

Preventing Occupational Injury: An Examination of Two Participatory Workplace
Health Programs

by

Shane M. Dixon

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Attempting to enhance their productivity or improve working conditions, many businesses have adopted organizational change programs that involve a participatory component. To attain a comprehensive understanding of these change programs we need to investigate the influence of social factors such as power, the impact of local and global contexts, and the role that agency plays in these programs. Further, because organizational programs do not unfold linearly and the contexts in which they are embedded continually evolve, it is crucial to employ an approach that allows studying organizational programs over time. Attending to these considerations enables the production of narratives of organizational change that are congruous with the dynamism of organizational life.

This dissertation explores the dynamics of an organizational program in a particular type of occupational health and safety program, which emphasizes employee involvement: participatory ergonomics (PE). Participatory ergonomics, intended to reduce workers' exposures to work-related musculoskeletal disorders, draws on the input of small groups of labour and management representatives called ergonomic change teams (ECTs) to address exposure to hazards that may lead to musculoskeletal disorders. The dissertation's examination of an organizational change program consists of an analysis of PE programs in two workplaces: a courier depot and a manufacturing plant.

The dissertation's investigation of the PE programs is based primarily on observations, which were gathered longitudinally as the ECTs endeavoured to make ergonomic changes, and fifty-five semi-structured interviews, which were carried out with ECT members and other key informants who were not members of the ECTs. Data

collection occurred during 48 months in the manufacturing setting; in the courier company, collection took place during a 30-month period. The dissertation's analysis is informed by negotiated order and critical theory lenses. Negotiated order considers social order as an ongoing process and draws attention to the activities of individuals and groups, and the manner in which they influence the dynamics of social life. In regard to organizational programs, it rejects the idea that they unfold independently of actors' efforts; rather, it considers them as products of individuals' attempts to establish and maintain the necessary agreements to ensure their operation. Critical theory, as it pertains to occupational health, identifies the constraints that shape working conditions and links these with the uneven distribution of power in the workplace and production imperatives. The dissertation addresses the following general research questions: What actions were undertaken by individuals to ensure the PE programs functioned and continued? How did the organizational and societal context enable or constrain the pursuit of PE program activities?

The presentation of the findings begins with an account of the problem-solving processes used in both of the settings, an overview of the types of knowledge that were used, and a description of the actors' access to knowledge. In each setting, design parameters, production pressures, the nature of the knowledge required to design solutions, and the differential distribution of that knowledge among workplace personnel influenced (a) the effectiveness of the ECTs' solution building activities, (b) the design process, and (c) the nature and degree of participation by the teams' worker members. The dissertation then proceeds to an examination of the implementation process. It explores how this process is affected by the organizational context, in particular the

ECTs' limited authority as agents of change, and shows that the minimal authority they possessed prompted the ECTs to select an array of strategies to accomplish their work. These strategies often took the forms of persuasion, persistence, and enlisting the assistance of other personnel.

Extending the discussion of implementation, the dissertation then focuses on the division of labour within the ECTs as they carried out their activities. In both settings, implementation activities were unevenly distributed among the ECTs' membership; they were predominantly carried out by managerial personnel. Both the programs' functioning and the participation of worker representatives were influenced by the interplay among three main factors: the type of activities that needed to be carried out, workplace hierarchy, and stance, or participants' views about their ability to act effectively.

The discussion of the PE programs then proceeds to an examination of whether the programs were supplied with the resources required to continue over time. The outcomes differed: in Courier Co. the program was discontinued, whereas in Furniture Co. it was maintained. The discussions investigate how PE program continuation was affected by the program supporters' activities and shaped by conditions both internal and external to the organization. Foremost among these conditions were management's view of health and safety and the occupational health and safety regulatory framework.

The dissertation's examination of the PE programs over time provides evidence that the functioning and the degree of worker involvement in participatory occupational health programs are conditioned by structural and interactional elements. The programs were shaped by an uneven distribution of power, limits on access to knowledge and

scarce resources, and actors' divergent interests and their capacities to act in accord with these interests.

The final chapter of the dissertation reviews the key findings and examines common themes that arose across the workplaces. The dissertation concludes with observations on several topics: the challenges of evaluating program outcomes in settings such as occupational health and safety; the lessons that participatory ergonomics practitioners can take from the study's findings; and suggestions for possible avenues of future research.

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CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

Responding to competitive markets, many businesses have adopted organizational change programs, such as total quality management, lean production, team working, and information systems management (Osterman, 2000). Prescriptions for implementing organizational change programs and narratives about how they have performed have been questioned by some sociologists. Patrick Dawson (2003b: 39) suggests that, “simple accounts” of organizational change in which pat causal relationships are presented to explain a program’s operation and outcomes need to be thoroughly scrutinized for their veracity. Questioning the sequential and linear way that the unfolding of change programs is often presented, Collins (1998: 90) argues that organizational transition is typically complex and seldom straightforward. Simple accounts of organizational change often fail to address, or at least downplay, social factors such as, power, actors’ diverse interpretations, and socio-historic context, all of which shape organizational change. Additionally, simple accounts exclude the emergent character of organizational change and the active role that individuals, both labour and management, play. Dawson (2003b: 3) states, “To put it simply, change does not occur in a hermetically sealed bubble; rather, choices are influenced by values and beliefs developed and modified during a lifetime of interaction with family, friends and social groups, and are constrained by socio-economic circumstances and power relations.” Similarly, Vallas (2003:227) remarks that, “workplace change is not akin to a surgical procedure performed under anaesthesia.” These authors suggest that to produce narratives of organizational change that may be

more congruous with the dynamism of organizational life, researchers need to incorporate the influence of structure and agency into their accounts.

With an eye to social factors, some researchers have examined organizational change programs in workplace settings. Research reveals that conditions at the organizational and the broader societal level often impinge upon organizational change programs in such a way that they become ineffectual, or at least, operate sub-optimally (e.g., Vallas, 2003: 223-224). In some cases, change programs are hindered because of worker resistance (Ezzamel *et al.*, 2002; Dawson, 2003b: 89-109). In other cases, organizational change failed as key managers opposed the program or half-heartedly supported it (Balogun and Johnson, 2004; Buchanan *et al.*, 2005b; Milkman, 1998; Zuboff, 1988). Further, organizational change may be implemented to ensure that a powerful group's control is maintained or regained over relatively less powerful groups (Noble, 1979).

In addition to the social and organizational factors they identify as affecting organizational change, some researchers reveal the active role of individuals, both labour and management, who are engaged in the operation of organizational change programs. These researchers, while still noting the importance of conditions that may constrain or facilitate a program's operation, go further to examine the micro-dynamics of change, such as negotiation, politicking, and resistance (e.g., Balogun and Johnson, 2005; Rouleau, 2005). Clarke and Preece (2005) explored the implementation of an Intranet designed to foster idea exchange among a firm's workers. They (2005: 164) found that Intranet use was largely the product of how different groups interpreted it:

[T]he emerging Intranet configuration represented different things to different people, was used in different ways by different people (and the same people over time), and was both shaped by, and in turn, used to shape a range of organizational and personal objectives and intentions. Some people were willing and able to go along with this, if not always necessarily to embrace this brave new world, whilst others did not have the opportunity to do so, or were not convinced of the net benefits to be obtained for themselves and/or the organization.

McLoughlin *et al.*, (2000), examining the implementation of a team-based manufacturing system, reported on the critical role that individuals played in shaping the adoption of the program. The program failed, and the researchers (2000: 34) explained that this failure was largely because “of the incongruence between dominant assumptions, knowledge, and expectations concerning the configuration of technical and human elements of production within the firms and those proposed by the sociotechnical values and beliefs expressed in the frames of the action researchers and their allies.” In another example, Garrety and Badham (1999: 279), focusing on the introduction of a computerized manufacturing process, examined politics, which they defined as:

[A] collective, communicative activity that is goal-directed... The goals involved aspirations towards some vision of “the good life” for oneself (e.g., career advancement, freedom from responsibility) and/or the group (e.g., a more efficient factory, a more democratic society, a stronger union). The “things” that are encountered by people in their daily lives may be viewed as opportunities or obstructions along the paths towards these goals. Through interactions (the production of papers and manifestos, meetings persuasion, manipulation, argument...), people try to change the meanings of things so that particular courses of action can become easier or more difficult, and certain or more difficult assumptions become routine whereas others are excluded.

The above research adds to our comprehension of how organizational change programs function and unfold. A unifying element of the research is that exploring the “politics of change,” to use Garrety and Badham’s (1999) terminology, is of critical

importance to understanding how change programs function, how they evolve over time, and how they are shaped by contextual factors.

A central aim of these approaches is to disaggregate the process of change; that is, the investigators sought to understand the actions of individuals and groups within specific organizational circumstance and broad historic conditions that enable or constrain program functioning. To avoid excluding the consideration of pertinent factors that shape the change process and prioritize the actors' undertakings, a suitable sensitizing frame is valuable for investigating change. One means of investigating what factors are involved in change making is to examine what Strauss (1993: 53-54) refers to as a "trajectory," or "(1) the course of an experienced phenomenon as it evolves over time (an engineering project, a chronic illness ...) and (2) the actions and interactions contributing to its evolution." This dissertation draws on this orientation to examine questions regarding how a workplace change program functions in practice. Such an approach allows one to focus on the micro-dynamics of change, such as the interactions that pave the way for change or throw barriers up to alter its course or bring about its demise.

Relying on both interview and observational data, the dissertation examines two occupational health and safety (OHS) programs. The analysis is particularly attendant to the activities of individuals and groups trying to manage the programs. Specifically, the analysis considers the asymmetrical access to resources and power among actors, the variations in support for the programs within and among levels of management, the influence of broader societal factors such as the OHS regulatory climate and economy, and the role these latter factors played in the functioning and maintenance of the OHS

programs. I show how the functioning of the programs was shaped by organizational and social conditions and the agency of the actors involved.

The dissertation explores the dynamics of a particular type of OHS program referred to as participatory ergonomics (PE). I expand on the definition and origins of PE later in the chapter but it is sufficient to say here that PE seeks to address the burden of work-related musculoskeletal disorders (MSDs) by altering the physical workplace using input from workers and managers. MSDs are injuries and disorders of the soft tissue (e.g., muscles, nerves, tendons), such as lower back injuries and carpal tunnel syndrome. Exacting a human and an economic toll (Kome, 2006), MSDs constitute a serious social problem whose emergence is partly linked to macro shifts in the types of work that Canadians are doing (Sullivan and Frank, 2000) and the conditions under which they are working (Rinehart, 2006). Indeed, MSDs now account for the largest number of work-related lost-time injury claims in Ontario, and during the period 1996-2004, MSDs accounted for 40 percent of all lost-time claims or reported injuries serious enough to warrant an employee taking time off to recover. Financially, from 1996 to 2004, MSDs resulted in direct claim costs of approximately \$4 billion (Kome, 2006; Ontario, 2005).¹

This chapter is organized as follows. To situate these programs in a historical context, I begin by briefly describing the changes in the nature of work in Canada that have occurred over the last 30 years and the concomitant increase in the prevalence of MSDs. This is followed by a discussion of the emergence of PE and its underpinnings. Next, I outline the theoretical lenses that the dissertation relies upon. I then discuss how I

¹ It is estimated that the indirect costs of MSDs to employers may be 2-4 times the costs of workers' compensation claims (Punnett, 1999).

selected the settings in which the study was carried out, introduce these, and describe the participatory ergonomic intervention that the dissertation examines. The chapter concludes with an overview of the dissertation's chapters.

1.2 THE RISE AND CHALLENGE OF MSDS

1.2.1 Changing Nature of Work and Injury

Over the last 30 years, the types of jobs that Canadians hold have changed as Canada's employment landscape has undergone significant transformations. Economic changes such as de-industrialization and the movement of industrial jobs out of Canada and North America to areas where production costs are lower and/or the regulatory climate more conducive to business (High, 2003; Krahn *et al.*, 2007: 29) have contributed to a loss of jobs in the manufacturing sector. At the same time, there has been increased growth in the service sector. Indeed, the service sector has grown to be Canada's primary employer as the number of jobs in the primary (resource extraction) and secondary sectors (manufacturing) has decreased (Gunderson and Hyatt, 2000; Krahn *et al.*, 2007: 59-68). These changes in the nature of work have contributed to what Sullivan and Frank (2000) refer to as the "industrial-epidemiological shift," an alteration in the prevalent type of workplace injury that Canadians sustain. Canadian workers are incurring more MSDs than traumatic injuries such as lacerations, broken bones, and amputations than they had in the past.

Employees' working conditions are also undergoing substantial changes, some of which can be linked to corporations' attempts to address challenges linked to increased competition and globalization (Anderson-Connelly *et al.*, 2002; Gunderson and Hyatt, 2000: 62-64; Landsbergis, 2003). While approaches to increased competition have

varied, many companies have sought to introduce new technology and new management regimes, such as lean production. These and other rationalization schemes have typically intensified employees' work, increased workloads, and diminished employees' control over their work. The effects on work have been felt in various industry sectors such as automotive (Askenazy, 2001; Lewchuk *et al.*, 2001; Parker, 2003; Rinehart *et al.*, 1997; Yates *et al.*, 2001), garment (Gannagé, 1995; 1999), hospitality services (Seifert and Messing, 2006), mining (Hall, 1993; 1999; Russell, 1999), and food processing (Novek, 1992; Novek *et al.*, 1990). Characterized by fewer rest breaks, deskilling, increased mechanization, and rationalization, these changes in the labour process have created new physical demands and enhanced existing ones and thus increased workers' susceptibility to injury.

1.2.2 Addressing MSDs: Participatory Ergonomics

Ergonomics, also known as human factors engineering, explores humans' interaction with their environment. The International Ergonomics Association defines ergonomics as “the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance” (International Ergonomics Association, 2007). One focus of ergonomists' work is on the interactions between workers and their work environment, in an effort to reduce musculoskeletal injuries. Ergonomics focuses on physically altering the workplace through “engineering controls,” or the modification, replacement, or removal of features of a work process that expose workers to risk of musculoskeletal injury (Norman and Wells, 2000). Significantly, because it considers the source of injury in the work environment, ergonomics contrasts with other workplace health and safety

programs that address hazards by altering workers' behaviour, changing policies and regulations of work, or supplying workers with personal protective equipment. The intention in ergonomics to locate and address injury in the physical work environment corresponds with one of the key precepts underpinning ergonomics: that the workplace should be altered to suit the worker rather than vice versa (Norman and Wells, 2000).

Participatory ergonomics is one type of injury prevention program for addressing work-related musculoskeletal disorders (Wilson *et al.*, 2005). While there are numerous definitions of PE, they typically highlight involvement of stakeholders, including, notably workers, based on the understanding that their knowledge is particularly important for comprehending workplace hazards.² One of the most widely cited PE definitions is that of Wilson and Haines (1997: 492-493), which states that participatory ergonomics is “the involvement of people in planning and controlling a significant amount of their own work activities, with sufficient knowledge and power to influence both processes and outcomes in order to achieve desirable goals.”

Connected to a larger socio-historical trend of worker involvement in workplace decision-making, participatory ergonomics has emerged, in Wilson *et al.*'s (2005) words, out of the “participatory turn” in occupational health and safety and in production improvement (Imada, 1991). Participatory arrangements, known variously as total quality management, lean production, and quality circles, have been introduced in a wide

² Although PE programs are premised on the involvement of both workers and managers in the identification and reduction of workers' exposures to the risks of injury (Van Eerd *et al.*, 2008: 27), they vary widely in the degree of involvement of worker and management representatives (Haines *et al.*, 2002; Moir, 2005; Wilson *et al.*, 2005).

variety of organizations with the intention of improving workplace practices to enhance production and give employers a competitive edge (Smith, 2006).

Another condition that ushered in the use of PE programs was a conducive OHS regulatory climate. In the late 1970s, in many western countries, state health and safety regulatory regimes moved to a model that relied less on externally monitoring workplaces to one that increasingly emphasized combining state inspection with an approach whereby managers and workers were responsible for monitoring health and safety conditions (Frick and Wren, 2000: 22-25). A significant feature of the 1970s policy shift was that it provided workers an opportunity to participate in OHS decision-making, which previously was deemed to be management's prerogative and seldom considered subject to labour-management negotiation (Frick and Wren, 2000: 22-23; Smith, 2000; Storey and Tucker, 2006: 160-68; Tucker, 2007; Walters, 2006).

1.3 RESEARCH QUESTIONS

In this dissertation, I examine participatory ergonomics with an interest in how organizational programs operate and are maintained. As mentioned, a key concern in the dissertation is the micro-dynamics around organizational programs. With this in mind, I address the following broad research questions in the dissertation: What actions were undertaken by individuals to ensure the PE programs functioned and continued? How did the organizational, and societal contexts enable, or constrain the pursuit of PE program activities?

1.4 THEORETICAL FRAMEWORK

The dissertation relies on two complementary theoretical approaches that, in combination, allow for an examination of the micro-dynamics of organizational change

while attending to broader structural concerns. Conceptual material from negotiated order theory is used to assist in understanding how the actions of individuals in work settings affected the interventions. To complement this, I employ a critical theoretical approach to investigate the structural dimensions of the settings. Below, I give a brief overview of the theories, while a more fully developed theoretical discussion is provided in Chapter Two.

1.4.1 Negotiated Order and Critical Approaches

For negotiated order theorists, order in an organization and the rules and regulations within it are created and maintained through the continual interaction of individuals. According to Anselm Strauss (1993:87-90), “social organization and order are inconceivable without some form of negotiation between individuals and groups.” Social order is a continual process in which individuals and groups work at constructing and maintaining the necessary arrangements through which order is produced and reproduced. These arrangements are required because social units, such as workplaces, consist of heterogeneous groups, each of which has their own interests and interpretations of social life, which may be discordant with others’.

Although highlighting the actions of individuals and groups, negotiated order researchers see these activities as fashioned within and influenced by local and broader conditions. For example, according to negotiated order theorists, the creation and maintenance of arrangements among workers in a factory may be influenced both by that workplace’s culture as well market conditions, which could strain or improve relations among actors. To correctly understand the order in a setting, negotiated order considers the multiple levels of influence in which interactions are situated.

As plans that may go into an organizational change are rarely comprehensive, easily controvertible, and usually possess different meanings for different actors, negotiated order theory is particularly helpful for exploring the evolution of an organizational change program (Strauss, 1988: 164). The perspective draws attention toward the activities that individuals need to undertake to ensure that program goals can be accomplished. Additionally, it considers the role that context – both local and societal – might have as individuals attempt to carry out tasks. Fundamentally, the unfolding of programs, or their “trajectory” in Strauss’ words, is processual and affected by individual and group interactions within a set of circumstances over which actors may have varying levels of control. As Strauss (1993: 54) points out, “phenomena do not just automatically unfold nor are they straightforwardly determined by social, economic, political, cultural, or other circumstances; rather, they are, in part, shaped by interactions of concerned actors.”

If one makes the assumption that organizational change is emergent and dynamic, as suggested at the chapter’s outset, negotiated order theory is well suited to analysing change. Because negotiated order foregrounds the interactions among individuals and groups in its conceptualizations of organizational life, it provides the conceptual tools to examine the activities, or in Garrety and Badham’s (1999) words, the politics that surround the execution of an organizational change program. Additionally, negotiated order theorists note that organizational programs often evolve and therefore should be examined processually, drawing links between responses to organizational conditions and outcomes of these responses. Further, the negotiated order framework’s attention to the multiple and divergent interests within an organization enables a view that captures

influences that may be facilitative or constraining. Finally, by considering both the micro, organizational, and broader societal levels, a negotiated order approach keeps the analysis open to influence from multiple levels, not only micro or macro.

Critical theory also offers important insights that inform the dissertation. I use critical theory to locate the analysis in the political-economic conditions that might affect an OHS program in the workplace. The critical paradigm has been used successfully to understand OHS conditions and their alteration. As it applies to OHS, it predominantly considers the influence of structure and political-economic factors involved in the creation of hazards and how and if they are addressed. Using the framework, I consider the important role that the profit motive may play in the realization of OHS intervention goals and health and safety generally (Grunberg, 1983; Littler and Salaman, 1984; Nichols, 1997). The critical paradigm also presents a framework for understanding labour and management's asymmetrical access to resources that affect their power, and in turn, how differences in power affect the capacity of each party to alter the workplace.

To some extent, managers need to attend to occupational health and safety to reproduce the conditions required to produce surplus value. Conditions need to be at least tolerable to labour. The degree to which labour will tolerate health and safety conditions may be affected by its strength. For example, Grunberg (1986b) and Hall (1993) demonstrated that in situations in which labour was strong it was able to exert some control over health and safety conditions; whereas, Novek (1992) reported on a situation in which labour was weakened and therefore unable to forestall the deterioration of working conditions.

Attention to health and safety is affected by attendant costs. Generally, capital regards health and safety expenditures as a surplus value loss (Navarro, 1982; Schatzkin, 1984) and accordingly may be reluctant to invest money to address health and safety hazards. As a result of these cost-avoidance concerns in cases in which workers have sought to have a health hazard addressed, employers often have tended to select inexpensive options even if this means not achieving the best protection for workers. In one example of this, Storey and Lewchuk (2000) describe an employer's decision to address poor air quality by providing paper masks rather than more effective, though more expensive, ventilation.

The critical framework also enables a consideration of the fact that management may not want to cede its control of work processes. Economic imperatives encourage managers to maintain (or increase) their control over employees and the labour process. Loosening control over employees or the labour process can negatively affect the gathering of surplus value (Braverman, 1974; Buroway, 1979; 1985). As Walters (1985) points out, it is within the context of these structural constraints that management decides whether it is willing to invest in occupational health and safety and to what extent it is willing to do so. The critical framework, as it applies to occupational health and safety, is helpful in its consideration of the influence of broad social and political factors and the relations between labour and management in the workplace.

1.5 THE INTERVENTION SETTINGS AND PARTICIPATORY ERGONOMIC PROGRAM

Pathways to selecting a research setting are numerous and vary considerably. Some researchers begin with particular settings in mind that would ideally suit their research questions. I did not. The beginnings of this project – the selection of the

settings and decision to investigate PE programs – were not part of a carefully planned, well-executed research design. Rather, they were the product of a broad interest in the sociology of organizations and a set of fortuitous circumstances.

Hired to work with a university-based, multidisciplinary research team as a research assistant, I was responsible for collecting and analyzing qualitative data relevant to the unfolding of the two PE interventions over time. The research team consisted of ergonomists, epidemiologists and a sociologist with extensive experience in workplace interventions to address MSDs. Prior to my hiring, the team had formed an agreement with a corporation, Courier Co.³, to implement and study a participatory ergonomic (PE) program in one of its facilities. Some months later, and after I was hired, the research team arranged with a manufacturing company, Furniture Co., to commence and study a PE program in its factory. Shortly after I was hired, I realized that my employment as an RA with the intervention project provided an opportunity to explore the functioning of an organizational change program. My experience of site selection is by no means unusual; in fact, the alignment of a researcher's broad interest and sheer happenstance often are the source of an individual's decisions about what and where to study (Berg, 2009: 205; Ouellet, 1994:11-12). I expand on my involvement in the settings in Chapter Three. Below, I provide a brief overview of the companies and their respective industry sectors.

1.5.1 Parcels and Parts: Description of Settings

One setting in which the PE program was set up, Courier Co., was owned by a large courier company, which had customers in Canada and the United States, employed more than 10,000 workers in approximately 100 facilities across Canada, and had a fleet

³ Courier Co. and Furniture Co. are pseudonyms.

of more than 2000 delivery vehicles. The facility where the intervention was implemented employed 150 people; of these, 135 were hourly workers. The courier industry is labour intensive; its production processes are largely dependent upon manual labour rather than a reliance on complex technology. Courier Co.'s financial health was good at the time of the intervention and in the early 2000s, it expanded and built new facilities. Competition in the transport industry is intense as courier companies, which offer customers "overnight or later delivery"⁴ services to destinations inside and outside Canada, compete with rival companies which offer similar services; same-day couriers, which operate in a restricted geographical area, such as a city; and logistics companies, which specialize in transporting freight that is larger and in greater volumes than couriers would typically ship. Companies compete based on the services they can provide to customers, most importantly the speed and reliability of delivery. Accordingly, companies in this sector put a great deal of emphasis on the efficiency and effectiveness of their operations. In response to the time sensitivity of the courier industry, Courier Co. monitored the quality of its service daily and the timely pickup and delivery of parcels were continually stressed to employees by management.

Furniture Co. manufactures components for office furniture and home appliances and had 300 employees, of which approximately 250 were hourly. Part of a larger company that was established in the early 1900s, it has plants in Canada, the United States and Taiwan and is one of the largest manufacturers of its product globally. The industry is capital intensive and relies heavily on technology in its production processes.

⁴ Companies that offer overnight or later delivery service to a wide geographical area tend to be large firms that have at their disposal fleets of delivery vehicles. Conversely, same-day couriers, also known as local messenger services, are typically small firms and often are independent.

The industry has become extremely competitive in the last several years as raw material costs increased, foreign competition grew, and some customers sought overseas suppliers that could make parts more cheaply. In response, Furniture Co. restructured to offset these challenges and remain profitable. The reconfiguration of its Canadian operations in 2003 included amalgamating two plants and laying off workers. Coming in several waves, these lay offs typically involved 20 to 40 employees and included both hourly and salaried personnel. For some employees the lay offs were temporary; for others, they were permanent. Late in the study, the plant renewed its lean production program in an effort to shed inventory and eliminate waste in the production process. Additionally, the company attempted to become more specialized in the types of products it manufactured and focused on producing smaller volumes of higher-end parts.

1.5.2 The PE Program Framework and Change Team Formation

The interventions were the collaborative effort of the research team, management, and the union at each site. In each setting, the interventions were initiated by management, who contacted the university research team with an interest in reducing MSD injuries in their facilities. This initial contact was followed by preliminary discussions among management, union and the research team about the workplaces and types and frequency of injuries. These informal discussions led to more formal negotiations, in which the research team presented a detailed description of the sorts of activities that a participatory ergonomic program would involve, discussed the costs that the company would incur in implementing the program, and stressed that management support was essential to the program for it to be a success. The research team also discussed the methods that would be used in the program, most notably the creation of a participatory ergonomic change team (ECT), consisting of workers and manager

representatives. Importantly, the managers from both settings agreed that an ECT would be the agent of ergonomic change in the facilities and have the time and resources it required to alter the work processes. In each facility, the ECTs membership included hourly workers, management representatives, and an ergonomist-facilitator who was a member of the research team. Composition of the teams was based on a “representative participation” model of participatory ergonomics (PE) (Haines *et al.*, 2002: 311-312), which means that members on the teams represented their work areas within the settings.

Before each of the interventions began, the research team gave company representatives suggestions about the personnel who would be needed on the ergonomic change teams. Two main considerations were identified: 1) bringing together participants with different knowledge and skills appropriate for making ergonomic changes such as hourly workers, management representatives and technical specialists such as health and safety, human resources, and skilled trades personnel (Haines *et al.*, 2002; St. Vincent *et al.*, 2006; Van Eerd *et al.*, 2008); and 2) the notion of a “representative participation,” model of participatory ergonomics (PE) (Haines *et al.*, 2002: 311-312) wherein personnel on a change team represent their work areas and are directly involved in the change making process.

