

# Workplace Reorganization and Workers' Compensation Costs

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## INTRODUCTION

This study analyzes how human resource management (HRM) practices affect workplace safety and workers' compensation outcomes. Since the early 1980s, the work environment of today's business organizations has undergone tremendous change. The intensification of domestic and international competition has led companies to restructure the workplace by adopting new technologies, new management practices, and new models of work organization with complex task characteristics (Cappelli, 1997; Appelbaum and Batt, 1994; Levine and Tyson, 1990).

Particularly noteworthy since the 1990s have been HRM practices that provide employees with participation rights in decision-making processes and financial ownership rights of the company's performance. These so-called 'high performance' work organization practices have attracted the attention of practitioners and researchers of employment relationship for the last two decades in the US workplace. However, most previous research has limited its focus on how these work organization practices affect firm productivity and profitability and only a few notable exceptions (Rooney, 1992; Park, 1997) touched issues on employee side of implications such as employee job satisfaction and well-being. This study provides evidence on this critical gap in the current knowledge.

## RESEARCH QUESTION

This study focuses on the occupational safety implication, which has been often ignored, of recent changes in work organization.

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Following Ben-Ner and Jones (1994), these recent changes in work organization generally involve two-sided participation plans; one on the firm's decision-making process (e.g., self autonomous work teams, TQM, QC, QWL, Labor-Management Committee, etc.) and the other, on firm's financial returns (e.g., merit pay, gain-sharing, ESOP, deferred or cash profit sharing programs, etc.).

The main hypothesis of this study argues that workplace safety is affected by employees' safety enhancing or impairing efforts, in addition to the employer's decision on safety investments and production technology. Following the typology of employee participation plans used in this study, both employee participation in decision-making and financial returns will be analysed separately for their possible effects on workplace safety as measured by workers' compensation insurance system outcomes such as claim-filing frequency and lost work day duration from the workplace injury.

*Hypothesis 1: Employee Participation in decision-making may increase information about optimal policies.*

Since the actions of both workers and firms affect accidents, it is difficult to disentangle safety outcomes resulting from firms' actions from outcomes resulting from workers' actions, especially as both often occur simultaneously. This measurement problem is compounded by asymmetric information concerning safety conditions and sometimes, even liability policy. Granting employee participation rights in the firm's strategic safety policy—increasing worker involvement in the design and implementation of safety policy—may increase workplace safety for both informational and psychological reasons.

The first benefit from having workers participate in the strategic safety planning of the firm is that workers may be able to identify safety improvements that the firm might overlook in the absence of employee safety input. Employee involvement in strategic planning usually occurs on company time, so that the employees are acting as "paid consultants." There are at least two reasons to believe that employee consultations may be cost effective. Workers are more intimately involved with the risky production processes, including other worker responses to those processes, and so can identify risky situations at lower costs than firm managers or outside consultants (Eaton and Nocernio, 2000). Using internal employees as safety consultants may well make safety expenditures more cost effective, and lower workplace risk and risk outcomes. Also, by involving workers in the introduction of new production technologies, workers' own costs associated with the risky technology will be internalised in the decision process. This may reduce turnover, increase worker morale, and maintain the firm's stock of specific human capital. All of which may enhance safety outcomes.

A second possible benefit is that information about workplace risk and the firm's strategic safety plan may reduce employee anxiety.

More information concerning job risk and the firm's safety efforts will help reduce uncertainty in workers' minds, increasing their expected utility. This may help workers move towards optimal safety behaviours (and may, or may not, increase measured safety outcomes).

A third, psychological benefit of meaningful involvement in strategic safety policy is that the workers begin to take "ownership" for safety outcomes, possibly becoming more committed to the program's successful implementation. This would also be expected to increase the observed level of firm safety.

We measure this participation effect both through a numeric count of types of decision-making activities that the firm allows the workers to participate in (this is the extensive margin, EPDM) and the degree of participation in those activities (this is the intensive margin, EPDEG). We expect that greater involvement in either dimension will increase safety outcomes.

Another of our control variables, INFOSHR, measures the extent of information-sharing with workers concerning company finances, human resource planning, and workplace safety. Again, for the reasons discussed in this section, we anticipate that as information-sharing by the firm increases, that safety will increase.

