 when unions have made concessions in settings with jointly administered programs.

The results derived from Model 1 (but not from Model 2) also indicate that capital investments are positively and significantly associated with quality improvements. One unanticipated finding is that the gains attributable to capital investments are slightly greater in firms without participation programs than in firms with participation programs. As reported in Table 5, however, any differences in quality improvement associated with having or not having participation programs are negligible. Capital investment in and of itself, nevertheless, appears to enhance the likelihood of achieving quality improvements.

With respect to control variables, the estimates from both equations indicate that the larger the firm or plant, the smaller the quality improvements obtained. In both equations, the variable SIZE, as hypothesized, yields negative and

statistically significant coefficients (at the .05 level). In both equations the control variable DOWNSIZE also yields negative coefficients, but it is statistically significant (at the .05 level) only in Model 2.

Discussion and Conclusion

The results of this study of two different samples of manufacturing firms indicate that, on average, jointly administered participation programs are positively associated with product quality improvements. The evidence also indicates (in the Michigan sample) that the quality improvements achieved through jointly administered programs in unionized firms are equivalent to those achieved through participation programs in nonunion firms. The estimates made for both samples, furthermore, indicate that among unionized firms, quality improvements achieved through programs unilaterally administered by employers are not significantly different from improvements achieved through traditional collective bargaining relationships (that is, in the absence of participation programs).

The collective voice thesis finds strong support in these estimates, but with a catch. Unionized companies appear to achieve their goal of product quality improvement when union leaders are involved in the administration of participation programs, but not when union leaders are uninvolved. Taken together, these two findings suggest that positive collective voice effects are realized when unions are treated as partners, but negative restrictive union effects become dominant in the absence of such partnership.

These results also support the notion raised elsewhere (Boal 1990) that the labor-management climate is a key determinant of whether positive collective voice effects or negative restrictive union effects are dominant. Where the labor-management climate apparently precludes joint decision making, management seems unable, on average, to tap the full potential of employee input. The key role of the labor-management climate in determining the success of participation activities is further supported by the findings regarding subcontracting out bargaining unit work and concession bargaining. Both variables appear to have substantial negative effects on achieving product quality improvements, but only where participation programs are jointly administered. I have hypothesized that jointly administered participation programs, unlike traditional collective bargaining relationships, are founded on trust, and that adversarial actions by employers tend to undermine that trust and reduce the commitment to participation.

The notion that unions have shock effects on managers finds less support in the present results. If shock effects were truly at work, would we not expect the achievement of some gains associated with employer-administered programs? One could reasonably argue, however, that employers deciding to jointly administer programs perceive that much is at stake in demonstrating that joint activities can be successful. Hence, they are effectively "shocked" into making greater commitments to participation activities than they otherwise would, which, in turn, leads to more intensive and effective programs.

To date, the literature is only beginning to provide empirical evidence about the effectiveness of various participation strategies. This study is the first cross-sectional inquiry to estimate how the effects of participation programs on quality improvement differ between union and nonunion firms and between jointly and unilaterally administered programs in unionized firms. The evidence presented is limited, however, and the inferences that can be drawn, therefore, remain tentative.

Finally, missing from the literature and the present analysis is a cost-benefit assessment of participation programs. An important extension of the present kind of comparative analysis would be an assessment of the investment costs of participation activities (costs associated, for example, with training, reorientation, and meetings) in unionized versus

nonunion environments and in jointly administered versus unilaterally administered programs. The net benefits of participation programs may or may not closely match the gross benefits I have found.

REFERENCES

Addison, John T., and Barry T. Hirsch. 1989. "Union Effects on Productivity, Profits, and Growth: Has the Long Run Arrived?" *Journal of Labor Economics*, Vol. 7, No. 1 (January), pp. 72–105.

Allen, Steven G. 1986. "Unionization and Productivity in Office Building and School Construction." *Industrial and Labor Relations Review*, Vol. 39, No. 2 (January), pp. 187–201.

Amemiya, Takeshi. 1981. "Qualitative Response Models: A Survey." *Journal of Economic Literature,* Vol. 19 (December), pp. 1483–1536.

Banks, Andy, and Jack Metzgar. 1989. "Participating in Management: Union Organizing on a New Terrain." *Labor Research Review*, Vol. 8, No. 2 (Fall), pp. 5–55.

Boal, William M. 1990. "Unionism and Productivity in West Virginia Coal Mining." *Industrial and Labor Relations Review*, Vol. 43, No. 4 (April), pp. 390–405.

Clark, Kim B. 1980. "The Impact of Unionization on Productivity: A Case Study." *Industrial and Labor Relations Review*, Vol. 33, No. 4 (July), pp. 451–69.

Cooke, William N. 1989. "Improving Productivity and Quality Through Collaboration." *Industrial Relations*, Vol. 28, No. 2 (Spring), pp. 299–319.

