Assessing The Effects Of Industrial Relations
And Quality Of Working Life
Efforts On Organizational Effectiveness

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WP# 1381-82

December, 1982
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ABSTRACT

This study assesses the relationships among industrial relations system characteristics, quality of working life improvement efforts, and selected measures of organizational effectiveness in twenty-five manufacturing plants between 1970 and 1980. Theoretical propositions are developed by integrating research on organizational behavior, industrial relations, and micro-economics. Thereby, the importance of linking concepts and analytical techniques from these fields is illustrated. The paper also emphasizes the need for professionals within organizations to develop better data systems in order to track the effects of experiments in organizational change on industrial relations performance and organizational effectiveness. The empirical results show strong connections between measures of industrial relations system performance and organizational effectiveness and more limited support for the hypothesis that quality of working life efforts improve organizational effectiveness.
INTRODUCTION

The slowdown in productivity growth and sluggish macro economic performance in recent years has drawn increasing attention to the U.S. system of industrial relations and various strategies for improving its performance. This is leading to a new era of experimentation at the organizational level with various worker participation programs, new local collective bargaining agreements, and changes in other employment practices that are designed to both improve industrial relations and organizational effectiveness. These pressures are also producing a new emphasis within management on applying strategic planning techniques to the industrial relations function as firms and unions begin to recognize the interdependence among broad business policy decisions and industrial relations performance at the workplace level. Consequently, industrial relations professionals within both management and unions are being called upon to critically examine their prevailing practices and to assess alternative strategies that satisfy organizational and worker goals.

Unfortunately, the industrial relations profession has been slow in developing the type of analytical capacity required to support these experimentation, planning, and evaluation processes. Instead, there historically has been an aversion among many industrial relations managers and labor representatives to the idea of quantitative assessment of industrial relations practices and performance. Few firms, for example, systematically collect and analyze industrial relations activity or performance data. Even fewer attempt to relate variations in industrial relations outcomes
over time or across locations to indicators of organizational effectiveness or worker well being. Indeed, aside from the analysis of the effects of unions on wages and other job and organizational outcomes (Freeman and Medoff, 1981; Kochan and Helfman, 1981), we have little theoretical or empirical work that attempts to relate industrial relations outcomes to management and worker goals. Thus, industrial relations professionals are currently in a poor position to forecast or explain how various change strategies might influence organizational effectiveness and, perhaps more importantly, are poorly equipped to evaluate the effects of these change efforts.

These developments in organizational and industrial relations practices are emerging after a decade in which a wide range of researchers have been arguing for a closer link between industrial relations and organizational behavior theory, research and practice (Fox, 1971; 1974; Goodman, 1979; Brett, 1980; Kochan, 1980; Bomers and Peterson, 1982; IDE, 1981; Stephenson and Brotherton, 1979; Thomson and Warner, 1981). Two central themes are embedded in much of this literature. The first argues that industrial relations issues offer an ideal laboratory for testing organizational theories of workplace behavior and performance. The second theme counters with an important caveat, namely, that any organizational theories that ignore industrial relations institutions and practices are likely to have poor explanatory or predictive power and even less organizational relevance. Recently, micro economists have joined in the analysis of the intersection of industrial relations and organizational behavior as they search for ways to understand the interactions among market forces, institutional structures, and the behavior of individuals and firms (Leibenstein, 1966; Hirshman, 1970;

This paper attempts to illustrate and apply the themes noted above by exploring an issue that lies right at the heart of the intersection of organizational behavior, industrial relations, and micro economics. We will examine the effects of industrial relations system outcomes on selected measures of organizational performance as well as the effects of intervention strategies designed to improve performance by, in part, improving the performance of the workplace industrial relations system.

This is also the second in a series of papers designed to demonstrate the value of more systematic analysis of industrial relations data at the plant level. The initial paper was an exploratory effort that analyzed the relationships between plant level industrial relations performance, economic performance, and quality of working life (QWL) efforts (Katz, Kochan, and Gobeille, in press). This paper builds on the previous work by drawing on a broader set of data from a different set of plants. An improved set of measures of the QWL efforts active in these plants allows us to more effectively evaluate the effects of these on-going efforts than was possible in the earlier study. Thus, in addition to replicating the initial results of the previous paper, we can demonstrate more clearly both the value and complexities involved in assessing the effects of QWL interventions in the industrial relations system. Furthermore, because the initial paper was exploratory in nature, we emphasized the empirical results, and only after the analysis was completed, did we suggest a set of theoretical explanations for why and how QWL efforts might affect industrial relations and economic
performance. This paper allows us to more fully develop and test these propositions.

The Theoretical Framework

The central questions to be addressed by a theoretical framework that assesses the effects of industrial relations on the goals of the firm and workers are: (1) what are the critical dimensions of plant level industrial relations performance, (2) how do these influence worker and organizational goals, and (3) how do improvement strategies influence these industrial relations, organizational, and individual outcomes.

The general model guiding our analysis of these issues is outlined in Figure 1. The industrial relations system and its performance at the plant level are seen as being influenced by a variety of external environment, demographic, organization, and historical factors. While this stage of the model is important in its own right, it is not the focus of this paper. For the purposes of this paper we are less interested in the historical and environmental causes of variation in the properties of the industrial relations system than in identifying the effects of variations in these properties on organizational effectiveness and worker goals. The performance of the industrial relations system is expected to influence organizational performance primarily through its effects on labor efficiency, productivity, and product quality. QWL efforts and related interventions are seen as strategies for changing the work organization and relationships among workers, supervisors, managers, and union leaders so as to produce improvements in the industrial relations system and its outcomes (Goodman, 1979).
It is recognized, however, that not all of the goals of the firm and workers are common or compatible. Rather the employment relationship is mixed motive in nature -- some goals are shared, and through improved problem solving, integrative (joint gain) solutions can be identified while other goals are inherently distributive and require bargaining or tradeoff decisions (Walton and McKersie, 1965). QWL efforts represent a search for joint gains within this mixed motive relationship. Thus, as we develop the framework in more detail below, we need to recognize that plant level QWL efforts are only part of the industrial relations system and to survive over time must coexist with distributive bargaining within the larger mixed motive employment relationship.