*Hypothesis 2: Employee participation in the financial returns of the company will change their safety incentives, but not unambiguously.*

Whether or not employees take appropriate precaution against injury risk depends in part on the incentives for taking precautions, including the extent to which they will bear the cost if they fail to do so. This is one reason that workers' compensation benefits do not fully replace lost wages. Since the claimant bears some of the lost wage costs, he or she has greater incentive to take care before an accident occurs, and a greater incentive to return to work once an accident has taken place. Incentives are important because in many workplace accidents *information is asymmetric*: claimants return-to-work capability is difficult to observe directly, often the injured worker knows more about how debilitating their health condition than does the firm or even the treating physician. That is, the workers' compensation claimant often has more information on the state of his or her work ability than does either the firm or the health care provider.

If employees take advantage of this informational asymmetry by changing their behaviour because of insurance coverage, there is said to be a moral hazard. For example, the extent of back pain is generally accessed through the workers' self-report of pain. If her disability benefits were as high as her wages, and a worker doesn't like her job or her work supervisor, then she may choose to stay away from her job longer after the onset of back pain symptoms than she would in the absence of the insurance coverage. Partial insurance coverage,

discussed above, is one way insurance attempts to limit such moral hazard by making the insured employee bear some of the cost of being away from work.

Another mechanism for limiting worker moral hazard would be to involve the worker in the firm's financial returns. Employee's participation in financial returns (EPFR) is measured by the number of programs through which the worker shares in the financial outcomes of the firm. To the extent that involvement with the firm's financial returns affects the worker's expected income, the worker will tend to be more cautious if the worker can increase the firm's profits (and their income) by doing so. In experience-rated firms, for example, workers could reduce insurance premiums by filing fewer claims, and lower training costs and reductions in output by missing fewer days of work.

Moral hazard may also be a problem with the firm: experience rating of the firm's insurance premiums (where future insurance premiums depend on the current claims) may induce firms to deny more claims than they would in the absence of experience rating, in order to reduce their insurance costs and increase their profitability. Sharing those profits with the employees through financial participation rights lowers the incentives of firms to engage in such moral hazard behaviour as well.

Involving workers in the firm's financial returns also increases workers' willingness to provide information concerning effective changes in HRM policy and practice. To the extent that this increases the returns to safety investments, or lowers the costs of safety investments, accident-rate will fall. The demand for safety by workers may also increase if participation in financial returns increases workers' wealth, and this lowers willingness to bear workplace risk.

However, an increase in financial returns may increase accidents as well. If bearing more risk increases the expected profitability of the firm greater than the perceived costs of the extra risks (i.e., working without some possibly cumbersome safety guards, or working long hours without rest, for example), then the employee may actually have less incentive to take care and injuries and injury claims may rise.

Finally, participation in financial returns may be ineffective in lowering workplace safety costs because of the free rider problem: each worker perceives that their contribution to firm safety is negligible, and if that effort is costly, they will let others take care while they do not. But to the extent that all feel this way, no one takes care and the effects of employee participation on safety outcomes will be muted. For example, a worker with some low back pain symptoms may not file a claim if they thought they would bear the full costs of the claim. But if they file the claim, they realize that they gain the full benefits but share (indirectly) in only a fraction of the costs. The 'extent of ownership' may be too small to overcome the 'free rider problem,' and moral hazard claims may be filed even if there is some involvement with the financial returns of the company.

Employee participation in decision making (EPDM) may help to diminish the free rider potential by increasing workers' involvement and lowering the incentives for workers to engage in opportunistic behaviours: peer monitoring pressures, for example, may be one EPDM mechanism through which free riding is reduced.

## DATA AND METHODOLOGY

This study matches a survey of human resource and safety practices of 121 companies to workers' compensation indemnity claims to estimate the impact of various aspects of the workplace environment on workers' compensation costs per worker. Sample firms are all located (and operated) in the state of Minnesota, U.S.A. in 1998, and the data cover the period of 1996-1998.

