Relations industrielles
Industrial Relations

Unions and New Office Technology

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Volume 54, numéro 2, 1999

URI : https://id.erudit.org/iderudit/051234ar
DOI : https://doi.org/10.7202/051234ar

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Éditeur(s)

Département des relations industrielles de l'Université Laval

ISSN

0034-379X (imprimé)
1703-8138 (numérique)

Découvrir la revue

Citer cet article

Gattiker, U. E. & Paulson, D. (1999). Unions and New Office Technology. *Relations industrielles / Industrial Relations*, *54*(2), 245–276. https://doi.org/10.7202/051234ar

Résumé de l'article

Deux raisons expliquent l'importance de l'implantation de changements technologiques pour les syndicats : (1) l'adoption de nouvelles technologies peut accroître la productivité de l'entreprise et, partant, amener une meilleure sécurité d'emploi et de meilleurs salaires aux membres ; (2) les syndicats peuvent exercer une influence majeure sur le processus d'adoption en facilitant ou en retardant l'implantation fructueuse de la technologie (e.g., Templer et Solomon 1988; Solomon et Templer 1992).

Il y a, à ce jour, peu de recherches qui s'attardent à la complexité de la gestion efficace des changements technologiques dans les bureaux. La plupart des études s'intéressent à la façon dont les changements technologiques affectent les cols bleus. Il en existe cependant quelques unes portant sur les différences entre cols bleus et travailleurs de bureau eu égard à l'implication syndicale (e.g., Thacker et al. 1991). Même si l'influence des syndicats sur les changements technologiques peut être limitée (e.g., Keefe 1991), ou de nature surtout consultative (e.g.,-Keefe et Bansler 1993), ils peuvent quand même influencer les attitudes et les perceptions des travailleurs à cet égard (Fenwick et Oison 1986; Kelley 1989).

Nous présentons ici une étude empirique qui cherche à établir : (1) si les cols blancs dans les bureaux, selon qu'ils soient ou non syndiqués ou gestionnaires, ont une perception différente de ce que devraient faire les syndicats lors de l'introduction de changements technologiques ; (2) si des sujets de capital humain (par exemple, l'amélioration de la qualification professionnelle) ont un effet important sur la façon dont les usagers perçoivent ce que devrait être la réaction syndicale ; (3) si les caractéristiques individuelles des usagers et les variables sectorielles et organisationnelles influencent leur évaluation de ce que devrait être la réaction syndicale lorsqu'une nouvelle technologie est introduite sur les lieux de travail. Cet article se veut une contribution importante à la recherche sur les technologies, les qualifications et les relations industrielles parce qu'il applique des approches de capital humain, d'attitudes et de relations industrielles au domaine de la bureautique. Cet article veut aussi combler un vide dans la documentation en relations industrielles et améliorer notre compréhension de l'adaptation à la technologie et aux changements chez les cols blancs.

Nous répondants incluent des employés syndiqués et non syndiqués ainsi que leurs gestionnaires : 75 employés syndiqués (52,1 %), 36 non syndiqués (25 %) et 27 gestionnaires (18,75 %). En outre, 46 % de l'échantillon travaillait dans le secteur privé (voir le tableau 5 pour plus d'information). Pour être inclus dans cet échantillon, tous les répondants devaient avoir travaillé pendant plusieurs années avec différentes technologies (i.e., ordinateurs) et leurs applications ou avec des systèmes d'information.

Nos résultats démontrent quelques différences entre les employés syndiqués et non syndiqués. Les premiers étaient d'avis que si les salaires et les avantages s'amélioraient, le syndicat devait accepter le changement technologique. De façon surprenante, les non-syndiqués et les gestionnaires croyaient que les syndicats devaient être prudents. Les gestionnaires ajoutaient cependant que si les salaires et les avantages étaient accrus, les syndicats devaient accepter le changement technologique. De plus, pour les syndiqués, le revenu est un prédicteur de l'acception du changement technologique alors que la sécurité d'emploi influence la volonté de s'adapter à tel changement. Les gestionnaires du secteur public avaient moins tendance à accepter le changement technologique que leurs collègues du secteur privé. Les employés non syndiqués, eux, étaient prêts à accepter le changement technologique si leur revenu était accru.

Notre analyse repose sur des hypothèses typiquement ignorées des modèles de ressources humaines, de systèmes d'information et de relations industrielles. L'analyse suggère la présence de certaines différences et similarités importantes entre groupes d'employés lorsque nous distinguons entre des répondants syndiqués, non syndiqués ou gestionnaires.

En résumé, cette étude présente, à tout le moins, un début de preuve à l'effet que les cols blancs canadiens croient que les syndicats ont quelque crédibilité et pouvoir de négociation dans la protection des intérêts des travailleurs. Malheureusement, la réalité n'est peut être pas aussi rose que les croyances de ces travailleurs vu le nombre limité de clauses dans les conventions collectives portant sur les changements technologiques.

Unions and New Office Technology

URS E. GATTIKER
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To explain white-collar workers' expectations about what unions should do when technological change occurs in the workplace, two attitude scales were used. The data indicate that the industries in which employees works as well as their perception about whether computerized technology makes their job rewarding or creates de-skilling are all significant predictors of their attitude regarding a union's decision to accept or resist technological change. Income, hierarchical level, industry, job task, whether the computerized technology makes the job interesting, and whether the computerized technology is required to perform the job are significant predictors of an employee's attitude regarding a union's function to assist an employee to adapt to technological change. Non-union members and managers, in contrast to union members, appear to be concerned primarily about (1) bread-and-butter issues (e.g., wages, benefits, job security) and (2) quality of work issues (e.g., skills, training, and safety) and, therefore, somewhat less likely to feel positive about a union that accepts and helps workers adapt to new office technology.

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- The authors would like to thank Helen Kelley for her extensive help on an earlier version of this paper and Shamsul Alam for his statistical advice. Thanks also to Toby Lermer, LeWayne Howg, and Tom Watts who were instrumental in collecting, coding, and entering the data. Finally, we thank Jodi Preston for her editorial assistance. The usual disclaimers apply. Financial support for this research project was provided to the second author (principal investigator) by the Social Sciences and Humanities Research Council of Canada (Contract no. 494-86-003) and by a grant from the Alberta Manpower Program (Contract no. 083080). The analysis and conclusions of this paper represent those of the authors and do not necessarily reflect the view of the funding agencies.

† This paper was completed long after Dan's tragic death. However, Dan participated in the design of the study and was a wonderful colleague to all of us. He is truly missed and we dedicate this research to his memory.

According to a major study by the Economic Council of Canada, the effective implementation of technological and organizational innovation requires that all of the participants (e.g., government, management, union and workers) play an active role in promoting the value of the new technology (Peirce 1987: 80-97). For unions, the implementation of technological change is important for two further reasons: (1) adoption of technology can increase the firm's productivity, which can result in better job security and wages for their members; and (2) unions can exert a major influence on the adoption process, thereby either facilitating or hindering the successful implementation of technology (e.g., Templer and Solomon 1988; Solomon and Templer 1992).

To date, there has been very little research into the effective management of technological change in office settings; instead, most research concentrates on how technological change affects blue-collar workers. Nonetheless, some research highlighting the differences between blue-collar and office workers, as far as union commitment is concerned, has been conducted (e.g., Thacker et al. 1991). Although union influence over technological change may be limited (e.g., Keefe 1991) or primarily advisory in nature (e.g., Kraft and Bansler 1993), unions can have an impact on workers' attitudes and perceptions about technological change (Fenwick and Olson 1986; Kelley 1989).

This paper reports on an empirical study that investigates employees' perceptions of whether unions should *accept* or *resist* technology-induced organizational change and examines workers' views regarding whether and how the union should assist employees in *adapting* to technological change. The paper also explores how certain variables – demographic, human capital, unionization, industry-sector, job characteristics, employees' perceptions of technology-attributed effects on work, and whether a firm encourages the use and acceptance of new office technology – may relate to employees' views of the appropriate role for unions. Finally, the paper investigates potential differences between unionized and non-unionized employees and their managers/supervisors.

The paper is organized as follows. First, the theoretical background is discussed and the research questions to be tested are presented. Next, the development of the research instrument and data collection methods are outlined. The results of the research are then presented. We conclude the paper by summarizing the key findings and contributions. We also suggest future research directions, highlight implications for management, and describe the limitations of the research.