Ultimately, determination of ECT composition was the responsibility of the workplace parties. Recruitment procedures differed across the settings. In Furniture Co., a primary criterion for membership on the ECT’s was past or current experience on the plant Joint Health and Safety Committees (JHSCs). In Courier Co., membership overlap between the JHSC and ergonomic change team was intentionally avoided as there was a general understanding in the depot that the JHSC was ineffective and thus, a desire to

avoid overlap in the composition of the ECT and JHSC. In this workplace, management identified potential participants and asked if they wished to serve on the ECT. The selection process resulted in each of the ECTs being composed of hourly workers, management representatives, and an ergonomist-facilitator, who was a member of the University Research Team.

1.5.3 Ergonomics Training

Once the ECTs were formed in each setting, activity commenced with a series of training sessions conducted by research team members. These sessions, held for four hours a day, for four days, covered the principles of workplace ergonomics, basic anatomy as it related to work-related musculoskeletal injury, a model for systematically identifying and addressing risks of exposure, and tools for risk factor identification and measurement.

During the training and throughout the interventions, the research team emphasized two principles. One was that the sources of musculoskeletal injuries were located not in the behaviour of an employee but rather in the physical features and organization of workstations and the production process. This principle corresponds to the idea that ergonomics is concerned with how work can be adapted to the employee rather than fitting the employee to his/her work. Another principle that the research team emphasized was that there was a “hierarchy of control strategies” to reduce risk of injury: some strategies that altered the physical work environment were more effective at reducing risk of exposure to injury than others. According to ergonomists, the best way to reduce injury is to alter the physical work area through “engineering controls,” in contrast to altering work methods by attempting to change employees’ behaviours.

Accordingly, in their deliberations, the hierarchy of control strategies was influential in determining the types of hazards the ECTs' focused their attention on and the types of solutions they devised to address hazards.

In the training sessions, workers and managers were also introduced to a model for guiding their ergonomic activities. Referred to as the "Blueprint" (Wells *et al.*, 2001), it was developed on the basis of a review of ergonomics literature and the research team's previous experiences in implementing workplace ergonomic interventions. The Blueprint specified stages in which opportunities for change were identified, solutions formulated, implemented and evaluated, and then modified on the basis of the evaluations. Although there are variations in the content of models used in PE programs, such as the Blueprint, their use is widespread (Wilson *et al.*, 2005: 939-941) and considered by some researchers as a crucial prerequisite to a successful PE program (Burgess-Limerick *et al.*, 2007; de Looze *et al.*, 2001; St. Vincent *et al.*, 2006; Wilson and Haines, 1997).

The research team provided the ECT members with several tools for evaluating risks of musculoskeletal injuries. These tools enabled ECT members to develop an understanding of workers' job tasks and any pain or injuries associated with these tasks. As an example, one tool was designed to gather workers' input by means of a short questionnaire, referred to as "the one-minute survey." The research team also instructed workers to use a tool designed to quantify risk of exposure to injury by calculating the biomechanical forces acting on employees' backs. Together, these tools gave ECT members a sense of the workers' risks of exposure to injury and where the sources of these injuries were. Having described the settings and the intervention framework, I now provide a preview of the dissertation's subsequent chapters.

1.6 THE CONCEPTS OF CHANGE MAKING AND CHANGE

The objective of the PE program was to address workplace health concerns by establishing an ECT that addressed MSDs. In the dissertation, the term “change making” refers to the process whereby members of the ECTs and those they enlisted for assistance formulated and implemented projects in an effort to reduce MSD hazards. I examine two components of change making – solution design and implementation – and their constituent parts in depth in Chapter Four and Chapter Five, respectively. Throughout the dissertation the term “change” refers to alterations to the production process. The production process involves both the job tasks and technology used in the manufacture of a good or provision of a service. The changes to the production processes generally involved alteration of a facility’s physical layout, modification or replacement of equipment or tools, amendments to the speed or pace of production, and introduction or removal of equipment to a work area. Changes ranged from the simple to complex; from inexpensive to costly; from large to small. Typically, the scope of any given change affected ten or fewer people in a work area.

1.7 DISSERTATION OVERVIEW

Chapter Two provides a more detailed review of the theories that inform the dissertation. The chapter takes the negotiated order and critical theory perspectives in turn and reviews their assumptions and features that are germane to the dissertation’s analysis. It also explains how each perspective helps to comprehend the functioning of the OHS programs under examination here and how the perspectives complement each other. The chapter concludes with a list of questions that the dissertation attempts to answer.

In Chapter Three, I discuss the methodology used in the dissertation, the data collection methods, and the analysis. I describe the settings in detail, outline where and how field notes were recorded and what they contained, and talk about how interview data were gathered. Additionally, the chapter recounts some of the challenges I encountered as I established my role as an observer and throughout the project's data-gathering phases.

The dissertation's analysis follows the course of ECT activities and as such begins with a consideration of the solution design stage. Next the dissertation moves to the implementation of solutions and then on to sustaining the PE programs. The focus on these stages of change largely results from the fact that this is where I came into the process after being hired as a research assistant.

In Chapters Four through Seven, the findings are presented. The findings chapters focus on three aspects of the trajectory of the ECT's work: the development of designs for change, the implementation of changes, and the continuation of the OHS programs. Chapter Four focuses on the nature of and access to knowledge during the ECTs' development of solutions to address musculoskeletal hazards. The chapter describes how the availability and selection of resources affected both the production of solutions to address MSDs and the process for developing them. In Courier Co., the ECT was for the most part able to design workable solutions. However, later in the intervention, the ECT worker representatives' opportunities to apply their ergonomic and experiential knowledge were constrained by management's unwillingness to relieve them from their regular job duties to participate in ECT activities. In Furniture Co., solution development required technical expertise the ECT members did not initially have, limiting their

capacity to design solutions. The ECT's solution design problems were improved by adding managerial personnel with technical expertise. However, their participation and changes in the way solution design was carried out limited worker representatives' involvement.

The analysis in Chapter Five considers how the organizational contexts shaped the ECTs' implementation activities. Additionally, it examines the ECTs' undertakings to overcome obstacles and complete changes. The chapter's findings examine how the uneven distribution of power within the workplace affected the ECTs' activities. The findings also enhance our comprehension of the OHS programs' functioning because they draw attention to the negotiation that ECT members engaged in to implement changes. The chapter highlights the fact that implementation – far from being a straightforward, linear, stepwise process – involved negotiation with key decision makers, which often derailed the process. Problems securing authority to make changes added complexity and in some cases redundancy to the process and had the common effect in both settings of protracting the change process. The chapter examines the responses of the ECTs to problems in implementing changes that arose out of their respective organizational contexts. In each setting, the activities the ECTs undertook in response to their problems resembled “articulation work” (Strauss, 1993) – the establishment and maintenance of arrangements to ensure goals were accomplished.

The discussion in Chapter Six continues the examination of the process of implementing changes and turns attention to the division of labour on the teams. It shows that the teams' implementation activities were unevenly distributed among members and typically ECT management representatives were responsible for carrying out the ECTs'

work. To examine the distribution of tasks I draw on the concept of “stance,” (Strauss, 1993: 88), which is actors’ perceptions of their capacity to negotiate arrangements with other actors. In doing so the chapter examines how workplace norms, team members’ past interactions with non-ECT members, and the history of relations between management and workers limited worker representatives’ participation in implementation tasks. The findings in Chapter Six advance our comprehension of how involvement within the PE programs was enacted.

The participatory OHS interventions described here were designed to continue so that the risk of injury would be reduced over a longer period of time. Chapter Seven indicates what happened in regard to the PE programs’ sustainability over time and then explores the factors that either facilitated or constrained their continuation.

Chapter Seven describes how management’s shifting support affected the duration of the interventions. The chapter examines some of the conditions both internal and external to the organization that affected management’s support. In particular, the chapter describes how management’s perceptions of the ergonomic programs’ effectiveness were in part related to the government’s OHS regulatory system. In addition, the chapter explores the ECTs’ efforts to secure management’s ongoing support for the programs. Further, I explore how efforts to secure support were influenced by leadership, or the lack thereof, within the ECTs. The findings in Chapter Seven tell us that continuation was affected by the economic imperatives that the companies’ faced, by the regulatory and compensation system, and equally important, by how the ECTs’ members attempted to push for the PE program’s extension.

Chapter Eight closes the dissertation. The first part of the chapter briefly restates the theoretical approach and recaps the central findings. Next, the cross-case themes are discussed in relation to some of the literature and theoretical frameworks. In particular I reflect on access to knowledge in solution development, authority and the process of implementing change sustainability, and participation. These topics are covered as they figure into the narratives in each chapter and are helpful in understanding participatory workplace arrangements and comprehending how the organizational programs function in practice. In discussing these topics, the section addresses larger questions about participatory OHS approaches and organizational change programs.

Following the above, I discuss the outcomes of the PE programs and some of the challenges of evaluating these. The chapter's penultimate section consists of a discussion of the dissertation's contributions to participatory ergonomics. A large part of this discussion focuses on what practitioners may take away from the study's findings. To conclude the chapter I briefly discuss some possible avenues of future research.

This chapter has introduced the dissertation's focus, described the settings and type of organizational change programs that will be looked at, and offered an overview of the chapters that follow. I now proceed to Chapter Two, in which I discuss the theoretical orientation in the dissertation.

CHAPTER TWO

THEORETICAL ORIENTATIONS

2.0 INTRODUCTION

This chapter examines two theoretical frameworks that are used in the dissertation to understand the functioning of the OHS interventions. Negotiated order theory helps comprehend the agency of actors attempting to make changes and the processes that actually constitute change making. Critical theory gives insights into the structural constraints on the introduction, maintenance and functioning of OHS programs, such as economic imperatives. Together, the orientations let us see both the constraints and activities of those carrying out the OHS programs.

The chapter proceeds as follows: First, I briefly review the assumptions of negotiated order theory, an approach that considers both structure and agency, and how the theory might inform an investigation into workplace OHS interventions. Next, I review the main elements of critical theory as it applies to analyses of occupational health and safety. As I examine these theoretical approaches I discuss their relevance for examining organizational change programs specifically.

2.1 NEGOTIATED ORDER THEORY

Practice-based theories that consider the role of structure and agency are able to capture the reality of workplace interventions and, because they are attentive to change and activity, are particularly well-suited to guide the dissertation's examination of the acts of those engaged in OHS interventions. In this section of the dissertation I focus on one of those theories: negotiated order.

Negotiated order theory emerged in the 1960s in part in reaction to the determinism of structural functionalist and critical theories. Its origins lie in the symbolic interactionist tradition. There are some central tenets that underpin interactionist thinking. One set of premises that serve as a nice encapsulation of the interpretative orientation is provided by Prus (1996:15-18): (1) people communicate using symbols (e.g., language) and their shared understandings of these arise through social interaction; (2) individuals and groups may possess multiple perspectives; (3) people have the capacity to consider the others' point of view of them; (4) people engage in activities; (5) people have the capacity to influence and oppose the influences of others; (6) people develop ties and associations with others based in part on shared interests, and, (7) social life is ongoing and is not static.

Anselm Strauss (1963) and colleagues were the first to use the phrase “negotiated order.” Strauss (1978; 1993), Fine (1996), and Maines (1982) can be counted as proponents of the theory. Studies employing the negotiated order framework have been carried out in a variety of organizational settings, including restaurants, television networks, hospitals, schools, and prisons.

At the heart of the negotiated order framework is, “an understanding that social organization and order are inconceivable without some form of negotiation between individuals and groups” (Strauss, 1993: 46). For negotiated order theorists, structure does not exist objectively. Instead, negotiated order theory suggests that actors perpetually enact and re-enact organizational structures.⁵ In his comparison with other

⁵ I am referring to organizational structure here.

perspectives on organizations, Reed (1992: 120) points out, negotiated order theorists view

organizations as much more precarious and fragile collections of negotiated agreements and arrangements that are always open to renegotiation and reconstruction. It presumes that structure is something that has to be continually worked at and reproduced through social interaction rather than treating it as a transcendent object or entity imposed on social actors by the environmental imperatives they face.

2.1.1 Organizations and Structure⁶

The negotiated order framework rejects the notion that organizations or the environments in which organizations are embedded determine actors' behaviours. In negotiated order theory, actors play a key role in "shaping and reshaping organizational arrangements" (Reed, 1992: 86). How individuals act, according to negotiated order theorists, is less a product of organizational and social structure than it is of individuals' interpretations of their circumstances (Fine, 1984: 243). The assumption that individuals' interpretations are at the centre of activity means that multiple avenues of action are possible and that structural configurations do not, "automatically direct or lead the actor to one course of action" (Altheide, 1988: 343).

The negotiated order framework suggests that structure exists insofar as interaction among organizational actors gives rise to it and maintains it. In this way, organizations and their structures "are historically and temporally embedded and they will be reviewed, re-evaluated, revised, revoked or renewed over time" (Reed, 1992: 85).

⁶ Maines (1982) and Strauss (1978: 98-99) distinguish among negotiative (or immediate) contexts, organizational context and structural context. I use terms organizational structure and social structure to differentiate between local and broader social constraints.

Rather than treat key features of organization – such as goals, structures, technologies, socialization mechanisms and control systems – as supra-individual or collective forces which impose themselves on social actors, the negotiated order framework is based on the belief that these factors only take on meaning and significance in so far as they are recognized and utilized by actors in the source of their negotiating activities (Reed, 1992: 85).

Although the negotiated order perspective stresses actors' abilities to reflect on their circumstances and make changes accordingly, it considers these actors embedded in both organizational and social structure, which they may have limited ability to control. The significance that negotiated order theorists place on individuals' perspectives of the surrounding conditions does not mean that they dismiss structural influences, organizational rules, regulations, and so forth. According to Strauss (1993: 42), negotiated order theory rejects both conceptions of human behaviour in which structure is deterministic and conceptions in which structure has no influence on behaviour. While structure is fluid in the sense it can be revised, it remains influential on peoples' activities. Rules, regulations, division of labour, and hierarchies can exert constraint over activities, but ultimately, for negotiated order theorists, they are alterable and are not objective in the sense they are "structural givens which determine action processes" (Reed, 1992: 86).

Negotiation, according to the negotiated order framework, is influenced by multiple contexts, including the immediate circumstances and broader social structures. As Fine (1996: 3) points out, "Specific negotiations are contingent on the structure of the organization and the field in which the organization operates. Negotiations follow lines of power and communication and are patterned and non-random." For example, in a manufacturing setting, the local context might include the fact that there are scarce

resources, which affects managerial negotiations to invest in new machinery. The broader context may be the economic conditions, which in a recession may create a dearth of company resources. Moreover, Hall and Spencer-Hall (1982: 346) note that organizational features such as the distribution of power, the size of an organization and the degree to which power is centralized affect the degree of negotiation and that these “delimit the negotiative context and the consequent form of negotiation.”

There is little disagreement among key negotiated order theorists about the fact that structure should be taken into account. Fine (1984: 241) is unequivocal about this point, noting, “Despite the way in which the negotiated order approach has been caricatured ... its advocates do not claim that structures do not exist or affect other relationships, nor do these theorists believe that formal rules make no difference.” Strauss suggested that the relationship between structure and agency was not to be denied and connections were to be made between macro and micro levels of analysis.⁷

2.1.2 Power

While negotiated order theory emphasizes actors’ abilities to influence order, the theory also recognizes the significance of power in constraining actors’ agency. Reed (1992: 90) notes that for the negotiated order perspective the importance of power is linked to the fact that actors have divergent interests; within organizations, these different interests are connected to different intentions, which need to be worked out through negotiation among actors. As Reed (1992: 87-88) points out, in negotiated order theory,

⁷ As Strauss (1993: 42) explains, “there is no great strain between recognizing constraints on action while also emphasizing that actions cannot possibly be completely determined by economic, cultural, biological, ideological, political, etc., conditions.”“be both structural and processual in their explanations” which Strauss points out is captured in the notion of ‘structural process’, first used by Glaser and Strauss (1968: 239-42).

“Power is approached as a capacity to control the course of events and the actions of participants so that the negotiation process reflects the preferred outcomes of certain individuals and groups over others.” Power, for negotiated order theorists, is historically and situationally rooted, or in other words “contingent upon the conditions prevailing within an organizational setting over a particular period of time” (Reed, 1992: 88).

The angle that negotiated order theorists take on power suggests that its distribution may change over time. As conditions change internally or externally to an organization, opportunities may arise for those with less power to gain more. Negotiated order’s take on power also suggests that although differences in power are an important shaper of negotiative processes, the sources of power are not limited to those who are formally recognized as having it, such as managers and professionals in work settings.

2.1.3 Social Worlds

As a means of talking about different groups that inhabit settings, negotiated order theorists talk about “social worlds.” According to Garrety and Badham (1999: 280),

Social worlds are self-organizing units that share resources, information, assumptions about what is important, and about what sorts of activities are desirable and worthwhile. They consist of things as well as people – documents, buildings, and configurations of technology that facilitate work and communication within worlds. Although many worlds coincide with formal work structures (factories, laboratories, committees, departments) many do not.

Strauss notes that an organization may be constituted of a web of multiple sub-worlds (Strauss, 1993: 209-221). The notion of social worlds reflects the fact that there are multiple groups with potentially different perspectives on a situation. They subscribe to different values and beliefs and these different perspectives shape how they act in regard to other social worlds (See Star, 1991).

2.1.4 Examining the Concept of Work and its Reliance on Interaction

Throughout the dissertation I rely on Strauss' conception of work to describe the activities of those attempting to alter the workplace. Strauss' (1993) use of the term work is not limited to paid employment. He applies the term to a broader range of activities. For him, work may involve both activities that one does which are associated with jobs but also those associated with recreational pursuits, such as hobbies or sports. In this study, the concept of work can be applied to the activities that the ECTs undertook to carry out changes in their workplaces. Importantly, Strauss' (1993: 52) conception of work focuses on interaction. By this he means that work is accomplished through a set of "coordinated collective acts." The coordination of separate acts is dependent upon securing agreements among different groups and individuals. Additionally, Strauss' conception of work focuses analytical attention on the practices of work. Given that one of the central questions motivating the dissertation is, "how do those involved in OHS programs work to achieve their goals," of particular importance is a conceptual frame for *how* actors make changes.

The focus on *how* work is carried out leads us to consider interactions among participants and suggests examining the sorts of agreements actors are making and the conditions that affect these agreements. These interactions are necessary in any instance in which a goal is to be accomplished. According to Strauss (1993: 40-41), "The multitude of sequential actions involved in any interactional course requires a constant aligning (lining up) or articulation of these actions." Strauss (1988: 43) highlights that even for seemingly simple activities the alignment work that goes into its accomplishment can be complex:

The necessity for this [alignment work] can be seen, for instance, even during simple projects such as two couples deciding to meet for dinner at a restaurant. What day? What hour? Where? Not there, it's too far or too expensive or too formal, so why not at another place? A complex project like the ascent of Mount Everest by a team involves thousands of acts that need to be articulated in order to carry it off.

Negotiated order theorists stress the linkages among those in a setting that are required to accomplish work. Work is not merely the immediate act or task but the procession of activities leading up to the task and even a consideration of those tasks that follow. In this regard, work is about making necessary linkages with individuals or groups to accomplish a task. Strauss (1988: 45) points out,

The accomplishing of tasks requires the alignment of workers' actions: that is, the process by which workers fit together their respective work-related actions...Even when a task is carried out by a single worker, it usually involves some interactions before and after to articulate it with the other specific tasks on which it depends or which depend on it.

Strauss' conception of work as constituted by several activities has particular relevance to the analysis presented here. According to Strauss (1993), carrying out work may involve the following: (1) articulation, (2) arrangements, (3) stance, and (4) working it out. The first element, articulation, refers to the coordination of lines of work (Strauss, 1993: 87) and entails creating and maintaining linkages between units and departments that enable work to take place. If actors have not been successful at aligning various steps in an interdependent chain then goal achievement is impracticable, if not impossible.

The amount of articulation work may contract and expand over time, depending on the arrangements that actors in the setting have created and whether (and the degree to which) actors have been successful in maintaining these. As Strauss *et al.*, (1985: 267)

point out, in some cases there is extensive time and energy that goes into securing arrangements among individuals and groups; in other instances expenditures are minimal:

The most complicated unquestionably takes place when the representatives of multiple worlds and organizations are intersecting, for then at first nothing is routinized and virtually everything must be “worked out” later to be reassessed, reordered, in a word, reworked. Since those complex intersections are likely to lead to further segmentation within the organizations and social worlds of the respective participants, the negotiative work spawns further negotiations.

The work of negotiating and arrangement making is not over once articulation is secured. Articulation is dependent upon the maintenance of arrangements. If these are altered by participating parties, for instance because conditions outside an organization force them to, then actors must endeavour to articulate lines of work again. Indeed, over time aligned lines of action may be “disarticulated” (Strauss *et al.*, 1985:163-82) or break down if those in the setting fail to fulfill a bargain they have brokered with others. In response, actors may attempt to “rearticulate” lines of action to ensure that work can be successfully accomplished.

The second element that may be looked at when examining the performance of work are arrangements, which are the agreements among actors concerning who is responsible to do what and the manner in which those responsibilities are to be fulfilled. These arrangements concern the scheduling of tasks, recompense and the standards which actors need to meet while completing tasks (Strauss, 1993: 87). Settlement of these understandings is necessary for a task’s successful completion.

Arrangement making, according to Strauss (1993: 89), is partly influenced by a setting’s history:

Each arrangement making process is built also upon history, including personal histories, and the history of the organization, the interactions within and between departments, the power distribution within the organization, and the past experiences with both the current arrangements and similar ones.

Additionally, arrangement making is conditioned by an organization's environment, which is constituted by other organizations. In the case of a business, for example, its environment may be made up of competing businesses, parent companies, subsidiaries, suppliers, and regulatory bodies.

The third element that warrants consideration in examinations of aligning work tasks is an actor's stance. Stance, according to Strauss (1993:88), refers to the "position taken by each participant toward both the working-out process and the work itself." The importance of stance is its attention to the "perceived power" of those attempting to make arrangements "for gaining control over the broader structural and organizational conditions upon which the arrangements stand" (Strauss, 1993: 88). In other words, stance is partly based upon actors' expectations of what the outcomes of their attempts at negotiating agreements will be. The more control actors have over the structural and organizational conditions, the better positioned they may be to create arrangements that are in their interest (Corbin and Strauss, 1993).

An actor's stance is also affected by her/his biography, or the collection of personal experiences, which may be relevant to the work at hand, and/or other experiences that have little relation to the current work. It may also be related to her/his understanding of the work, and past interactions with those in the setting (Corbin and Strauss, 1993). Further, arrangement making is also affected by the history "of interactions within and between departments, of power distribution within the

organization, and past experiences with both the current arrangement and similar ones” (Corbin and Strauss, 1993:72; see also Prus, 1999).

The fourth element involved in carrying out work is what Strauss (1993) refers to as “working things out” or the collection of “interactional strategies” and counter strategies that actors use in their attempts to make and maintain linkages that will enable the execution of work (Corbin and Strauss, 1993: 74). Interactional strategies vary considerably and they may include such actions as manipulation, persuasion, coercion or various combinations of these.

Interactional processes include persuading others (such as the company president), teaching relevant others about the value or feasibility of the project, or negotiating some exchange that will make the project seem worthwhile to them. At least two other interactional processes may be involved, even at this early phase. The first is manipulation (such as not revealing anything about the goal or plan); the second is coercion or the threat of coercion. These interactional processes are essential to articulating people’s work and getting work done despite the inevitable impediments to the workflow, even when major disturbances arise (Strauss, 1988:166).

Understanding arrangements and articulation work are central to comprehending the accomplishment of work. Corbin and Strauss (1993: 74) provide the activities of a nursing staff as an example of the centrality of arranging and articulating in work:

The work that a nursing staff must do in hospitals requires coordinated and cooperative arrangements with physicians and other departments (engineering, surgery, central supply, X-ray, and other labs). Without arrangements the nursing staff would have no way of ensuring that treatment plans were available and up-to-date, medications would not be on the unit when needed, and that patients would be fed and could be operated on, rooms kept clean, sufficient manpower and supplies would be on hand and that equipment was kept in working order.

Strauss (1988; 1993) points out that disruptions or contingencies are always possible in the accomplishment of work and they may nullify or alter agreements to the extent that articulation is not possible. In the case of participatory ergonomics, contingencies, depending on their severity, may hinder or completely disrupt a project from being completed or workflow from proceeding. As Strauss (1993) points out, some contingencies are routine and easily handled by actors but others are non-routine and pose significant threats to work and maintenance of alignment. The latter may therefore cause actors to rearrange how work is carried out and re-establish arrangements so that articulation is once again possible.

2.1.5 Studies Employing a Negotiated Order Framework.

A number of studies have employed negotiated order theory to explore work practices. Investigating the work of scientists in a cancer research laboratory, Fujimura (1987) focuses on how scientists attempt to maintain continual research output by aligning their experiments with multiple social worlds, including granting agencies, the scientific community, and the university which hosts their laboratories. Failure to do the articulation work necessary to line up these different social worlds behind research endeavours means a potential disruption in the funding that is integral to achieving research goals.

In a different setting, Allen (1997) and Svensson's (1996) studies of hospital order examined the negotiations between nurses and doctors. Allen (1997) and Svensson (1996) found that though doctors had authority over much of the work that went on within the hospital units, the nurses were able to assert control over their own work and to a certain degree over the doctors' work.

Garrety and Badham (1999) examined how a group of employees attempted to develop a computerized manufacturing process. In their analysis, the researchers draw on Strauss' (1993) notions of social worlds, trajectory, and Star and Griesemer's (1991) notion of "boundary work." In this case, Garrety and Badham were concerned with the relations among divergent parties as one group attempted to include human factors principles into the technology's design.

Greenberg *et al.*'s (2005) study drew on negotiated order to examine activities undertaken by employees to side-step management control in a television broadcasting facility. The actors used inaction as a means of resisting managers' control over the content of what a television station could broadcast.

Fine (1996) applies a negotiated order approach to restaurant work. Fine's research is particularly significant in the context of the present research because, like the work presented here he ably draws links between the everyday work of kitchen staff and the local and broader economic circumstances in which restaurants are located.

2.1.6 Utility of the Negotiated Order Approach for Studying OHS Programs

The negotiated order approach has great utility for explaining the activities involved in OHS programs. The functioning of OHS programs is not solely the product of a program's inherent properties. The negotiated order perspective would suggest that it is actors' agency as well as how the structures in the setting are maintained that shape the functioning of an OHS program.

OHS programs are embedded in work organizations, which are in turn located in the capitalist mode of production and characterized by differential access to resources, including time, and power, sets of rules and regulations, labour process and production

pressures. These contexts may shape the actions of those associated with the programs but do not determine their behaviour. The consciousness of actors, their agency and their ability to respond to the features of the settings play an important role in explaining the program's operation and its continuation. According to the negotiated order framework, those in the setting can create and recreate critical arrangements, which need to be intact to meet program objectives.