The Industrial Relations System and its Performance

While the popular accounts of the industrial relations system found in American plants admonish it for being too "adversarial," this term is seldom clearly defined. Indeed, the dimensions of the industrial relations system and its performance at the plant level are not well specified in the theoretical or empirical literature.

In the previous paper (Katz, Kochan, and Gobeille, in press) we suggested that the industrial relations system at the plant level influenced economic performance through three interrelated routes: (1) the effectiveness of the management of conflict in the union-management relationship, (2) the motivation, commitment, and behavior of individual workers and work groups, and (3) the rules and practices governing the allocation and use of human resources. These emerged as tentative hypotheses for explaining the empirical relationships observed between measures of industrial relations performance (grievance rates, discipline rates, absenteeism, and
labor-management climate) and economic performance (product quality and labor efficiency). In this section we spell out more fully the links expected between these aspects of plant level industrial relations and organizational effectiveness.

Conflict Resolution Systems. One critical function of an industrial relations system is to establish procedures and processes for addressing and resolving conflicts or problems that arise between employees and management. In the U.S., unions and employers rely heavily on formal contract negotiations and grievance procedures for this purpose. We propose that the effectiveness of these formal negotiation and conflict resolution mechanisms are directly related to organizational effectiveness for at least three reasons.

First, because these are formal representative procedures they require a considerable amount of time, people, and resources to manage. Thus, the sheer volume of grievances and bargaining demands that arise in a plant will have an effect on the costs of managing a plant. To the extent that management and union resources (time and people) are devoted to managing these formal adversarial procedures, fewer resources are available for training, problem solving, communications and other productivity, human resource management, or organizational development activities. This might be described as the displacement effect (Katz, Kochan, and Gobeille, in press).

Second, the volume of grievances and bargaining demands can be symptomatic of the success or failure of the parties to resolve differences on a more informal basis or at early steps of the formal procedures. Thus, the number of grievances or bargaining demands, and the inability of the parties to settle issues without frequent threatened or actual work stoppages most likely signal deeper seated
problems in the conflict resolution/problem solving systems in the plant. Thus we would expect that plant level measures of grievance rates, the number of bargaining demands, the length of negotiations, strike threats and strike occurrence should be systematically related to other measures of industrial relations performance. A good deal of previous research on the determinants of grievance rates is consistent with this argument (Peach and Livernash, 1974; Thomson and Murray, 1976; Knight, 1978; Katz, Kochan, and Gobeille, in press).

Third, because the formal grievance and bargaining processes focus on distributive issues, they inherently entail some degree of political and tactical posturing, gamesmanship, bluffing, and commitment building tactics (Walton and McKersie, 1965; Schelling, 1960). To the extent that these political or distributive bargaining tactics escalate, get perpetuated over time, and spread across the entire range of issues that the parties deal with, a high conflict/lowlow trust syndrome (Fox, 1974) or what Boulding (1962) described as a "conflict trap" can set in. That is, the distributive or inherently conflictful patterns may drive out the potential for integrative bargaining or cooperation even on those issues over which the parties share common interests. The belief that this is a common feature of current American industrial relations is what gives rise to the criticism that our system is "too adversarial" (Barbash, 1980).

For these three reasons, we hypothesize that indicators of greater conflict between labor and management at the shop floor level will be associated with lower efficiency, poorer quality and generally, poorer plant level organizational performance. Secondly, we hypothesize that there will exist strong interrelationships between the various indicators of plant level industrial relations performance.
It should be noted that we are not implying here that these conflict resolution systems do not serve important and useful functions for labor and management. They are natural and necessary procedures that have endured the test of time for resolving conflicts that are bound to arise in any employment relationship and for protecting the individual rights of employees. It is not their existence _per se_ but their poor performance that is expected to lead to lower levels of organizational effectiveness.

_Worker Motivation/Commitment/Involvement/Performance._ While the conflict resolution system reflects the broad _institutional_ features of an industrial relations system, it is clear that the motivation, attitudes, and behavior of _individuals_ and informal work groups can exert an independent effect on organizational performance as well. Yet, there has been a longstanding (Brayfield and Crockett, 1955; Herzberg, _et al._, 1959; Schwab and Cummings, 1970) and to date unresolved (Dyer and Schwab, 1982) debate on the direction and strength of the causal relationships between these individual attitudinal and behavioral characteristics, and organizational performance. On the one hand, there is abundant evidence to suggest that there is no consistent or simple causal relationship between individual worker satisfaction and individual worker performance (Schwab and Cummings, 1970). On the other hand, a wide range of theoretical arguments suggest that individual worker ability, motivation, and participation in job related decision-making will affect both organizational effectiveness and individual worker satisfaction (Hackman and Oldham, 1976; Goodman, 1979; Walton, 1980; Lawler and Ledford, 1981-82; Mowday, Porter, and Steers, 1982). To the extent that workers have the ability and willingness to make
suggestions and to participate in the search for ways to improve job performance, and to the extent these efforts can be maintained over time, high levels of individual worker motivation/commitment/participation should lead to improved organizational effectiveness and worker satisfaction.

These potentially positive links between individual attitudes and behavior and organizational effectiveness can only be maintained over time if the larger economic and institutional environment maintains support for high levels of individual involvement and labor management cooperation (Walton, 1980; Kochan and Dyer, 1976). Unless the larger union-management relationship and management systems remain supportive and workers experience tangible rewards from their involvement, high levels of commitment are likely to either gradually atrophy (Walton, 1975) or end abruptly in response to some visible conflict (Goodman, 1979).

Another aspect of individual behavior that is expected to be related to other industrial relations outcomes is the absenteeism rate in the plant. While the evidence on the strength of the relationship between job satisfaction and the frequency that an individual worker is absent is mixed (Dyer and Schwab, 1982), it has been argued that voluntary absenteeism should be related to employee motivation (Steers and Rhodes, 1978). Others have suggested that the relationships between the aggregate plant-wide rate of absenteeism and worker attitudes, commitment and other aspects of industrial relations should be stronger than the relationship between individual worker attitudes and absenteeism (Nicholson, Brown, and Chadwick-Jones, 1976). In any event, the costs imposed by high rates of absenteeism should exert an independent effect on organizational
performance (Hackman and Lawler, 1971) regardless of the relationship between absenteeism and other industrial relations outcomes.