———. 1990a. "Factors Influencing the Effect of Joint Union-Management Programs on Employee-Supervisor Relations." *Industrial and Labor Relations Review*, Vol. 43, No. 5 (July), pp. 587–603.

———. 1990b. *Labor-Management Cooperation: New Partnerships or Going in Circles?* Kalamazoo, Mich.: W.E. Upjohn Institute for Employment Research.

Cooke, William N., and David G. Meyer. 1990. "Structural and Market Predictors of Corporate Labor Relations Strategies." *Industrial and Labor Relations Review*, Vol. 43, No. 2 (January), pp. 280–93.

Costanza, Anthony J. 1989. "Participatory Action Research: A View from the ACTWU." *American Behavioral Scientist*, Vol. 32, No. 5 (May–June), pp. 566–73.

Delaney, John T., David Lewin, and Casey Ichniowski. 1989. *Human Resource Policies and Practices in American Firms.* Washington, D.C.: U.S. Department of Labor, BLMR 137.

Eaton, Adrienne E. 1990. "The Extent and Determinants of Local Union Control of Participation Programs." *Industrial and Labor Relations Review*, Vol. 43, No. 5 (July), pp. 604–20.

Eaton, Adrienne E., and Paula B. Voos. 1992. "Unions and Contemporary Innovations in Work Organization, Compensation, and Employee Participation." In Lawrence Mishel and Paula Voos, eds., *Unions and Economic Competitiveness.* Washington, D.C.: Economic Policy Institute, pp. 173–215.

Faith, Roger L., and Joseph D. Reid. 1987. "An Agency Theory of Unionism." *Journal of Economic Behavior and Organization.* Vol. 8, pp. 39–60.

Foulkes, Fred K. 1980. *Personnel Policies in Large Nonunion Companies.* Englewood Cliffs, N.J.: Prentice-Hall.

Freeman, Richard B., and James L. Medoff. 1984. *What Do Unions Do?* New York: Basic Books.

General Accounting Office. 1987. Survey of Corporate Employee Involvement Efforts. Washington, D.C.: U.S. GAO.

Hammer, Tove H., and Robert N. Stern. 1986. "A Yo-Yo Model of Cooperation: Union Participation in Management at the Rath Packing Company." *Industrial and Labor Relations Review*, Vol. 39, No. 3 (April), pp. 337–49.

Hoyer, Denise T., and Gregory E. Huszczo. 1988. *Forging Partnership Through Employee Involvement.* Washington, D.C.: U.S. Department of Labor, BLMR 130.

IAM Research Report. 1982. "Quality of Work Life Programs." In *Labor-Management Cooperation: Perspectives from the Labor Movement.* Washington, D.C.: U.S. Department of Labor, 1984, pp. 16–21.

Katz, Harry C., Thomas A. Kochan, and Kenneth R. Gobeille. 1983. "Industrial Relations Performance, Economic Performance, and QWL Programs: An Interplant Analysis." *Industrial and Labor Relations Review*, Vo. 37, No. 1 (October), pp. 3–17.

Katz, Harry C., Thomas A. Kochan, and Mark Weber. 1985. "Assessing the Effects of Industrial Relations and Quality of Working Life Efforts on Organizational Effectiveness." *Academy of Management Journal*, Vol. 28 (September), pp. 509–26.

Katz, Harry C., Thomas A. Kochan, and Jeffrey H. Keefe. 1987. "Industrial Relations and Productivity in the U.S. Automobile Industry." *Brookings Papers on Economic Activity,* Vol. 3, pp. 685–715.

Kelley, Maryellen R., and Bennett Harrison. 1992. "Unions, Technology, and Labor-Management Cooperation." In Lawrence Mishel and Paula Voos, eds., *Unions and Economic Competitiveness.* Washington D.C.: Economic Policy Institute, pp. 247–85.

Levine, David I., and Laura D'Andrea Tyson. 1990. "Participation, Productivity, and the Firm's Environment." in Alan S. Blinder, ed., *Paying for Productivity.* Washington, D.C.: The Brookings Institution, pp. 183–243.

UBC Bulletin. 1983. "Quality Circles: How Should Unions Respond?" In *Labor-Management Cooperation: Perspectives from the Labor Movement.* Washington, D.C.: U.S. Department of Labor, 1984, pp. 39–43.

Verma, Anil, and Robert B. McKersie. 1987. "Employee Involvement: The Implications of Noninvolvement by Unions." *Industrial and Labor Relations Review*, Vol. 40, No. 4 (July), pp. 556–68.

Voos, Paula B. 1987. "Managerial Perceptions of the Economic Impact of Labor Relations Programs." *Industrial and Labor Relations Review*, Vol. 40, No. 2 (January), pp. 195–208.