2.2 CRITICAL THEORY

The critical paradigm has its origins in the writings of Karl Marx (1867 [1976]) and, when applied to work settings, theorizes that workplace conditions are the product of relations between labour and capital. Central to the critical paradigm is a concern with employers' control over the means of production, or the raw materials, as well as technology, capital investments, and labour power⁸, that is employees' capacity to work, used in the production process. Sociologists using a critical framework suggest that labour and employers' interests are incompatible or at least in conflict and that the organization of work is contested (Buroway, 1979; Edwards, 1979).

A central concept in understanding the organization of work is the social relations of production; that is, the formal and informal relationships that emerge from ownership over the means of production. Ultimately, because of employers' ownership over the means of production the form the relations of production take is that workers are accountable to and directed by management and the latter has final say in decisions concerning the work processes and workplace conditions. However, the relations of

⁸ Marx differentiates between labour, the people doing the work, and labour power, employees' potential capacity to carry out work. Struggles over control of the workplace, workers, and the production process are often about management's attempts to ensure they are getting the most labour power from employees.

production take on a slightly different form in every workplace. The particular form the relations of production take are partly a product of the distribution of power, which is conditioned by labour and managers' access to resources. When workers are in a relatively powerful position they are more likely to call for better work conditions, whereas in a weakened position to demand, they are less apt to call for better conditions.

Investigations into occupational health and safety that use a critical framework are concerned with the generation and prevention of workers' exposures to risk of illness and injury, such as musculoskeletal disorders, and how these are affected by relations between labour and capital. In particular, researchers using a critical framework consider the relationship between injury and the control employees have over work organization and conditions. Few comprehensive theoretical articulations of occupational health and safety using a critical theory exist. Some examples of the use of the theory include research by Theo Nichols (1997; 1999), Eric Tucker (1992; 2003) and Vivienne Walters (1983; 1985). I unpack the assumptions that underpin a critical theory of occupational health and safety in greater detail below.

2.2.1 Worker Health and the Labour Process

The critical paradigm considers work organizations as embedded in larger social structures. Reed (1992: 94) points out that in the critical paradigm, organizations are formed and maintained by dominant power holders in capitalist economies. "The structural arrangements and managerial practices typical of formal or complex organizations are determined by these wider configurations of domination; the latter also control the extent to which organizations reproduce the ideological and political constraints in which they are embedded" (Reed, 1992: 93).

For critical theorists, formal organizations are a means by which dominant classes establish, defend, and replicate class relations (Reed, 1992: 95). The relations of power are contested though, and thus while organizations are places of reproduction they are also sites of struggle where capital attempts to ensure its power is maintained and labour attempts to alter the conditions under which capital accumulation occurs. Given these struggles for control, Reed (1992: 121) points out that, “Of considerable importance for the critical paradigm are ‘the mechanisms of control’ that are necessary to regulate endemic conflicts of interest and value between contending groups.”

It is within this context that health and safety issues are dealt with. The drive to maintain and increase capital accumulation affects the extent to which health is taken into consideration and how it is addressed. Typically, employers must continually increase capital accumulation to remain competitive in the capitalist mode of production (Littler and Salaman, 1984: 29-35; Nichols, 1997: 98-99). Generally, the process of altering work organization begins as alternatives to existing means of production emerge. Labour process transformation may come in a variety of forms including alteration of a managerial style or production equipment (Nichols, 1997: 99). An example of the adoption of a new managerial style is the utilization of post-Fordist techniques in the 1980s and 1990s by employers. One such technique is lean manufacturing, which emphasizes standardization, efficiency, and management’s strict control over quality. In many recent instances, the outcomes of adoption of post-Fordist techniques have been increased control over quality and quantity of production and in general the intensification of work (e.g., Landsbergis, 2003). One way employers achieve this is by altering the labour process, or the way workers’ labour power and machinery are used in

the transformation of raw materials into commodities (e.g., Braverman, 1974; Burawoy, 1979; Edwards, 1979; Marx, 1867/1976; Nichols, 1997).

2.2.2 Contradictions of Capital Accumulation

Occupational health and safety in the capitalist mode of production is, in part, the product of contradictions produced in the labour process. On the one hand, to remain profitable, employers attempt to maximize employees' labour power, or their capacity to work, and restrict investment in workers' welfare, including investment in health and safety. On the other hand, employers and managers need to provide conditions for the reproduction of labour power. Employers' provision of these conditions may diminish capital accumulation.

A critical framework suggests that employers cannot completely disregard worker health, as they need to ensure the conditions of production are reproduced. The production process depends upon obtaining the consent of able-bodied workers to exchange their labour power for a wage. Once employers negate worker health to the extent that workers' capacity to labour is diminished, production and capital accumulation may be hindered. In this way, alterations to the labour process that create unacceptable levels of illness and injury among workers may actually conflict with capital accumulation (Grunberg, 1983; Hall, 1993; Navarro, 1982; Novek, 1992; Walters, 1983; 1985). This helps to explain why management would be willing to alter the work conditions and incur costs in an effort to prevent worker injury. Walters (1985: 413-414) describes how injurious work can potentially reduce workers' labour power:

In order for capital accumulation to occur labour power must be renewed or reduced, for it is the sale of workers' labour power that makes possible the appropriation of surplus value. One aspect of the reproduction of labour power is the physical

maintenance of workers and this will include the physical health of labour force... To the extent that the labour process created illness and injury it destroys the physical health of workers and is therefore destructive of labour power. In this sense there is a contradiction between the requirement of capital accumulation – which leads to a primary emphasis on the profitability of new technologies and materials – and the requirement of reproduction of labour power.

As injuries and illness increase, workers' labour power, or their capacity to work, (i.e., to create surplus value) is reduced. This inverse relationship may reduce employers' ability to extract surplus value and subsequently, accumulate capital. In this way, employers' attempts to maximize workers' labour power to accumulate capital conflicts with their need to maintain a relatively healthy workforce. Maintenance of worker health may be especially salient in situations where workers are highly skilled and are difficult to replace and/or during labour shortages. To maintain a minimal level of health for workers, employers must invest to a degree in health and safety (Walters, 1985: 58). This investment may take the form of creating return to work programs, training workers in health and safety, hiring health and safety personnel and providing rehabilitation for injured workers.

The second aspect of the reproduction of labour power is that employers must create and maintain the "relations of consent" (Burawoy, 1979:15-16; Edwards, 1979; Edwards, 1986; Hall, 1993; Littler and Salaman, 1984). In order for workers to exchange their labour, they must be relatively satisfied with, or at least, consent to the conditions the employer provides. In part, the relations of consent are contingent upon the provision of a satisfactory level of health. Unhealthy working conditions potentially create discord between workers and management, which jeopardize the consent required for labour

power to be transformed into labour and, in turn, into surplus value (Eakin and MacEachen, 1998; Hall, 1993; Walters, 1985).

The establishment of a “satisfactory” level of health is best conceptualized as the product of negotiation or contestation between labour and employer. One important result of these negotiations concerns the attention or investment in health, which is part of what Novek (19) refers to as the “wage/effort/ health bargain.” The wage/effort/health bargain is a tentative agreement between labour and management about how much wage a worker receives for a specified amount of work and the working conditions, including the health conditions, that the work is to be carried out under. The health conditions and how these may be altered if deemed unacceptable to one of the parties is an outcome of the ongoing negotiations between workers and managers and may be altered as the labour process is changed or as the power of capital and labour shifts. The health bargain that is arranged between workers and employers is, to an extent, open to “negotiation... and should reflect the balance of power in the workplace between management and labour” (Novek, 1992: 19). Therefore, if workers’ bargaining position is weak, and they have little leverage to contest the state of health conditions, they may tolerate the conditions under which labour power is exchanged even though they became unhealthy. Conversely, if workers are in a relatively powerful position vis-à-vis an employer, they can demand better working conditions (Grunberg, 1983; Navarro, 1982; Nichols, 1997; Storey and Lewchuk, 2000). Grunberg (1983: 623) aptly captures the negotiation concerning health and safety in a manufacturing setting:

...the actual effort [intensity of labor] expended will be determined by the extent to which workers can encroach upon and limit the prerogatives and power of capital to determine the social conditions of production. In concrete terms the struggle will

revolve around the degree to which management can independently decide upon manning levels, the speed of the line, noise and heat levels, the length of rest breaks, the allocation of tasks and the movement of workers across tasks, and on the freedom management has to discipline and fire workers.

It should also be noted that employers can draw on a variety of means by which to satisfy calls to address health and safety concerns and minimize their investment in health and safety. One way of keeping health and safety costs down is to adopt low-cost protections, such as personal protective equipment, rather than altering the technology used in production, which usually is much more expensive to do. Employers have also attempted to minimize investment in health and safety by staunchly resisting attempts by workers to broaden the definition of what can be considered a risk or what ailments can be considered work-related (Harrison, 1995; MacEachen, 2003; Morello-Frosch, 1997; Walters, *et al.*, 1995). The maintenance of narrow definitions of health risks serves employers' interests by reducing the scope of issues they must address in the course of "protecting" workers' health, thus protecting the generation of capital.

2.2.3 Studies Employing Critical Theory

Novek's (1992) comparative case study of labour process transformation in two meat-processing plants provides a good example of an application of a critical framework to the analysis of workplace injuries. In one plant, a new system of production enabled management to increase the speed at which animals were killed and processed, and thereby exacerbated the intensity and repetitiveness of the already onerous physical labour workers did. As a result of the intensification of work, employees were at a greater risk of lacerations and muscle strains (Novek, 1992: 27). In the labour process transformation, employees' work was altered in two significant ways. First, workers' jobs that originally involved performing numerous varied tasks became specialized so

that workers did only a limited number of tasks but did these repeatedly. Second, under the new system of production, employers introduced conveyance machinery, the speed of which was regulated by management, and as a result workers lost much of the control over the pace of their work and the speed at which workers performed their tasks increased markedly. Novek (29) notes that changes in the injury rate in one workplace that experienced transformation of the labour process were commensurate with the increase in output:

The number of lost time accidents at the plant was 25.8 per 100 production workers in 1983 and 26.7 in 1984. In 1985 with the intensification of production well underway the rate rose dramatically to 39.4 per 100 production workers, almost 40 percent of the bargaining unit.

Storey and Lewchuk (2000) provide support for the notion that, in attempting to minimize OHS investment, employers may invest in cheaper and less effective safeguards. In their case study of worker health in a manufacturing plant, Storey and Lewchuk (2000: 117-121) found the employer provided only protective clothing in reaction to high levels of carcinogenic dust in employees' work environment, instead of installing expensive, but more effective, ventilation equipment. Moreover, workers were provided personal protective equipment only after a bitter round of collective bargaining.

Hall's (1993) study in the mining industry provides examples of how workers may resist deleterious work conditions. In his case study, management implemented new production processes characterized in particular by new technologies to increase the production rate. One outcome of these changes was increased injury and illness rates. Hall's (1993) study shows that increased mechanization in an underground mine setting increased the rate of injuries, in part because workers sacrificed their control over their

work and the informal safety practices they had developed to protect themselves from injury. Workers' loss of control over safety led to animosity between union and management. Hall (1993: 14-15) points out that restructuring the labour process also altered the relations workers had with supervisors, which was one of the primary ways health and safety concerns had previously been handled:

...[D]ue to labour process changes, mine supervisors could no longer handle resistance. While conflict had largely been mediated and addressed in conventional relations among miners and between miners and their "foreman," the shift in control and planning to management, the creation of machine operators' jobsshifted the locus of potential conflict and the means of resolution.... (see also 12-14; 15-16).

2.2.4 Utility of Critical Theory for Studying OHS Programs

The critical framework highlights the significance to working conditions of labour-management relations and economic imperatives, including investments in occupational health and safety. Following from the above discussed broad features of the critical perspective, we can identify some specific contributions to the analysis of OHS in particular. First, it recognizes structure as important in explaining OHS decision-making and in particular, it considers the effects that the social relations of production and economic imperatives may have on OHS interventions. Second, it draws out the important role that power plays in the workplace and how it may influence interventions. In the workplace, power is unevenly distributed, such that workers typically will be unable to push their agenda the way others who are in positions of power may. It embeds workplace activities in the capitalist mode of production and economic imperatives, which have an important bearing on managers' orientations toward health and safety. Significantly, it considers the effects that employers' and managers' attempts to maintain and/or increase production may have on occupational health and safety and OHS

interventions. In so doing, a critical paradigm points to health and safety's precarious, and often subordinate, position relative to economic imperatives. Third, it recognizes that work processes can have negative impacts on worker health and that managers need to address these so the conditions required for capital accumulation remain intact. Fourth, health hazards are socially constructed and, as such, their presence, severity, and how they are addressed, are a product of negotiation, and often contestation, between labour and management. Therefore, this opens the possibility that management may contest an injury or illnesses' work relatedness.

2.3 CONCEPTION OF MANAGERS IN CRITICAL THEORY

While research on OHS from a critical perspective has done a good job in exploring occupational health and safety, a feature of this work is that it has failed to fully explore the concept of management and how divisions and in some cases conflicts between managerial roles may affect OHS. In the literature on OHS that employs a critical framework there are few examples where researchers go beyond the dichotomous representation of management and labour and the class roles they fill. Several researchers have noted that the critical framework often glosses over important aspects of management and managerial activity. As Reed (1989: 10) notes, "The dominant economic imperative that management have to realise is the need to achieve a sufficient degree of control over the production process necessary to secure the efficient extraction of surplus value and corresponding levels of profitability that it guarantees." However, how management carries out these activities, and even whether it carries them out, may be more complex than is reflected in some variants of the critical paradigm.

One of the elements of managerial activity that researchers have discussed is the degree to which management acts to implement and sustain economic imperatives that are crucial to capital accumulation. Within this dialogue around managers and their activities there is a discussion of the various, and sometimes conflicting, influences on their behaviour. For instance, Whittington (1992) notes that there may be multiple influences on management, some of which may impinge upon how mechanisms of control that are so essential to capital accumulation are put into practice.

Reed (1989: 125-129) notes that some managers may share some of the same concerns that labour does in terms of fending off work intensification and may act to protect both their status within an organization and their work involvement. Managers may resist organizational change such as the implementation of new technology if the outcomes of such changes are anticipated to have detrimental effects on their own power and authority within the firm (Balogun, 2003; Harely *et al.*, 2003; Knights and Graham, 1994). This may particularly be the case for mid-level managers, who possess less power than their upper-level counterparts. Mid-level managers' rejection of change, based on how these changes affect them personally, complicates senior managers' attempts to ensure labour transformations are successful and that capital accumulation is improved, or at least maintained. Significantly, the research noted above highlights mid-level management's mediating role between economic imperatives and senior managements' attempts to respond to these imperatives.

Willmott (1997) provides an insightful critique of how managers are considered in Marxist writing. In particular he criticizes the one-dimensional character that managers are often assigned. In large part, this one-dimensionality is rooted in the fact

that managers are tasked with maintaining or improving capital accumulation by, among other things, “containing structural contradictions and conflicts in the organization.” Though these factors may be the primary motivation for managers, for Willmott (1997), they are reflective and agentic and thus should not be treated as “personifications of economic categories.” Willmott (1997: 1338) notes that lower-ranking managers are often exposed to similar forms of pressures as their worker counterpart’s experience, such as surveillance and increased pressure to perform. Reacting to this, managers seek to protect themselves by attending to things such as “career advancement and job security.” In Willmott’s (1997) words, “The positioning of managers within capitalist relations of production, as *sellers of labor*, tends to render managers less concerned with the demands of capital *per se* than with the security of their employment and their career prospects (emphasis in original).” For Willmott (1997), the point is that there are features of the capitalist mode of production that highlight the importance of managers’ job security and career prospects and managers, as reflective beings, will act accordingly in efforts to maintain their security and maximize their career prospects. As Willmott (1997) notes, “Managers are not ‘judgemental dopes’ (Garfinkel, 1967) who slavishly perform the functions of capital. The very positioning of managers within capitalist labor processes makes it possible, and indeed likely, that there will be departures from the performance of those functions attributed to managers by Marx.”

Similarly, Whittington (1992), drawing on Giddens’ notion of structuration, and institutional theory, argues that the labour process perspective needs to move to a more agency-oriented understanding of managers. As Whittington points out, “the relationship of particular actors to society becomes less one of passive embeddedness, and more a

matter of active engagement” (704). Whittington notes two sources of management agency. The first source of agency emerges from the myriad possible avenues of action for managers to achieve their company’s economic goals. Agency emerges from managerial discretion and the choices managers have to make as they enact “sets of social structures” which are both numerous and ambiguous. Although managers are aware that their goal is to accumulate capital for their company, Whittington argues that how managers should pursue this goal is not straightforward. Because the path to profit making is unclear, managers are frequently compelled to make choices among multiple options. In Whittington’s words, “managers ... are ... faced by a variety of conflicting rules of conduct, all legitimate and plausible, but, often, none with any obvious superiority” (705).

Agency can also arise from sources outside of the economic sphere. Noting that managers inhabit economic *and* non-economic spheres, Whittington (1992: 704-706) suggests managers are able to draw on “rules and resources” from both spheres. These spheres connect managers to the multifarious non-economic influences that they may draw on in their decision-making. According to Whittington (1992: 706) such a conceptualization recognizes a manager’s “plural social identities” including gender, family, religion and ethnicity that may influence her/his behaviours. A manager’s participation in these realms and the assumptions and norms embedded in them may bleed into managerial decision-making. Significantly, norms and values in the non-economic sphere may be inconsistent with economic imperatives, and managers may make decisions based on these values that diminish capital accumulation, or at least, do little to improve it.

Another point that emerges in the discussions concerning managerial activity is that with the divisions of labour among managers come differences in power in the workplace. Managers who have a close connection to the production processes and control over labour typically have greater control over the workplace than those managers who are closely connected to production. These differences in power can have important consequences for the shape and effectiveness of organizational programs (Thomas, 1994; Vallas, 2003).

2.4 OCCUPATIONAL HEALTH AND SAFETY MANAGERS

A number of researchers including Barely (1996) and Lounsbury and Kaghan (2001) have noted that organizational theories need to keep pace with changes in organizational forms, the emergence of new occupations and professions, and the changing nature of work. Keeping astride of workplace changes includes taking into account the changes that new occupations may have brought about in work organizations. The emergence of new occupational groups, or structural changes that may have increased an extant occupation's power, may affect the way groups interact and alter the power balance in a workplace.

One occupation that is of interest in this dissertation is that of the occupational health and safety manager, who monitors OHS conditions and when necessary addresses health and safety concerns. Changes in the nature of injury, how injury and illness are addressed in the workplace, and rising injury costs (Sullivan and Frank, 2000; Sullivan and Cole, 2002) have influenced the responsibilities and pressures faced by OHS managers. These actors may mediate workers' and managers' relations with production

and may provide each with new resources that they did not have in the past. These actors may have an important role in shaping how OHS management practices play out.

Dwyer (1991) noted that the increase in the number of occupational health managers has come about to address the increase in injury-related costs. Swuste and Arnoldy (2003) and Hale (1995) note that OHS managers are transitioning from their traditional role of monitoring individuals' safety practices to a role in which they are taking on more organizational-level activities, such as the construction and implementation of OHS policy, procedures, and programs. For example, in a study of the pulp and paper industry in Quebec, Brun and Loisel (2002) noted that fifty percent of their sample of health and safety managers acted in an "advisory role" to management who considered the health and safety implications of their business decisions.

Another point to consider when examining the role of OHS managers is that the degree of influence they wield in the workplace is variable. Hale (1995) notes there are differences in power between managers, especially production managers, and occupational health and safety professionals and an important part of this is whether or not the OHS manager is a technical specialist (e.g., engaged in fire suppression) or a health and safety generalist. Research with a variety of health and safety professionals, including generalists and ergonomists, highlights the difficulty these managers have in getting management to heed their recommendations (Broberg and Hermund, 2004; Fulmer *et al.*, 2006; Garrigou and Peissel-Cottenaz, 2008; Perrow, 1983).

2.5 CONCLUDING COMMENTS ON THE THEORETICAL FRAMEWORKS

Negotiated order and critical perspectives present important insights, with particular relevance to the examination of OHS programs. A critical perspective provides

a means of unpacking the structural conditions that OHS programs are immersed in, which may enable or constrain the PE programs. Emphasizing management and labour's asymmetrical access to resources, the critical perspective recognizes the influence of power on actors' attempts to modify work processes. Additionally, the perspective helps comprehend the importance of the economic imperative and the role that it may play in shaping the functioning of OHS programs. In so doing, it makes us aware that for employers the economic imperative is central to organization survivability and other concerns such as health and safety will generally be subordinate to it.

The negotiated order framework highlights a different set of considerations, which are equally important to examining the processes involved in an OHS intervention. The perspective considers that competing groups in any organization may have different interests and interpretations about what should be done, or in the manner something should be done. Furthermore, the perspective considers both power and structure as influencing negotiations, although does not see these as deterministic. It recognizes that even those with limited power may be able to influence the program. The negotiated order framework also highlights the critical relevance of "articulation work" or the linking of lines of action through arrangements to accomplish program goals. Finally, as it is rooted in interactionist assumptions, negotiated order theory considers any program to be enacted by knowledgeable humans and reliant on individual agency (interpretation, creativity, resistance, etc).

The theories discussed above raise several considerations. They are helpful in suggesting a set of questions that is more specific than the broader questions identified in the introductory chapter: "What actions were undertaken by individuals to ensure the PE

program's functioned and continued? How did the organizational and societal context enable or constrain, the pursuit of PE program activities?" The following questions, derived from a consideration of the theories, guide my examination of the PE programs. How do differences in power between workers and managers affect the ECTs? How does the economic imperative influence the ECTs' functioning? How do management's and workers' divergent (sometimes opposing) interests affect the extent to which the PE programs are supported? Do management's attempts to establish and maintain the conditions of production affect the PE program? And if so, to what extent? To what extent do people's different perspectives (social worlds) affect the ECTs' functioning? What role does articulation work play in the PE program's functioning? What sorts of tasks constitute the arc of action or trajectory of work? What sorts of work are involved in articulation?

In this chapter I have outlined the theoretical lenses that inform the analysis. In doing so I have described the theories' underlying assumptions and discussed their relevance for examining workplace change. Importantly, they enable consideration of both structure and agency and their influence on the programs' dynamics. In the next chapter I discuss the methodology used and the data gathering and analysis techniques. This is followed by a description of the validity and generalizability of the findings. The remainder of the chapter is devoted to a discussion of the limitations of the methods.

CHAPTER THREE

SETTINGS AND METHODS

3.0 INTRODUCTION

This chapter describes the research settings, the participatory ergonomic (PE) program implemented in each setting, and the data collection and analysis techniques used. In my description of the data collection I cover the details of entrée, interviewing and direct observation, but I also consider some of the challenges I encountered in gathering the data for the project. Accordingly, the descriptions concerning how the data were collected are interspersed with what Van Maanen (1988) refers to as “confessional tales” that describe some of the methodological challenges that arose during data gathering. Van Maanen (73) states that confessional tales include, "Stories of infiltration, fables of fieldwork rapport, mini-melodramas of hardships endured (and overcome), and accounts of what fieldwork did to the fieldworker." Including these types of stories about how the data were collected is part of the responsibility researchers have in presenting a transparent and accurate picture of the data gathering process.

The chapter begins by discussing the methodology used and then describes the data collection techniques and the data analysis. This is followed by a description of how I endeavoured to ensure the findings were valid and generalizable. The chapter concludes by talking about the limitations of the methods.

3.1 METHODOLOGY

The research aimed to examine how two ergonomic change teams worked and how they attempted to sustain a participatory ergonomic program. With little known about the processes by which bodies such as ECTs go about altering work practices, an

appropriate way of investigating these occupational health interventions was to consider the perspectives of those who were carrying them out, using qualitative data gathering and analysis techniques. These techniques were not presumptive about what the problems, concerns or capabilities were of actors involved in the OHS programs under study or that the programs would function as conceived by the RT. Accordingly, I used an ethnographic approach consisting of direct observation and interviewing in which I observed events as they unfolded over time.

Ethnography typically involves the use of multiple data gathering techniques, such as interviewing and direct observation, to intimately study some group, usually over an extended period of time. As well, it stresses the interpretation of the setting from the point of view of those within it, and generally focuses on process or, as Morrill and Fine (1997:438) noted in reference to organizational ethnographies, the “doing” of organizational work rather than the outcomes (see also Atkinson and Hammersley, 1994; Friedman and McDaniel, 1998; Morrill and Fine, 1997; Prus, 1996; Spradley, 1979). To represent the perspectives of individuals involved with the PE programs and to capture the process of addressing work-related hazards, I incorporated multiple data gathering techniques, and maintained contact with individuals in the settings over a period of months. I describe the data gathering techniques below but before doing so introduce the settings.

3.2 DESCRIPTION OF THE SETTINGS AND PARTICIPATORY ERGONOMIC MODEL

3.2.1 Courier Co.

The interventions took place in two settings, a courier facility (Courier Co.) and a manufacturing plant (Furniture Co.). The courier industry can be divided in to two

categories: local messenger services which specialize in “same day delivery,” and usually deliver to destinations within a local area, and courier companies, which specialize in “overnight or later delivery” and deliver to locations locally, regionally, nationally and internationally. In 2002, delivery firms classified as “overnight” made up only about 12% of firms in the courier industry, but accrued approximately 85% of the industry revenue and accounted for 85% of pieces moved (Statistics Canada, 2005). The courier facility in which the intervention was carried out was owned by a large company in the overnight or later delivery category, which has customers in Canada and the United States, employs more than 10,000 employees in approximately 100 facilities across Canada and has a fleet of more than 2000 delivery vehicles. In the facility where the intervention was implemented the company employed 150 people; of these 135 were hourly workers. The company’s financial health was good at the time of the intervention and, in the early 2000s it expanded and built new facilities.

Competition in the transport industry is intense. Courier companies compete with both small local couriers and large transport companies. Essentially, in the courier industry, companies sell consumers the ability to ship an item from one location to a destination. Companies compete based on the quality of services they can provide to customers, most importantly the speed and reliability of deliveries.

Macro-level changes over the last several years have increased the time sensitivity of courier work and the pressure on companies to ensure their services are both fast and reliable (Taylor and Hallsworth, 2000: 243). Developments in information technology allow for the tracking, monitoring and dispatching of couriers. The emergence and growth of just-in-time modes of production in which inventory is minimal, means that

courier companies constitute an integral part of the infrastructure of production. To retain the customers that use just-in-time production processes, courier companies are pressured to ensure they maintain dependable and expeditious service. At one point in the history of the industry, courier companies focused on niche markets (Taylor and Hallsworth, 2000) but now many firms offer similar services and compete over the same markets. Additionally, changes in the market resulting from internet sales in which companies do not use retail outlets but instead depend on couriers to distribute their products have also created opportunities for courier companies to expand and compete. Courier companies now provide an invaluable link between customers and retailers, a link that has created what Taylor and Hallsworth (243) refer to as “logistics partners” whereby certain companies that do not maintain conventional “bricks and mortar” retail locations, sell their products over the Internet and use couriers to ship their products to customers. The combined effect of the above changes in the courier market puts pressure on courier companies to maintain promptness and reliability of their services. To this end, Courier Co. monitored the quality of service and the timely delivery of freight daily both across the company and within the facility according to the company’s standards, which were continually stressed to employees by management.