THEORETICAL BACKGROUND AND RESEARCH QUESTIONS

The popular press reports frequently about technology-related lay-offs and job losses. The ever greater use of technology in the workplace makes

the acceptance of and resistance to new technology an important issue for organizations, unions and researchers alike (Gattiker and Larwood 1986). This study seeks to shed some more light on these issues by comparing the opinions of union members, other employees and managers regarding the circumstances in which unions should accept technology and how they might be able to help workers to adjust. Although it is sometimes assumed that unions and their members agree about how the union should act, misunderstandings can result, leading to unnecessary labour unrest (cf. Hundley 1989). Consequently, a better understanding of the attitudes of union and non-union members, as well as those of managers, regarding the circumstances in which a union should accept technology and how it can help employees to cope effectively with technology-induced change is required in order to avoid misunderstandings and unnecessary labour conflicts.

Adaptation and Acceptance of New Office Technology

The importance of employee attitudes concerning when unions should accept new office technology and how unions should facilitate their members' adaptation to technological changes in the workplace, can draw support from four separate findings. First, Pratkanis (1989: 92) stated that attitudes are "excellent predictors of conceptual cognitive processes, reliably determining how individuals make sense of their social world". Second, employees' interpretations of identical tasks and work situations can be substantially different (O'Reilly, Parlette and Bloom 1980), which suggests that while an employee may interpret new office technology positively, an outside observer may not (e.g., Spenner 1983). Third, studies indicate that attitudes are constant over time and across situations (Staw and Ross 1985; Staw, Bell and Clausen 1986). Finally, attitudes have been shown to influence behavioural outcomes such as absenteeism and turnover (e.g., Mobley 1982), union grievance behaviour (Kochan, Katz and McKersie 1986), as well as strike behaviour (Godard 1992). A systematic measurement of perceived job and work characteristics and employee attitudes about technology is needed (e.g., Wall et al. 1987). The potential effect of technology upon what union members and other employees expect from a union, as far as acceptance and support are concerned, remains to be answered (cf. Wall and Davids 1992).

Short-term enthralment with office technology. Much of the recent research has dealt with technology and work changes on the shop-floor. Rarely has research tried to learn more about these issues in office settings (e.g., Attewell 1987; Bikson, Gutek and Mankin 1987; Gattiker, Gutek and Berger 1988; Littek and Heisig 1991). Another concern is that research has concentrated on assessing employee attitudes either during or immediately after major technology-related work changes occur, primarily, in factory-type

settings (e.g., Adler 1991). Some researchers have suggested that short-term enthralment with office technology subsides over time, and correspondingly, workers' positive attitude about the technology may decline (e.g., Stevenson 1989: 8). This suggests that research addressing technological-change-related outcomes in office settings not immediately before, during, or after a major change, may help in further clarifying some union and employee attitudes and strategies regarding technology (Littek and Heisig 1991).

Union acceptance of or resistance to technological change. What is of interest, in context, is how workers (both union and non-union members) perceive a union's position when it comes to technological change. For example, when should the union accept and support or resist technology-related changes in the workplace (cf. Fenwick and Olson 1986)? Templer and Solomon (1988) reported that a key reason why Canadian unions accept technological change is that technology matches management's expertise with the union knowledge of that particular technology (e.g., data bases). Many commentators suggest, however, that benefits (extrinsic and intrinsic) will drive employees' acceptance of or resistance to technology.

Union helping workers to adapt to technological change. Braverman (1974) and others proposed that technology would result in de-skilling of employees. However, other studies have found that as applications expand and diversify from unskilled into skilled jobs, including clerical positions, employees may obtain additional skills (Littek and Heisig 1991). Research has shown that automation in office settings may increase workers' skill levels and job autonomy (e.g., Attewell 1987; Cappelli 1993). Unions have tried (often successfully) to bargain for improved job security and safety (e.g., Betriebsrat, Max-Planck-Institut für Bildungsforschung 1988) as well as for increased skill levels for performing the job (e.g., Kelley 1989) when new office technology is introduced. In turn, if unions address these concerns for their membership, the adaptation of new technology by union members will be facilitated (e.g., Berger, Olson and Boudreau 1983; Fiorito, Gallagher and Fukami 1988).

Attitudes of union, non-union and managerial personnel. McLaughlin (1979) reported that five categories of union attitudes toward technological change may be identified, namely (1) encouragement, (2) willing acceptance (positive effects on wages, quality of work life and training), (3) adjustment (e.g., job security, safe work environment and no de-skilling), (4) competition, and (5) opposition. Nearly half of the unions concerned indicated a "willing acceptance" of technological change, whereas approximately a quarter indicated "adjustment" (i.e., help members to adapt and change through training and other cushions against possible negative effects from technology). A Canadian study (Peitchinis 1983) reported that union attitudes can be best characterized as conditionally positive. American findings (McLaughlin

1979) indicate that acceptance or adjustment typically characterized unions' attitudes toward technological change (Peitchinis 1983).

Unionism is usually regarded as providing workers with a mechanism for protection against opportunistic behaviour by the employer, while being able to negotiate the conditions needed to facilitate acceptance of and adjustment to the introduction of new office technology (Littek and Heisig 1991; Peitchinis 1983). Non-unionized employees are, in contrast, less protected and more vulnerable to lay-offs and other undesirable consequences of technological change (cf. Hundley 1989). Recent experience in corporate restructuring and retrenchment indicates that this applies mainly to management personnel. This raises the following question:

Question 1. Do unionized employees' attitudes, regarding when a union should accept technological change and how a union may be able to help its members adapt to technological change, differ from those of non-unionized employees and managers?

This question raises two other significant issues: Are the views of all employee groups similar regarding (1) how and when the union should accept technology (i.e., control of opportunism and shirking by the employer, i.e. taking advantage of the situation while avoiding sharing benefits such as profits and cost savings with workers) and (2) what the union should do to help workers adjust? Fiorito, Gallagher and Fukami (1988) suggests that union satisfaction is greatly affected by the union's success in negotiating bread-and-butter issues (e.g., wages, training and upskilling of jobs). These questions and issues are obviously important to the future of technological change for management and unions and for collective bargaining strategies; however, how they relate to the area of technology remains unclear (Templer and Solomon 1988).

Demographic, human capital, structural and job characteristic variables. The importance of demographic variables in management, psychological, and sociological research is well established (e.g., Zedeck and Cascio 1984). Human capital variables have been used extensively to explain earning differentials by race and gender (Strober 1990). Industry-sector and unionization may also relate to various issues, such as job attributes and organizational change strategies, that have been documented (e.g., Hundley 1989; Chaykowski and Slotsve 1992). Demographic, human capital, and structural variables might provide us with some insights into the still unclear relationship between, for example, gender or education and employee attitudes regarding unions and new office technology. Research also indicates that a systematic measurement of perceived job characteristics and employee attitudes toward new office technology is needed (e.g., Wall et al. 1987). This raises the following question:

Question 2. Are workers' attitudes concerning the conditions under which a union should accept technological change, and a union's ability to help members adapt to technological change affected by:

a) demographic variables;

b) human capital and structural variables;

c) sector and union variables; and

d) job characteristic variables?

Technology and its perceived relationship to work, job skills and organizational factors. Some studies suggest that technology does not automatically lead to de-skilling of the worker (e.g., Attewell 1987; Cappelli 1993; Zicklin 1987) whereas others claim that it does (Braverman 1974; Glenn and Feldberg 1982; Smith 1991). Research also indicates that skill issues, such as job complexity and autonomy, are likely to affect a union member's satisfaction with his or her union (Fiorito, Gallagher and Fukami 1988). Canadian workers believe that unions can influence their work situation positively in regards to wages, benefits, working conditions and job security (Kuruvilla, Gallagher and Wetzel 1993). This would suggest that, if these working conditions are satisfactory to workers, unions should be able to facilitate their members' acceptance and adaptation of technological change.

Other research has reported that union commitment is influenced more "by the proximal, micro-level work situation than the larger economic, political, and cultural systems" (Thacker et al. 1991). Hence, an organization's efforts to facilitate change, an organizational culture that encourages the adoption of new technology, and a work structure that requires the use of technology to perform job tasks may also facilitate workers' acceptance of technological change (Bikson, Gutek and Mankin 1987). One would suspect that an employee's perception of a union's acceptance and assistance in employee adaptation would be positively affected by these issues. However, this proposition needs to be tested.