To partition HRM effects into frequency and duration components, we use a grouped (to the firm level) linear probability model to analyze claim frequency. The aggregate (to the firm-level) linear probability-regression for claim frequency takes the following form:

$$\text{claim frequency} = X\beta + M\delta + Hy + D\alpha + Z \cdot D\theta + \varepsilon$$

- where X = industry and workforce characteristics,  
 M = management culture variables  
 H = other human resource practice variables  
 D = downsizing dummy variable  
 Z = vector of both M and H variables

The linear probability model in the equation implies that the error term,  $\varepsilon$ , will be heteroskedastic (Maddala, 1983, p. 28). Hence, the estimation of equation (1) will account for this heteroskedasticity by employing White's heteroskedastic-consistent covariances in the results reported below. The coefficient vector  $\delta$  will capture the direct effects of management culture on claims, while the coefficient vector  $\gamma$  of the HRM practices will capture the direct effects of employee participation practices on claim frequency. Effective management culture or HR practices will generally reduce claim frequency, so we expect a negative coefficient for management culture variable, given the findings by Hunt and Habeck (1993).

The duration regression, which controls for the right censoring of lengthy claims still in progress, and follows a specification mir-

$$\log(\text{duration}) = X\beta + Hy + D\alpha + \cdot D\theta + \varepsilon$$

where the error term,  $\varepsilon$ , is such that the duration distribution comes from the Weibull distribution (McDonald and Butler, 1990). The duration will be fit for those claims with lost work time, consistent with our focus on the impact of these practices on the expected lost time costs of workers.

By estimating equations claim frequency and duration separately, we will be able to detail the paths through which workplace characteristics affect workers' compensation claim frequency, as well as which workplace characteristics affect workers' compensation claim duration. Thus, we will be able to parcel the impact of alternative safety strategies on whether it principally affects loss prevention or loss reduction. Our hypotheses are given above: greater financial involvement in the firm's outcomes or greater involvement in the formation and execution of the firm's safety program will lower workers' compensation costs. We also expect that the management culture variables will have a statistically significant impact on claim frequency, but may or may not affect claim duration. The reason for this latter effect is that a change in claim frequency that differentially affects short term claims, will change *observed* claim duration even if the extant claims don't change their duration: if there are fewer short-duration claims, for example, average claim duration will increase. We anticipate that involvement in firm decision-making will ameliorate the impact that downsizing has on workers' compensation costs.

## EMPIRICAL RESULTS

### *Claim Frequency*

The descriptive statistics in Table 1 indicate a relatively high lost work-time injury rate (of .06), and a substantial amount of downsizing (32.6 percent had experienced downsized their workforce within 12 months of the sample survey date) reflecting the dynamics of the mid-size and small-size firms in the sample. Twenty five companies are represented in Table 1 and Table 2 in our analysis of claim frequency; some of these companies providing 2 or 3 years worth of data. The relatively small sample size is because the "percent of production workers" variable is missing in many of the surveys. We include percentage of production workers (and deal with the smaller sample size) in the analysis, however, because it is the best proxy we have for occupational differences—and hence, intrinsic workplace risk—between firms, a factor that we feel is important to control for in our analysis for reasons mentioned previously.

The values of the HRM variables indicate a relatively high rate of employee and management involvement in the safety efforts of the firm. The management culture, MGTCULT, variable in Table 1 provides an index of management's relative involvement in the company's safety programs, and as in the last chapter, the mean score for MGTCULT of 23.01 indicates a relatively high level of management involvement in safety among these firms. INFOSHR is another index created from six variables indicating the extent of information sharing with employees concerning investments, production, human resource planning, profit-ability, corporate finance, and work-place safety. The highest possible level of information sharing would receive a score of 30, the lowest a score of five.

The mean score of about 19 indicates that management shares a significant amount of information, but not all of it.

Recall that EPDM is the sum of eight dummy variables indicating whether the firm allows employee participation in the following decision-making activities: suggestion system, quality circles, self-managing work teams, joint labor-management committees, quality of work life program, total quality management program, job redesign, and employee representation on the board of directors. The mean score of 2.63 indicates that the average firm in this part of the analysis uses less than three of these eight HR decision-making practices. While EPDM indicates how many decision-making activities that the workers participate in, EPDEG indicates the intensity of worker involvement: the mean score of 8.01 indicates that workers are reported to participate rather intensely in those decision making activities that they are involved with. So while workers are not involved in too many strategic decision making activities, they are intensely involved with those in which they are allowed to participate.