In Courier Co., the production process consisted of unloading and loading of delivery trucks and the delivery and pick up of freight. Couriers delivered and picked up freight; dockworkers, who worked in the depot, unloaded, sorted, and loaded freight from delivery trucks. Consisting largely of manual materials handling, couriers’ and dockworkers’ job tasks at Courier Co. were labour intensive. The technology used in the production process was neither complex nor varied and the operations performed during

the production process were simple and predominantly manual. For dockworkers, the packages were moved by “hand bombing,” or the processing of packages manually with minimal use of tools. Typically, if a tool or equipment was used to relocate freight within the depot, moving was accomplished through the use of (1) powered and manual conveyance equipment; (2) pump carts, which are large manually operated carts that were “pumped” or “jacked” to raise their loads off the floor before being moved; and (3) cage carts, which were large carts in which freight was enclosed in a wire cage. Couriers transported their freight in delivery trucks. Once at a destination, they either carried their freight or relied on two- and four-wheeled carts and dollies, two principal tools of courier work, which typically were manually operated and consisted of simple components.

Some managers who were involved in Courier Co.’s PE program were located within the depot and others at the company’s headquarters (See Table 3.1). Local management in Courier Co. consisted of the district manager, supervisors and a human resources manager. The district manager directed the depot’s day-to-day operations. The supervisors oversaw the couriers and dockworkers. Many of the senior managers were located at the company’s headquarters approximately 180 kilometres from the depot. This included the general manager of operations, and the department heads of fleet, engineering, retail, facilities, and materials handling. The national health and safety director oversaw the company’s health and safety system. The regional health and safety manager was responsible for health and safety in the jurisdiction where the depot was located and answered to the national health and safety director. Both of these managers’ offices were located at company headquarters.

3.2.2 Furniture Co.

Furniture Co. produces a variety of components for office furniture and home appliances and at the time of the intervention had 300 employees, of whom approximately 250 were hourly. A subsidiary of a larger company that was established in the early 1900s, Furniture Co. has plants in Canada, the United States and Taiwan and is one of the largest manufacturers of its product globally.

Furniture Co. competes predominantly with two large multinational manufacturers and a number of smaller foreign and domestic manufacturers. Competition in this manufacturing sub-sector is based on the price and quality of parts. Furniture Co.'s manufacturing expenses consisted primarily of labour costs and purchase of raw materials, such as plastics and steel. The industry became extremely competitive in the early 2000s. During the time of the study the company's profit margins were challenged by an increase in the worldwide steel price, a decrease in demand in the furniture market, a slowdown in demand for Furniture Co.'s parts as some customers looked for overseas suppliers that could make parts more cheaply, and an increase in competition from Asian manufacturers. Indeed, in a discussion I had with him, the company's president said that attempts to improve the company's profit margins were about holding on to existing market share and "survival."

In response to the challenges it has faced, Furniture Co. remained profitable in part by restructuring. It reconfigured its operations in Canada in 2003 by amalgamating plants and laying-off workers. Beginning in 2003, the company initiated several rounds of temporary and permanent layoffs of typically between 20-40 hourly and salaried workers. Late in the intervention, the plant adopted lean production methods in an effort

to shed inventory and eliminate waste in the production process. Additionally, in an attempt to enter into areas of the market that were not as crowded, the company focused on producing medium and high-end parts and on a line of specialized components few of its competitors sold.

The production process in Furniture Co. comprised a set of interrelated operations: roll forming, pressing, assembling, painting, and packaging of finished product. Much of the technology used during these operations was automated and complex. Operations technology consisted of roll-forming machines and an assortment of different sized machine presses and assembly machines. Additionally, there were areas in the plant where products were painted. Most of the work that went on in these areas involved feeding parts into machinery. The factory was divided into work areas, such as the assembly department, and parts were shuttled between work areas by forklifts and lift trucks. Because production at Furniture Co. was highly mechanized, altering machinery or reconfiguring the lay out in any significant way was neither straightforward nor quick. I expand on the work processes in Furniture Co. insofar as they affected the ECT's activities in Chapter Four.

In Furniture Co., all managers involved with the PE program were located within the plant (see Table 3.1). The President managed three plants but was usually not directly involved in daily operations. The Vice President managed the plant's daily operations and one of his responsibilities was evaluating the ECT's requests for changes. The plant manager was in charge of the supervisors in the each of the departments. In turn, the supervisors ran their departments and monitored the operators within them. The maintenance manager supervised the maintenance department and its personnel whose

duties included regular machine maintenance, emergency maintenance (e.g., repairing breakdowns), and installation of new equipment. The production manager was responsible for maintaining and, in some cases improving production efficiency, which involved such responsibilities as overseeing factory layout, workflow, and planning new product manufacture. Both the plant manager and the production manager answered directly to the Vice President of Operations.

Table 3.1 Managerial Personnel Involved in the ECTs

Company	Position	Responsibilities	Located
Courier Co.	District Manager	Oversaw the daily operations within the depot and outside	Depot
	National Health and Safety Director	Oversaw health and safety country-wide	Corporate Headquarters
	Regional Health and Safety Manager	Oversaw health and safety province-wide	Corporate Headquarters
	Senior Managers: Fleet, Facilities, Engineering, Operations	Oversaw various facets of the company's operation	Corporate Headquarters
	Supervisors	Oversaw couriers and dockworkers	Depot
Furniture Co.	President	Oversaw Operations at Three plants	Plant
	Vice President Operations	Oversaw Operations within Furniture Co.	Plant
	Plant Manager	Oversaw daily plant operations	Plant
	Production Manager	Supervised layout and production equipment	Plant
	Maintenance Manager	Supervised maintenance dept -- emergency maintenance and preventative maintenance	Plant
	Supervisors	Oversaw individual production units (e.g., assembly, press)	Plant
	Occupational Health and Safety Manager	Oversaw health and safety within the plant	Plant

3.3 THE PE PROGRAMS AND CHANGE TEAM FORMATION

In each setting, the programs were a collaborative effort of a university-based research team (RT), management, and the union. The change process began with the formation of facility Ergonomic Change Teams (ECT) based on a “representative participation” model of participatory ergonomics (PE) (Haines *et al.*, 2002: 311-312). The ECTs included hourly workers, management representatives, and an ergonomist-facilitator who was a member of the University Research Team. The same ergonomist-facilitator served in both settings.

In the courier setting, the ECT consisted of 11 representatives: five salaried employees including, a supervisor, the human resources representative, a health and safety management representative from corporate headquarters, and six worker representatives and an ergonomist-facilitator who was a member of the University Research Team. The team experienced turnover during the course of the programs as one management member was transferred and replaced and two worker members from the team left and were replaced.

In Furniture Co., the ECT was composed of nine members: two worker representatives and a supervisor, the health and safety manager, an engineer, the plant manager, a continuous improvement manager and maintenance manager and the ergonomist-facilitator. In Furniture Co. turnover involved an engineer and the two worker representatives. Three months into the program, the engineer was released from the company in one of the lay offs as the plant downsized and not replaced. The worker representatives were laid off and replaced with other workers from the plant.

In each setting, ECT activity commenced with a series of training sessions conducted by members of the RT, including the RT member who would serve as an ergonomist-facilitator throughout the intervention. These sessions, held for approximately four hours a day, for four days, covered some of the main issues in ergonomics, including risk factor identification and measurement. In their deliberations, the ECTs identified hazards and designed and oversaw the implementation of multiple changes. The programs were intended to evolve according to a “Blueprint” (Wells *et al.*, 2001) that specified stages in which opportunities for improvement were identified, solutions formulated, implemented and evaluated by workers and then improvements modified on the basis of the evaluation. The Blueprint was developed on the basis of a review of literature pertinent to making ergonomic changes and the research team’s experiences in implementing workplace ergonomic programs in previous sites. Similar models of change have been used in other MSD reduction programs (e.g., de Looze *et al.*, 2001; St Vincent *et al.*, 2006).

In Furniture Co. the ECT met for 48 months, for the first 12 months weekly, and after that, bi-weekly. In Furniture Co., the ECT made 40 changes. In the courier setting, the ECT met for 30 months, for the first 8 months weekly, then bi-weekly and then on a monthly basis. During this period, the ECT implemented 14 changes. Having described the settings and PE intervention framework I now move to a discussion of the data collection and analysis.

3.4 DATA COLLECTION AND ANALYSIS

In this section I describe the primary data gathering technique: observation. In so doing I relate some of the challenges that I encountered in the field. I begin by describing

the process of securing ethics approval. Then, I discuss my entry into the settings, establishment of my role, and adoption of a research stance. I conclude the section by outlining the sequence of events that typically unfolded during a field visit.

3.4.1 Ethics Clearance

Prior to entering the field I received ethics clearance through the University of Waterloo's Office of Research Ethics (ORE project 10658). As part of the ethics process I informed the plant and district manager in each setting in writing about my research objectives and sought their permission to spend time in the facility. Each manager wrote a brief letter to the University of Waterloo's Office of Research Ethics acknowledging they were cognizant of and consented to my presence in the setting. For all audio-recorded interviews, individuals were presented with an information letter indicating that the project was directed by researchers from the University of Waterloo and describing the goals of the research, data collection techniques, and procedures for ensuring participants' confidentiality (see Appendix A). After a potential interviewee read the letter, I asked if they would give written consent to participate in an interview and for the use of anonymous excerpts from their interviews in academic publications (see Appendix B). Additionally, before beginning the interview, I verbally summarized the research objectives and underlying interests, provided some examples of the interview questions, and reiterated my commitment to confidentiality. In particular, I noted that no one within the organization would see the raw data and all names, including the company's name, would be replaced with a pseudonym in any publications or presentations. In each of the settings, in a high traffic area, I posted an information letter that described my research. Additionally, prior to periods of observation of non-ECT members, I informed

individuals about the purpose of my research and asked for their verbal consent to observe.

3.4.2 Gaining Entry

My research was part of a larger project, which aimed to examine both the outcomes and implementation of a participatory ergonomic program. I was hired as a research assistant to collect qualitative data to examine the implementation of the PE programs. As a research assistant, I was provided formal access to the settings. That management, labour, and the RT had already discussed and agreed to the broad goals and data gathering methods of the research prior to my entry into the settings meant that much of the time-consuming preparatory work typically associated with accessing research settings (Schatzman and Strauss, 1973) was already done. Therefore, my experiences gaining entry may differ from those researchers who work independently (e.g., Barley, 1995: 9-11; Smith, 2001; Thomas, 1994: 262-265). Although my connection with the research group facilitated my initial formal entry into the settings, as discussed below it did cause some confusion when it came time to establish my role as a researcher.

3.4.3 Establishing my Role

While my entry into the setting was facilitated by my involvement in a larger research project, I still needed to establish and clarify my role and develop rapport with individuals in the settings. An important aspect of establishing my role was achieving independence from the ergonomist-facilitator, who filled both a researcher role and a facilitator role for both of the change teams. In his researcher role he conducted such activities as collecting data about the injury rates in the organizations and gathering biomechanical data about the changes the ECTs were making. As a facilitator, his

responsibilities included, but were not limited to, teaching the ECTs ergonomic skills, assisting them in identifying and assessing hazards and the formulation of solutions to address these hazards, and for the first eight months of the interventions, chairing the ECTs' meetings. In contrast to the ergonomist-facilitator's traditional researcher and interventionist role, my own role was that of an observer and I did not involve myself in the ECTs' activities or decision-making.

Initially, managers, ECT members and workers in the setting did not distinguish between the ergonomist-facilitator's work and mine, and perhaps for good reasons. Because both the ergonomist-facilitator and I were part of the RT, often travelled together and were seen together, many in the setting were under the impression that the ergonomist-facilitator and I shared the same interventionist role. Confusion around my role was connected to my non-interventionist, observer, status.

One of the ways that I thought my association with the ergonomist-facilitator could be damaging was if participants saw me as an agent of surveillance. I suspected that workers and managers may not see me as a researcher operating "neutrally" but rather as someone who was there to monitor the ECTs' activities for management and/or the research team. Most significantly, they might expect me to monitor ECT members' compliance with the ergonomist-facilitator's suggestions, participation in meetings, and willingness to carry out ECT activities. Such a perception would affect their trust in me and what they shared with me.

To counter such understandings, I attempted to distance myself from the ergonomist-facilitator, frequently noting in ECT meetings and in conversations with workers and managers that I was working independently of him as another researcher on

equal footing, with complementary but distinct, research priorities. Additionally, in my conversations with workers and managers I emphasized that my interest was in describing the intervention's evolution, that I wanted to hear the "positives" *and* "negatives" about the ergonomics program and that both were important aspects of developing an understanding of the intervention. I also arranged for times, and opportunistically seized occasions, when I could talk to workers and managers without the ergonomist present, in an attempt to insure they could speak freely about the ergonomics program.

After several weeks, the ECT members in both settings came to understand my position as the individual who was chronicling how the PE programs unfolded and, as several participants said, who "just took notes." Indeed, one worker representative in Courier Co. frequently joked that my nickname was "buzz," referring to the fly on the wall. Conversely, throughout the intervention, there remained confusion about my role among some non-ECT workers, who on occasion misidentified me as an ergonomist, and directed my attention to "ergonomic problems."

Another important aspect of data collection involved delimiting the opportunities for observation. I knew that I wanted to observe as much of the ECT-related activities relevant to the research questions as possible. At the intervention's outset, I considered that attending ECT meetings and observing ECT members would receive the bulk of my attention (which I describe later in the chapter). Indeed this was the case, but as themes emerged and I became aware of what I needed to know, I realized that certain interactions and discussions that occurred outside of the ECTs' meetings were relevant to my research.

In Courier Co., in the program's first months, I discovered opportunities for observation that I had not anticipated. For example, I determined that my understanding of the change-making process would be enhanced if I learned about the relations between the ECT members and other company representatives, as these had significant bearing on the ECTs' activities. In the early months of the intervention in Courier Co., I was surprised to learn that I was excluded from a meeting among the worker representatives, ergonomist-facilitator, and representatives from middle management concerning the acquisition of a solution the ECT had recommended. Upon hearing about this meeting, I immediately made the ergonomist-facilitator aware that I wanted to be informed of the conversations that were occurring outside of the ECT's meetings and where possible, invited to attend. I explained that if I was not able to attend, that I would be interested to know about the discussions he was having with people from either of the sites regardless of whether these were face-to-face, over email or teleconferences, noting that what went on was valuable for my research. The ergonomist-facilitator responded favourably to this request and subsequently included me in much of the correspondence and meetings that were relevant to my interests or informed me of deliberations in meetings that I was unable to attend. Typically, I asked him about the circumstances under which such communications arose and how he had dealt with (or was going to deal with) their inquiries, requests, and so forth. This information, obtained either directly or indirectly through the ergonomist-facilitator was very helpful. It usually allowed me to glean insights regarding the obstacles the ECTs had encountered and/or enablers that the ECTs used to deal to with obstacles and address hazards.

3.4.4 Research Stance

Researchers doing qualitative fieldwork adopt a stance or relationship to participants that is informed by their research goals, theoretical orientations, and the limits and opportunities they encounter while collecting data. Several possible options exist in regard to the role a researcher might play during fieldwork including those in which the researcher's aim is to intervene in the setting, as is the case with participatory action research (e.g., Szala-Meneok and Lohfeld, 2005; Ulichny, 1997; Whyte, 1998). In participatory action research, the researcher's aim is typically to advocate on behalf of those people under study and in many cases collaborate with the groups to alter conditions they identify as negative.

Another stance, the one I took during the research, was non-interventionist. It is decidedly different from one that seeks to advocate on behalf of a particular group. It aims to describe a setting but does not advocate on behalf of a group of individuals or aim to transform the setting. Instead, it seeks to minimize, as much as possible, the researcher's influence on the setting (Hammersly and Atkinson, 1994). Adoption of a nonpartisan orientation not only serves to reduce a researcher's disruption of the dynamics in a setting, but also may facilitate a researcher's movements in the setting (Prus, 1996; 1997).⁹ Grills (1998: 77) speaks to this approach to participant observation research and notes that the participant observer "utilizes the distance afforded by remaining non-judgemental to interpersonal advantage – as an interactional strategy that allows for access to the relations, negotiations, perspectives, and processes found within any particular research setting." This stance ensures that a researcher does not advocate

⁹ While I strove to minimize contamination in the setting, I am aware that not having an impact is an ideal.

on behalf of a particular group, which diminishes the risk of alienating other groups in the setting, and conveys to individuals in a setting that a researcher has no particular agenda outside learning about the goings on of a setting.¹⁰

As is typical with workplace ethnography (Buroway, 1979; Delbridge, 1998; Fine, 1996: 233-235), I was aware that both management and labour could interpret my presence as a threat to their interests, and I was cautious about appearing sympathetic to either group or even to the PE program itself. Therefore, from the early days of the initiatives, I tried to play the part of an interested but neutral researcher. To this end, I attempted to spend time with each group in the setting and while doing so I tried not to present views that might be seen to ally me with either management or labour, or factions within either group. Also, in my conversations with stakeholders I did not praise the intervention or the RT. This stance, *to my knowledge*, worked out well. I freely moved between labour and management and saw no evidence that individuals in either group were concerned about my work, including most notably, the possibility that I would relate any of the material I recorded or share any of my observations with the other party. Fortunately, my experiences concerning the relationships with groups in the field stand in contrast to those of researchers who have described how study participants have attempted to label them a spy for one group by another (Barley, 1995: 25-26), or ask them to become a spy for one group (Ferdinand *et al.*, 2007: 529-531; Morrill, 1996:237), or to pressure a researcher to disclose where his or her loyalties lie (Grills, 1998; Murray,

¹⁰ As productive as it can be, there can be also serious repercussions from adopting this stance. Participants may for instance question the loyalty of researchers who do not appear to be advocates aligned with their values (Grills, 1998). Also, researchers themselves may have misgivings about maintaining this stance (Murray, 2003). I pick up this latter point below.

2003) or simply act uncooperatively (Leidner, 1993: 242-44). The consequences of such situations on fieldwork may range from mild discomfort to abandoning a particular data gathering technique or line of inquiry, or, at worst, abandoning a research project altogether.

Attempting to minimize my impact in the setting and on the PE program processes and to let events unfold “naturally,” I divulged little information to individuals in the settings. This meant revealing little to individuals about my interpretations of the setting, or activities associated with the programs, teams or their members. Periodically those in the setting asked me for my perspective on the program or the ECT’s actions. Occasionally, as I took fieldnotes, they asked about what I was recording and often this took the form of comments such as, “I’d love to know what you are writing.” To parry these inquiries I used strategies similar to what Schatzman and Strauss (1973: 89-90) refer to as “begging off” in which participants are told that a researcher is still formulating an impression of what is going on, and “giving bits of information,” in which a researcher comments on occurrences in the setting but in ways that minimize contamination of the study, and reveal very little about the his/her findings. Additionally, infrequently those in the settings asked whether I thought what I was observing was strange, to which I typically replied that what I was observing was not unusual. (For another example of participants inquiring about researchers’ views on their behaviour see Fine, 1996: 256).

I also was faced with decisions about what to reveal to the ergonomist-facilitator. We occupied similar positions in that we were both researchers, but otherwise filled very different roles. As I noted above, he was also an interventionist, whereas I was solely

observing. I suspected that revealing my interpretation of events and sharing information with him might affect his behaviour and lead to alterations in the program being studied. In instances in which I felt my interpretations might lead the ergonomist to rethink how he approached an issue, this often required begging off or giving bits of information. Additionally, in many instances, when I felt answering a question could lead the ergonomist-facilitator to change his position, I reiterated that I was in an observer role and I did not want my interpretations to influence what was unfolding. After several months, the ergonomist realized that I evaded some of his questions or responded vaguely to them. And there were occasions when he asked a question and before I could reply quickly stated, “you’re not going to answer that, are you?” Over time, the ergonomist-facilitator’s questioning lessened, although there were still occasional queries throughout the interventions. An email exchange that took place 12 months into the program was typical of the exchanges the ergonomist-facilitator and I had when questions about the ECTs arose. On this occasion, the ergonomist-facilitator emailed a company representative to confirm whether the ECT had a meeting scheduled for the following day. The company representative replied, “As far as I know, there is a meeting. Not sure what the attendance will be...” and noted that several members would likely be absent. The ergonomist-facilitator then asked me for my interpretation of the situation. Worried that I may influence whether there was a meeting or not, I told the ergonomist-facilitator that I would go to the meeting, if held, but declined to comment on whether there should be a meeting or not. He responded that he did not expect me to “to cancel or not.” But that, “I was wondering what your thoughts were on this situation.”

An unanticipated consequence of my ethnographic stance of non-involvement was that it occasionally made me uneasy. My commitment to non-involvement conflicted with my awareness that effective OHS interventions decrease workers' exposures to risk of injury. My non-involvement stance was also incongruous with the fact that MSDs are a serious issue in need of addressing; that they had altered some workers' lives in either subtle or dramatic ways and that these committees, if they functioned well, might play a significant role in reducing work hazards. However, taking action with these observations in mind would go against a stance of neutrality. Perhaps naively and arrogantly, there were many occasions when I wanted to be involved in the discussions in various ways, such as to point out some of the topics that I thought were important but being overlooked, to disagree with the ECTs' choices and suggest alternatives, and to reveal information that not all members were privy to. These were not topics that involved ergonomics *per se* in either the assessment of work hazards or development of solutions to address hazards – topics about which I had no expertise. Instead, they were topics such as the ECTs' relation to the broader work organization, communication between the ECT and managerial personnel, and what ECT members or the ergonomist-facilitator could be doing to improve the likelihood of the program's effectiveness and continuation. Despite my misgivings, I endeavoured to remain purposefully uninvolved with the exception of one occasion.

I broke character, to borrow a theatrical phrase, and injected my interpretation of an event late in the intervention at Courier Co., as the team struggled to perform its activities in the face of failing management support. I was discouraged by this state of affairs but hoped that members would remain enthusiastic, despite growing problems

related to management's lack of commitment. I interrupted an exchange among members during an ECT meeting in which team members were talking about the outcomes of a discussion that had occurred in which senior management, the research team, and management from the local depot were involved. One of the issues under discussion in this meeting was whether the ergonomic program was going to continue at this depot or be terminated and introduced elsewhere. No answer to this question was provided during this meeting involving senior management. Yet, hours later, at an ECT meeting when a worker member asked whether the ergonomic program would continue he was told by a management member it was going to be cancelled. I suddenly blurted out, "Whoa, that's not what happened!" I then noted that when this issue was discussed in the meeting with senior management there was no final answer. An ECT member playfully stated that it must be true because I was protesting too much. Some of the members, laughing, also chided me noting that I was "not supposed to talk." I am unsure what impact if any my statement made. Surveying the ethnographic literature one can find examples of situations in which researchers, despite aiming to minimize involvement, have occasionally intervened (e.g., Leidner, 1993: 246-247). Sometimes these interventions are motivated by aggravation with individuals under study; other times, by compassion for those investigators study. Fine (1993: 287) points out that these types of emotional displays are not uncommon among participant observers, "Participant observation often becomes participation intervention: Finding a problem we wish to fix it. Identifying with our informants *in loco parentis* we wish to take their side.... to protect them from harm and make everything right."

3.4.5 Description of Field Visits

The observations recorded during visits to each of the settings make up the central part of my data. During the program at Courier Co., I visited the depot approximately 75 times; during the program at Furniture Co., I visited the plant around 90 times. The visits ranged in length from one to nine hours but typically lasted approximately three hours. In the first months of the intervention the visits to each of the sites were weekly and then, in keeping with the ECT's scheduling, they occurred biweekly. In Courier Co. approximately eight months into the intervention the ECT switched to meeting biweekly and at Furniture Co. the ECT shifted to biweekly meetings 18 months into the intervention. The goals of my site visits shifted over time as I moved through the phases of the data collection. The intent initially was to develop rapport with those in the sites and become familiar with how organizational factors affected the PE program and its continuation. As the intervention proceeded, my data collection became more focused and I moved from questions about "what was going on" to questions about "how and why things were going on" (Pettigrew, 1995: 106). As a result, my data gathering strategy shifted and I began to go to the settings with more specific questions.

At the research project's outset in each setting, during an introductory meeting with the workers and managers, I told them that I was interested in how the process of making change in the workplace unfolded, that I would be attending the ECT meetings and activities, observing, and making notes. In the early stages of data gathering, visits to the research settings involved going to ECT meetings, which usually lasted approximately 2½ to 3 hours. In the meetings the ECT members sat around a table and I sat with them. There were no assigned seats but most often the worker representatives sat close to one another, managers sat together and the ergonomist-facilitator typically sat

near the OHS manager. The meetings at the courier facility were held in a small conference room approximately 10 x15 feet, around a rectangular table, which prompted people to sit fairly close together but everyone had room to sit at the table. In the manufacturing setting, the majority of meetings took place in a much larger space, about 25 x 25 feet, that permitted members to spread out. In each of the settings, the meeting rooms were equipped with an overhead projector, an easel, and dry erase board that the ECTs' periodically used when discussing changes. Typically, at each meeting, each person was given an agenda by the ECT chair, members brought the last meetings' minutes, and a binder supplied by the research team. Team members' binders usually contained a condensed version of the training manual, the notes they had individually taken concerning the changes the team had or was in the process of making, and the minutes and agendas of past meetings.

During the ECT meetings I listened to and watched discussions and recorded observations that were germane to the investigation. In these meetings I was not covert about taking notes. ECT members appeared to pay little attention to my presence during the ECT meetings but occasionally jokingly inquired about whether I had recorded something that they found particularly interesting or humorous. Such comments by participants are not atypical of ethnographic research (Barley, 1995: 28; Fine, 1996: 235; Theberge, 2000).

As the intervention proceeded, in addition to attending the meetings I spent time outside of the meetings, talking directly to ECT members and to those who were involved with supporting the ECTs' activities. Informal conversations with several team members on each of the ECTs before and after meetings, as well as during meeting breaks, were

invaluable opportunities to ask questions, to get reactions to what had or had not transpired, and to talk to members about what they had done regarding ergonomics between meetings and about what was going on in the organization more generally.

Berg (2004: 171-173) refers to individuals who possess “expert knowledge” about the setting as “guides” (see also Spradley, 1979 on “key informants”). In each of the sites, one individual filled this role and was particularly valuable in supplying information about the ECTs' activities: the OHS manager in the manufacturing setting and the operations administrative assistant in the courier setting. These individuals, because of their position within the ECT and within the worksite, possessed an awareness of the ECT's activities that other members of the ECT did not have. Their vantage point was different from that of others in the setting partly because they had the opportunity to spend more time on OHS than other ECT members. They were also heavily involved with the requests that the ECTs were making to management, so they had insight into who was involved and how management was receiving the ECTs' proposed changes. Perhaps as importantly, their position within the organization meant that they routinely had time to discuss the ergonomics program when I visited the settings.