We therefore expect our measures of employee participation in suggestion programs, attitudes, and absentee rates to be related to other industrial relations performance measures and to measures of organizational performance.

Human Resource Management Rules and Practices. The substantive rules and practices governing the organization of work, the allocation of workers, the compensation system, and the adaptability to change serve as a third important channel through which the industrial relations system of a plant will influence organizational effectiveness and employee goals. Work rules and their administration and modification historically have been recognized as important factors influencing labor costs and productivity (Slichter, 1941; Slichter, Healy, and Livernash, 1960; Hartman, 1973; McKersie and Hunter, 1973). These rules and practices develop over time both explicitly through collective bargaining agreement provisions and informally (Roy, 1952; Dalton, 1959; Kuhn, 1961; Sayles, 1958; McKersie and Klein, 1982) in both union and non-union situations. Rules are necessary to bring about stability and equity in work practices and to protect the rights and responsibilities of both workers and their employers. Over time, however, work practices and rules can accumulate, and become outmoded because of technological or other changes in the plant or the product. Yet, they also become difficult to change since change often threatens worker job security by affecting the jurisdiction of work, seniority and transfer rights, the number of workers required to perform the given volume of work, etc. Thus, work practices discussions are inherently mixed motive in
nature—all parties share an interest in eliminating wasteful work practices that add to costs, yet changes in practices may require changes which threaten the job security or alter the promotion prospects of individual workers. Thus, the flexibility with which the industrial relations system manages work rules and work practices at the plant level will influence organizational effectiveness and worker objectives.

As with the bargaining process and grievance procedures, establishing policies and rules governing the organization and distribution of work opportunities is a necessary and essential function of the industrial relations system (Dunlop, 1958). Yet the buildup of rules and the inability to modify work practices can reduce organizational effectiveness. Thus, again it is the ability of the parties to manage and adjust work practices to meet the productivity needs of the firm and the interests of the workforce that is critical, and it is not the presence of rules per se that influences organizational effectiveness.

In summary then, we are proposing that the degree of conflict resolution, individual worker attitudes and behavior, and the flexibility within substantive work rules are three key dimensions of an industrial relations system that will have important effects on organizational effectiveness. Over time these dimensions become interrelated in a reinforcing cycle. Worker dissatisfaction or lack of trust may lead to higher levels of grievances and bargaining demands, and to a more adversarial relationship between workers and management. Inability to effectively resolve conflicts is, in turn, likely to lead to greater emphasis on legalistic rules and strict enforcement of contract terms and the further build-up of work rules.
that one or both of the parties will resist changing. The high conflict/low trust cycle will then spill over to reinforce supervisors' beliefs in the need for rigid/authoritarian styles of supervision, and employee motivation, job performance and commitment to the organization will decline.

QWL efforts represent strategies for breaking into the cycle of events described above in order to initiate changes that will reverse the high conflict/low trust pattern and support individual employee participation and involvement. To the extent these efforts are successful in increasing trust, employee involvement, and problem solving in the short run, they can be expected to lead to short run improvements in both worker satisfaction and organizational effectiveness. Improved trust and problem solving and a more participative managerial style may also lead to lower grievance rates or settlements at lower levels of the grievance procedure. At an advanced stage, QWL efforts may also lead to more flexibility in work rules. To the extent that these QWL efforts can coexist with the on-going distributive aspects of the bargaining relationship and survive political and economic pressures that challenge these efforts over time, they can be expected to help organizations maintain higher levels of organizational effectiveness.

The above discussion provides the theoretical framework that we believe should guide the collection and analysis of data designed to assess the effects of an industrial relations system on organizational effectiveness and worker goals, and to track and evaluate the effects of QWL or other intervention strategies. Because of the importance we attach to the effects of the larger contexts (economic environment, distributive bargaining,
organizational policies, union-management climate, etc.) a longitudinal research design that is sensitive to the cycle of activities that occur in a normal bargaining relationship is critical to an evaluation framework. Short run improvements in worker attitudes, motivation, grievance rates, and even measures of economic performance are necessary but not sufficient tests of the effects of QWL efforts. The more telling test is whether the short run positive effects can be maintained through a complete cycle of contract negotiations, the negotiation of changes in local work rules, turnover of key management or union decision-makers, and in an even broader sense, the engagement of management and union officials in major bargains over strategic issues such as the organization of new plants or the reinvestment of resources in existing plants.

We obviously cannot build all of these tests into the empirical analysis to follow, nor would we expect any single study in the future to do so. These comprehensive design criteria are spelled out here to put our own work and future work in perspective. We are able to present the results of a longitudinal study that takes advantage of a rich data set collected as part of the information system of a major company. We thereby illustrate the value of this type of internal data collection and analytical capability.

Data and Analysis Plan

The data for this study were collected from a large durable goods manufacturer in the United States. The data are plant level observations covering the years 1970-80 from the company's twenty-five manufacturing facilities which employ roughly 50,000 persons and have annual sales in excess of one billion dollars. The
technology and product in all of the plants are very similar. All the hourly workers in these plants belong to the same industrial union.

The overall data set provides a pooled cross-section sample of 275 observations for most of the industrial relations and economic performance measures. Missing data reduce this sample in some of the analyses.