Similar to EPDM, EPFR is the sum of 10 dummy variables indicating whether the firm allows employee participation in the financial returns of the firm including: individual incentive plans, cash profit-sharing plans, gain sharing, pension plans, stock purchase plan, employee stock ownership plan, deferred profit-sharing plan, skill-based pay, 401k plan, group bonus plan. The mean score of 2.125 indicates that, on average, the firms in the frequency analysis only offer two of these 10 options to participate in the financial returns of the firm.

Given the prior results cited in the literature above, our expectations are that higher values of these HRM variables will generally lower claim frequency. Which HRM practices actually lower claim frequency, and by how much, is an empirical issue addressed in Table 2.

Since the results in the far left-hand column of Table 2 come from a linear probability model, they are readily interpreted as the change in the probability of an injury given a unit change in the corresponding regressors. (Since the specifications in the two right hand columns involve "injury severity" measures rather than injury frequency, they will be discussed below.) For example, unionized workplaces have a four percent lower frequency of injuries than non-union workplaces. A 10 percent increase in the number of production employees results in a .9 percent increase in the injury rate. An increase in the injury rate accompanying the addition of more production employees is expected as production employees engage in riskier work activities than managerial works. The union effect is more difficult to interpret: unions tend to enforce safety standards at work more than non-union workplaces, which would explain why unions might decrease the injury rate. However, unions tend to form in worksites that are intrinsically more dangerous, so that on the basis of sample selection you might expect a positive coefficient here.

The strongest effect among the control variables, however, is that of female workers. About half of the workers in our frequency are female employees (47.65 percent), our results suggest that increasing this by 10 percent (to 57.65 percent) would decrease the

**Table 1. Descriptive Statistics: Firm-Level Analysis (1996-1998 Claims)**

<i>Variable</i>	<i>Definition</i>	<i>Mean</i>	<i>St. Dev</i>
<i>Dependent Variables</i>			
INJINC (Injury Incidence Rate)	The number of workers' compensation claims per employee	0.060	0.256
INJSEV1 (Injury Severity Rate 1)	The number of lost work days per employee	0.784	1.992
INJSEV2 (Injury Severity Rate 2)	The number of lost work days per injury	18.616	31.425
<i>Downsizing</i> DOWNSIZE	A dummy variable coded 1 if the claimant's company experienced layoff or cutbacks in the last 12 months, 0 otherwise	0.326	0.470
<i>HRM Variables</i>			
EPDM	Score of the employee participation programs in decision-making process (number of programs)	2.631	1.473
EPFR	Score of the employee participation programs in the firm's financial returns (number of programs)	2.125	1.211
MGTCULT	Score of the management commitment on the workplace safety	23.011	2.896
EPDEG	Score of the degree of employee's participation in the company's decision-making process	8.011	1.256
INFOSHR	Score of the degree that management shares information with employees on the various issues in the production process	18.895	5.079
<i>Control Variables</i>			
UNION	A dummy variable coded 1 if the workplace is unionized, 0 otherwise	0.745	0.437
PCTWOMEN	Percentage of women employees	47.654	34.647
PCTAGE(25-54)	Percentage of employees of age between 25 and 54	68.307	15.800
PCTPROD	Percentage of production employees	73.396	17.230



injury rate by 2 percent. A full one standard deviation increase in the percentage of female workers (that is an increase of 34.6 percent) would decrease the injury rate by 7 percent.

The negative coefficient on the downsizing dummy variable suggests that sample selection and moral hazard mitigates the filing of additional claims. For those already on a lost time claim, the effect of downsizing is to increase claim duration (as indicated by the 3.57 coefficient in the right hand column of Table 2 for aggregated firm results). However, while claim duration increases for extant claims, claim frequency falls in those firms experiencing layoffs; either downsizing selectivity retains workers least likely to file a claim (sample selection), or workers won't file claims for fear of being included in the next round of layoffs (i.e., there is a "moral hazard" that lowers the firm's safety costs). However, the downsize effect is relatively small: downsized firms only have 3.2 percent lower rate of injury than firms that did not downsize though the difference appears to be significant at the 5 percent level of significance.