Paramount to starting and keeping information flowing in a setting is building and maintaining rapport with the individuals in it. Having poor relations with those in the setting and failing to develop rapport can often impinge on what can be heard, observed, recorded and asked about (Prus, 1996; 1997; Shaffir *et al.*, 1994: 47-48; Spradley, 1979; Schatzman and Strauss, 1973: 18-23). Generally, rapport between researcher and participants is established over time and through demonstrations of respect and goodwill (Berg, 2004; Morrill, 1996; Prus, 1996; 1997). Overall, my rapport with participants in

the settings was good and remained stable throughout my time in the field. Few individuals would not answer my many questions. Worker representatives at the courier company indicated that they wanted their story told and were glad someone outside the company in a position of neutrality was there to record what was happening. In both settings, I think the trust I gained was partly enabled by the fact I was a member of the university research team and as such an “outsider.” This outsider status was reinforced by the fact that funding for the project came from external sources (specifically, the Research Advisory Council of Ontario’s Workplace Safety Insurance Board) and that I was not working for the companies or the unions. Moreover, the trust between the ECT members and me was nurtured by my regular attendance at meetings, which demonstrated my commitment to telling the ECT members’ stories.

3.4.6 Typical Field Visits

Generally, a visit to the courier depot proceeded as follows. I, often accompanied by the ergonomist-facilitator, arrived at the facility thirty to sixty minutes prior to the scheduled meeting time and signed the visitors’ logbook. I then proceeded to an area in the depot where the supervisors worked – a large office with several computer workstations and phones – and/or to the area of the depot where the delivery vehicles were loaded and unloaded and often talked to any ECT members I located. In many instances, prior to meetings, ECT worker representatives congregated outside the building talking and I would chat with them in this location.

At the manufacturing setting, I arrived, usually accompanied by the facilitator, signed in at the front entrance, and then typically proceeded either directly to the ECT meeting or to the OHS manager’s office. Unlike the courier setting, employees often

worked up to a few moments prior to meeting time so there was little time to chat. On other occasions, I met ECT members who were milling about prior to the meeting, we chatted and then I accompanied them to the ECT meetings.

In both settings I often stayed after the meetings, especially after the program had been underway for a couple of months. Usually this meant lingering in the meeting room to talk to ECT members before they dispersed and/or talking briefly with an ECT member in another part of the facility before s/he went back to work. Staying after meetings typically granted opportunities to ask ECT members to clarify remarks they made during the meeting, to comment on what occurred in the meeting, and to investigate topics that emerged out of the previously collected data.

The opportunities to chat with managers and worker representatives were different as the former had more discretionary time. Unless it was a scheduled formal interview, in which case the member was given a block of free time, I talked with individual employees in the settings as they carried out their regular work duties or change team related tasks.

3.5 DATA SOURCES

In the subsections that follow I describe the three data sources that I used: field notes, interviews, and documents. I discuss what I recorded in my notes, what personnel I talked to in my interviews, and what sorts of documents I used in my analysis.

3.5.1 Field Notes

As Berg (2004: 173) points out, “The central component of ethnographic research is the ethnographic account. Providing such narrative accounts of what goes on in the lives of study subjects derives from having maintained complete, accurate, and detailed

field notes.” Recording observations can be done in a range of ways (Wolfinger, 2002). Some researchers do not record any notes in the field, making only “head notes” or mental notes, choosing to wait until they leave the setting to compose notes (Emerson *et al.*, 1995: 17-19, Papp, 2007); others take notes in the setting but do so covertly (Berg, 2004: 173-175; Delbridge 1998: 28). In my case, during informal conversations and in the ECT meetings, I took notes with pen and notepad clearly visible, making no attempt to conceal the fact that I was recording observations. The nature of my notes varied. Some of these were in the form of “cryptic jottings,” (Berg, 2004: 171) in which I recorded the significant aspects of what went on in the setting and depended on these to cue my memory later when developing full notes. The bulk of my field notes, recorded in ECT meetings, were “comprehensive” (Wolfinger, 2002) and consisted of detailed accounts of the teams’ activities and discussions that included a mix of paraphrased conversations and verbatim quotations. Regardless of the manner in which field notes were taken down, they were transcribed into more elaborate records soon after I left the field. Both in the field and when I elaborated on my field notes as I transcribed them I made use of what Berg (2004: 174) refers to as “observer comments” or notes concerning “linkages between people in the study, theories that might serve to explain something happening in the field, or simply a judgmental observation.” One way that I used these comments was to note the possible connections between activities I observed in the meetings and the circumstances surrounding their occurrence.

3.5.2 Interviews

The other data source for developing an understanding of the programs for the research is face-to-face interviews with ECT members and non-ECT members. Thirty-one individuals were interviewed in the courier setting, twenty people were interviewed

in the manufacturing setting, and the ergonomist-facilitator was interviewed on four separate occasions. In Courier Co. I carried out interviews after 16 months and in Furniture Co., I carried out interviews after 20 months into the intervention. In each setting I did some follow up interviews with ECT members (Courier Co. N=6; Furniture Co. N=4).

The interviews were semi-standardized, based on research questions common to both sites and adapted to address issues specific to each site that emerged in an analysis of the field notes. In the interviews I used a mix of question styles including “descriptive questions” (Spradley, 1979: 85-91) which ask an interviewee to specify, in as complete detail as possible, the activities involved in a task. For instance, I asked interviewees, “typically, in order to do X what sorts of things are necessary?” or “usually, who undertook X?” I also used “probing questions” (Berg, 2004: 86-87), which can be employed when the interviewer wants the interviewee to be more expansive in her/his answer (See Appendix C). In an attempt to elicit detailed answers I employed a number of verbal and non-verbal cues signalling to interviewees that I was interested in what they had to say further about a point. I also deviated from the interview schedule when warranted. For example, during the interviews if an interviewee mentioned a topic that s/he was particularly passionate about or s/he mentioned a topic repeatedly or mentioned a topic that I had not thought of but was relevant to the research, I pursued this point and also would ask the next the interviewee about this.

Interviews ranged from 45 minutes to 150 minutes in length, with most lasting around 90 minutes, were audio-recorded, and transcribed verbatim. The majority of interviews were carried out in the workplaces, in rooms where there was privacy, and that

were free of interruptions, such as offices with the door closed. Three of the follow-up interviews were carried out off-site at settings of the interviewee's choosing. The interviewees consisted of those people who were directly involved with the ergonomic program, including the change team members, senior management and a small group of workers from each setting (N=5), who were not on the change team but had some involvement in the change making process. With the exception of four individuals in management who had been with the companies for at least a year, those interviewed had been with their respective companies for five or more years.

While I typically found that individuals readily accepted my requests for interviews, this process was not without its obstacles. One ECT member at the courier company agreed to be interviewed, but repeatedly did not meet me for prearranged meetings and in the end was not interviewed. This individual left the ECT in the sixth month of the program and I was unable to interview this person, who was replaced by another worker representative, whom I did interview. At the manufacturing facility, three supervisors declined to be interviewed. Follow-up interviews were carried out with some of the ECT members from each site but follow-ups with some employees were impossible because these individuals had left the company.

3.5.3 Documents

In addition to the primary data sources – field notes and interview transcripts – I examined a number of types of documents that were made available to me. These included copies of minutes of ECT meetings, meeting agendas, the surveys the ECTs used to assess job task hazards, and diagrams of potential changes drawn by ECT members. The documents reviewed also included materials produced by the companies

that seemed pertinent to my investigation such as company newsletters, documents related to health and safety, production data, and, in the case of Courier Co., results of a company-wide employee satisfaction questionnaire. Also, to gather additional information about the companies' backgrounds, I consulted their websites and looked for news stories in the popular press.

Documents prepared by the company, such as newsletters, were used to develop a better understanding of the context influencing the company internally and externally. For instance, in one of the newsletters gathered from Furniture Co., a column written by the president explained the company's financial concerns and the sources of these concerns, such as the reduced market demand for parts and increase in the price of raw materials. In another example, the ECT meeting minutes provided an excellent source to crosscheck findings and to review timelines. In particular, the minutes were a means to corroborate which personnel most often had the responsibility for the team's implementation tasks. Looking at both agendas and timelines one could also get a sense of the progress (or the lack thereof) the teams were making toward their goals.

3.6 DATA ORGANIZATION AND ANALYSIS

Once a portion of the data was transcribed, a coding scheme was developed. This coding scheme was adjusted over time as the data collection and preliminary analysis progressed. As field notes and interviews were transcribed they were imported into a qualitative data software package, QSR NUD*IST. This software facilitated data organization and analysis by allowing me to code, save, and easily retrieve categorized data.

Once field notes and interviews were transcribed and imported to NUD* IST they were coded. I used both initial and focused coding (Lofland and Lofland, 1995: 189-191). Initial coding represents a first examination of the raw data and usually involves going through the transcripts line-by-line, categorizing small units of text. Focused coding is used to examine codes that the researcher identifies as particularly salient to getting at the research objectives. During coding I found it helpful to follow Strauss' (1987) suggestion of "asking the data specific and consistent questions." A particular series of questions that I found useful are those that Charmaz (2004: 507) suggests: "What's going on?; What are people doing? ; What's the person saying?; What do these actions and statements take for granted?; How do structure and context serve to support, maintain, impede or change these actions and statements?"

As the analysis proceeded, I followed an iterative process, continually moving back and forth from interpretations to the raw data. This added to the clarity of interpretations as well as insuring that they were representative of the data from which they were produced. An analysis technique that I found particularly useful throughout the analyses was the "constant comparative method" (Glaser and Strauss, 1967: 105-113; Lofland and Lofland, 1995; Strauss and Corbin, 1998). The constant comparative method may involve comparing data from different individuals, comparing different situations, and/or comparing data from two different points in time if the data are collected longitudinally, and aims to identify consistencies and inconsistencies and reasons for these.

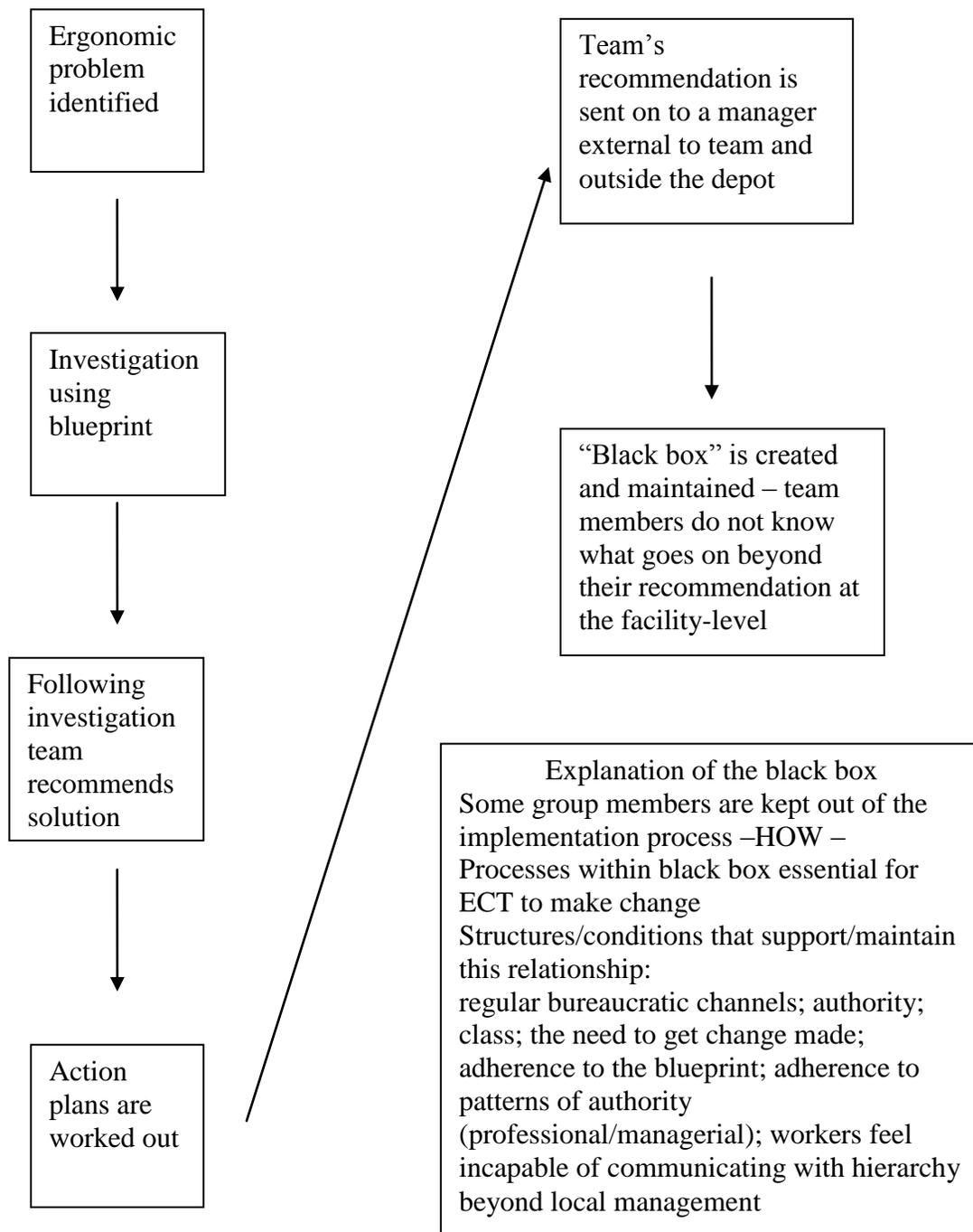
Principally, I compared data from different situations, points in time, and data from different ECT members. I also compared interviews, field notes and documents

(e.g., meeting minutes). For instance, a juxtaposition of the ECTs' activities around assessment and solution building in the first several months of the interventions with the ECTs' activities around assessment and solution building later in the interventions, gave me an idea of how the ECTs altered some of their activities. Further examination gave me an understanding of why these changes had occurred. Additionally, as the ECTs' projects varied in scope, complexity, and duration, I was able to examine the various types of activities associated with different types of projects, what the activities were, and whether they enabled the ECTs to reach their objectives.

Another technique I used during analysis was "diagramming" (Lofland and Lofland, 1995: 199-201) as a means to help to organize what was going on in each of the settings. Diagramming often directed my attention to topics to be followed and helped to generate questions that I pursued in the field and as I analyzed the data. For instance, I used flow charts to map the processes involved in implementing changes, and at various times, to map how the ECTs' activities changed over time and how a series of events led to these changes.

Figure 3.1 is an example of a diagram used during data analysis. The diagram makes clear how worker representatives and others were not fully aware of what activities needed to be carried out during implementation in Courier Co. once a request had been submitted to senior managers outside the depot. (This topic is discussed in detail in Chapter Six.) The diagram outlines the factors that perpetuated this lack of awareness such as organizational hierarchy, worker representatives' reluctance to confer

Figure 3.1 Constraints on Change Team Member Learning About Implementation Activities



with senior managers, and failure to discuss how the process of requests is negotiated. Combined, these factors created and maintained a “black box” around implementation that prevented several ECT members from learning about the process by which changes were requested.

A technique that I also used to coax patterns from the data was to perform what Huberman and Miles (1994: 429) refer to as “data display,” which is “an organized, compressed assembly of information that permits conclusion drawing and/or action taking.” I found that data display techniques could be accomplished by examining the material around a code using NUD*IST, which allowed me to efficiently display the data when trying to comprehend what and why “things” were going on.

A significant portion of the latter phases of analysis consisted of memo-writing. Memos ranged in length from a few sentences to a couple of pages and described particularly significant themes and the relations between these themes (Emerson *et al.*, 1995: 162-166; Lofland and Lofland, 1995: 193-195). Some of these memos were developed into narratives.

Qualitative researchers are faced with the task of distinguishing between irrelevant and germane themes as they analyze their data. Part of the burden of this task is that there are few criteria by which to judge what a “good” theme is. I typically selected themes that I pursued based on several criteria, which resemble those outlined by Emerson *et al.*, (1995: 157-160). I judged themes to be important according to whether I found recurring instances in my fieldnotes and interviews, how important particular issues seemed to be to the individuals in the setting, and how the themes related to the broad research questions I set out to investigate which were, What actions were

undertaken by individuals to ensure the PE programs functioned and continued? How did the organizational, and societal context enable or constrain, the pursuit of PE program activities?

3.7 ASSESSING QUALITY

This section discusses issues related to the quality of the data gathering and analysis. I describe the techniques that were used during the data gathering and analysis to enhance the validity of project's findings. The section begins with a discussion about credibility then proceeds to talk about transferability. I conclude the section by considering the limitations of the methods.

3.7.1 Credibility

To evaluate qualitative research there must be some sort of assessment of how consistent the fit is between a researcher's account and what actually occurred in the setting. Another way to put this is how valid is a researcher's account of what really went on? One approach to questions of validity is by "establishing credibility" or "the naturalist's substitute for the conventionalist's internal validity" (Lincoln and Guba, 1985: 296).

I attempted to ensure the validity of the findings in the present study by following some of the techniques that Lincoln and Guba have laid out. Lincoln and Guba (1985: 301-309) put forward a set of measures for assessing the credibility of a piece of qualitative research, which they refer to as "establishing trustworthiness." Establishing trustworthiness in the results of qualitative analysis can be achieved both during data collection and analysis stages. One way I tried to establish credibility during the data collection phase was to use "prolonged engagement" or the "investment of sufficient time

to achieve certain purposes: learning of the ‘culture,’ testing for misinformation introduced by distortions either by the self or of the respondents, and building trust” (303) (see also Creswell and Miller, 2000). Another way I sought to increase the data’s trustworthiness was to engage in what Lincoln and Guba (1985: 304) call “persistent observation,” which “adds the dimension of salience to what might otherwise appear to be little more than a mindless immersion.” The purpose of persistent observation is the inverse of prolonged engagement in the sense that the former intends to focus on a select group of themes relevant to the research questions, whereas the latter intends to cast one’s net as widely as possible so as not to miss anything relevant. In persistent observation, instead of going to the field and focusing on new events each time with no direction as to what may be of importance to the research questions, one goes there with specific questions in mind. Persistent observation motivates one to “sort” among those aspects of the setting that are relevant to the phenomenon and those that are not and to focus on elements that are germane to the emergent themes in the analysis. As such, the observations were recorded over several months, *in situ*, collected contemporaneously, as events unfolded, as opposed to retrospectively, thus reducing recall bias.

Triangulation is another way of enhancing credibility (Lincoln and Guba, 1985: 305). Most simply put it is the use of multiple sources of information to verify or corroborate some observations and/or interpretations. In the analysis, triangulation was employed by using different data sources and methods of collection. I used documents, interviews, and observations as data sources and used interviewing and direct observation as the core data collection methods. Together, the various data sources and data gathering methods enabled me to continually recheck my observations.

Another means of enhancing credibility was to discuss my findings with other researchers in particular, Nancy Theberge and Donald Cole, who were familiar with the project, and worked on both conference presentations and papers with me. During these “peer debriefings,” in the words of Lincoln and Guba (1985: 308-309), among other suggestions, they encouraged me to check whether my portrayals corresponded to what the participants had said or done and to check the sequencing of events. In particular, it was helpful to ensure there were no gaps in the narrative and to ask the data more questions.

3.7.2 Transferability

Some would say that the question of whether what happened in the sites is representative of what may occur in other settings is beside the point, noting that there is a “trade off” (Morrill and Fine, 1997: 440-441) between the depth one achieves and how representative the setting is of a broader population of settings. Qualitative researchers typically reject conventional notions of generalizability (Athelaide and Johnson, 1994; Lincoln and Guba, 1985; Lincoln, 1995; Patton, 2002). Instead, they generally rely on what is referred to as “transferability.” In qualitative research, some researchers suggest, “that only working hypotheses may be abstracted, the transferability of which is an empirical matter, depending on the degree of similarity between sending and receiving contexts” (Lincoln and Guba, 1985: 316). Lincoln and Guba (1985) suggest that the onus on the researcher is *not* to predict whether or not the results are “generalizable” but rather to ensure there is enough detail or “thick description” about the setting, the concepts, the data gathering process, and the process whereby interpretations were arrived at such that future researchers can compare between studies. Following this line of thinking, Schofield (2002:198) notes that, “A consensus appears to be emerging that for qualitative

researchers generalizability is best thought of as a matter of the “fit” “between the situation studied and others to which one might be interested in applying the concepts and conclusions of that study.”

Schofield (2002: 180-185) suggests there are ways of increasing the generalizability of qualitative findings. One such way is to do multi-site analyses. Carrying out the study in two settings exposed me to a wider range of processes and events, enabled me to see common processes, and allowed me to compare the circumstances under which different processes arose. Further, some of the data collected from Courier Co. was used in a cross-site analysis of several sites in which the RT had conducted PE interventions and there was consistency of the findings among it and three other settings (Cole *et al.*, in press). According to Schofield (2002), another way to enhance the generalizability of a study’s findings is to examine situations that are typical or representative of the phenomenon under study. In establishing the representativeness of the interventions two aspects of the intervention are of interest: the intervention model and the organization itself.

Based on descriptions of PE interventions in the ergonomic literature, I am confident that the programs that were introduced in the sites were representative of the interventions that PE researchers usually undertake (see for instance, Haines *et al.*, 2002; Hignett *et al.*, 2005; St Vincent *et al.*, 2006; Van Eerd *et al.*, 2008) and have parallels with other participatory interventions designed to reduce musculoskeletal disorders (e.g., Wands and Yassi, 1992). The PE program the RT introduced followed the general precepts of participatory ergonomics (e.g., Imada, 1991; Wilson *et al.*, 2005) including an emphasis on worker input and use of ergonomic assessment tools to evaluate work

hazards. It was also similar to other models of PE programs in its use of ergonomists to train and then guide the ECT, its use of “representative participatory” style of involvement, and its use of an iterative model (the Blueprint) to guide change making (see Van Eerd *et al.*, 2008).

It is more difficult to establish whether or not the organizations in which the interventions took place were representative of the population of organizations in the courier sector or manufacturing sector. Nonetheless, some of the relevant characteristics of the settings can be enumerated. First, the settings were unionised and staffed by full-time employees. Studies have shown that non-unionized labour typically fare worse on health and safety issues compared to their unionized counterparts (Nichols, 1997). Second, the settings may differ from other Ontario workplaces based on management’s interests in health and safety. The organizational settings where the interventions took place were self-selected to take part in a PE program and management, at least to some extent, saw workplace health, or at least recorded injuries, as important, as evidenced by the fact that management in each company contacted the university research team in an interest to address MSDs. Third, the settings in which the interventions were carried out were mid-sized organizations and both were part of larger companies. This is relevant because their size gave them reliable access to certain resources, such as health and safety practitioners, not likely to be possessed by smaller organizations. Lastly, the occupational health and safety regulatory climate differs across Canadian jurisdictions. Some provinces, such as Manitoba, Saskatchewan, and British Columbia, have legislation regarding MSDs. The absence of such MSD legislation in Ontario may have had some

impact on how managers responded to the PE programs both in their functioning and continuation.

3.8 LIMITATIONS OF THE METHODOLOGICAL APPROACH

One limitation of ethnography is that the ethnographer, despite how much he or she would like, cannot be in all places at once to observe and record activities and circumstances germane to the research. Situations unfold, conversations take place, and decisions are made in the researcher's absence that may be relevant to the investigation but which the researcher has no opportunity to observe and record. This reality reflects the natural goings on of a setting and was definitely the case in this study. While much of the decision-making was carried out in the ECTs' meetings and I was able to accompany the ECT members during some of their activities, some of the ECTs' activities were carried out at times, usually non-meeting days, when I was not in the settings. Also, there were some meetings and discussions about the participatory ergonomic programs that I was not present for but would like to have been. Missing some of these opportunities to observe is one of the hazards that researchers are exposed to as they attempt to witness and chronicle how phenomena unfold "naturally." I tried to minimize this issue by staying in the settings over a prolonged period and trying to get at what had happened when I was not around by talking with those in the setting. When I became aware of decisions that had been made or discussions that had occurred that had shaped or could possibly shape the participatory programs, I tried to follow them up as much as possible.

3.9 COMPARING CASES

The comparison of multiple cases can be formatted in several ways. One could, for instance, use a predetermined list of core or common concepts that allows comparison across cases and elucidates the phenomenon of interest with one explanation. This type of comparison is suitable when the cases under study are similar and differ quantitatively on a set of data points. A problem with this approach is that it does not leave much room for qualitative differences between, or among, the cases under study. As a result, as a researcher attempts to capture the empirical findings using a single explanation, some of the key qualitative differences between the cases, such as the presence of a factor in one setting that is absent in another, may be overlooked, undervalued and/or excluded. Significantly, such instances may diminish the validity of a study's results. Also, as MacPhee (1995: 191) points out, "The key challenge in integrating cases under a single model is one of calibration – making sure that cases with different values for the model's general variables or categories really do belong on the same dimension in the order they appear to have."

Another way of comparing across cases and the one that this dissertation uses is to rely on different explanations for the cases. The idea underpinning such an approach is that different factors may account for divergent or similar outcomes across cases. MacPhee (1995:191) suggests this type of style is analogous to looking at a map in the sense that, "there can be two or more alternative routes to a destination." So, for example, the effectiveness of an occupational health and safety program in one site may be attributed to strong management commitment, but in another, effectiveness may be due to actions by OHS consultants external to a company. In the dissertation, discussions of the

empirical findings from each site will be interpreted using concepts that in some cases differ based on the findings from each site. The dissertation's findings chapters are organized as parallel case studies that explore a common set of topics for each, namely: (1) how the ECTs developed solutions to address the hazards they identified, (2) how the ECTs implemented solutions, and (3) how the participatory ergonomic programs were sustained. The examination of the cases resembles what Bonnell refers to as an "analytical comparison." Bonnell (1980) describes two types of comparative practice: "analytical comparison" and "illustrative comparison." In analytical comparisons,

the main point of comparison is between or among equivalent units. The comparison involves identification of independent variables that serve to explain common or contrasting patterns or occurrences. The investigator juxtaposes equivalent units with each other in order to discern regularities that might provide explanatory generalizations. In the second or illustrative type [of comparison] the main point of comparison is between equivalent units on the one hand and a theory or concept on the other. This variant evaluates individual units not in relation to each other but in relation to a basic theory or concept applicable to all of them" (Bonnell, 1980: 164-65).

Unlike illustrative comparisons, which tend to be more deductive and where the objective is to provide a test of theory, analytic comparisons are typically more inductive but still may use concepts to guide the researcher's interpretation of findings. In this dissertation, similarities and contrasting elements of each case are discussed at a conceptual level in the final section of each chapter. By pursuing this comparative style more of the particularities of each setting are retained, enabling a closer examination of some of the contextual factors that may account for different empirical findings in each setting. There are challenges though in following such a comparative strategy. MacPhee (1995:192) points out that, "The key challenge of this approach involves distinguishing

between minor case differences and differences reflecting different models, and determining the exact relations that hold among different models.”