**Industrial Relations Performance Measures**

The industrial relations performance measures included in the analysis and their respective variable names are:

1. The number of grievances filed per 100 workers (Grievance)
2. The number of disciplinary actions per 100 workers, actions which involve a suspension or some more severe penalty. (Discipline)
3. The number of demands submitted by the union in tri-annual local contract negotiations. These local agreements are supplemental to the company-wide contract. (Demands)
4. The number of days it took to reach a settlement in local contract negotiations before or after settlement of the company's master agreement. Four rounds of bargaining occurred in our sample (1970, 1973, 1976 and 1979) thus the maximum sample size for data relating to the negotiating process is 100. (Negtime)
5. The number of strike intent letters issued by the union. Under the provisions of the company-wide contract only disputes that concern production standards legally can lead to local strikes. Other local disputes are resolved through the grievance procedure that includes arbitration as its final step. In practice, these strike letters often involve issues other than production standards and serve notice to the company that tensions are high between labor and management in the plant. (Strikelet)
6. The number of authorized or unauthorized local strikes. (Totstrike)
7. A survey asked salaried employees including first line supervisors a number of questions regarding compensation and benefit levels, working environment, relationships with supervisors and subordinates, and career progress. Low score responses indicated dissatisfaction. A summary score was derived from these surveys for each plant. The variable we utilize is the percentage of respondents in each plant that had an overall survey score greater than 3.2 on a 1 to 5 scale. Survey data are available for the years 1977 to 1980. (Attitude)

8. The number of suggestions submitted per employee in the company's suggestion program. (Sugperemp)

9. The percentage of employees that submitted at least one suggestion during the year. The suggestion program data are available from 1976 to 1980. (Sugpct)

10. The absentee rate as a percentage of straight time hours, excluding contractual days off. (Absentee)

The first six of these variables all capture aspects of the formal conflict resolution systems in these organizations. The last four measure aspects of individual attitudes and behaviors that are expected to influence organization effectiveness. Unfortunately, no measures of plant work rules or practices are available for this study.

Economic Performance Measures

The organizational effectiveness measures available for this study primarily capture a number of key dimensions of the economic performance of each plant. Therefore, from here on we will refer to these as economic performance measures while recognizing that although economic performance is most likely the most important dimension of organization effectiveness, it is not necessarily synonomous with this broader construct.

Economic performance of each plant is measured with variables that measure the costs of workers' compensation, accidents and illnesses, the number of illnesses and accidents, and with measures
of the direct labor efficiency and product quality in each plant.
These measures are treated separately because, although the presence
of higher accident or illness rates in a plant may indirectly affect
direct labor efficiency and product quality, these rates are not
incorporated in the specific direct labor or quality variables we
employ. A detailed description of these variables follows.

1. The cost of sickness or accident (non-work related) benefits
provided for in the company collective bargaining
agreement. The dollar payments are expressed on a per
employee basis and are adjusted by a price deflator which
captures the effects of the escalating cost of these
benefits. (SAcost)

2. The number of injuries requiring more than minor first aid
per 200,000 hours worked. Accident rate figures are
available from 1975 to 1980. (SArate)

3. The number of accidents producing an injury which prevented
an employee from performing his or her normal job deflated
by the total hours worked. (SAtime)

4. The company costs of worker compensation payments to
employees, ex-employees or surviving spouses for work
related injuries under state workers compensation programs.
These costs are deflated by a price index and an index of
average state indemnity costs to account for inter-state
variations in legal coverage. (WCcost)

5. A quality index derived from a count of the number of faults
and "demerits" that appear in inspections of the product. A
higher quality score is associated with better product
quality. This index is available for 1975-80. (Quality)

6. A direct labor efficiency index which compares the actual
hours of direct labor input to standardized hours calculated
by the company's industrial engineers. The labor standards
utilized in this index are adjusted for product attributes.
A higher direct labor index is associated with higher
efficiency and lower costs. (Direct)

QWL Program Measures

With the cooperation of the union representing its workforce, this
company began to implement QWL programs in its plants in 1973. From 1973
to 1980, the actual development of QWL programs among salaried and hourly
employees varied widely across the plants. The extent of QWL development is measured by the percentages of salaried (QWLInvsa) and hourly (QWLInvhr) employees involved in some form of QWL program in each plant. These figures are estimates provided by the personnel director in each plant.

The analysis starts with a description of the variations in industrial relations and economic performance across the plants. We then review the correlations that exist among the various industrial relations performance measures and the correlations that exist between the industrial relations and economic performance measures. Then we assess the diffusion and impacts of involvement in QWL programs.

Results

The descriptive statistics provided in Table 1 illustrate the importance of examining the diversity of outcomes that are produced by collective bargaining in different bargaining relationships. Despite the common technology, union, and employer from which these data are drawn, there is a wide variation across plants in grievance rates, discipline rates, absenteeism, and other industrial relations and economic performance measures. Note, for example, that in 1980 grievances per one hundred workers varied from a low of 5 in one plant to a high of 121 in another plant. Absenteeism varied between 4.6% and 8.8%. The number of contract demands introduced in the local negotiations for the 1979 agreement varied from a low of 66 to a high of 690. Direct labor efficiency varied from 20.4% above standard to 23.7% below standard.

The measures of worker participation in suggestion programs, salaried employee attitudes, and involvement in QWL programs also reveal wide
variation across plants. In 1980, the number of suggestions per employee ranges from .13 to 1.04, and the percent of salaried employees with high QWL attitudes is 40% in one plant to 74% in another. The percentage of salaried employees involved in some form of QWL program varies from 0 to 100%, while the percentage of hourly employees involved in QWL programs ranges from 0 to 74%. The wide variation in QWL program involvement across the company suggests some of the difficulties involved in introducing these programs. As well, the fact that QWL involvement varies significantly across the plants assists our efforts to identify the independent impact of QWL programs on industrial relations and economic performance. Before turning to the evaluation of QWL, we analyze the interactions between the measures listed in Table 1.

Relationships Among Industrial Relations Performance Measures

The correlations among the measures of industrial relations performance across plants and years are presented in Table 2. The table reveals a high degree of inter-correlation among the various measures of industrial relations performance thus supporting our hypothesis regarding the inter-connected nature of the industrial relations system. For instance, the data show a strong correlation between the various indicators of the level of conflict within the plants. The higher the grievance rate in a plant the higher the discipline rate ($r = .34$), the more demands introduced into local negotiations ($r = .22$), the longer the negotiating time required to reach an agreement ($r = .38$), the more strike letters issued ($r = .25$), and the more frequent are local strikes ($r = .02$). Except for the correlation with strike number, all of these correlations are statistically significant at the 1% level.1

The data also reveal a strong connection between indicators of the level of conflict and measures of employee attitudes and participation.
Better attitudes among salaried personnel are associated with lower grievance rates \((r = -.47)\), lower discipline rates \((r = -.25)\), fewer contract demands \((r = -.22)\), fewer strike letters \((r = -.29)\) and fewer strikes \((r = -.06)\). Again, except for strike occurrence these correlations are statistically significant at the 1% level. The connection between individual behavior and the level of conflict also is revealed in the associations that absentee rates and employee participation in suggestion programs have with grievance rates, discipline rates, the number of demands, negotiation time, and the issuance of strike letters. These interrelationships are consistent in both direction and magnitude with our analysis of a similar data set (see Katz, Kochan and Gobeille, in press).