The human resource management practice variables in the right hand side column of Table 2 pretty much have the expected signs with statistically significant impacts on the claim rate. The intensity of worker involvement (EPDEG) does not affect claim frequency (the -.002 coefficient is statistically insignificant). More information sharing seems to increase the injury rate: a standard deviation increase in the value of the INFOSHR variable (from 20 to about 25), increases claim frequency by 2.5 percent. On the other hand, a standard deviation increase in employee participation in decision making decreases claim frequency by 1.5 percent, while a standard deviation increase in employee participation in financial returns decreases the injury rate by 3 percent. A standard deviation increase in management's involvement as measured by MGT CULT results in a 3.5 percent decrease in the claims rate.

### **DURATION OF NON-WORK SPELLS**

Table 2 shows that employee participation programs in the firm's financial returns significantly reduces the duration of non-work spells due to workplace injuries. Such positive effects from EPFR were consistent for per employee and per injury non-work spells.

The table also shows that employee participation programs in decision-making process is negatively associated with the length of lost workdays, however without conventional level of statistical significance.

A striking result is that EPDEG has mixed effects on the duration measures; significantly reduces the per employee lost workdays and significantly increases per employee non-work spells. The sample in Table 2, as previously noted in the discussion of the descriptive statistics, is limited to those reporting a full set of control variables (union, percentage women, percentage young, percentage production employees).

**Table 2. The Effects of Human Resource Management Policies on Workplace Injuries (Firm-Level Analysis: Full Model Adjusted for Asymptotic Covariances)**

	<i>Dependent Variable: The number of workers' compensation claims per employee</i>	<i>Dependent Variable: The number of lost work days per employee</i>	<i>Dependent Variable: The number of average lost work days due to injury</i>
Constant	0.304** (0.141)	1.044 (2.883)	-50.065 (40.872)
<i>Downsizing</i>			
DOWNSIZE	-0.032** (0.019)	-0.072 (0.390)	3.753 (3.795)
<i>HRM Variables</i>			
EPDM	-0.012** (0.006)	-0.119 (0.149)	-1.017 (2.428)
EPFR	-0.014*** (0.006)	-0.203** (0.115)	-2.154* (1.461)
MGTCULT	-0.012* (0.007)	-0.010 (0.165)	3.012* (2.052)
EPDEG	-0.002 (0.007)	-0.312** (0.163)	3.151* (2.111)
INFOSHR	0.005** (0.003)	-0.021 (0.097)	-0.813 (1.588)
<i>Control Variables</i>			
UNION	-0.040*** (0.017)	0.017 (0.459)	10.603* (6.785)
PCTWOMEN	-0.002*** (0.0007)	-0.020 (0.013)	-0.031 (0.131)
PCTAGE(25-54)	0.0001 (0.0006)	-0.029 (0.019)	-0.508* (0.321)
PCTPROD	0.0009* (0.0006)	0.017 (0.011)	0.270** (0.134)
Year Dummies	yes	yes	yes
Industry Dummies	yes	yes	yes
F Value	2.608***	1.007	0.769
n	78	78	54

Notes:

-Estimated heteroskedastic consistent standard errors are in parenthesis

-Statistical significance levels are denoted as follows:

\* - 0.1 level

\*\* - 0.05 level

\*\*\* - 0.01 level

## CONCLUSION

We estimate the direct and indirect impacts of the corporation's safety environment, broadly measured, on the firm's lost workday costs due to injury. In particular, we examine how lost workday costs vary along different human resource management (HRM) dimensions: 1) the extent and intensity of employee's decision-making involvement and the level of employee's financial involvement in the company's performance, and 2) indices of management's commitment to workplace safety and the extent of their information sharing. The estimated strength of these effects will be calculated by their coefficients in claim frequency and claim duration regressions, and then be related to their implied safety benefits.

Our aggregated firm-level analysis showed that, in essence, recent work organizational change which involved employee participation programs in decision-making and/or financial returns were positively related with workers' compensation insurance system outcome. In particular, both decision-making and financial return participation programs significantly reduced claim-filing rates in the workers' compensation system. Also, employee participation plans in the firm's financial return significantly reduced both per employee and per injury lost work days. As noted in the hypotheses section of this paper, both type of employee participation programs expected to have mixed effects (i.e., either positive or negative) on the workplace safety and claim-reporting behavior in the workers' compensation system. Our empirical results show that positive effects from employee participation programs dominated negative effects on the work-place safety.

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