Question 3. Are workers' attitudes concerning the conditions under which a union should accept technological change and a union's ability to help union members adapt to technological change affected by:

a) technology that is required to perform job tasks;

b) technology that may create up-skilling or de-skilling;

c) organizations that encourage the use of the technology; and

d) organizations that accept technological change?

Comparing unionized, non-unionized employees and managers. Research indicates that members' satisfaction with their union depends upon the latter's success in negotiating collective agreements that satisfy requirements

of salary and benefits, as well as favourably addressing quality-of-work issues such as job features (e.g., job is complex, interesting offers status) (e.g., Fiorito, Gallagher and Fukami 1988). The industrial relations literature indicates that, when introducing new technology, non-unionized organizations accentuate the creation of new jobs and job redesign whereas unionized organizations stress control and job cutting features (Templer and Solomon 1988). Kelley (1989) reported that with the introduction of new technology, non-unionized workers have a higher probability of experiencing up-skilling than do unionized employees. In the present context, what is of interest is to learn more about how these effects may differ between unionized employees, non-unionized employees and managers working in an office environment utilizing technology.

Question 4. Are unionized employees' attitudes concerning the conditions under which a union should accept technological change, and a union's ability to help members adapt to technological change affected differently than the attitudes of managers and non-unionized employees when studying the effects of:

a) demographic variables;
b) human capital and structural variables;
c) sector and union variables;
d) job characteristic variables;
e) technology that is required to perform job tasks;
f) technology that may create up-skilling or de-skilling;
g) organizations that encourage the use of the technology; and
h) organizations that accept technological change?

In summary, this paper focuses on attitudes, skilling, human capital and acceptance/resistance issues in the context of the introduction of new office technology. Specifically, this empirical study investigated the following issues: (1) whether the attitudes of white-collar workers in office settings regarding what unions should do when new technology is being introduced varied according to their membership in the union or in the management structure; (2) whether human capital issues (e.g., skills upgrading) have an important effect upon the attitudes of users towards union response; and (3) whether individual characteristics of users, sector and organizational variables affect their assessments of how unions should proceed when new technology is introduced. This study represents a contribution to research on technology, skills and industrial relations because it extends human capital, attitudinal and industrial relations approaches to the office technology domain, it addresses a gap in the IR literature, and it broadens our understanding of technology adaptation and change for white-collar workers.

METHOD

Design and Subjects

Individuals from both federal and provincial government agencies and firms in Western and Central Canada were asked to participate in this study. The data collection process initially involved requesting department supervisors or employers for their cooperation in the distribution of surveys to employees. Employees were then asked by the researchers if they were willing to participate in the study. The researchers gave each employee who responded positively a survey to complete and return directly to the researchers.

Of approximately 300 individuals asked to participate in the study, 153 employees ultimately agreed to participate and 144 completed surveys were returned (74.5 percent of the 193 surveys originally distributed). Respondents included both unionized and non-unionized employees and their manager: 75 unionized employees (52.1 percent), 36 non-unionized employees (25 percent) and 27 managers (18.75 percent). Forty-six percent of the sample worked in the private sector (see Table 5 for more descriptive information). To be included in this sample, all respondents were required to have worked with various technologies (e.g., computers) and application software (e.g., a spreadsheet) and/or information systems for several years. This eliminated any possible short-term enthralment with office technology, which may have been a threat to the validity of the results (Stevenson 1989: 8).

Several factors must be considered with mailed surveys: (1) respondents, who choose to, will complete the questionnaire (Pitkow and Becker 1994); (2) the characteristics, behaviours and/or attitudes of the respondents are relevant to the study (Christensen 1991: 100); and (3) sampling procedures are used to minimize the extent of sampling bias (Christensen 1991: 101). Using the sampling procedures described above, we achieved a stratified sample that met the generally accepted threats to robustness of our data (Tabachnick and Fidel 1983: 230).

Instrument

Participants completed a questionnaire that assessed attitudes about technology-related issues in the areas of wages, benefits, working conditions, and possible up-skilling and de-skilling effects. Questions pertaining to the conditions under which a union should accept technology and a union's potential ability to assist employees to adapt to technological change were also included. The questions pertaining to unions and technology were based on an extensive literature review of union satisfaction studies and technological implementation and change studies.

The union and technology portion of the survey consisted of several sections (see Table 1 for a list of the questions). The first section queried employees as to when he or she felt a union should *accept* technological change. The second section questioned how the union could help the employee *adapt* to technological change. Questions regarding the employee's attitude about the union and technology were surveyed using a five-point Likert-type scale, ranging from (1) "disagree completely" to (5) "agree completely".

To obtain the independent factors, orthogonal varimax rotations were done with the items listed in Table 1. Eigen values greater than 1.0 were used to determine the number of factors for orthogonal varimax rotation and interpretation (Kaiser 1974). Comrey (1973) categorizes factor loadings in the following manner: (1) loadings greater than .71 are considered excellent; (2) loadings between .71 and .63 are considered very good; (3) loadings between .62 and .55 are considered good; (4) loadings between .54 and .45 are considered fair; and (5) loadings between .44 and .32 are considered poor (Tabachnick and Fidell 1983: 411). Using a conservative approach, only items loading greater than .55 were considered for the two factors labelled ACCEPT and ADAPT.

Next, a reliability analysis was performed. According to Nunnally (1978: 246), during the early stages of statistical formulation reliability coefficients greater than .70 are suggested as the desirable minimum for constructs. This level was attained in both of the dependent scales for the combined, union data, and non-union data sets (see Table 1).

Another section of the survey listed several items pertaining to job characteristics, technology attributes and culture, as well as technology, work structure, and organizational acceptance as viewed by the participants (see Table 2 for the complete set of questions). The procedure described above was used for the factor analysis and selection of items (Comrey 1973; Kaiser 1974). Reliability scores obtained for each scale are listed in the right-hand columns of Table 2.

Empirical Model and Analyses

Literature dealing with members' union satisfaction and union commitment contends that demographic, human capital and structural variables have resulted in mixed and inconclusive results (e.g., Berger, Olson and Boudreau 1983). The literature also suggests that job features (e.g., responsibility) and job tasks facilitate the explanation of a person's attitude or disposition towards a union (e.g., Lincoln and Boothe 1993; Thacker et al. 1991). An industry-sector variable and a variable measuring unionization (see Table 3) were added to the equation (e.g., Hundley 1989). To date,

TABLE 1

Items Used to Define the Two Scales for Unions and Technology Attitudes

Scale Items	*Item-total Correlation*				*Cronbach's Alpha*			
	Combined Data Set	*Union Employees*	*Non-union Employees*	*Managers Data Set*	*Combined Employees*	*Union Employees*	*Non-union*	*Managers*
Accept:								
A union should accept technological change only if:								
Proper training is provided	.6567	.5796	.6398	.7737				
Organization's profits increase	.5834	.4700	.6750	.6756				
Improves employees' quality of work life	.6939	.5424	.8328	.6924				
Present employees' jobs are not lost	.6532	.5507	.8018	.6103				
Employees' wages are increased	.6159	.4969	.7565	.5224	.8378	.7602	.8933	.8446
Scale Means					.68	.80	.37	.52
Standard Deviation					.47	.41	.49	.51
Coefficient Variation					.6912	.5125[3]	1.3243[1]	.9808[2]
Adapt:								
A union can help the employee to adapt to technological change by ensuring:								
Employees receive adequate training	.4870	.4959	.5594	.4908				
Employees will not lose their jobs to technology	.6992	.5502	.8303	.6646				
Employees' tasks will not become tedious because of the new technology	.7512	.5685	.8601	.7870				
Union will be sensitive to job stress created by the technology	.6851	.6101	.7274	.6048				
Employees are assured that the new technology is physically safe to work with	.4998	.3061	.5935	.5456				
Employees are not de-skilled because of the technology	.8112	.7103	.8724	.7806	.8578	.7898	.9014	.8527
Scale Means					.88	.97	.78	.74
Standard Deviation					.32	.16	.42	.45
Coefficient Variation					.3636	.1649[3]	.5385[2]	.6081[1]

Note. Item-total correlations for the two scales were obtained using raw scores for each item ranging from 1 (disagree completely) to 5 (agree completely). The mean, standard deviation, and coefficient variation scores were calculated after the variables had been recoded into dichotomous variables (1 if positive response, 0 if otherwise) to permit the use of the scales in logistic regression analysis.