**Relationships Between Industrial Relations and Economic Performance**

Correlations between measures of economic performance and a number of the industrial relations performance measures are presented in Table 3. These correlations provide strong supporting evidence for our hypothesis that the level of conflict and individual behavior can affect organizational effectiveness.

A number of the indicators of plant level conflict intensity are strongly associated with the economic performance indicators. For example, higher grievance rates are associated in a statistically significant manner with lower direct labor efficiency \((r = -.41)\), poorer product quality \((r = -.30)\), and more injuries \((r = .23)\). The issuance of more strike letters in a plant is associated with lower direct labor efficiency \((r = -.18)\), poorer product quality \((r = -.26)\), higher sickness and accident costs \((r = .02)\), more injuries \((r = .10)\), and more accidents \((r = .23)\). Three of these five correlations are statistically significant at the 1% level.
A connection between individual behavior and economic performance is revealed in a number of the correlations. More positive salaried employee attitudes are associated with higher direct labor efficiency ($r = .40$), better product quality ($r = .48$), lower sickness and accident costs ($r = -.30$), fewer injuries ($r = -.38$) fewer accidents ($r = -.41$), and lower workers' compensation costs ($r = -.03$). Except for the latter, all of these correlations are statistically significant at the 1% level. Supporting evidence also comes from the positive association between the number of suggestions offered per employee and higher direct labor efficiency ($r = .21$), better product quality ($r = .53$), lower sickness and accident costs ($r = -.14$), fewer injuries ($r = -.23$), fewer accidents ($r = -.20$), and lower workers' compensation costs ($r = -.16$). Five out of these six correlations are statistically significant at the 1% level.

As well as supporting our hypotheses, evidence of a connection between plant level industrial relations and economic performance lends further strength to our argument that the systematic collection of this type of data has great value for organizations. These data provide a way to both assess current performance and identify problem areas.

QWL Evaluation

As mentioned earlier, the company under study, with the cooperation of the union, initiated an effort to diffuse QWL programs throughout its plants in 1973. In this section, we assess the extent to which QWL programs diffused across the plants and evaluate their impacts on industrial relations and economic performance.

The first task is to assess the extent to which QWL programs were underway within the various plants after 1973. We utilize the percentages of the salaried and hourly workforces involved in some form of QWL program in each year as a measure of the QWL diffusion. Figure 2
reports these data for the company as a whole for 1973 to 1980. As Figure 2 shows, salaried employees QWL involvement rose dramatically in 1976. At that point in time corporate officials had initiated a new campaign to encourage plant level personnel staff to expand their QWL programs. Elsewhere, Mower (1982) discusses the important role played by QWL involvement among salaried employees in the diffusion of QWL programs among hourly workers. Evidence of that role is provided by the fact that hourly QWL involvement, after growing only modestly between 1973 and 1978, shot upward in 1979, three years after the dramatic rise in salaried employee QWL involvement.

It is also interesting to note that the upturn in hourly QWL involvement coincides with a sharp deterioration in this company's economic situation.2 This economic downturn led to a large number of layoffs in the company and significant new concern regarding the company's production costs relative to its international competitors. This is consistent with the argument of Katz (1982) that cost pressure can strongly contribute to the growth of QWL programs.

Roughly 90% of the total company-wide hourly employee involvement in QWL prior to 1978 came from one plant (this plant is discussed in more detail later). As of 1980, after the upward turn of hourly QWL involvement, most of which occurred in 1979, there were six plants that had at least 33% of their hourly employees involved in some form of QWL program. In 1980, nine plants had no QWL hourly involvement and the remaining plants had very few hourly workers involved.

Observations of an individual plant's history of economic and industrial relations performance, along with knowledge of when a QWL program got underway in that plant, is one way to analyze the impacts of
QWL programs. Longitudinal analysis also provides a way to observe the staying power of QWL impacts, another issue of critical importance.

Figures 3 through 6 provide longitudinal plots for two plants in our sample. These figures compare measures of the plant's economic and industrial relations performance to the company-wide mean level of these measures. Underneath the horizontal axis the percentage of hourly workers involved in QWL in the respective plant is plotted. These graphs then allow us to see if the performance of a particular plant has improved relative to the rest of the company after a QWL program has developed in that plant.

These figures and similar ones for other plants and variables consistently show relative improvements in plant level performance after increases in the level of QWL involvement. For example, as Figure 3 shows, plant 23's direct labor efficiency was lower than the company mean in 1973 and 1974, but coincident with extensive growth in QWL hourly involvement, the plant's direct labor efficiency rose dramatically relative to the rest of the company. The grievance rate in plant 23 plotted in Figure 4 also shows relative improvement, particularly in 1973 and 1974 when the QWL program was getting underway in this plant.

Plant 8 in Figure 5 also shows a dramatic relative improvement in its direct labor efficiency when QWL involvement increased among its hourly workforce in 1979 and 1980. The same is true of plant 8's grievance rate plotted in Figure 6.

Plant 23 is an interesting case because it provides an example (the only one in this company) of a plant that had an increase followed by a substantial decrease in QWL involvement during the 1973 to 1980 period. As Figure 3 shows, when that decline occurred in 1979 and 1980, the direct labor efficiency of plant 23 deteriorated relative to company mean
figures (this is also true for plant 23's absentee rate). Plant 23 suggests that improvements achieved through QWL programs may well be reversible.