3.10 SUMMARY

This chapter presented a description of the settings and an overview of the data sources, the data collection techniques, and the analysis. It also described some of the problems that were encountered while establishing my role in the settings as an observer rather than interventionist. Additionally, the chapter outlines how issues such as credibility and generalizability were dealt with. The primary data gathering techniques chosen, direct observation and interviews were suitable for getting at the “how” of intervention change and sustainability. Chapter Four discusses the activities undertaken by the ergonomic change teams as they identified ways to address MSDs.

CHAPTER FOUR

THE NATURE OF AND ACCESS TO KNOWLEDGE IN DESIGNING SOLUTIONS

“I’ve walked the circumference of the earth with a cart for Christ’s sakes. I should be able to speak to this. ... You should listen to what I have to say” (Courier, in reference to an engineer’s questions about one of the designs proposed by the ECT).

4.0 INTRODUCTION

Participatory ergonomic (PE) programs are intended to involve workers, considered to be the most familiar with production processes, in the design of ergonomically sound solutions. However, as the design process is also affected by social and organizational conditions, attaining this goal of ergonomically- and worker-informed solutions can be problematic for an ergonomic change team (ECT). Some projects require specialized knowledge that is not possessed by an ECT and gaining and maintaining access to this knowledge may be difficult. Further, production pressures often pose challenges to accessing workers’ time to attend to ergonomic issues.

This chapter examines solution design, the process by which the ECTs in each setting developed a means to address MSDs. The ECTs’ goal was to devise solutions to reduce MSDs and, in doing so, apply workers’ experiential knowledge.¹¹ In this chapter I present an account of the problem-solving processes used in both of the settings, an overview of the types of knowledge that were used, and a description of the actors’

¹¹ Worker knowledge encompasses both an understanding of a job that may be codified in a job description but also an understanding of a job that is amassed over time, informal, and usually emerges from workers’ experiences, not formal training. Kusterer’s (1978) research in the manufacturing and service sector on knowledge and skill brings to light the depth of worker knowledge. Worker knowledge includes knowledge of how to perform a job but also the hazards that it entails. Recently, Cann *et al.*, (2008) reminded us of the important role worker knowledge plays in identifying hazards.

access to knowledge. In examining solution building, the chapter investigates one part of the change-making trajectory. The analysis reveals that the organizational program was dependent upon the perspectives of multiple groups. It also suggests that different types of and differential access to knowledge affected both the levels of worker participation and the design process effectiveness. In each setting, design parameters, production pressures, the nature of the knowledge required to design solutions, and the differential distribution of that knowledge among workplace personnel influenced (a) the effectiveness of the ECTs' solution building activities, (b) the design process, and (c) the nature and degree of participation by the teams' worker members.

4.1 CHALLENGES TO KNOWLEDGE SHARING AND APPLICATION

The degree to which worker knowledge is used in workplace programs is affected by the extent to which workers are given opportunities to use it. Evidence in the literature on occupational health programs demonstrates that management control of a workplace may limit workers' application of knowledge relevant to addressing hazards (Hall *et al.*, 2006; Nelkin and Brown, 1984; Smith, 2000; Tucker, 1995; Walters and Nichols, 2006). In the literature on participatory work arrangements there are many examples in which the goal of worker involvement is not reached because production demands subordinate participatory objectives (e.g., Vallas, 2003), and managers are reluctant to grant workers autonomy to provide input into problem solving (e.g., Rothstein, 2006). This literature makes clear that worker involvement in participatory schemes is not straightforward and is often shaped by both managerial control and economic imperatives.

Findings reported in the ergonomic design literature demonstrate that the incorporation of ergonomic principles into workplace design is a political process (Garrety and Badham, 1999; 2004; Jensen, 2002; Perrow, 1983). In a study of interaction during a design project, Burns and Vicente (2000) showed that because of the divergent perspectives of multiple actors it was necessary for ergonomists to negotiate the incorporation of ergonomic principles into the design; this process was often difficult and sometimes resulted in conflict. Similarly, Wulff *et al.*, (1999a; 1999b) note that even if an organization has policies and procedures in place for the application of ergonomic principles in design processes, integrating them involves negotiation. In their study of OHS consultants' efforts to promote ergonomic design, Broberg and Hermund (2004) confirmed that, for OHS consultants to participate in technology design they must be "skilled in political and negotiative processes and the dynamics of technological design processes." Importantly, a common thread in these studies is that the design process is affected by the priorities which actors in different social worlds place on ergonomic-informed design.

4.2 KNOWLEDGE LIMITATIONS

The uneven distribution of workplace knowledge may limit workers' participation. Because opportunities for learning about the whole labour process are often limited by the conditions of Fordist¹² production, production workers (e.g., machine operators) typically possess fewer skills than trades people (Braverman, 1974; Rinehart,

¹² Generally, Fordism refers to production processes in which there is little worker involvement in production decisions (e.g., how job tasks should be carried out), work is carefully controlled by management, and often machine paced. Post-Fordist organizations are those that have genuinely embraced participatory schemes. Many authors note that claims by management and consultants about the genuine adoption of Post-Fordist practices are exaggerated (see for instance Vallas and Beck, 1996).

2006). Accordingly, even if workers are granted opportunities to engage in the problem-solving process, the uneven and often hierarchical distribution of knowledge within the workplace means they may be unable to come to a solution themselves. As a result, some types of problem solving require involvement of those with specialized expertise. In participatory initiatives to improve quality and production processes (e.g., Delbridge *et al.*, 2000; Rothenberg, 2003), which resemble participatory OHS programs in that both depend on worker knowledge for their effectiveness, there is evidence of a discrepancy between the knowledge required to solve problems and workers' experiential knowledge.

A body of literature that has focused on collaborative design processes has examined the ways in which these processes are constrained. Evidence in various contexts, such as science (Fujimura, 1987; Sundberg, 2007), policy formation (Hall and McGinty, 1997; Prus, 2003), medicine (Casper and Clarke, 1998), technology (Klein and Kleinmann, 2002), culinary arts (Fine, 1996), art (Becker, 1974; 1982) theatre (Lyon, 1974), and invention (Whalley, 1991) highlight the constraining influence of multiple audiences on design. A key point in this literature is that the production of "things" at the local level is subject to shaping by organizational and social structure. Ensuring that something meets the need of those who designed it is important, but because designs are contextually influenced, typically this is not the only design consideration. For instance, an architect may be tasked with designing a house but have to create a house plan that is compliant with local fire codes, electrical codes, and municipal bylaws. Multiple audiences typically have different expectations about what design elements need to be taken into consideration. Design teams need to be aware of these parameters; more, they

must also have the knowledge to incorporate the global features into their designs; otherwise, design failure may result.

The research discussed above makes clear that design processes may be affected by a multitude of factors: in the case of OHS programs, both the process and the extent of worker involvement may be shaped by access to knowledge and access to opportunity to share and apply that knowledge. This chapter explores how the nature of and access to knowledge affected solution design and the incorporation of workers' knowledge into the design process. The next section describes the approach that both ECTs used to formulate plans to address hazards in the initial months of the interventions.

4.3 DESIGNING SOLUTIONS IN COURIER CO. AND FURNITURE CO.

This section describes the scheme that was intended to guide the processes, and how in both workplaces, as the process unfolded, deviations from the scheme occurred. Dealt with are the types of knowledge that were deemed important, the formal model used by the ECTs to address hazards, the activities entailed in devising plans to address them, and the sequence of stages that the ECTs followed when developing solutions to address these hazards.

The discipline of ergonomics studies how humans interact with their physical environment. With regard to injury prevention, ergonomics is devoted to reducing the biomechanical forces acting on workers. In what are typically referred to as “engineering interventions” ergonomists devise ways to alter human interactions with work environments by modifying work processes, usually locating the source of injury in the physical workplace rather than workers' personal characteristics (e.g., height, age) (Wilson *et al.*, 2005). As Norman and Wells (2000: 119) point out, “Engineering

interventions are physical manipulations of hazards or routes of exposure to physical hazards. Typical examples may be the provision of lift tables to prevent lifting from ground level, or adjustable office equipment.” Significantly, because the focus of ergonomics is on the source of injury in the work environment, the ECTs concentrated on addressing injury by manipulating the physical environment through modifying tools, machines, and work organization.

Given that this was a project in participatory ergonomics, the principal knowledge the ECTs relied on was ergonomic. As described in Chapter 3, in both settings, ergonomic knowledge was provided to the ECTs’ members during an initial multi-day training session held at the outset of the programs and a three-hour, follow-up training session held ten months into the programs. During these sessions, the ECTs learned about basic anatomy, how physical forces act on the human body, and how these forces are identified and measured.

The ECTs also relied on workers’ experiential knowledge, which was applied by the ECT’s worker representatives and collected from workers who were not ECT members. The ECTs spent considerable time consulting with workers about the team’s prospective changes and gathering information from workers regarding the potential hazards and ways of addressing them.

PE programs may also require technical knowledge, that is, an understanding of how to carry out the design and development of changes, and perhaps familiarity with the operation and inner workings of machinery, as well as knowledge about the use of tools and operations of systems, and the alignment of various pieces of production equipment

in order to manufacture a product or provide a service. This knowledge may also include information about industry standards that need to be followed, including safety protocols.

An important feature of technical knowledge is that it also includes knowledge specific to a given work site. As Cooke's (2002; 2003) research demonstrates, maintenance personnel possess an array of skills, both generic and types of "firm-specific" knowledge": "Maintenance work may incorporate much more than checking machines and fixing breakdowns; it may involve the purchasing of spares, liaising with the supplier/customer, supervising contractors, training other people and so on" (58). Both formal and informal knowledge of equipment and work processes may need to be taken into consideration in the design of a change.

In the ECTs' meetings, decision-making about what should be changed and how it should be changed was shaped by the multi-step model called the "blueprint" (Wells *et al.*, 2001), which emphasizes that decision-making should be based on carefully gathered evidence from the examination of work areas and job tasks. In each of the settings, the ergonomist-facilitator frequently endorsed the formal model's usefulness and encouraged the teams' use of it. He frequently pointed out when team members skipped the necessary steps in the model, and on these occasions, asked them to re-evaluate the hazard under consideration so they could accurately identify its source.

The initial steps of any project undertaken by the ECTs were to develop a solid understanding of the job and then evaluate the hazards it exposed workers to (Chapter 3 provides details of the process of identifying hazards). Then, using what the ECTs' members referred to as "solution building" team members identified what would address a hazard and determined how it would achieve that goal. Central to solution building was

the application of workers' intimate knowledge about the work processes and ergonomic principles to generate solutions. Solution building initially involved coming up with a general idea of how to optimally address a hazard. For instance, if a hazard arose from bending into a bin, then the solution would likely involve minimizing the need to bend. Next, solution building involved the ECT specifically identifying how it would put its general idea into practice. It also involved locating articles, such as equipment and tools, or services so that a hazard could be addressed. Occasionally, the ECTs were able to identify articles that were purpose-built to reduce MSDs (e.g., adjustable tables), which minimized the time and effort to design something. Sometimes there was equipment housed within the facility that the ECTs could use; other times, the ECTs had to go outside the worksite to obtain equipment or services. With regard to equipment, whether it was found in the facility or outside, it often needed some adjustments and was re-configured to fit within the work processes and meet the team's ergonomic requirements. If a solution was unavailable, the ECT designed something from scratch to address a work task that exposed employees to MSDs.

Sources of information about potential solutions varied: In some cases, these activities could be accomplished by drawing on the knowledge within the team; other times it meant going to get information from non-ECT members. Few changes were ever designed in one meeting. Design usually occurred over a series of meetings. There were two reasons for this: (a) design took a good deal of time and team members did not have a lot of time to devote to design in a single meeting and (b) often, the information to pursue a design required was not possessed by those in the meeting.

The ECTs began solution building by “brainstorming,” the term of their choice, to generate several alternative approaches that might address a hazard. Typically, the teams next compared these solutions by examining their positives and negatives and asking about their feasibility, in order to narrow the list to those solutions that best addressed the hazard. Frequently, during the generation of solutions and their evaluation they sought additional information about them. These additional types of information included concerns such as the financial cost and measurements to allow the ECT to predict the extent a solution would reduce exposure to injury. Additionally, the ECT’s sought feedback from non-ECT workers on what would best address a hazard.

As brainstorming and the evaluation of possible solutions were intended to include ECT members’ perspectives, both were important opportunities for dialogue within the teams. Encouraging as frank an exchange of ideas as possible, the ergonomist-facilitator often emphasised that during brainstorming there were no incorrect suggestions about how a problem should be addressed and that ECT members should think as creatively as possible and not limit their thinking by worrying about cost or how management might respond to the suggestion. In both settings, at the outset of interventions, the teams were quite inclusive in their efforts and their activities could be described as co-production or co-authorship. In Courier Co., for instance, the ECT members described it as a “good forum” in which “nothing was considered wrong.” Likewise, in Furniture Co., worker representatives described solution building and assessment of solutions as very participatory.

4.4 COURIER CO.

4.4.1 Solution Building and ECT Members' Experiential Knowledge

Once the ECT had enumerated a number of potential solutions to address a hazard, the members typically tried to narrow their list to a single possible solution. Whether worker representatives were involved in the process was generally contingent on whether they possessed knowledge of how the hazard could be addressed and knew where they might be able to get what the ECT needed. When worker members were not involved, solution building mainly involved the ECT's management representatives, and for the most part, excluded worker representatives.

The solution building stage generally emphasized the application of contextual information, which was the kind of knowledge that workers possessed, and so they generally were heavily involved. For instance, when the ECT was looking into injuries incurred by couriers delivering to a shopping mall, they suggested that getting a trailer with a mechanical lift, known as a tail-lift, would reduce risk of injury. The decision to get the trailer and tail-lift was based on the fact that there were few mall loading docks onto which couriers could offload their cargo, and these were often inaccessible to the couriers, which compelled workers to repeatedly clamber in and out of the trailer, exposing themselves to potential injury. In another example, the ECT's selection of a lightweight two-wheeled cart for a courier was not only about the cart's ability to carry freight but also about how easily it could be loaded and stowed in the courier's delivery trucks, a task that the couriers performed repeatedly every day. Because the ECT operated with workers' knowledge of the job, the solutions it selected were tailored specifically to their understandings of workers' job environments and demands.

A dramatic example of how workers brought their experiential knowledge to the solution building stage occurred in a situation in which a worker was invited into a meeting to talk about a design for a new four-wheeled cart, to replace a cart that couriers currently were using to pull heavy loads of freight. The heavily-laden cart that they wanted to replace, weighing several hundred pounds, often needed to be stopped quickly. When the team asked the worker how he stopped the cart he swung a dirty, well-worn, steel-toed work boot onto the table and pointed to the boot's toe. The leather had been stripped from the toe of his boot revealing the steel underneath and he indicated that he usually slowed the cart by bracing his body against its load and sticking the toe of his work boot under one of the cart's front wheels. Part of the proposed design of the cart was to add a handbrake.

Worker representatives used their experiential knowledge of a job not only to determine a practicable solution, but also as a resource to identify vendors who could assist in developing or providing the solutions. For instance, the ECT's courier representatives frequently relied on information from customers on their delivery routes to develop ideas about how to address a hazard. The mechanic drew on his own expertise as well as relationships with vendors who did regular depot maintenance, with companies that supplied parts and tools to the depot's garage, and with companies that did major repairs to Courier Co.'s delivery trucks. In one instance of the incorporation of experiential knowledge into solution building, some couriers requested new wheels and casters on two carts. As the ECT began to think through the appropriate type of cart wheels, a courier on the ECT pulled out a supplier's catalogue that contained materials handling equipment, read some of the wheels' characteristics aloud, and noted that he

knew of a vendor on his delivery route from whom wheels could be purchased. In another instance in which the ECT was investigating different types of carts to haul parcels, several worker representatives participated in the process of selecting what the best type of cart might be. Some worker representatives volunteered to talk to people they knew who sold carts, and another worker representative offered to look into a different type of cart, saying, "I'll see if there are places around here [depot] [where they can be purchased]." The worker representatives reported that they checked into the availability of carts using the Internet, the phone book, and their personal contacts.

While the majority of the ECT's solution-building activities heavily involved worker representatives, in other instances solution building involved almost exclusively management members. When worker representatives were unaware where they could obtain a solution, they typically turned to the ECT's manager representatives and the ergonomist-facilitator for assistance. The OHS manager and operations administrative assistant were the team members who either had this information or knew people in the company who had it, and thus could give members insight into their options. The ergonomist-facilitator drew on his ergonomics knowledge and on his experiences with past interventions in other settings. Usually, the operations administrative assistant or OHS manager came forward or was asked by the ECT to look into possible solutions and then share them at the next meeting.

An exchange at one meeting provides a good example of worker representatives seeking assistance from management representatives. On this occasion the ECT was attempting to address the concerns of some of the depot's dockworkers, who spent much of their shift standing stationary on a concrete floor sorting packages, a position which

created pain in their knees and ankles. Having decided that anti-fatigue matting would address these concerns, the ECT needed to select the most appropriate matting for their needs from an array of different types. The ergonomist-facilitator advised the group to compare the quality of several types of matting and to select a type that best suited the team's purposes. The OHS representative suggested that a vendor visit the depot with some samples. However, the ECT's worker representatives did not know what vendor to consult, and during the discussion a worker representative asked the OHS manager to contact an appropriate vendor.

A similar exchange occurred at another meeting. The ECT discussed changing the speed of one of the depot's conveyor belts, and the conversation turned to borrowing a device that the team could use to measure the belt's speed from management at another depot. After a lengthy discussion of the problem, the ergonomist-facilitator asked who was going to be responsible for measuring the belt's speed and then suggested making some calls to acquire the measuring device. A worker representative replied, "Who do you even call?" The operations administrative assistant interjected at this point and said, "I will do it." Even when the team's worker representatives were given the names of company personnel to contact, reaching these individuals often proved difficult. The operations administrative assistant recalled an instance in which she tried to connect a change team member with company personnel located outside the depot.

.... we tried that once with [ECT worker representative].... and he had to find out about the low boy trailer [trailer that sits low to the ground] and it didn't work out too well because I gave him a couple of names and he came back and he said, "This person said I had to talk to this person and this person said I had to talk to this person."... which is the same thing I would have done if I had of called – sometimes you are not talking to the right person and

that's how you find out who the right person is and they tell you you should talk to someone else.

Overall, in the ECT's solution development activities at Courier Co. designing and selecting solutions were largely done within the change team and did not require outsiders. The reliance upon team members flowed from the kinds of concerns that were addressed. The production processes in the depot involved very little high-tech machinery. For the most part, it involved considerable manual materials handling: the movement of packages, freight, and mail from one area in the facility's loading dock area or from a delivery truck to another. The equipment used was rudimentary: mainly two- and four-wheeled carts, manual and powered conveyance equipment, pallet jacks, and cage carts. Significantly, the limited amount of complex production equipment reduced the ECT's need for technical knowledge.

The descriptions above give a sense of the types of knowledge that the ECT in Courier Co. required and how this influenced the involvement of worker members. Those whose knowledge was required to devise solutions were, for the most part, ECT members, and only infrequently did members have to go outside the group to get information about *how* it could best design a solution to address hazards. The workers supplied their intimate knowledge of tasks, as well as their opinions about how they should be addressed, based, in part, on their ergonomic knowledge.

4.4.2 Forwarding Frustrations and Challenges to Knowledge Application

To apply and share their knowledge, workers had to be able to attend the ECTs' meetings and involve themselves in its activities. In the program's first several months, local management, supportive of the PE program, provided the ECT with the time it

needed to investigate hazards and discuss how they could be addressed. Significantly, their support included relieving workers from their regular duties so they could attend ECT meetings and carry out activities related to making change. This support began to wane some eight to twelve months into the intervention, when the district manager expressed concern about his ability to meet production demands and indicated he was experiencing difficulty relieving workers from their jobs to attend to ECT activities. Thus, worker attendance at the ECT meetings became irregular as the intervention proceeded, which greatly hindered the ECT members' capacity to apply workers' knowledge. The effect of workers' absences was twofold: the ECT's activities slowed and worker representatives' involvement in the decision-making process was limited.

An ECT worker representative explained how the company's production pressures constrained the ECT's ability to collect and use ergonomic information. When I asked what he thought of the formal model for making changes, he noted that the approach was fine but was significantly compromised by the time pressures that workers faced:

As a process itself it [ergonomics program] makes great sense. To apply it to [Courier Co.] is the.... weak link, I'd say.

Interviewer: Why is that the weak link?

[Courier Co.] is a minute-by-minute business. They think about two seconds ahead at any given moment. They want results exactly when things happen. They have no patience,... they want to see the money spent, they want to see the results for the money. This ergonomics blueprint doesn't flow with the culture of [Courier Co], because it takes time. It takes research. It takes people to ... go out and have a look and see what the problem is and try to solve the problem.

Management was able to relieve workers, and especially couriers, for ECT meetings under certain conditions, but on many occasions scheduling couriers off was precarious. Such scheduling hinged on whether a spare courier was available to cover the ECT member's delivery route. Having one or more spare couriers in the depot was company policy. The availability of spare couriers was conditional on whether any difficulties developed. If there was a problem, such as a worker calling in sick, and the spare courier had to fill his/her spot, then a courier was often unable to be released to attend the ECT's meetings. When I asked the supervisor responsible for "scheduling off" the couriers about the challenges the ECT faced in getting its work done he said:

...I had four back up guys, I had two guys call in sick this morning [courier]'s out there and his grandmother just died, ...and [courier]'s truck [engine] just blew up. Well, what am I going to do?

The supervisor's comments highlight the precariousness of the ECT's position in the facility, which relied on the availability of personnel to cover team members as they engaged in ergonomic activities. The limited availability of people to relieve couriers on the ECT is linked closely to the limited number of spare couriers in the depot.

When I asked the OHS manager why it was difficult to relieve workers so they could attend meetings he said,

The bottom line is that operations come first. Delivering the package comes first. We deliver packages. If we don't deliver packages there's no opportunity for the ergonomic change team to even be looked at.

The couriers' inability to get relieved for the ECT's meetings influenced the ECT's ability to gather the information that it required to devise potential solutions to address hazards, and thus, limited its progress. As one worker representative stated, "We

need to, the ergo team needs to do things quick BUT you can't do things quick if you don't have the people there. ...only four people at a meeting ain't gonna cut it." The failure to grant worker representatives time to participate in meetings or do ergonomic-related activities restricted the ECT's access to the team's worker representatives' experiential knowledge, and their suggestions and evaluations of ways to address risks of exposure to injury. Without the ECT's worker representatives involvement, the team's commitment to use workers' knowledge of job tasks to assess hazards and devise ways to address them could not be fulfilled, and its progress on several projects slowed or even came to a standstill.

An example of how the ECT's information gathering activities conflicted with the time available for employees was in the team's difficulties getting together and sharing information about the work hazards associated with the depot's delivery trucks. The team was interested in examining delivery truck doors because it identified that the incidence of injuries was related to several features of the doors and their use. The delivery trucks had three different doors, each presenting distinct hazards. The ECT split into three subgroups, each investigating one door. The subgroups aimed to gather information about the biomechanical forces it took to open and close the doors, the frequency with which the doors were opened and closed during a shift, the condition of the doors (e.g., damage, lack of maintenance) which affected their operation, and the couriers' sense of the work processes that might affect their use of the doors. Soon after forming, the subgroups had difficulties meeting because members were not relieved to attend the meetings; these troubles persisted for over three months. At several consecutive meetings, because couriers were not relieved from their regular duties,

members reported that they were unable to meet with their subgroups. At one point, in an attempt to ensure the ECT made some progress, the team decided that it would only examine one delivery truck door but because workers still could not get the time off, this change did not resolve the problems of making time to address issues. A meaningful discussion among ECT members about the delivery trucks' doors, and how the hazards associated with them might be addressed, never occurred.

The dialogue around devising solutions involved substantial worker input and incorporated workers' knowledge of job tasks, some technical knowledge and knowledge of sourcing the ECT's solutions. Discussions regarding solutions were inseparable from the production imperative and management's control over the ECT's members, especially worker representatives. The conflict between production pressures and the ergonomic approach became more prominent over several months of the intervention, and continued to affect the ECT's access to worker knowledge and the opportunity workers could play in solution development.

4.4.3 Summary

For the most part, in the courier company solution-building processes were a joint effort between worker and management representatives. Brainstorming and solution evaluation relied heavily on workers' experiential knowledge and ergonomic knowledge to generate and then select potential solutions. As noted above, there were some exceptions, when worker representatives needed management representatives' assistance. Later in the intervention, attendance problems associated with production pressures hindered the participation of worker members, which had the effect of also limiting their

ability to apply their experiential knowledge to solution building and slowed this process down.

4.5 FURNITURE CO.

This section examines how the ECT in Furniture Co. assessed hazards and developed solutions designed to address them. The discussion indicates that the ECT experienced problems at the outset because its members lacked access to knowledge required to design solutions. These problems were addressed through managerial intervention. The chapter also examines how the ECT's solution building changed over time and the effects of these changes on the involvement of the ECT's worker representatives.

4.5.1 Back to the Drawing Board

In its earliest months, ECT members were able to identify hazards but had difficulty developing workable solutions. Many of these difficulties were due to the complexity of the production process. In a few instances, the ECT developed a solution to address a hazard, attempted to implement it into the work process, but quickly realized it was impracticable. In other instances, the ECT took its designs to plant maintenance personnel and was told that its plans were unworkable, as they did not adequately take into consideration key features of the production process or plant layout. These problems often prompted team members to backtrack and redesign solutions that they thought they had settled on. Scrapping or significantly modifying plans cost the team a lot of time. Indeed, twelve months into the intervention the team had seven projects in progress, and was having difficulty finalizing an acceptable design for each. Difficulties devising workable solutions frustrated the team's members. Noting the ECT's protracted

discussions about work hazards and solution designs but lacklustre progress, one member lamented the team was “not moving,” another said that the ECT’s progress was “stagnating,” and still another said the team had “lost momentum.” The following section examines in detail the design considerations that the ECT needed to take into account to devise workable solutions.

4.5.2 Considering Production Flow, Machinery, and Shopfloor Space

Plant features, such as the production process, built environment, and the technical complexity of production equipment determined the types of knowledge that the ECT required to formulate practicable solutions. One consideration the ECT needed to think through was whether a change could be accommodated given the plant’s space restrictions. In Furniture Co., work was carried out in interdependent work areas within different departments (e.g., roll forming, press, assembly, paint). To move raw materials and finished parts between work areas they were loaded into corrugated steel containers called “bins,” measuring about a metre long, three quarters of a metre high, and three quarters of metre wide, and then forklifts and tow motors shuttled the bins among the work areas. Typically, bins sat near machine operators and usually there were input bins that held parts that required work and output bins in which finished parts were placed so they could be moved to another department. Significantly, the bins took up a lot of floor space and limited the room available near production machinery. Accordingly, when ECT members recommended that a machine be repositioned or modified, or that a piece of equipment be installed near a workstation, they had to consider whether (a) fork lift drivers had sufficient room to safely and quickly place and retrieve parts around equipment and operators and (b) fork lifts and employees could travel unobstructed in the plant’s aisles.