The coefficient variation score shows a ranking for the relative variability attained for each of the two scales indicating that 1 represents the highest while 3 represents the lowest variability.

TABLE 2

Questionnaire Items Used to Define the Eight Scales for the Independent Variables

Scale Items	*Cronbach's Alpha*			
	Combined Data Set	*Union Employees*	*Non-union Employees*	*Managers*
Job Characteristics Scales[1]				
JOBTASK: Item				
The tasks I do with my technology are usually:				
More complicated than my other work	N/A	N/A	N/A	N/A
JOBFEAT1:				
My job:				
Is complex				
Is interesting				
Is challenging				
Requires a lot of innovation/creativity				
Requires a lot of decision making				
Offers responsibility				
Offers status	.8811	.8364	.8955	.9163
JOBFEAT2:				
My Job:				
Offers clear goals				
Offers the necessary resources to perform well				
Offers regular performance feedback	.7037	.7495	.7509	.6210
Technology Attributes and Culture Scales[1]				
REQUIRED:				
The respondent was asked to answer the following questions about his or her primary technology:				
At my work I depend a great deal on this equipment				
This piece of equipment enables me to do my job more effectively				
This piece of equipment makes my work easier				
This piece of equipment supports me in my work				
I am much more effective in my work with this equipment than I would be without it				
Using this equipment makes me more productive				
This piece of equipment enables me to do my work faster				
This piece of equipment enables me to do my job more thoroughly	.8990	.8937	.8946	.8949
UP-SKILL:				
The respondent was asked to answer the following questions about his or her primary technology:				
This equipment is fun to use				
Using this piece of equipment makes my work more interesting				
I enjoy using this piece of equipment				
My productivity is controlled by this equipment				
This piece of equipment enables me to do interesting tasks at work				
The use of this piece of equipment makes my work more enjoyable				
I like doing my work with the help of this equipment	.8187	.8317	.7963	.8669

TABLE 2 (Continued)

Scale Items	*Cronbach's Alpha*			
	Combined Data Set	*Union Employees*	*Non-union Employees*	*Managers*
DE-SKILL:				
The respondent was asked to answer the following questions about his or her primary technology:				
I feel that this piece of equipment controls my behaviour at work				
This piece of equipment makes my work more demanding				
Using this equipment limits my ability to move around				
If this equipment is out of order, it prevents me from doing my work				
The use of this equipment has improved communications beyond the organization (when compared with previous methods)	.7442	.6828	.7387	.6625
Technology, Work Structure and Organizational Acceptance Scales[1]				
USEENC:				
The respondent was asked to think about his or her organization first when answering the following questions:				
I encourage my co-workers to use the computer-based technology I use the most				
I encourage my subordinates to use the computer-based technology I use the most	.8391	.8858	.9181	.9544
ORGACC:				
The respondent was asked to think about his or her organization first when answering the following questions:				
The computer-based technology I use most is easily accessible for everybody to work with				
The computer-based technology I use most is accepted in my organization				
The computer-based technology I use most is accepted by my subordinates	.6189	.5741	.6597	.4822

[1] Scales were constructed by (1) taking those items which loaded highly (greater than .55) when doing a factor analysis using orthogonal varimax rotations (cf. Comrey, 1973) and (2) averaging the scores obtained from these items ranging from 1 (disagree completely) to 5 (agree completely).

union members' attitudes about a union's acceptance of technology and the assistance it provides to workers in adapting to technology-induced changes have not been addressed by the research community. First, it is necessary to determine if demographic, human capital, job features, job tasks, sector and union variables are useful predictors of the two dichotomous dependent variables measuring unions' acceptance and facilitation of employees' adaptation to new office technology in the workplace. We can therefore estimate the logistic regression models as outlined in Table 3. Table 4 provides the reader with the variable definitions used in the study. After the effects of the above-mentioned variables on the two dependent variables have been determined, the evaluation of additional variables ("technology is

required to perform job tasks, technology creates up-skilling or de-skilling", "the organization encourages the use of the technology", and "the organization accepts the technological change") can be explored.

Table 3

Equations of Predicted Model

1) $DEPENDENT = \beta_0 + \beta_1(AGE) + \beta_2(GENDER) + \beta_3(TENURE) + \beta_4(INCOME) + \beta_5(EDUCATION) + \beta_6(POSITION) + e$

2) $DEPENDENT = \beta_0 + \beta_1(AGE) + \beta_2(GENDER) + \beta_3(TENURE) + \beta_4(INCOME) + \beta_5(EDUCATION) + \beta_6(POSITION) + \beta_7(SECTOR) + \beta_8(UNION) + e$

3) $DEPENDENT = \beta_0 + \beta_1(AGE) + \beta_2(GENDER) + \beta_3(TENURE) + \beta_4(INCOME) + \beta_5(EDUCATION) + \beta_6(POSITION) + \beta_7(SECTOR) + \beta_8(UNION) + \beta_9(JOBTASK) + \beta_{10}(JOBFEAT1) + \beta_{11}(JOBFEAT2) + e$

4) $DEPENDENT = \beta_0 + \beta_1(AGE) + \beta_2(GENDER) + \beta_3(TENURE) + \beta_4(INCOME) + \beta_5(EDUCATION) + \beta_6(POSITION) + \beta_7(SECTOR) + \beta_8(UNION) + \beta_9(JOBTASK) + \beta_{10}(JOBFEAT1) + \beta_{11}(JOBFEAT2) + \beta_{12}(REQUIRED) + \beta_{13}(UPSKILL) + \beta_{14}(DESKILL) + e$

5) $DEPENDENT = \beta_0 + \beta_1(AGE) + \beta_2(GENDER) + \beta_3(TENURE) + \beta_4(INCOME) + \beta_5(EDUCATION) + \beta_6(POSITION) + \beta_7(SECTOR) + \beta_8(UNION) + \beta_9(JOBTASK) + \beta_{10}(JOBFEAT1) + \beta_{11}(JOBFEAT2) + \beta_{12}(REQUIRED) + \beta_{13}(UPSKILL) + \beta_{14}(DESKILL) + \beta_{15}(USEENC) + \beta_{16}(ORGACC) + e$

Note. The explanations for the variables used are given in Table 4. Two scales were used (see Table 1 for further explanation) as the dependent variables labelled ACCEPT and ADAPT. Hence 10 logistic regressions were run in total.

In short, the models described above (see Table 3) follow the literature and represent regression equations with the a priori reasoning as outlined in the literature review. We currently lack (1) a testing of a model including demographic, human capital, structural, job features, job tasks as well as unionization, while (2) testing these variables relationships with the dependent variables, union's acceptance and facilitation of employees adaptation of new office technology.

RESULTS

Table 5 provides the descriptive statistics for each sample and independent variable. The coefficient of variation presents the ratio of the standard deviation to the arithmetic mean or the relative measure of dispersion for each scale and variable. This relative measure of dispersion in Table 5 shows that the highest degree of dispersion is evenly distributed among the

TABLE 4

Variable Definitions

Demographic Variables:	
AGE	Actual age of respondent
GENDER	1 if woman, 0 otherwise
Human Capital and Structural Variables:	
TENURE	Number of months with organization
INCOME	Actual annual income in $
EDUCATION	1 if post-secondary, 0 otherwise
POSITION	1 if manager, 0 otherwise
Industry Sector and Unionization Variables:	
SECTOR	1 private sector, 0 otherwise
UNION	1 unionized, 0 otherwise
Job Characteristics — Scales[1]:	
JOBTASK	One item measuring task-related variables
JOBFEAT1	Seven items measuring how interesting the job is
JOBFEAT2	Three variables assessing the intrinsic & extrinsic rewards of the job
Technology Attributes and Culture Scales[1]	
REQUIRED	Eight items measuring how much the technology is needed to perform tasks
UPSKILL	Seven items assessing the degree to which technology-mediated work led to up-skilling
DESKILL	Five items assessing the degree to which technology-mediated work led to de-skilling
Technology, Work Structure and Organizational Acceptance Scales[1]	
USEENC	Two items measuring how much the use of technology is encouraged by the organization
ORGACC	Three items measuring how much the technology is accepted within the organization

[1] Scales were constructed by (1) taking those items which loaded highly (greater than .55) when doing a factor analysis using orthogonal varimax rotations (cf. Comrey, 1973) and (2) averaging the scores obtained from these items ranging from 1 (disagree completely) to 5 (agree completely).