One would not want to make too much out of the experiences of one plant, however, plant 23 reinforces our claim that the diffusion of QWL will not put an end to the "adversarial" relationship that exists between labor and management. Furthermore, this reinforces our view that it is of critical importance to assess the ability of QWL programs to survive the challenges of difficult negotiations. This particular company, like many other American manufacturers, currently faces severe economic pressure. An essential task for future research is to assess how well the QWL programs that are underway fare in the midst of this difficult economic period.

A weakness of these longitudinal plant plots is that they do not provide a measure of the overall impacts of the QWL programs. QWL impacts in any particular plant may not be representative of the experience in other plants. Secondly, these plots do not control for the influence of other things that are occurring in the plant which may be affecting the outcome variable. For instance, a change in direct labor efficiency or absentee rates could be due to the effects of reductions in output in the plant which happen to be occurring contemporaneously with the growth in the plant's QWL program.\(^3\)

To generate a broader assessment of the impact of hourly QWL involvement we utilize the 33% hourly QWL involvement figure as a cutoff point and compare the industrial relations and economic performance of the six plants that had at least 33% hourly QWL involvement to the other plants. In this comparison we focus on the percentage changes in grievance and absentee rates, direct labor efficiency, and product
quality in the three years before and after 1977. 1977 is chosen as a point of comparison because this is when hourly QWL involvement began to expand in the six plants. Table 4 summarizes this comparison.

From 1977 to 1980, the industrial relations and economic performance of the six plants that had high QWL hourly involvement did not differ consistently from the performance of the rest of the company. We draw from this comparison no evidence that QWL led to relative improvements in the plants that had high levels of hourly employee QWL involvement. These comparisons of high QWL plants with the rest of the company provide a more comprehensive assessment of QWL impacts. However, they do not control for the influence of other factors that are varying across the plants which may be affecting economic performance. Furthermore, group comparisons do not pinpoint the moment when a QWL program actually expands in a particular plant. The regression analysis reported below accounts for these factors.

In these regressions we try to identify the independent impact of QWL involvement on economic performance by controlling for the influence of other factors. To do so, pooled time series-cross section regressions are estimated with direct labor efficiency and quality as the dependent variable, with QWL hourly involvement as an independent variable, and with the share of overtime hours and plant size entered as control variables. In a related study (Katz, Kochan, and Gobeille, in press) we noted the important effects that plant size and overtime usage exert on economic performance, hence the need to control for their effects. A number of other unmeasured plant characteristics also may affect the economic performance of each plant. To the extent that these unmeasured factors are randomly distributed across these plants they do not bias the coefficients obtained in our analysis. However, to the extent that there
unmeasured factors are correlated with a measured variable, the coefficients will be affected. Thus, in some of the analyses dummy variables are included to capture the unique plant specific unmeasured variables that may otherwise bias our results.\textsuperscript{5}

Tables 5 and 6 report the results of these regressions. When product quality is the dependent variable, the percentage of hourly employees involved in QWL has a positive impact on quality in all of the regressions and a statistically significant impact in three of the four regressions. The coefficient of \(0.01\) on the QWL hourly involved variable in the fourth column of Table 5 implies that an increase of 50\% in the percentage of hourly workers involved in QWL activities in a plant leads to a 5 unit increase in the plant's quality index which amounts to 0.71 of the standard deviation of the quality index over the whole sample. When direct labor efficiency is the dependent variable, the negative coefficient on the percent QWL involved variable implies that greater QWL involvement is associated with lower efficiency, however, the coefficient is not statistically significant.

Both the grievance and absentee rate variables in these regressions often have significant independent impacts in the expected direction. With respect to the quality regression, the negative coefficient on the grievance rate variable implies that higher grievance rates are associated with lower quality. The positive association between product quality and absentee rates is surprising, but may be explained by the upward time trend that exists in both quality and absentee rates throughout the company.\textsuperscript{6} When direct labor efficiency is the dependent variable, both higher grievance and absentee rates are associated with lower efficiency. In two of the four cases this association is statistically significant.
In the quality and direct labor efficiency regressions the other control variables frequently have statistically significant effects. Except in a few of the regressions, both the use of more overtime and larger plant size are associated with lower direct labor efficiency and product quality. As well, the plant dummy variables as a group consistently are statistically significant.

The regression technique provides a mechanism to isolate the independent impacts of the QWL programs after controlling for the influence of other factors. The regression technique, however, does have a number of limitations. For one thing, the specification we utilize focuses on the impacts that QWL involvement in a given year exerts on economic performance in that year. This may ignore the cumulative and dynamic impacts of the QWL programs. Secondly, the percentage of hourly workers involved in QWL programs may be a poor measure of either the intensity or quality of the QWL programs underway in a plant. This is particularly troublesome if the true QWL effort is correlated with one of the control variables included in the regression. In this case it may well be that the control variables strip the QWL variable of its effects. For example, in the case of a plant that persistently has a high QWL effort, the impacts of the QWL programs may be inaccurately picked up by the plant dummy variable or by the plant's low grievance rate.

In the face of these problems we conclude that the regression technique is a useful supplement to our analysis, but should not be relied on exclusively to test for the impacts of the QWL programs. For that reason, we also put value in the before and after 1977 comparisons of the high QWL plants with the rest of the company and in the individual plant histories reported earlier.
Discussion

Utilizing a wide range of indicators of industrial relations and economic performance, we find substantial diversity across the plants in this company, even in the face of many common institutional and background factors across the plants. The extent of this diversity supports our claim that the collection of comparable longitudinal plant level data can be a valuable tool for industrial relations practitioners.

Correlations between the various industrial relations performance measures support our hypotheses regarding the inter-connected nature of the industrial relations system. We find evidence that conflict carries over from the grievance function, to local bargaining, and into strike threats and strike occurrence. We also find evidence that individual attitudes and behavior (as measured by absentee rates and participation in suggestion programs) are strongly related to measures of plant level conflict intensity.