The plant's production flow was another feature the ECT needed to consider in its designs. In particular, the team members needed to think through the interconnectedness of the production process within and among departments. Such production process interconnectedness meant that the ECT had to consider in its solution building not only how its proposed changes would impact a job task, but also how the change would affect the sequence of job tasks necessary to complete a part in any department. One example in which the interconnectedness of the work processes confounded the ECT and they were unable to formulate a workable solution was the attempted introduction of a lift table. During a lengthy discussion about where the lift should be located, the ergonomist-facilitator observed that the ECT needed to consider the job task *and* how the lift, "affects a whole system that involves the press shop, operators on the... riveter [machine], placement of parts in the bin prior to arriving at the riveter, and the correct positioning of the bin on the lift by forklift operators." He then added, "I don't think we have the knowledge in the room to know the whole system." The ECT's lack of comprehensive knowledge of how its changes might disrupt operations within a work area and/or the department-level production flow complicated and often slowed solution building.

One feature of plant life that the ECT also needed to be aware of was the ongoing changes in the factory that were introduced independently of the ECT but nonetheless influenced its activities. For instance, unbeknownst to the ECT, the factory's lines sometimes were reconfigured or eliminated, or a piece of machinery on a line, such as a press, was modified. The significance of this is that the ECT devised some solutions but then had to revise or even scrap its plans because the area that it was working in had changed in a way that rendered its changes unworkable or impractical to install.

Adding to the ECT's design considerations was that it had to be mindful of whether the solution it devised negatively affected safety. This meant that the ECT needed to ensure its proposed changes to work processes did not introduce new hazards. If the team did identify safety hazards that were linked to its proposed change, it had to develop a plan to address them. In one example of how this unfolded, the ECT attempted to add safety features to a lift table, which would reduce the need for workers to bend to floor level. In this case, the team had to ensure that the lift table met OHS regulations concerning proper safety guarding around the mechanism that raised and lowered the table. At one point during an ECT meeting, after several failed attempts to come up with proper guarding and the lift table had sat unserviceable in storage for a number of weeks, the plant manager remarked that the ECT's inability to introduce it to the shopfloor was "a little embarrassing." In another instance in which the ECT had to integrate safety features into its designs, the team's attempts to devise a receptacle for parts next to a workstation to reduce reaching stalled because one design was too expensive and another was unsafe due to the risk of operators pinching their fingers. In the end, after approximately eight months of considering various designs and prototyping some of these, this project was abandoned.

Ascertaining whether the functionality of a piece of equipment it intended to alter would be negatively affected by the proposed changes was an additional concern for the ECT as it attempted to devise workable solutions. Whereas some machinery could be repositioned and perform optimally with minimal adjustment; repositioning others was complex. For example, it was easier to have a trench dug in the floor where workers

stood to operate a large piece of production machinery, providing a lower work platform, rather than lower the machine.

Additionally, to create operable plans for equipment that the team sought to introduce, its members needed to be aware of four design considerations. First, if the ECT was attempting to introduce a lift table or tilt table, the team needed to be attentive to the weight-bearing tolerances under which the equipment could operate¹³ and to what extent a load on a lift could be safely tilted to facilitate the removal of parts. Second, because the ECT's solutions typically involved machinery, it required some mechanical knowledge and an understanding of the materials required. Third, many of the team's mechanical changes, such as lift tables, operated hydraulically, pneumatically, or electrically thereby requiring a power source; therefore, the team members needed to be cognizant of whether this was accessible. For instance, some ECT-recommended lifts to reduce employees bending into bins required pneumatic power so a source of this had to be located for each lift. Fourth, the ECT needed to consider issues that arose around equipment installation, such as whether it must be portable or stationary. Typically, lift tables had to be moveable; conversely, tilt tables had to be bolted to the floor so they would not tip.

4.5.3 The Need for “Technical Expertise”

The significance of the above discussed design considerations were particularly significant at the intervention's outset, when many of the changes the ECT considered required knowledge that was not possessed by the team's members. The problems that

¹³ Indeed, when it came the redesign of some pieces of equipment, according to provincial occupational health legislation, their safe operation had to be certified by a professional engineer in what is called a “Pre-Start Health and Safety Review.” <http://www.labour.gov.on.ca/english/hs/guidelines/prestart/index.html>

arose from this fact led to considerable slowing of the team's work, which in turn led to frustration among team members. The ECT's members' frustrations with their inability to design workable solutions came to a head approximately 12 months into the intervention and in a series of meetings the team discussed the problems it was experiencing. A prevailing theme expressed by several members during this period was that, in the ECT members' words, the team did not have the "technical expertise" it needed. In one such meeting, the ECT discussed its inability to formulate plans for changes and the OHS manager asked three times if the team had the right composition. At one point she queried, "Is this kind of team really suited to the kind of make-up of the facility? I am questioning whether we have the right people on the team." To address its lack of technical expertise, the ECT's members agreed they needed to work more closely with the plant's skilled trades personnel, such as the engineering staff and maintenance department, who were responsible for modifying and installing equipment, and with the plant's production manager, who was responsible for plant layout and maintaining and improving the plant's production. The ECT expected that enlisting the assistance of trades personnel would improve its capacity to conceive and implement workable solutions.

To address the above concerns, the change team requested that the maintenance manager and the production manager become members. In the intervention's eighth month, the maintenance manager started attending meetings and then, approximately eight months later, the production manager became a member.¹⁴ The maintenance and

¹⁴ I expand on the production manager and maintenance manager's recruitment in Chapter 5, in a discussion of implementing changes.

production managers possessed knowledge about the plant's production processes and the operation of its machinery that other change team members did not, and for this reason, their addition to the team greatly improved the ECT's capacity to devise workable solutions.

While a certain amount of the production manager's and maintenance manager's knowledge overlapped, each possessed some distinct skills. When I talked to the ECT members about the managerial personnel they stressed the importance of the production manager's lengthy and varied experience: he had worked in the factory for over twenty years, and had done many of the plant's jobs from machine operator to his present position. His experience enabled him to enumerate some of the plant's features that the ECT needed to consider during solution design that were not visible to other ECT members. During the ECT's deliberations, the production manager frequently described the spatial parameters the team had to work within to install (and/or modify) a piece of equipment in a department. Acutely aware of the plant's layout, he knew whether re-positioning or modifying equipment would interfere with production flow. He also had a commanding knowledge of the plant's production equipment. The OHS manager described the production manager's knowledge this way

For example, one of our last meetings, ... we were talking about the reaching necessary for a particular die and [production manager] says, "No big deal. We can run that die in another press and in the other press it's closer to an employee and we can just remove the issue." I WOULDN'T have known that. I don't know which dies can run in which of the presses, but [production manager]'s had years of experience here and he knows that's no big deal he just changed that on the order routing. And he also knew that there was probably enough capacity in that other machine to do that. ...that would have taken me two hours of goin' all over the place to figure that out.... So that decision was made, what, in a couple of minutes as I recall as opposed to

weeks of running around and finding the answer and bringing it back to the team.

Additionally, the production manager's regular duties and involvement with the plant's senior management kept him abreast of the company's plans to reposition and/or alter equipment. He was therefore able to help the ECT avoid designing unworkable solutions that they may eventually have had to reconfigure. In ECT meetings the production manager frequently noted that the volume of parts that was running in a particular work area was either low or high and whether or not the work area would maintain, increase or decrease that output. Crucially, this knowledge influenced the types of change that the ECT considered were possible or sometimes even whether the ECT would attempt to introduce a change at all.

If the production manager's central contribution to the ECT's solution design was his comprehensive knowledge of the plant's layout and production flow, it was the maintenance manager's intimate knowledge of the plant's machinery that was his principal asset to the ECT's solution building. The maintenance manager possessed what Rothenberg (2003:1792) referred to as "process knowledge," or "an understanding of the mechanical and chemical properties at hand, as well the performance parameters within which the process should operate." Possessing formal knowledge about machine operation and adept at modifying machinery, the maintenance manager could ascertain what sort of materials needed to be procured and how they should be fashioned to realize the ECT's designs. In many instances, when the ECT was deliberating on a solution, the maintenance manager drew on his skills and experience to raise issues that he foresaw as problems and suggest ways to address these issues. For instance, during discussions about conveyance equipment he knew that a specific conveyor's rollers would become

clogged so he suggested alternatives. In another instance, in which the team attempted to reduce employees' bending, he advised the team to avoid selecting an underpowered vacuum to extract ball bearings from a drum. When asked about the maintenance manager's role on the ECT, the plant manager said:

...we needed [maintenance manager]– MAINLY for technical solutions and looking at technical ideas or technical solutions in the trades' areas. We needed his input for that to how to solve a problem, what makes sense, WHAT is possible. And we just had ideas we want to take something from A to B. That's easy for us on paper to say, "We'll get this measure, this part and put it here, and this is what we want, this is nice and friendly to grab it from here." ...this is the person to do this with. ... how do you physically do that? What kind of mechanisms do you use when you do it? So we needed the [maintenance manager] for that.

As Cooke (2003) has pointed out, skilled trades people often draw on knowledge that goes beyond tools and machines; they also rely on knowledge of who the parts and services suppliers are. The production and maintenance managers' positions required that they had continual responsibility for replacing, modifying, and/or repairing equipment and lines. These responsibilities familiarized both of them with vendors from whom the ECT could procure some of the equipment it needed. Throughout the intervention they relied on this knowledge extensively to provide critical input into the ECT deliberation process. Frequently, during the ECT's discussions around changes, the production manager and maintenance manager passed around catalogues that contained equipment or tools that the team may be interested in, so each member could consider whether equipment or tool under discussion suited the problem. Additionally, in the ECT meetings, the managerial personnel often drew on their organizational memory to provide information that was useful to team activities. For example, there were instances in the ECT's meetings when they pointed out that there was unused equipment in the facility

that the ECT could use. They were also knowledgeable of some of the attempts to make changes that had occurred in the past and gave pertinent information about how this was carried out.

The maintenance manager and production manager delimited what sort of solution could be built, based on several factors. One of these factors was cost. They often explained that the cost of a change increased markedly with its complexity, therefore designing or selecting a solution that was simplest was better. Also, given the time it would take to design a solution from scratch, the managers frequently suggested purchasing something ready-made, if possible. Another vital piece of information that the maintenance manager and production manager contributed was knowledge about how the solutions would be crafted: how the change could actually be designed, what materials were to be used and, in cases in which something could be sourced ready-made, what company could supply it.

Drawing on the maintenance manager's and production manager's stocks of knowledge enabled the ECT to create ergonomically-informed, workable solutions, something that previously proved very difficult for the ECT. Key to the managers' participation was that they were able to take abstract ideas about how a hazard should be addressed and transform these into concrete plans. One of the ECT's worker representative's comments typified what other ECT members said regarding the managers' abilities to transform ideas into operable plans, "We could have come up with a million ideas, and... without [maintenance manager's] input we would, like we do need someone who knows a bit on how things ...are made, and [production manager,] he's

also got experience with that...I think things would be a lot harder if we didn't have them.”

Importantly, the maintenance manager's and production manager's contributions were not just about technological know how, although that was important. They also contributed to design based on their knowledge of the local and global design parameters and how the two needed to correspond. For instance, one could design and fabricate a piece of equipment according to ergonomic principles but these had to be carried out in accordance with parameters such as safety rules, production flow, and machine tolerances and functionality.

The production manager's and maintenance manager's activities on the ECT made them similar to Nutch's (1996) “gadget scientists,” technically proficient field biologists who were able to overcome environmental challenges and equipment limitations and malfunctions to accomplish their study goals. Drawing on their skills and experience, gadget scientists and management personnel enabled their respective groups to surmount technical contingencies, anticipate and subsequently avoid problems and formulate successful plans. The production manager and maintenance manager's participation in solution building reduced the likelihood the ECT would devise unworkable solutions, spared it from struggling with design issues, which its members were not knowledgeable about, and saved the ECT's membership time. Though designing the changes that the ECT wanted to make still took a fair amount of time even after the managers joined the team, their participation made the process much more efficient.

4.5.4 Changes to Solution Building

The team's solution building changed dramatically eighteen months into the program. The team remained committed to reducing employees' exposures to hazards but solution building changed such that ergonomic principles and formal model change-making were no longer an important means by which hazards were reduced. Instead, the dominant concern was designing workable solutions that were compatible with the factory's layout and work processes.

The ECT's changes to its solution building were, in part, a reaction to the lengthy time needed to follow the steps outlined in the formal model, the failure to make substantial changes in the intervention's early months, and a view among some members that following the formal model was needless or at least inefficient for what it intended to accomplish. In reference to the changes the ECT had made in its solution designing and its aims to devise workable solutions, the OHS manager said:

... I think we became less concerned with following the process exactly and the paper flow and whether we had enough surveys or enough pictures or it documented and just more concerned with, "Let's make something before we all resign." Because that's how people were feeling, ... "Like, am I making any difference here? I think not." That's how we were at the end of the first year. So I think it came with, "Let's make something work and we honestly don't care how we get there, we JUST have to have something to show for all this effort."

Contrary to the step-by-step process in which the ECT went about solution building in the intervention's initial months, later in the process the team members rarely carefully considered the root causes of injuries and they seldom paused to evaluate the extent to which their solutions addressed the hazard. Initially, the determination of the extent to which a solution addressed a hazard was typically based on careful

measurement of how a solution decreased the biomechanical forces acting on a worker. Later in the intervention, the ECT's decisions were guided more by general ergonomic principles regarding acceptable motions, postures, and positions. For instance, the group knew that repetitive bending was to be minimized so they aimed to devise solutions that reduced it. Approximately 12 months into the intervention, the ergonomist-facilitator became markedly less involved in the assessment and solution building, notably by not asking the team to reconsider the cause of injuries when group members were either skipping steps or not attempting to identify the root causes of an injury. Additionally, the team less often engaged in brainstorming and evaluation of their proposed solutions, which had been occasions in which all members, regardless of expertise, had an opportunity to participate. Approximately 20 months into the intervention this point was captured by one ECT member who said, "I can't remember the last time we brainstormed using the steps." In an interview twenty-four months into the program, one ECT member described solution building this way:

...we talk about the injury,... we say, "So what can we do?" And we'll come up with a solution right there. And then that's basically it. So it's a lot faster NOW but we're not doing the legwork behind it so we say, "Is it the right solution, could there be a better solution, what are the drawbacks...? What will the employees working there think?" So we don't do any analysis anymore before we go ahead. And maybe the solutions that we're coming up with right now are simpler if that's the word.

One feature that was noticeable during this period was that the ECT had lowered its standards for defining a result as a meaningful improvement. One manager representative said that the team took a different orientation to solution building later in the intervention, "And now we're just kinda like, 'Oh it's better than it was,' ..., this project could be put in place because this solution is better than it is now.... We just

come up with a solution and we think, ‘Okay that’s not bad, we’ll work with that.’” Other ECT members shared this sentiment, which represented a significant change in the ECT’s expectations.

The change team members felt that there were few drawbacks in the new way that solutions were devised and the new approach enabled them to more quickly fulfill their goals. Many ECT members noted that although they sidestepped several of the formal model’s stages, little was lost in the transition to the truncated version of solution building. The plant manager distinguished between the forms of solution building used at the outset of the intervention and the one used later, noting that both achieved the same purpose:

...it’s still brainstorming just not as formalized as in the beginning. ...I don’t think seriously at this point that we’re ...LOOKING for somebody that has the ANSWER rather than us trying to brainstorm and come up with the answer to look to [production manager] “What can we do here?,” or [maintenance manager] “What are we going to do here?” That risk is there, but I think we still talk about it [solutions] enough to make sure that we feel good about the solution.

ECT members did not doubt that the team’s less formal style of designing solutions was improving the efficiency of its activities. In an ECT meeting approximately 24 months into the program, the OHS manager reviewed the team’s accomplishments that year by listing their finished projects. Looking at the list of changes, the maintenance manager said, “I didn’t realize we had done so much even though things have been painfully slow.” The OHS manager responded, “Yeah, we are on track, we said we would do two changes per month and we are on track to have twenty-four done by year end.” The fieldnote excerpt that follows, developed from notes

taken in an ECT meeting, points to the fact that the change team members sought to make changes, but not necessarily according to the formal model's evidence-based approach:

[OHS manager] notes that with [maintenance manager] and [production manager]'s help the team has been able to work more efficiently. [Maintenance manager] "we are not looking for pie in the sky solutions but we are doing things." [OHS manager]: "It's not enough [indicating that there were still many MSDs to address], but we are rolling."

4.5.5 Diminishing Worker Involvement

Changing the way solution design was carried out and managerial personnel's increased involvement reduced participation by other ECT members in the development of solutions. In the later stages, during the discussions in which the ECT identified a hazard, discerned its cause, and talked about solutions at a very general level, typically all members were involved. Once the discussion began to move from a general to a particular solution, however, the maintenance manager and production manager often dominated the discussions. In fact, in many instances during the ECT meetings, the two managers had extended discussions between themselves as the other team members looked on. When it came time to discuss the specifics of a change, that is, the particular measurements and materials needed to build something, where a piece of equipment might be found, or who might build it the managers engaged in what I refer to as "tech talk." These discussions were typically wide ranging, including elements such as whether there was a supplier who could readily provide a piece of equipment down to the minutiae of design, such as the types of nuts and bolts required and types of mechanisms. Exchanges between the managers were rapid, with little time taken to explain the nuances of machine function. Often, tech talk was impenetrable unless someone possessed the know-how to design a change in accord with both local and global parameters.

Worker representatives were also prevented from being more involved in solution building as the maintenance manager and production manager sought information from external sources. The maintenance manager and production manager were devising solutions, making calls to suppliers, and discussing solutions between themselves outside of, as well as in, the meetings. Often, members who were not involved in the discussions about solutions that occurred outside the ECT's meetings would only hear about a solution once the maintenance manager and/or production manager reported to the ECT, after a series of decisions had already been made. These activities effectively shut some of the ECT members out of the process. Also, these activities stood in contrast with the ECT's earlier investigations in which sales representatives from vendors came into the company and met with all the team members to discuss equipment of interest to the ECT. Moreover, unlike solution design at the intervention's outset in which solutions were suggested and then scrutinized at team meetings, the maintenance manager and production manager's suggestions were not held up to the same scrutiny. The fact that other team members did not evaluate the managerial personnel's suggestions may be understood as the managers having what Mukerji (1976) refers to as "authority to know." The past experiences and expertise that managers possessed, which was acknowledged by team members, exempted managers' ideas from the more careful and prolonged examination that other suggestions received.

4.5.6 Summary

The evolution of solution design in Furniture Co. was affected by a number of factors. The problems encountered in the first 16 months were associated with its inability to devise workable solutions. Additionally, they were complicated by the lack of personnel on the ECT who had the expert knowledge to design solutions that were

practicable in light of the plant's production processes, technology, and spatial constraints. Solution building changed dramatically after about a year and half, in that the gathering of ergonomic information and following the formal process became much less a focus for the ECT. The primary focus was on building solutions that were workable with much less attention to whether this yielded the "best" possible ergonomic solution. This change had serious repercussions for the ECT's worker representatives, as they were much less involved than they had been.

4.6 DISCUSSION

The chapter began by noting the goal of PE programs was to design ergonomic- and worker-informed solutions to address MSDs. In both settings, the ECTs had received ergonomics training, had guidance from the ergonomist-facilitator, and had worker representatives on the team who possessed intimate knowledge of job tasks. Additionally, as the analysis shows, the teams' solution development processes were affected by the social and organizational context, the teams' access to knowledge required to devise workable solutions, and the worker representatives' opportunities to apply their knowledge.

In both settings, limitations to worker representatives' contributions were influenced by factors that were related to the production process, although the manner in which this occurred differed in the two sites. In the program's first 12 months in Furniture Co., the complexity of the production process and the team's lack of access to skilled trades personnel and their specialized knowledge hampered the team members' attempts to devise workable solutions. The need to have skilled trades personnel involved in the ECT's solution building was related to the range of design considerations

that were required to be accounted for such as production flow, spatial constraints, and machinery functionality. In contrast, team members in Courier Co., were generally able to develop operable solutions themselves without additional expertise. In part, this was connected with the simplicity of the tools used in production, which enabled, or at least facilitated, the process whereby workers could draw on their experiential knowledge and ergonomic knowledge.

The findings that pertain to access to technical knowledge raise important questions about workers' involvement in the solution design process. In order to maintain managerial control over the production process, for the most part, workers are the executors and not the designers of work (Braverman, 1974; Rinehart, 2006). This is contrary to the principles of PE, which endeavours to draw workers into the conception of work activities in an effort to reduce MSDs. Yet, in the two workplaces examined here, the differential access to knowledge created limitations on workers' contributions to some parts of the design process. Under Fordist production regimes workers generally receive limited technical training in how machinery functions and the overarching knowledge of the production processes (Livingston and Sawchuk, 2004). In a study of workplace knowledge, Livingstone and Sawchuk (2004) highlight the limitations on workplace learning and offer insights into why workers' involvement may be constrained in participatory initiatives. Writing about their own research in an automobile-parts factory, Livingstone and Sawchuk (2004: 181) state

In general, there are clear limits to worker involvement in work processes shaped by the organization of work. For production workers at this parts factory, for example, intensification of work and the demands of the assembly line diminish human energy, limit the time to reflect, constrain access to an experience of the broader production process and restrict discretionary interaction

among co-workers. Through the organization of work, the production worker comes to participate in work-based learning life more as an “operative” or “tool” than as an “agent” of production.

In Courier Co., late in the intervention, the company’s production pressures affected the ECT’s functioning and worker involvement. These pressures, manifest in difficulties relieving workers from their regular duties, restricted their opportunities to apply their ergonomic and experiential knowledge. Discrepancies between the time that worker representatives needed to complete ECT activities and how much time management at Courier Co. was willing to provide are consistent with findings reported in other research on participatory work arrangements (Ichniowski *et al.*, 1996).

In Furniture Co. the lack of access to knowledge of the production system prompted the ECT to seek, in the ECT members’ words, “technical expertise” from the maintenance manager and production manager. The managerial personnel’s involvement greatly improved the ECT’s capacity to devise workable solutions. Changes to the way the ECT carried out solution development and the presence of the managers eventually limited worker representatives’ input into the dialogue around solution development.

The specialized knowledge that was required to design solutions to address hazards influenced solution design and involvement of worker representatives. This finding is consistent with evidence from various bodies of literature on participatory problem solving. For instance, Rothenberg (2003) in a study of an environmental management program, found that changing a workplace may involve a number of different types of knowledge which typically are not possessed by workers. Likewise, Delbridge *et al.*, (2000), in an examination of a production improvement program, found that decentralizing responsibilities to workers was difficult for anything beyond their

regular production activities, in large part because of their limited production system knowledge.

The design problems that the ECTs' encountered converge with findings reported in literature on ergonomic design (Badham and Ehn, 2000; Broberg and Hermund, 2004; Burns and Vincente, 2000). As Burns and Vincente (2000: 81) point out, "Contextual constraints provide the background for any ergonomics problem. Constraints arising from the parsing and distribution of design work are commonplace in engineering design projects. And finally, constraints from other domains are inevitable in an interdisciplinary design effort." Similarly, in their study of an information technology project, Garrety and Badham (1999:288) discuss the constraints that face those attempting to integrate ergonomic principles into design plans:

it [the study] demonstrates the sheer difficulty of aligning people and objects into trajectories deemed to be desirable by human factors experts. There are always others involved. These others may have different goals and plans, and they may possess the power to carry them through in ways that override or circumvent the trajectories planned by human factor experts.

The ECTs' solution building process was conditioned by the complexity of the production process and the ECTs' access to the knowledge it required. Moreover, the difficulties encountered in solution building had important consequences for the collaborative nature of problem solving around MSDs and the efficiency of the solution design process. Significantly, this raises questions about notions of participation and involvement and what, in practice, it means to be involved in solution design.

Drawing on the negotiated order insights, the findings demonstrate that the ECTs had to align the designs they put forth with multiple audiences. This was particularly the case for Furniture Co., where the design process was marked by a greater number of

concerns. A solution had to be ergonomically sufficient but also had to meet a number of other concerns: fit within the work area, match with the interdependent workflow among areas and departments, and correspond with safety and engineering protocols. In this study, worker representative creativity and involvement were limited by production pressures, production process complexity, and the uneven distribution of knowledge. Becker's (1974: 770) words, though pertaining to artists, fit equally well for the ECT members:

Artists often create works which existing facilities for production or exhibition cannot accommodate. Sculptors build constructions too large and heavy for existing museums. Composers write music, which requires more performers than existing organizations can furnish. Playwrights write plays too long for their audience's taste. When they go beyond the capacities of existing institutions, their works are not exhibited or performed: that reminds us that most artists make sculptures which are not too big or heavy, compose music which uses a comfortable number of players, or write plays which run a reasonable length of time. By accommodating their conceptions to available resources, conventional artists accept the constraints arising from their dependence on the cooperation of members of the existing art world. Wherever the artist depends on others for some necessary component he [sic] must either accept the constraints they impose or expend the time and energy necessary to provide it some other way.

Given the multiple worlds that the ECT had to satisfy, or at the very least consider, we could say that the ECT's work was analogous to that of the scientists in Fujimura (1987) research who sought to envision "doable" research projects. According to Fujimura (1987:2), "Doability is the alignment of several levels of work organization. These include experiments as a set of tasks; the laboratory as a bundle of experiments and other tasks; and the social world as the work of laboratories, colleagues, sponsors, and other players all focused on the same family of problems." (see also Sundberg, 2007).

The chapter highlights that solution design was a creative, collaborative activity employing both worker and ergonomic knowledge. The use of worker representatives' experiential knowledge and their involvement in the process of solution design were affected by the circumstances in the settings. Lining up the ECT's designs with relevant audiences proved challenging in Furniture Co. as the production processes consisted of complex machinery and work processes. In Courier Co. worker representatives' opportunities to apply their knowledge was circumscribed by production pressures. In Chapter Five, the examination of the trajectory of change is furthered as the dissertation investigates the implementation of changes and the factors that bear upon this process.