three groups. Unionized employees have the highest degree of dispersion for the following independent variables: *sector, technology required to perform job tasks, technology creates de-skilling,* and *the use of technology is encouraged by the organization.* Non-unionized employees have the highest degree of dispersion for the following independent variables: *age, tenure, income, job is interesting,* and *technology is accepted by the organization.* Managers have the highest degree of dispersion for the following independent variables: *gender, education, job tasks, job is rewarding,* and *technology creates up-skilling.*

Table 5

Mean and Standard Deviation of Independent Variables

Independent Variables	*Mean*			
	Combined Data Set	*Union Employees*	*Non-union Employees*	*Managers*
AGE	34.90	35.21	32.35	37.96
GENDER	.48	.62	.43	.19
TENURE	67.89	65.15	48.09	107.00
INCOME	34,574.47	33,133.33	30,833.33	43,888.89
EDUCATION	.65	.68	.67	.52
POSITION	.19			
SECTOR	.46	.25	.81	.48
UNION	.65			
JOBTASK	2.88	2.98	3.00	2.59
JOBFEAT1	3.95	3.82	3.92	4.41
JOBFEAT2	3.40	3.39	3.44	3.33
REQUIRED	3.89	3.68	4.20	3.97
UP-SKILL	3.83	3.72	3.94	3.95
DE-SKILL	2.58	2.47	2.80	2.51
USEENC	3.89	3.75	3.87	4.24
ORGACC	3.92	3.86	3.91	4.16

Independent Variables	*Standard Deviation*			
	Combined Data Set	*Union Employees*	*Non-union Employees*	*Managers*
AGE	9.62	9.42	10.03	9.27
GENDER	.50	.49	.50	.40
TENURE	59.74	51.21	53.10	71.08
INCOME	11,641.82	9,542.70	12,733.53	10,127.39
EDUCATION	.48	.47	.48	.51
POSITION	.39			
SECTOR	.50	.44	.40	.51
UNION		.48		
JOBTASK	1.05	1.04	1.02	1.14
JOBFEAT1	.68	.61	.71	.67
JOBFEAT2	.84	.75	.92	.97
REQUIRED	.79	.82	.59	.80
UP-SKILL	.62	.61	.57	.71
DE-SKILL	.82	.82	.86	.73
USEENC	.86	.91	.81	.75
ORGACC	.67	.63	.74	.53

Table 5 (Continued)

Mean and Standard Deviation of Independent Variables

Independent Variables	*Coefficient Variation*			
	Combined Data Set	*Union Employees*	*Non-union Employees*	*Managers*
AGE	.2756	.2675[2]	.3100[1]	.2442[3]
GENDER	1.0417	.7903[3]	1.1628[2]	2.1053[1]
TENURE	.8800	.7860[2]	1.1042[1]	.6643[3]
INCOME	.3367	.2880[2]	.4130[1]	.2308[3]
EDUCATION	.7385	.6912[3]	.7164[2]	.9808[1]
POSITION	2.0526			
SECTOR	1.0870	1.7600[1]	.4938[3]	1.0625[2]
UNION				
JOBTASK	.3646	.3490[2]	.3400[3]	.4402[1]
JOBFEAT1	.1722	.1597[2]	.1811[1]	.1519[3]
JOBFEAT2	.2471	.2212[3]	.2674[2]	.2913[1]
REQUIRED	.2031	.2228[1]	.1405[3]	.2015[2]
UP-SKILL	.1619	.1640[2]	.1447[3]	.1797[1]
DE-SKILL	.3178	.3320[1]	.3071[2]	.2908[3]
USEENC	.2211	.2427[1]	.2093[2]	.1769[3]
ORGACC	.1709	.1632[2]	.1893[1]	.1274[3]

Note. Explanation of the coding employed for the various independent variables are given in Table 4. The coefficient variation score shows a ranking for the relative variability attained for each of the two scales indicating that 1 represents the highest while 3 represents the lowest variability. In other words, For the coefficient variation a superscript of 1 meant that variability for this group was the lowest (e.g., .3100[1]) while a three represents the highest degree of variability for this group of employees (e.g., .2442[3])

The sample of respondents used in this study was heterogeneous. Detailed demographic information is outlined in Table 5. For the coefficient of variation a superscript of 1 meant that variability for this group was the lowest (e.g., .3100[1]) while a 3 represents the highest degree of variability for this group of employees (e.g., .2442[3]).

Research question 1. Question 1 asked whether the respondents from the three groups would differ in their attitudes regarding when a union should accept, and how a union can help employees adapt to technological change. Multivariate analyses of variance (MANOVA) and univariate analysis of variance (ANOVA) were performed to compare the scores of each of the groups on the two attitude scales (see Table 6). The multivariate F test of Pillai's V from SPSS MANOVA indicates reliable (F = 3.13002,

$p < .05$) differences among the three groups on the pattern of their scores for each of the two scales. The results of the univariate analysis reveal that, for instance, unionized employees feel that if training, quality of work and job security are safeguarded while wages and benefits rise, unions should accept technological change in the workplace. Moreover, union members also believe that the union can help workers adapt to technological change if, for instance, the union ensures that adequate training is provided and if the union is sensitive to job stress, occupational health and hazards issues, as well as skill issues (see Table 1 for complete list of items).

TABLE 6

Multivariate Analysis of Variance for Scales

	Multivariate of Pillai's V				*Univariate F-test*	
	df	*F*	*(df)*		*Accept*	*Adapt*
Group	2	3.13002**	2,121		4.28674**	5.78171**
				Mean		
				Union	3.356	3.894
				Non-union	2.878	3.487
				Manager	2.977	3.429
				Standard Deviation		
				Union	.687	.521
				Non-union	1.026	.933
				Manager	.906	.836
				Coefficient Variation		
				Union	.2047[3]	.1338[3]
				Non-union	.3565[1]	.2676[1]
				Manager	.3043[2]	.2438[2]

Note. Multivariate tests compare the three groups (Unionized Employees, Non-unionized Employees, and Managers) on both scales simultaneously, using Pillai's V as calculated by SPSS MANOVA, whereas univariate tests compare the groups on one scale at a time only.

The two scales were constructed by averaging scores for each item ranging from 1 (disagree completely) to 5 (agree completely).

In other words, For the coefficient variation a superscript of 1 meant that variability for this group was the lowest (e.g., .3565[1]) while a three represents the highest degree of variability for this group of employees (e.g., .2438[3]).

* $p < .05$ ** $p < .01$ *** $p < .001$

Conversely, the attitudes of managerial employees and non-unionized workers are not as positive about whether a union should accept technological change, and whether a union can ensure a smooth transition for workers trying to adapt to new office technology in the workplace. What is most interesting is that managers are more likely than non-unionized workers to agree that a union should accept technological change if bread-and-butter issues have been satisfied in negotiations (see acceptance items in Table 1). Managers are almost as positive about the union's effect and help with the adaptation to new office technology as non-unionized workers (e.g., see scale means in Table 5).

These findings suggest an affirmative response to the first question: respondents' evaluations about the circumstances in which a union should accept technological change and how a union may best support its members in trying to adapt to new office technology do differ between the groups of respondents.

Testing the Model

Because our independent predictors are categorical-type variables, assumptions necessary for testing the research questions using regression analysis are violated. For instance, errors will not be normally distributed and multicollinearity may be an issue. We employ logistic regression analysis utilizing a hierarchical procedure which enables us to enter the variables into the models outlined in Table 3 without violating any of the regression assumptions.

Originally (see Table 3), ten regression analyses were performed on the data. For both dependent variables (ACCEPT and ADAPT) the addition of independent variables to the hierarchical logistic regression procedure statistically improved the fit of the models. The fifth regression equation for the ADAPT model results in a statistically significant ($p < .05$) goodness of fit (see Table 7)[1]. The final models outlined in Table 8 were developed from the results of testing performed on models 1-5 outlined in Table 3. Only independent variables that were statistically significant or near statistically significant ($p < .10$; using the Wald test, see also Cohen 1994) and with R values sufficiently large enough to partially contribute to the final model were selected.

Between-Groups Differences and Similarities

To answer research questions 2-4, we employed the hierarchical logistic regression procedure from SPSS using the final regression equation models

1. Space limitations do not permit us to provide all these data; however, they can be obtained from the authors.

outlined in Table 8. For each group (unionized employees, non-unionized employees, and managers) we employed logistic regression analysis utilizing a hierarchical procedure that enabled us to enter the variables into the models outlined in Table 7 without violating any of the regression assumptions[2].