We find strong evidence of an association between measures of industrial relations and economic performance, where the latter is measured by direct labor efficiency, product quality, and sickness and accident rates and costs. This evidence is provided in both the correlation and regression analyses. Here, we find support for our view that it is useful to distinguish a conflict and an individual behavior channel in the association between industrial relations and economic performance. The presence of this association provides further testimony of the value of this sort of cross sectional and longitudinal plant level data.
With the longitudinal plant level data we are able to assess the QWL efforts underway in this company. The data reveal a slow and limited diffusion of QWL involvement among hourly workers in this company. We hypothesize that QWL efforts can affect organizational performance through three channels--through conflict management, employee motivation and work rule flexibility. With our data we could directly test only the first two of these channels. Analysis of the effects of work rules on organizational performance remains an important objective for future research.

The evidence from our QWL assessment is inconsistent. Regression analysis shows a strong positive impact of QWL involvement on product quality but no impact on direct labor efficiency. Individual longitudinal plant plots consistently show improvements in industrial relations and economic performance coincident with the development of hourly workforce involvement in QWL activities. However, the high QWL hourly involvement plants as a group compared to the rest of the company show no relative improvements in performance over the 1977 to 1980 period.

This suggests that QWL may well have varied impacts across plants. The inconsistent findings also point to the need to extend our analysis to later periods and other plants, and to search for more precise measures of QWL program activity.

By exasperating the tensions associated with mixed-motive bargaining, the current economic slump poses difficult challenges for the QWL programs underway in this company and elsewhere in the U.S. Further empirical research is therefore needed to test the staying power of the QWL programs and their impacts. Further theoretical work also is needed to clarify the causal interaction between industrial relations system properties, and organizational and worker goals. In this process much
could be gained from enhanced interaction between practitioners who are striving to sustain QWL programs and industrial relations researchers engaged in the evaluation of QWL efforts.

The results of this research reinforce our belief in the value of integrating theory and methods from organizational behavior, industrial relations, and micro-economics. Organizational changes that focus on the relationships among workers, unions, and employers must be well grounded in understanding of the structural and procedural aspects of collective bargaining, and must be assessed with consideration of their ability to survive over time through changes in economic conditions. The growing recognition of the importance of organizational changes should lead to continued growth in research that focuses on the intersection of markets, organizations, and industrial relations practices.
FOOTNOTES

1. The weakness of the correlations with the strike occurrence measure may be due to the fact that 18 of the 30 strikes which occur in the data happened in one year and were associated with the negotiation of a new company-wide contract.

2. The average annual hourly workforce in the company dropped 20% from a peak of 29,966 in 1978 to 23,877 in 1980.

3. For evidence that direct labor efficiency, product quality, grievance and absentee rates are strongly affected by overtime usage and the business cycle in these plants see our discussion on page 22. Similar evidence from a different data set is provided in Katz, Kochan and Gobeille (in press).

4. This before and after 1977 comparison differs somewhat from that presented in Katz, Kochan and Gobeille, in press, Table 4. Here, we provide a more conservative test of QWL impacts and compare high QWL plants to the rest of the company. If the form of the earlier paper is followed and changes in the performance of the six highest QWL plants is compared to changes in the performance of the six lowest QWL plants, the six high QWL plants show significant relative improvements in industrial relations and economic performance from 1977 to 1980.

5. This procedure is equivalent to what is referred to in the econometrics literature as a "fixed effects" regression.

6. The effects of an upward time trend in both quality and absentee rates can be removed by looking at cross plant data in a given year. For each of the years 1975, 1978 and 1980, across plants we find correlations between absentee rates and product quality of -.13, -.29, and -.12, respectively. None of these correlations, however, are statistically significant at even the .10 level.
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FIGURE 1

Environmental Characteristics \rightarrow Industrial Relations \rightarrow Quality of Working Life Efforts

\rightarrow Economic Performance

\rightarrow Quality of Jobs
Table 1
Mean, Minimum, and Maximum Values of
Industrial Relations, Economic,
and QWL Involvement Variables, 1980

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Minimum Value</th>
<th>Maximum Value</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grievance</td>
<td>45.9</td>
<td>3.2</td>
<td>121.1</td>
<td>25.7</td>
</tr>
<tr>
<td>Absentee</td>
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<td>4.6</td>
<td>8.8</td>
<td>10.5</td>
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<tr>
<td>Discipline</td>
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<td>.045</td>
<td>.401</td>
<td>.075</td>
</tr>
<tr>
<td>Demands$^1/$</td>
<td>283.4</td>
<td>66</td>
<td>690</td>
<td>137.3</td>
</tr>
<tr>
<td>Negtime$^1/$</td>
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<td>210</td>
<td>54.6</td>
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<td>0</td>
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<td>74</td>
<td>7.9</td>
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<td>0.13</td>
<td>1.04</td>
<td>.24</td>
</tr>
<tr>
<td>Sugpct</td>
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<td>8.0</td>
<td>37.3</td>
<td>7.6</td>
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<td>140.0</td>
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<tr>
<td>SACost</td>
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<td>$130.1</td>
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<tr>
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<td>2.24</td>
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<tr>
<td>WCCost</td>
<td>$138.4</td>
<td>$21.0</td>
<td>$313.0</td>
<td>83.2</td>
</tr>
<tr>
<td>% Salary QWL Involvement</td>
<td>76.6</td>
<td>0</td>
<td>100</td>
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<tr>
<td>% Hourly QWL Involvement</td>
<td>15.7</td>
<td>0</td>
<td>72.4</td>
<td>24.2</td>
</tr>
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</table>

$^1/$ This data is for 1979, there were no negotiations in 1980.
Table 2
Inter-relationships Among Industrial Relations Performance Variables
as Measured by Simple Correlation Coefficients

<table>
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<tr>
<th></th>
<th>Grievance</th>
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<th>Discipline</th>
<th>Demands</th>
<th>Negtime</th>
<th>Strikelet</th>
<th>Totstrike</th>
<th>Attitude</th>
<th>Sugperem</th>
<th>Sugpct</th>
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<td></td>
<td></td>
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<td>1.00</td>
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<td>0.32***</td>
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<td></td>
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<tr>
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<td>0.13**</td>
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<td>1.00</td>
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<td>-0.18*</td>
<td>-0.25**</td>
<td>0.30***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>-0.47***</td>
<td>-0.51***</td>
<td>-0.25**</td>
<td>-0.22</td>
<td>0.02</td>
<td>-0.29**</td>
<td>-0.06</td>
<td>1.00</td>
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<td></td>
</tr>
<tr>
<td>Sugperem</td>
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<td>0.12</td>
<td>0.16*</td>
<td>0.09*</td>
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<td>-0.12</td>
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<td>Sugpct</td>
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<td>0.22</td>
<td>-0.15</td>
<td>-0.15</td>
<td>0.43***</td>
<td>0.91***</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* = significant at .10 level
** = significant at .05 level
*** = significant at .01 level
### Table 3
Correlations Between IR Performance and Economic Performance