Table 7 provides the between-groups logistic regression analyses for the two final regression models (see Table 8 for final regression equations used). *Income* has a nearly significant predictor with a negative coefficient for the respondents' assessment of union acceptance of technology in the union and non-union samples.

Research question 2. This question raised the issue of under what conditions a union should accept technological change and its ability to help union members adapt to technological change, and if these attitudes would be affected positively by (a) demographic, (b) human capital, (c) sector and union, and (d) job characteristic variables. To test this question, we used the first three regression models from Table 3 (Models 1-3)[3]. The logistic regression analysis indicates that income, sector, and education variables are important predictors of attitudes ($p < .10$, using the Wald test) measuring under what circumstances a union should accept technology change at work; whereas *age, gender, tenure, position, union, jobtask, jobfeat1,* and *jobfeat2* were not significant predictors.

The logistic regression analysis indicates that *income* and *tenure* are important predictors of attitudes ($p < .05$, using the Wald test) measuring how a union can help ensure easier adaptation by workers to technological change. In contrast, *age, gender, education, position, sector, union, jobtask, jobfeat1,* and *jobfeat2* are not significant predictors. These data suggest that we must respond to question 2 with a cautious no, since only three independent variables for ACCEPT (i.e. *income, sector,* and *education*) are significant predictors and only two independent variables for ADAPT (i.e., *income* and *tenure*) are significant predictors.

Research question 3. This question attempted to determine if employees' attitudes regarding a union' acceptance of technological change and a union's ability to help union members adapt to technological change would be positively affected by (a) technology that is required to perform job tasks, (b) technology that may create up-skilling or de-skilling, (c) an organization that encourages the use of the technology, and (d) an organization that accepts technological change. To answer this question we used the last

2. Space limitations do not permit us to provide all this data; however, they can be obtained from the authors.

3. Due to space limitations, the data are presented in shortened form; however, more details can be received from the authors.

TABLE 7

Equations of Final Model: Logistic Regression Analysis - Association Between the Various Independent Variables and Unionized Employees', Non-unionized Employees' and Management's Attitudes About a Union's ACCEPTANCE of Technological Change and a Union Assisting Employees to ADAPT to Technological Change

Dependent Variable	*Equation Models*							
	Accept				*Adapt*			
Panel A: Fit of Model	*Chi-Square Values*							
	Combined Data Set	*Union Employees*	*Non-union Employees*	*Managers*	*Combined Data Set*	*Union Employees*	*Non-union Employees*	*Managers*
-2 Log Likelihood	73.021	33.374	28.094	.000	37.581	.000	9.508	9.027
Model Chi-Square	33.762**	6.658	6.068	20.190**	35.471**	16.272*	18.583**	13.887**
Improvement	33.762**	6.658	6.068	20.190**	35.471**	16.272*	18.583**	13.887**
Goodness of Fit	70.177	35.222	25.299	.000	93.472**	.000	.9723	8.644
Overall	76.54%	85.00%	79.31%	100.00%	91.86%	100.00%	88.46%	88.89%

Panel B: Independent Variables

Independent Variables		*Accept*				*Adapt*			
		Combined Data Set	*Union Employees*	*Non-union Employees*	*Managers*	*Combined Data Set*	*Union Employees*	*Non-union Employees*	*Managers*
AGE	WALD	.2550				.0230			
	B	-.0245				-.0151			
GENDER	WALD	1.3896				.0051			
	B	.9042				-.0820			
TENURE	WALD	.0939				2.3729	.	.5945	1.4441
	B	.0026				.0232	.9833	-.0002	-.0009
INCOME	WALD	1.9841	**3.1427**[n]	**2.6871**[n]	.	**2.6955**[n]	.	.1863	1.0034
	B	-6.4E-05	**-9.8E-05**	**-.0001**	-.0011	**-.0002**	-.0020	.0196	-.0381
EDUCATION	WALD	.8246	.2141	.2604	.	.5716			
	B	.7987	-.5992	.6741	56.1752	1.3748			
POSITION	WALD	.0694				**4.2446***			
	B	.2673				**-3.0172**			
SECTOR	WALD	**3.1274**[n]	1.0017	.8290	.	**3.4741**[n]	.	.0460	.7983
	B	**-1.4850**	-1.0960	1.1897	-62.8378	**-3.3597**	4.4792	-29.4542	8.6395
UNION	WALD	1.3019				.1088			
	B	.9594				.4558			
JOBTASK	WALD	.4605				**2.6474**[n]	.	.6095	1.2088
	B	.2467				**1.0398**	-38.3366	5.9746	9.6991
JOBFEAT1	WALD	.0660				**4.5006***	.	.2629	1.3346
	B	.1518				**2.3209**	29.2153	-7.5308	4.9988
JOBFEAT2	WALD	**2.8924**[n]	.0413	.0243	.	.0675			
	B	**.8364**	-.1551	.0800	37.9944	-.1674			
REQUIRED	WALD	1.0041				**4.0647***	.	.6764	1.3429
	B	-.7334				**-3.8237**	-.5176	-22.3469	-14.0465
UP-SKILL	WALD	.0829				.5686			
	B	-.2132				-1.0090			
DE-SKILL	WALD	**6.1742***	.4024	.5312	.	.3054			
	B	**1.4753**	.4064	.4789	30.0168	.4816			
USEENC	WALD	1.4919				.1990			
	B	-.5169				.3091			
ORGACC	WALD	.0364				2.0561			
	B	-.1140				1.6173			

Note. The above Table lists the overall fit of the various models using logistic regression under Panel A. Panel B provides the various coefficients obtained for each of the independent variables used here.

Significant and nearly significant predictors are listed in bold.

[n] $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$

two models from Table 3 (Models 4 and 5 which include the previously entered variables in Models 1-3). The addition of five independent variables to the logistic regression model changes the predictors of attitudes measuring ACCEPT and ADAPT.

The improvements of the fit of the models are statistically significant. Data presented in Table 7 (see Combined Data Set columns in Panel B of Table 7) show that *sector, jobfeat2,* and *de-skill* variables are important predictors of attitudes ($p < .10$, using the Wald test) measuring the conditions under which a union should accept technological change, while *age, gender, tenure, income, education, position, union, jobtask, jobfeat1, required, upskill, useenc,* and *orgacc* are not significant predictors. The logistic regression analysis also indicates that *income, position, sector, jobtask, jobfeat1,* and *required* are important predictors of attitudes ($p < .10$, using the Wald test) measuring a union's ability to help workers adapt to technological change. In contrast, *age, gender, tenure, education, union, jobfeat2, up-skill, de-skill, useenc,* and *orgacc* are not significant predictors. We therefore respond to question 3 with a cautious no, since only the *de-skill* variable is a significant predictor for ACCEPT and the *required* variable is a significant predictor for ADAPT measures.

Research question 4. Here the issues are whether unionized employees' attitudes differ from those of non-unionized employees and managers, when studying the relationship between the two dichotomous dependent variables and the set of independent variables.

TABLE 8

Final Equations for each of the Two Model Scales

Accept = $\beta_0 + \beta_4(\text{INCOME}) + \beta_5(\text{EDUCATION}) + \beta_7(\text{SECTOR}) + \beta_{11}(\text{JOBFEAT2}) + \beta_{14}(\text{DESKILL}) + e$

Adapt = $\beta_0 + \beta_3(\text{TENURE}) + \beta_4(\text{INCOME}) + \beta_7(\text{SECTOR}) + \beta_9(\text{JOBTASK}) + \beta_{10}(\text{JOBFEAT1}) + \beta_{12}(\text{REQUIRED}) + e$

Note. Explanation of the coding employed for the two dependent variables are give in Table 2. The coefficient variation score shows a ranking for the relative variability attained for each of the two scales indicating that 1 represents the highest while 3 the lowest variability.

The hierarchical development of the models in Table 8 (data are presented below but not included in any table) indicates some interesting similarities and differences among the three groups. For the union data, the *income* variable is either a statistically significant or a near significant predictor ($p < .05$ or $p < .10$, using the Wald test) for the ACCEPT attitude

scale and before the ADAPT model becomes a perfect fit, the *tenure* variable is a near significant predictor ($p < .10$, using Wald test). The *income* variable is either a statistically significant or a near significant predictor ($p < .05$ or $p < .10$, using the Wald test) for the ACCEPT attitude scale and is an important predictor for the ADAPT attitude scale until the last hierarchical procedure for the non-union sample. The logistic regression analyses of the manager sample indicates that before the ACCEPT model becomes a perfect fit the *sector* variable is a statistically significant predictor ($p < .01$, using Wald test) and for the ADAPT attitude scale none of the independent variables are important predictors.

Based on the findings through modelling using logistic regression analysis, question 4 is answered as follows: for (a), (d), (e), (f), (g), and (h) there is not a significant effect; and for (b) and (c) the answer is in the affirmative, since across the three groups certain independent variables influence employees' attitudes concerning the conditions under which a union should accept technological change and concerning a union's ability to help employees adapt to new office technology in the workplace.

The final models for each of the three employee groups reveal some additional information (see Panel B of Table 7). Regression analysis of the final model indicates that, for the ACCEPT dependent variable, the *income* variable is a nearly significant predictor for both the union and non-union samples. Overall, the final regression equation for the manager sample significantly improves the fit of the ACCEPT model ($p < .01$, using chi-square values). Moreover, the final regression equation also significantly improves the fit of the ADAPT model ($p < .05$ and $p < .01$, using chi-square values) for all three groups. Table 7 (Panel B) demonstrates that demographic variables, union and industry-sector variables, job characteristic variables, technology attributes and culture variables, technology, work structure and organizational acceptance variables, and most human capital and structural variables are not important predictors for either of the between-groups' attitude scales.

DISCUSSION AND CONCLUSION

A major purpose of this paper was to test whether the research findings, theories and models that apply to blue-collar workers can also be applied to office workers, regardless of unionization, facing technological changes in their workplace. In particular, our intention was to investigate the attitudes of unionized and non-unionized white-collar employees and managers regarding the conditions under which a union should accept technological change, and how it can support workers trying to adapt to this rapid development. The findings are summarized in Table 9.

TABLE 9

Summary of Findings

Research Questions (RQ)	*Unionized Workers (UW)*	*Non-Unionized Workers (NUW) and Managers*	*Overall Sample*
1) Yes to RQ	UW felt that if training, quality of work and job security are safeguarded, while wages and benefits rise... unions should accept technological change	NUW feel that unions should be cautious Managers are almost as positive as UW: likely to agree that a union should accept technological change if bread and butter issues are safeguarded	
2) Cautious No to RQ			Important Predictors: Accept: sector, jobfeat2 and de-skill variables Adapt: income, position, sector, jobtask, jobfeat1 and required for doing one's job
3) Cautious No to RQ			Important Predictors: Accept: De-skilling Adapt: Required (to do job)
4) Mostly No but for parts b and c Yes to RQ...	Important Predictors: Accept: Income Adapt: Tenure	Important Predictors: Accept: Income (NUW), sector (managers) Adapt: Income (NUW).	

Similarities and Differences between Unionized, Non-unionized and Managerial Employees

An important finding is that union members *and* managers tend to agree that unions should accept technological change if bread-and-butter issues (e.g., wages, benefits, job security) have been safeguarded. Union members and managers also agree that a union can support workers in adapting to such change if the union ensures that quality of work issues (skills, training, safety and job features) have been addressed. There is a school of thought in the industrial relations field that suggests that the collective bargaining process is entering a new era of collaboration and cooperation between union and management (Thomas 1991). Our data further strengthens this argument. Nevertheless, research indicates that unions' involvement and participation in decision making involving the implementation

of technology is limited (e.g., Betcherman 1991; Keefe 1991). In the Canadian context, technological change legislation has not resulted in the successful bargaining by unions for the inclusion of technological change clauses and provisions in collective agreements (Peirce 1987: 90-97). Hence, in our sample, the least positive response concerning if and when unions should accept or resist technological change is by non-union members, which might suggest that they are more realistic about a union's real influence and bargaining strength regarding technological matters. Union members may be too optimistic, while managers might submit to a self-serving bias.

The above also means that collaboration and cooperation between union and management (Thomas 1991), may occur in some settings but, as our findings also suggest, public sector employees may not feel a potential threat of substitution of their services by workers elsewhere around the globe; accordingly, collaboration and cooperation may be the last thing on their mind. As suggested below, bread-and-butter issues may be the core of any solution for smoothing the adaptation and adoption of new technology (Gattiker 1990).

Bread-and-butter issues. Previous research has indicated that satisfaction with union representation is significantly affected by how successful the union is in safeguarding bread-and-butter issues (Fiorito, Gallagher and Fukami 1988). Our data indicate that income has a nearly significant effect on how union and non-union employees feel about the conditions under which a union should accept technological change for both the union and non-union samples. If income is high, the verdict is more likely to be positive regardless of union status. McLaughlin (1979) already reported that nearly half the unions indicate a "willing acceptance" of technological change if the effects on bread-and-butter issues are positive. This is further confirmed by our study.

Demographics, Human Capital and Structural Variables

For the ACCEPT attitude scale in the combined data set, the *sector* coefficient is negative. The negative coefficient for the *sector* variable is explained by Stevenson's (1989) conclusion that the implementation of office technology is in the early stages and 74.5 percent of the public sector respondents were not involved in the decision and selection process. One would, therefore, expect that public employees are somewhat leery about their union accepting technology change.

For the ADAPT attitude scale in the combined data set, the *income, position* and *sector* coefficients are negative. One possible explanation for the negative *position* coefficient is that other research indicates that the introduction of office technology can result in either de-skilling or up-skilling

of clerical work (e.g., Attewell 1987; Cappelli 1993); however, managerial workers will most likely experience up-skilling (e.g., Bikson, Gutek and Mankin 1987). Accordingly, clerical personnel, regardless of union membership, may be wary. Unions' efforts to help employees adapt to technological change may not be enough, as perceived by these employees! The negative income effect may be explained by higher income individuals being less likely to have a positive attitude in general toward unions helping them adapt to technological change at the workplace.

For the sector variable, data simply indicate that workers from the public sector are less positive toward technology-related change. In part this may be due to their being less exposed to possible replacement effects as experienced in private firms (e.g., if product/service too expensive, alternative suppliers will be found). Public sector unions as well as managerial personnel in public institutions can resist technology-related job changes and effects, as recent negotiations between unions and the government in Canada and Germany would suggest. Regardless of the unemployment rate, budget concerns and other factors, public sector employees want to proceed carefully in order to safeguard their jobs against the negative side-effects attributed to technology (e.g., Betriebsrat, Max-Planck-Institut für Bildungsforschung 1988).

Work, Job Skills and Organizational Factors

For the ACCEPT attitude scale in the combined data set, the *jobfeat2* and *de-skill* coefficients are positive (see also Table 9). One possible explanation for the positive sign of the *jobfeat2* coefficient is that if the implementation of technology increases an employee's intrinsic rewards, then that employee's general attitude about technology will be positive; consequently, his or her attitude about a union's acceptance of technology would also be positive. The positive sign for the *de-skill* coefficient is explained by the fact that the probability of unions accepting technological change increases if employees perceive that the technology does not create de-skilling. The low mean scores for the *de-skill* variable in the combined, union, non-union and management data sets indicate that respondents believe that the technology does not create de-skilling.

For the ADAPT attitude scale in the combined data set, the *jobtask* and *jobfeat1* coefficients are positive. One possible explanation for the positive *jobtask* coefficient is that increased complexity experienced with technology should result in a positive outcome. In fact, many unions now insist on technology improving job quality and job features (e.g., skills variety) for their members (e.g., Betriebsrat, Max-Planck-Institut für Bildungsforschung 1988). In turn, if unions address these concerns for their membership, the

adaptation of new technology by union members will be facilitated (e.g., Berger, Olson and Boudreau 1983; Fiorito, Gallagher and Fukami 1988) as the positive coefficients obtained here would suggest.

Acceptance and Resistance Across Groups

Our analysis, which rests on assumptions that are typically ignored by human resource, information systems, and industrial relations models, suggests the presence of some important differences and similarities between union, non-union and managerial respondents. In summary, this study provides at least initial evidence that white-collar employees in Canada do feel that unions have some credibility and bargaining clout in protecting workers' interests. Unfortunately, reality may not be as rosy as the beliefs held by these same workers because of the limited number of technological change clauses in labour contracts (Peirce 1987: 44-50). The importance of income upon employees' attitudes toward whether a union should accept technological change and how a union can help workers adapt to technological change expands upon earlier research, which has reported that pay outcomes have a significant effect upon union satisfaction (Berger, Olson and Boudreau 1983). Income may increase organizational allegiance, and thereby positively affect employees' perceptions about whether a union should accept technology and how a union can help employees' adaptation since income may facilitate technological change in the workplace (Fullagar and Barlin 1991).