<table>
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<tr>
<th></th>
<th>Direct</th>
<th>Quality</th>
<th>SAcost</th>
<th>SARate</th>
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<th>WCost</th>
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<td>-.30***</td>
<td>-.09</td>
<td>.23***</td>
<td>-.04</td>
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<td>Absentee</td>
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<td>.07</td>
<td>.29***</td>
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<td>.28***</td>
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<td>-.05</td>
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<td>-.12</td>
<td>-.24*</td>
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<td>-.07</td>
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<td>.19***</td>
<td>-.11</td>
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<td>Attitude</td>
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<td>.48***</td>
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<td>-.38***</td>
<td>-.41***</td>
<td>-.03</td>
</tr>
<tr>
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<td>.53***</td>
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<td>-.23**</td>
<td>-.20**</td>
<td>-.16*</td>
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<td>Sugpct</td>
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<td>.53***</td>
<td>-.08</td>
<td>-.26***</td>
<td>-.23***</td>
<td>-.14</td>
</tr>
</tbody>
</table>

* = significant at .10 level

** = significant at .05 level

*** = significant at .01 level
Figure 2

QWL INVOlVEMENT - Company Means

% of employees involved

- QWL INVOL

(Selected months)

1973 74 75 76 77 78 79 80
Figure 3

Plant 23 Direct Labor Efficiency vs Company Mean

DIRECT LABOR EFFICIENCY

100

0

-50

1972 73 74 75 76 77 78 79 80

Company

Plant 23

QWLYYTH 70 100 100 100 100 100 100 82.4 72.4
Figure 3

Plant 8 Direct Labor Efficiency vs. Company Mean

DIRECT LABOR EFFICIENCY

1972 73 74 75 76 77 78 79 80

QWLINEVAR 70 0 0 0 0 0 0.5 50%
Figure 6

Plant 8 Grievance Rate vs. Company Mean Rate
Table 4
A Comparison of the Changes in IR and Economic Performance of the Six High QWL Hourly Involvement Plants with the Rest of the Company Before and After 1977

<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Six High QWL Plants</td>
<td>Rest of the Company</td>
</tr>
<tr>
<td>Mean Plant Percentage Change in:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grievance Rate</td>
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<td>-8.3</td>
</tr>
<tr>
<td>Absentee Rate</td>
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<td>Quality1/</td>
<td>----</td>
<td>----</td>
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<tr>
<td>Direct</td>
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1/ Quality index figures are not available before 1975.
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<tr>
<th>Explanatory Variables</th>
<th>Quality 130.72** (47.97)</th>
<th>Quality 133.35** (67.75)</th>
<th>Quality 111.88** (38.76)</th>
<th>Quality 116.23** (48.11)</th>
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<tr>
<td>Intercept</td>
<td>-25.14* (2.12)</td>
<td>-30.21** (2.65)</td>
<td>5.79 (2.12)</td>
<td>-7.07 (.727)</td>
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<tr>
<td>Overtime</td>
<td>-.002** (2.85)</td>
<td>-.002** (3.14)</td>
<td>.001 (1.26)</td>
<td>.003** (3.03)</td>
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<td>Work Force Size</td>
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<td>.008 (1.62)</td>
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<td>QWL InvHourly</td>
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<td>.004 (1.64)</td>
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<td>.158** (4.34)</td>
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<tr>
<td>Absentee</td>
<td>135</td>
<td>135</td>
<td>135</td>
<td>135</td>
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<tr>
<td>Dummies</td>
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<td>135</td>
</tr>
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</table>

*t - statistics are in parentheses

* = Statistically significant at .05 level

** = Statistically significant at .01 level

1/ As a group the dummy variables are statistically significant at the .01 level.
### Table 6
Regression Analysis of the Impact of Background, Industrial Relations, and Hourly QWL Involvement Variables on Direct Labor Efficiency

<table>
<thead>
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<th>Explanatory Variables</th>
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<td></td>
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<tr>
<td>Work Force Size</td>
<td>-.02**</td>
<td>-.03**</td>
<td>-.009</td>
<td>-.02*</td>
</tr>
<tr>
<td></td>
<td>(2.94)</td>
<td>(4.94)</td>
<td>(.90)</td>
<td>(2.33)</td>
</tr>
<tr>
<td>QWL InvHourly</td>
<td>-.04</td>
<td>-.03</td>
<td>-.005</td>
<td>-.05</td>
</tr>
<tr>
<td></td>
<td>(1.26)</td>
<td>(.98)</td>
<td>(.10)</td>
<td>(.99)</td>
</tr>
<tr>
<td>Grievance</td>
<td>-.08**</td>
<td></td>
<td>-.002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.41)</td>
<td></td>
<td>(.11)</td>
<td></td>
</tr>
<tr>
<td>Absentee</td>
<td>-.84</td>
<td></td>
<td>-1.47*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.73)</td>
<td></td>
<td>(3.62)</td>
<td></td>
</tr>
<tr>
<td>Dummies</td>
<td></td>
<td>included^1</td>
<td>included^1</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>.206</td>
<td>.121</td>
<td>.768</td>
<td>.748</td>
</tr>
<tr>
<td>F</td>
<td>9.23</td>
<td>8.25</td>
<td>19.10</td>
<td>18.76</td>
</tr>
<tr>
<td>n</td>
<td>184</td>
<td>184</td>
<td>184</td>
<td>184</td>
</tr>
</tbody>
</table>

^x - statistics are in parentheses

* = Statistically significant at .05 level

** = Statistically significant at .01 level

^1/ As a group the dummy variables are statistically significant at the .01 level.