This study indicates that no single set of estimates exists that relates particular job features (e.g., job complexity), characteristics, skill issues, human capital and other variables to workers' beliefs regarding when a union should accept or resist the implementation of new office technology and how a union may most effectively facilitate this process. Further insight into the union and technology change connection awaits the development of more refined models which investigate this potentially complicated relationship.

Limitations of the Present Study

One potential limitation of this study may be the limited control we have over the various types and applications of computerized technology in the samples. In contrast, exploring our research questions in a laboratory-type setting in which subjects perform simulated computer activities on identical computer hardware might have provided additional controls for the research. Also, the relatively small sample size suggests that additional testing is needed.

The choice of the alpha level is always a limitation. This has been discussed by several researchers (Cohen 1994; Pollard and Richardson 1987)

and is still an objective of future statistical research. In this study, the alpha level was chosen by taking this into consideration. Nevertheless, the classical disadvantages of MANOVA and multiple regression need to be considered: (1) the attribution of causality to independent variables is in no way assured by the statistical test; and (2) the adjusted means for the dependent variables might not correspond to any realistic situation (Tabachnick and Fidel 1983: 230). To secure reliability and validity of the findings, additional One-way ANOVAs were used, as well as the hierarchical logistic regression procedure, thereby minimizing these risks. Despite these limitations, this research did generate significant and important findings. Additionally, the design of the research did permit the elimination of generally recognized threats to validity.

Implications for Research and Practice

This study tries to respond to the need for additional research. It shows that, although other researchers call for greater innovation efforts, end-user support and the adoption of new organizational forms and practices to successfully manage technological change are important; unfortunately, the differences between employee groups and between blue-collar and white-collar workers are numerous. Pro-activity and improved quality of communication between a union and its members should increase the likelihood that members will support the union in accepting new office technology, and be more willing to adapt to technological change since (1) bread-and-butter issues, and (2) quality of work issues have been bargained and negotiated to members' satisfaction. Our findings may have been influenced by the stronger support for unionism in Canada as compared to the United States (Thacker et al. 1991). However, various research suggests that unions' track record concerning technological change is far from rosy (e.g., Betcherman 1991; McLaughlin 1979; Peitchinis 1983). This could mean hard times for union organizers trying to promote and secure union commitment, involvement and participation. Future research should test our measures in different research settings to further develop and validate their use.

The importance of income upon employees' attitudes toward whether a union should accept technological change and how a union can help workers adapt to technological change expands upon earlier research, which reported that pay outcomes have a significant effect upon union satisfaction (Berger, Olson and Boudreau 1983). Income may increase organizational allegiance, and thereby positively affect employees' perceptions about whether a union should accept technology and how a union can help employees' adaptation since income may facilitate technological change in the workplace (Fullagar and Barlin 1991).

Although we have increased our knowledge of the attitudes of union and non-union employees as well as managers regarding the circumstances in which a union should accept and facilitate the adaptation of new technology in the office environment, a great deal remains to be discovered and synthesized. To guide future research on and possibly strategy development by firms for how to introduce new technology into the workplace, we must develop a better understanding of how de-skilling models for blue-collar workers as well as human capital theory and structural variables might help in better explaining the attitudes and behaviour of employees, unions and managers regarding the introduction of new technology into the workplace.

Finally, whilst unions efforts to assist members to adjust and benefit from new office technology and their success in protecting bread-and-butter issues is laudable, the current level of unemployment raises questions about this strategy. Accordingly, unions may also have to address the issue of their unemployed members' fate as far as technology change is concerned. Protecting bread-and-butter issues may, in part, result in an ever smaller group garnering a larger portion of the pie, while an ever larger group of members remains unemployed. Unions, employers and society-at-large will have to address this issue to avoid potential backlashes attributing negative outcomes to technology, whilst human values were the basis for decisions resulting in the particular use of technology with these negative outcomes.

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RÉSUMÉ

Syndicats et bureautique

Deux raisons expliquent l'importance de l'implantation de changements technologiques pour les syndicats : (1) l'adoption de nouvelles technologies peut accroître la productivité de l'entreprise et, partant, amener une meilleure sécurité d'emploi et de meilleurs salaires aux membres ; (2) les syndicats peuvent exercer une influence majeure sur le processus d'adoption en facilitant ou en retardant l'implantation fructueuse de la technologie (e.g., Templer et Solomon 1988; Solomon et Templer 1992).

Il y a, à ce jour, peu de recherches qui s'attardent à la complexité de la gestion efficace des changements technologiques dans les bureaux. La plupart des études s'intéressent à la façon dont les changements technologiques affectent les cols bleus. Il en existe cependant quelques unes portant sur les différences entre cols bleus et travailleurs de bureau eu égard à l'implication syndicale (e.g., Thacker et al. 1991). Même si l'influence des syndicats sur les changements technologiques peut être limitée (e.g., Keefe 1991), ou de nature surtout consultative (e.g., Keefe et Bansler 1993), ils peuvent quand même influencer les attitudes et les perceptions des travailleurs à cet égard (Fenwick et Olson 1986; Kelley 1989).

Nous présentons ici une étude empirique qui cherche à établir : (1) si les cols blancs dans les bureaux, selon qu'ils soient ou non syndiqués ou gestionnaires, ont une perception différente de ce que devraient faire les syndicats lors de l'introduction de changements technologiques ; (2) si des sujets de capital humain (par exemple, l'amélioration de la qualification

professionnelle) ont un effet important sur la façon dont les usagers perçoivent ce que devrait être la réaction syndicale ; (3) si les caractéristiques individuelles des usagers et les variables sectorielles et organisationnelles influencent leur évaluation de ce que devrait être la réaction syndicale lorsqu'une nouvelle technologie est introduite sur les lieux de travail. Cet article se veut une contribution importante à la recherche sur les technologies, les qualifications et les relations industrielles parce qu'il applique des approches de capital humain, d'attitudes et de relations industrielles au domaine de la bureautique. Cet article veut aussi combler un vide dans la documentation en relations industrielles et améliorer notre compréhension de l'adaptation à la technologie et aux changements chez les cols blancs.

Nous répondants incluent des employés syndiqués et non syndiqués ainsi que leurs gestionnaires : 75 employés syndiqués (52,1 %), 36 non syndiqués (25 %) et 27 gestionnaires (18,75 %). En outre, 46 % de l'échantillon travaillait dans le secteur privé (voir le tableau 5 pour plus d'information). Pour être inclus dans cet échantillon, tous les répondants devaient avoir travaillé pendant plusieurs années avec différentes technologies (i.e., ordinateurs) et leurs applications ou avec des systèmes d'information.

Nos résultats démontrent quelques différences entre les employés syndiqués et non syndiqués. Les premiers étaient d'avis que si les salaires et les avantages s'amélioraient, le syndicat devait accepter le changement technologique. De façon surprenante, les non-syndiqués et les gestionnaires croyaient que les syndicats devaient être prudents. Les gestionnaires ajoutaient cependant que si les salaires et les avantages étaient accrus, les syndicats devaient accepter le changement technologique. De plus, pour les syndiqués, le revenu est un prédicteur de l'acception du changement technologique alors que la sécurité d'emploi influence la volonté de s'adapter à tel changement. Les gestionnaires du secteur public avaient moins tendance à accepter le changement technologique que leurs collègues du secteur privé. Les employés non syndiqués, eux, étaient prêts à accepter le changement technologique si leur revenu était accru.

Notre analyse repose sur des hypothèses typiquement ignorées des modèles de ressources humaines, de systèmes d'information et de relations industrielles. L'analyse suggère la présence de certaines différences et similarités importantes entre groupes d'employés lorsque nous distinguons entre des répondants syndiqués, non syndiqués ou gestionnaires. En résumé, cette étude présente, à tout le moins, un début de preuve à l'effet que les cols blancs canadiens croient que les syndicats ont quelque crédibilité et pouvoir de négociation dans la protection des intérêts des travailleurs. Malheureusement, la réalité n'est peut être pas aussi rose que les croyances de ces travailleurs vu le nombre limité de clauses dans les conventions collectives portant sur les changements technologiques.