CHAPTER FIVE

THE LONG AND WINDING ROAD TO CHANGE IMPLEMENTATION

5.0 INTRODUCTION

Evidence in the literature on health and safety programs demonstrates that OHS program functioning is often undercut by social and organizational factors such as lack of managerial support. One finding of interest is that often health and safety committees are able to identify and assess hazards but unable to effectively alter the conditions to minimize hazards. In reference to joint health and safety committees¹⁵, Tucker (1995: 256) pointed out the importance of the “distribution of power and political-economic and ideological circumstances. Management guards its control over basic investment decisions, including what, when, and how to produce.” Commonly cited obstacles to the implementation of changes are workers’ weak power relative to management, lack of managerial support, and the weak position of health and safety experts (Fulmer *et al.*, 2005; Tucker, 1995; Walters *et al.*, 1995; Walters, 1985). Our understanding of how health and safety programs function greatly benefits from these studies, and we are able to identify some of the key obstacles to effective OHS program functioning. However, there has been less attention paid to how those involved in health and safety programs are able to make changes and overcome constraints if they are encountered. This chapter extends the available research by examining the hindrances to implementing changes that the ECTs faced and the ways they attempted to circumvent these hindrances. It focuses

¹⁵ Joint Health and Safety Committees (JHSC) are legislated in many jurisdictions in Canada and elsewhere. In Ontario, all companies with 20 or more employees must have a JHSC. Consisting of both labour and management representatives, they are intended to give workers an opportunity to assess the health and safety conditions in a workplace and address conditions that are not satisfactory.

on the ECTs' implementation activities. The analyses draws in particular on Strauss's notion of articulation work to examine the strategies that ECTs used to turn their plans into concrete changes in the workplace. I suggest that articulation work's form and pace was affected by workplace conditions and in particular the authority ECTs had to make changes.

5.1 HOW WORK IS CARRIED OUT

To understand how project work plays out, we have to understand how this work is "fitted together" (Strauss, 1993). To accomplish tasks, according to Strauss (1988), workers need to align their "respective work-related actions," which requires that they engage in a series of interactions, a process he called "articulation work." To implement ergonomic changes, actors must have the authority to bring together both material and nonmaterial resources.

Creating and maintaining the necessary links between units and departments to make changes is part of the articulation process. Of central importance to Strauss (1988; 1993) is how work processes are brought together, or linked, so that an objective can be met or workflows maintained. Successfully articulating work tasks means that arrangements among actors have to be created and preserved. Arrangements refer to the agreements among actors about the work to be done. Strauss noted that (1993: 89)

Within departments, the arrangements pertain to such questions as what work, by whom, where done, for how long, for what pay-back, for what purposes, and according to what standards?

Between departments the arrangements may be concerned with the above but also with other issues, such as: what resources, technology, and supplies, within what time-frame, with what information, in what space, and with what other back-up services that a particular department may need to do its work?

If arrangements are not created and maintained, then workflow is hindered, or may even be stopped.

Arrangements are made through “interactional processes” (Strauss, 1993: 87), which refers to tactics that actors use to make arrangements so that project goals can be accomplished. Interactional processes include such activities as negotiating, manipulating, lobbying, and discussing. Arrangements and the form(s) that interactional processes take are influenced by local circumstances and broader structural conditions (Strauss, 1993: 88). That is, those involved are not free to make arrangements as they wish but are to some extent constrained by aspects of an organization’s structure, such as power relations between labour and management.

5.1.1 Articulation Work

Articulation work, encompasses securing authority to make change and gathering material and nonmaterial resources. In the case of PE this includes the personnel to physically carry out and integrate the changes into the work processes. To accomplish these tasks, the ECTs used an array of interactional processes – negotiation, persuasion, alliance building, and recruitment. Articulation work involves coordinating tasks. In the workplaces studied, it is directed at linking the tasks that are required to alter the workplace, including gathering scarce resources and securing support from managers who may see investment in occupational health as unimportant or even threatening to the maintenance of capital accumulation.

At the core of articulation work in these settings is the fact that there were problems realizing the ECTs’ authority to make change. Lacking the authority to pursue

changes independently, the ECTs had to negotiate for permission to make changes and secure the resources they needed to do so. As Corbin and Strauss (1993: 76) point out,

To arrive at an arrangement, then, involves arriving at a common definition of the situation. This means that any discrepant understandings (such as, about who has what power to control structural organizational conditions and a willingness to share or relinquish some of that control; or about expectations about what is to be done) must be discovered, thought about, and ironed out through interactional strategies.

In both settings, although management agreed the ECTs were to be the agents of change for the PE programs, arriving at “common definitions” concerning what latitude the ECTs had to independently alter the workplace was difficult and prompted the teams to do articulation work.

Articulation work was necessary for two reasons. First, as noted above, there was a need for articulation work because the ECTs had little independent authority to affect changes, a contradiction of the initial management-approved agreement that the ECTs would oversee and implement ergonomic changes. Similar to the advisory role of joint health safety committees and their limited powers to make change (e.g., Tucker, 1995; Nichols and Tucker, 2000), the ECTs were constrained in the degree to which they could independently act. Management had to approve any of the ECTs’ recommended changes but were often uninterested and/or reluctant to do so. In both settings, managers at various levels, who controlled the resources required to make changes and had the influence to authorize changes, were uncooperative for at least part of the interventions.

Second, articulation work was required because of the collaborative nature of change making in such settings. Changes, regardless of their scope, necessitated that material and nonmaterial resources be gathered and a plan formulated concerning who

would carry out the change. However, gathering these resources required the cooperation of personnel who were often unwilling to render assistance. Aligning the resources required for ECT changes often meant channelling resources away from production, but such resources were already typically scarce and, generally, were controlled by groups that were closest to production (Ranson *et al.*, 1980). Therefore, achieving a degree of access to the personnel and the material resources required to fabricate and install changes meant that the ECTs had to employ interactional strategies in an effort to secure arrangements to achieve their goals.

In examining the implementation of changes the chapter explores how this process is affected by (1) the organizational context, in particular the ECTs' authority as agents of change, and how their activities, were shaped by conditions in their settings, and (2) the activities that constituted the ECTs' articulation work. The chapter shows that limitations on the authority the ECTs had to make changes prompted them to select an array of interactional strategies.

5.2 COURIER CO.

5.2.1 Context of Change Making

In Courier Co., change implementation was complex and time consuming. Three contextual features in particular shaped the form and pace of the change-making process: (1) the ECT's limited authority as an agent of change, (2) the centralized/fractionalized organizational hierarchy, and (3) managers' lack of cooperation with the PE program.

The ECT had no authority in practice to make changes independently; thus it had to frequently contact senior-level managers for permission to make changes in the depot. Seeking management's permission to make changes was difficult because of the

organization's hierarchy. The division of labour within management was in Hales' (1989) terms "fractionalized" and "centralized." Hales (27) points out that, "[w]here management functions are highly fractionalized, the content of managers' work will have a relatively heavy technical component, with a concentration upon specialist 'decisional' roles." The division of an organization into separate specialist roles means that those in the organization trying to make change may have to consult with and get permission from multiple managers. Importantly, Hales (1989: 34) noted that

The extent to which ownership and management functions are fractionalized will impact predominantly upon managers' contacts and interactions. Where these functions are relatively fractionalized, managers will need to accomplish their work through relatively large networks, a high level of lateral communication, many meetings and contact patterns more closely resembling the 'hub' or peer-dependent types (Stewart, 1976).

Manager involvement was not straightforward, however: some of them were resistant or indifferent to the ECT's recommendations. Senior managers were largely unaware of the ECT or, if aware, either uninterested in, or resistant to, its activities. When the ECT sent requests to management representatives, they typically failed to respond or referred the request to another unit within the company. In other cases, though less frequently, managers argued that the ECT's recommendations were unwarranted. Management's responses, or lack thereof, meant the ECT frequently had to revisit issues.

It is within this organizational framework that the ECT evolved a set of practices, or carried out articulation work, that enabled it to implement some of its intended changes. These practices, however, were not always successful; indeed, four of its recommendations were denied; and, in the other cases that were approved, the process

was both inefficient and time consuming, hindering the ECT's progress and limiting its effectiveness. Three aspects of articulation work found in this setting are examined: (a) revisiting (persistence), (b) using allies, and (c) making a case for change. Although I separate these for the purpose of the analysis, often, they were used concurrently during articulation work.

5.2.2 “Revisiting Issues”

In many instances, the ECT was forced to persist and revisit issues. Indeed, at least nine of the ECT's nineteen proposed changes required its members to contact a manager multiple times to ensure that a project was proceeding. The OHS manager referred to these activities as “keeping issues alive” a response used to counter managers' general indifference to the program. Because management often did not act on proposals for change, the ECT needed to make contact with management again; otherwise, the change making process stalled. The OHS manager and the operations administrative assistant were most involved in keeping issues alive.

Ensuring that changes proceeded involved following up on requests and reminding managers that a project existed. Such activities usually came about after the team considered it had waited for an unreasonably long time for management approval or to get feedback on a request. While revisiting was a feature of all proposed changes, projects of greater scope generally required particularly extensive follow up. Typically, larger projects required the team to contact management repeatedly to keep the project moving; in smaller projects, fewer calls were placed to management and much less time and energy were required.

In one case, the ECT needed to contact a manager repeatedly to ensure a small handcart, a relatively routine piece of equipment that had been requested, was received. The ECT recommended a cart but the wrong cart was sent by management. The operations administrative assistant phoned the purchasing department and clarified what the ECT wanted, requested the cart again, but, once more, the incorrect cart was sent. A second call was placed to the purchasing department, and the manager there noted that the cart sent was the “standard” cart used for that courier’s route. The operations administrative assistant explained what the ergonomics team had requested, and the purchasing manager said that he was unaware of the ergonomics program. In the end, after the administrative assistant’s repeated phone calls over more than eight weeks, the simple, off-the-shelf cart finally arrived.

5.2.3 Using Allies and Making a Case for Change

The OHS manager drew on a repertoire of tactics in an effort to secure management cooperation with the ECT’s recommendations. The OHS manager did much of what he referred to as the “legwork” to make the changes happen. In doing so, he sometimes relied extensively on connections with key managers. On certain occasions, to help push changes through, he contacted the general manager of operations, who was a supporter of the program. In a discussion with me he noted that he and the general manager were close, and they had been through some “important battles together.” About one change the OHS manager said

If I didn’t take on the tail-lift project¹⁶ it would have got buried –
if the team went to [the district manager] he would have looked at

¹⁶ A tail-lift is a mechanism attached to the rear of a delivery truck or trailer that allows workers to lower items from the back of the truck or trailer to ground level. For couriers in this setting, the tail lift

the cost and said “no.” [It was a result of] My access to [general manager of operations] and got a commitment on it when there is NO money.

The OHS manager described himself as a “lobbyist,” when it came to the ECT’s changes, something that involved “selling” the team’s changes and coaxing managers in the right direction. He explained that some company personnel needed to have projects explained to them and be convinced about their utility. At times, in his words, he “had to circumvent regular procedures.” Sometimes the OHS manager’s activities involved persuading uncooperative managers that the project had the full support of other senior managers.

Part of the OHS manager’s activities involved making a convincing case for the change. One element of making a case involved differentiating the ECT’s requests for changes from other requests in the company. He explained that senior managers see numerous requests and, if unfamiliar with them or unable to quickly understand their usefulness, they put the requests aside. To address this concern the OHS manager often tried what he termed, “putting a face” on a change: establishing who the change was for, what it was for, and the rationale behind it, thereby “guiding” the managers toward the right decisions. Often, he did this by having face-to-face discussions with the managers.

Another aspect of articulation work involved discussing the benefits of a change. In some ways, doing so resembled “pitching” (Prus and Fleras, 1997; Prus, 1989). Often, managers wanted to know about potential cost and the likely return on investment or “pay back.” These inquiries were connected to the fact that the ECT’s suggestions for change

eliminated the need to climb into the back of the truck using poor hand- and footholds, and it eliminated the need to move parcels from the back of the truck to ground level by hand, both of which were sources of injury.

were being assessed by some managers, not on merit to reduce workers' exposure to injury, but on economic merit – how the change would either save or make the company money. Consequently, gaining some managers' endorsement was difficult because the ECT's changes were seldom based on a return on investment, and if they were, returns would only show up many months later or in enhanced productivity. Importantly, when it came to results, the OHS manager noted, "you have to explain to them that you won't see the fruits of... this [change] [i.e. lower injury rates] until a year away. Even some of the people who... SHOULD understand that don't understand it."

The ECT also sought to make a case for changes by highlighting both health related and other types of benefits, particularly economic. Referred to as the "business case for change" by the ergonomist-facilitator and OHS manager, the persuasiveness of these arguments rested on explaining to managers that there were production benefits to changes, such as decrease in task time and reduction in rework, which could make operations more efficient and less costly. The ergonomist-facilitator met with managers face-to-face to make the case for the ECT's changes. The rationale behind inviting the ergonomist-facilitator was that his expertise enabled him to make a more convincing case for an ergonomic change than the OHS manager could. The ergonomist-facilitator noted that there were times when the OHS manager and other members of the ECT could not articulate to management why changes were required beyond the fact they reduced workers' exposure to injury.

On one such occasion, the ergonomist-facilitator went to corporate headquarters to meet with the head of engineering; in another case, he met with the head of the company's fleet department to argue that a larger truck be purchased by the company. In

yet another, he met with the district manager, unit supervisor, and engineer to argue for a speed reduction in the depot's main conveyor belt. In the case concerning the fleet department, the manager argued that a smaller truck would best meet the couriers' work demands. Countering this point, the ergonomist noted that the larger truck would be beneficial because it gave workers more room to manoeuvre and in this way decreased the risk of injury.

While the ergonomist-facilitator's attempts to influence engineers often were successful, as in the examples noted above, on other occasions they failed. One example of an unsuccessful effort involved an attempt to alter the task of unloading a trailer. One of the duties of the depot's dockworkers was to manually unload the contents of large, fifty-three foot trailers of freight. The depot's injury statistics showed that the intensity of this job was hazardous for dockworkers, with workers suffering arm, shoulder, and back injuries. The ECT evaluated the unloading job and determined that it placed dockworkers at risk of injury based on a set of recognized health guidelines for manual lifting.¹⁷ The ECT recommended that adding another person to the position to assist unloading the trailer's contents could alleviate some of the pressure on workers. The engineering manager disagreed, arguing that there were enough people to unload the truck, and that the intensity of the dockworkers' activities was within the guidelines that he was using. The ergonomist-facilitator met with the engineer to make the case for the

¹⁷ The ECT's recommendation was based on the National Institute of Occupational Safety and Health's (NIOSH) lifting equation. The NIOSH lifting equation is a method to evaluate the hazards of lifting in manual handling tasks. The equation provides a weight limit that should be lifted in a particular job task. The weight limit for a given job task is determined by considering the following: the weight of a lift, frequency of lifting, duration of a lift, height of the lift, body position during a lift, and the quality of the grip a person has on the object being lifted.

ECT's proposed change, and in an interview, described their exchange. He began by describing the engineer's position.

Because his idea is to put one person in the truck and we're saying, "well, they've got to do double lifts, you've got a person working in there all by themselves. They could be at risk of anything. They could trip over a box, hit their head. Nobody's there to help them. And he's saying, "well, there's somebody right outside the door".... and his words were, "I've just told them to work as fast as they can and don't worry about what you do, just work as fast as you can. Don't worry about a break. We'll spell you off every 15 minutes." So you got someone working their ass off every 15 minutes. Well, your potential for injury's increased because now they're working like a dog for 15 minutes, going out there [on the loading dock], and they're still doing SOMETHING. It's not like they're just sitting down and resting. Then they're going back in and working like a dog for another 15 minutes. And he quoted me a bunch of numbers, "well, they're working within the [engineering standards] rates per person,".... And I said, "but no, they're working at the upper end of that. They're not working in the middle as you're saying, they're working at the top end of it, by themselves." And who's to say these rates are even correct? They're an engineering spec rate."

The significance of this story is that it highlights (a) the ECT's limitations in pushing its agenda and (b) that the ergonomic principles and data showing the high injury rate were insufficient to persuade the engineer. In this instance, the engineering manager drew on materials-handling standards to argue against the request for another worker, even though there was good evidence from injury statistics that it was an injurious position and the ECT, using a recognized set of lifting standards, calculated that work tasks unloading the trucks put dockworkers at risk of injury.

5.2.4 Budgeting for the Ergonomics Program

The ECT needed funding for the majority of its changes but receiving it was problematic because there was no ergonomics budget; that is, no finances were exclusively allotted for making ergonomic improvements. Consequently, each time the

ECT wanted to make a change – large or small – the team looked for a manager who could draw resources from his/her budget. Company policy was that the district manager had discretion over expenditures of five hundred dollars or less. If sums of money were required beyond five hundred dollars, managers external to the depot needed to review and approve the request, which often made the search for funds complicated and time consuming.

When the ECT recommended a small-scale inexpensive change, it relied on the budgets overseen by company personnel who were within the depot and easily accessible, such as the district manager. If the ECT received permission to make a change, and the district manager agreed to supply funds from his budget, getting monies for small changes was handled with relative ease and speed. In one instance, a worker representative was given the depot's credit card, and with little discussion, purchased a set of wheels and casters for a cart. The district manager also used his budgetary discretion to make small, ECT-driven changes to the depot's physical lay out, such as removing a railing that obstructed dockworkers and forced them to do unnecessary lifting.

If a change required large expenditures, the ECT went through the company's administrative channels to make capital acquisitions: an unfamiliar and protracted process for most of the ECT members. This process started with an effort to secure the district manager's endorsement of the change; the request was then sent on to the more senior managers who needed to approve the investment.

As mentioned, some senior managers were not cognizant of the intervention, and, were thus reluctant to have monies drawn from their budgets. Without its own budget,

the ECT was working outside the company's regular channels with no immediately apparent funding source, sparking confusion among managers and hindering budgetary approval. Typically, the ECT's requests for changes were not turned down because of their cost; however, managers' were reluctant to have funds pulled from their own budgets.

Throughout the intervention, the district manager and OHS manager noted that the ergonomics team should have had its own budget which tied the team's requests to what they referred to as a "project code," which was an identifier that linked expenditures with a company project that had money allotted solely for it. If the PE program had such a code its expenses would be associated with it and confusion among company personnel minimized. According to them, a budget and project code would have greatly simplified the process, eliminated some of the uncertainty among managers, reduced discussions related to that uncertainty, and saved company personnel and the ECT much frustration. According to the OHS manager, the project code would have given the ergonomic program and the ECT "its own corporate identity" and would have been a clear statement of the importance of the ECT and its activities, extending the intervention's "scope," and thereby minimizing the ambiguity about who was responsible for paying for ergonomic changes. The district manager, in particular, was vocal about this point, in part because he was concerned about the money coming out of his budget. When asked if having a budget would speed up the process he said, categorically, "Yes absolutely. It would." He talked about being responsible for maintaining his own budget and not overspending, and commented on pulling money from one place to put it in another and his frustration over the fact that there was not a budget for ergonomics even after he had requested one.

When the district manager was asked if he thought that not having a budget was a problem from the beginning of the intervention he was unequivocal:

Absolutely. A HUGE one. It delayed a number of things. I think it's become very political. I think that because there is no budget everything is politics. I guess what I mean by that is we're doing the process, we are identifying what we need and we need something we are going through the process of filling out [acquisition forms] and whatever the case might be, but because there is no budget I am looking at it differently than I would if the money was there. Others are looking at it differently because the money isn't there. I think if there was a bucket of ergo money and someone was paid to manage that, to make sure it went to the right stuff than I think it would be very easy to make decisions because that's what the facts say that's what we should do. ... what happens now is that my level to my boss to his boss to whoever signs these things, knows whatever we are buying has to come from a bucket that it wasn't planned to get money from. So, robbing Peter to pay ergo. ... But, if I had a ten thousand dollar ergo line, tell me what you need and if it makes sense, we'll buy it. But that's not what we are doing right now. So it's definitely hampered the ergo process in my opinion.

If there had been an ergonomics budget, confusion about where responsibility to pay for changes resided and worries about accountability may have been reduced and requests would likely have been processed more smoothly. As the OHS manager said,

By NOT getting that project classification up front, I think [we] hampered the effectiveness of this group tremendously, in the sense of bogging [them] down with a lot of red tape and having me do a lot more explaining and impromptu seminars about what the ergonomic team is and why they [managers] are getting billed for this.

Having a PE program budget would have eliminated, or at least lessened, delays associated with managers who needed to be convinced that they would not be accountable for the expenses and assured department heads that senior management was supporting the program.

One of the first change(s) the ECT attempted to carry out involved getting cordless phones for the depot's retail and garage workers. The ECT needed little time to determine that cordless phones would alleviate the workers' exposures to physical strains, but it took quite a while to receive budgetary approval. A problem emerged when the retail and fleet department heads balked at the request. The fleet manager, responsible for signing off on a request to put an additional phone in the depot's garage, did not return the ECT's calls, delaying the team's progress. The OHS manager said he finally persuaded the retail manager and fleet manager to purchase the phones after explaining that senior management endorsed the PE program and that when it came time to review the budgets, ergonomics expenditures would be considered.

If the ECT had possessed some discretionary power over a budget, change-making progress would have been more efficient. Time consuming conversations with management regarding funding would have been unnecessary. While the lack of a budget and management's incognizance of the intervention may explain the delays in the early months of the intervention, it does not explain why management was unwilling to provide the ECT with a budget after it had operated for twelve months and raises questions about where ergonomics ranked on the company's list of priorities.

5.2.5 Consequences of Slow Change

The changes that the ECT undertook, even those that required limited or no fabrication and would only minimally interrupt the workflow, required extended time to complete because of the need to secure senior management approval. Frequent negotiating and revisiting issues with managers had important consequences for the team.

The constant, lengthy, delays contributed to the ECT's lack of momentum, and frustrated worker representatives.

In one instance of frustration exhibited over the protracted process, a worker representative, who was quite involved with acquiring a small handcart for a courier, was discouraged by the unreasonably long time it took to get the cart. Noting that the old cart was heavy and unwieldy, and its use by the courier was putting him at risk for injury, he said the process could have been speeded up. He noted the irony of a courier company that sells customers its speed of deliveries taking so long to get the cart: "like eight weeks, COME ON! You know we're a shipping company. We can have stuff here the next day. So don't tell me ...– we can't get it from Toronto, get it from out West or something. I think it [to receive the cart] was a minimum of eight weeks."

Some worker representatives' sense of dissatisfaction with the time it took to implement changes was rooted in their own expectations and also that their fellow workers were waiting to hear about the status of their suggested changes and continued to work under onerous conditions while they waited. In ECT meetings, the worker representatives repeatedly noted that non-ECT workers wanted to know when their changes would be implemented, that they were getting impatient, and that they were starting to believe that there would be no changes. These worker representatives, feeling obligated to fulfill their promises to fellow workers, found it difficult to repeatedly tell them that a change was ongoing. In one instance of this, a worker representative recalled an episode in which a fellow worker asked him about the status of a change:

he's asking me, "What's the deal?" and I said, "look we're trying." And I was in there [ECT meeting] battling but I felt really bad for the guy. ... it was out of my hands. I couldn't really do

anything except wait for the new one to come. ...– apparently where it was ordered they didn't know diddly squat about what it was for. All they thought was that we were ordering a [standard] cart. To me, if you can tell somebody on the other end of the phone, "We need this ASAP this guy, is going to hurt himself – he's already hurt himself..." and it was a top priority in my view. It should've been treated that way and it seemed like, "Well it's not here yet, Well it's not here yet." Well to me there should've been a phone call. ...finally a couple of phone calls were made and it got shipped and finally came, and I assembled it for him.

Occasionally, when confronted with a situation in which they were unable to make a change for a prolonged period, the ECT suggested interim solutions. For instance, as it waited for a cart, the team ordered wheels and bearings that served as a temporary solution, reducing couriers' exposures to injury. In another instance, the ECT was able to fix some badly damaged carts that the dockworkers were using to move freight around within the depot, without going to management. For the most part, however, the ECT was forced to wait.

ECT members often commented on the ECT's slow progress – or how much it was hindered by going through multiple channels to secure endorsement for its projects. One of the ECT's courier representatives referred to getting support from management for the projects and its concomitant problems as the, "Courier Co. two step." In an interview 16 months into the intervention, the operations administrative assistant noted that even when it came to the smaller changes, the ECT could not do things without checking with multiple levels of management, which invariably took time and slowed progress. In her words, "as far as even little changes, I don't think we felt we ...could make them without checking with someone else first."

The pace of the ECT's changes also frustrated local management. In one meeting the district manager said that the ECT was "stalled" and was "spinning its wheels." In

particular, he noted that there were items that had reappeared on the ECT's agenda week after week but were never accomplished.

Several members noted that the team could have operated more efficiently if someone in management, supportive of the ergonomic program, was readily available to help. Members suggested that having access to such a person would reduce the confusion encountered among managers and made the ECT's changes more of a priority.

5.3 FURNITURE CO.

5.3.1 “It just takes so much time to get something done”

For the first twelve months at Furniture Co., the ECT had great difficulty implementing its changes, leading to considerable frustration among the ECT's worker and management representatives, both of whom saw the team as ineffectual. Members described the ECT as “floundering,” and “languishing” because of its inability to make changes. Managers not on the ECT wondered whether the team had accomplished anything. The plant manager, talking about some of the ECT's changes, described the ECT's problems this way:

Let's say... all the things we're looking at the prototypes for the stands – altering the stands or the chutes [for parts]... we were floundering as a group when we're trying to deal with, without those individuals, trying to buy lifting devices and tilting devices trying to get them modified on our own. We were floundering as a group, we just didn't have – it wasn't happening it was taking weeks to get things in weeks and if something wasn't right it would take weeks to get it resolved.

In the first 12 months of the intervention, the team faced at least two problems that hampered its change-making activities. First, it had no influence on the shopfloor to implement changes. Second, the ECT had little control over the material and non-material resources it required to have the solutions it designed fabricated and installed.

At the intervention's outset, once the ECT identified a hazard and developed a solution, a representative, typically the plant manager, went to the maintenance manager, who was key to having the maintenance department fabricate and then install changes. The plant manager's articulation work was undermined because the maintenance manager was not carrying out the required changes.

Initially, the group underestimated the amount of work it took to make the changes and did not directly involve the plant personnel who had authority and access to resources. The plant manager recounted early ECT attempts and expectations:

I thought if we got the employees on the plant floor, this supervision and training from the University that we would be able to package it better to be able to present it and say, "here, to the organization, here is the improvement that we want. Here's what we want to deliver. If you do this, you get this." ... it didn't seem to work very well that way. It seemed more that we have to involve the structure within the plant that lives and breaths that activity. I think it's got to be part of that. Whatever system's in the plant that is responsible for CHANGES in the plant, this [PE program] is all about changing things, and I think you have to involve those groups. That's the trades group because those are the ones who are constantly something breaking and they're fixing it, or someone say "this is always breaking and I'm always fixing it, can't you do something better?" And that's the group that's gotta do that. They have this workin' relationship day in, day out. That's what they do.

Below, I describe some of the exigencies that the ECT faced as it attempted to move its changes from the drawing board to the shopfloor and the articulation work that it engaged in to implement its changes.

5.3.2 Shopfloor "Collisions": Authority Required to Make Changes

One factor related to the ECT's lack of authority to make changes on the shopfloor was that it did not have the cooperation of the production manager responsible. One of the issues here was that the ECT's activities conflicted, or "collided" in the plant

manager's words, with the production manager's undertakings. Similarly, in an interview well into the intervention, the production manager described his goals and the ECT's as "conflicting."

The plant manager, an ECT member, oversaw department supervisors but had no authority over the shop floor's production machinery. The plant's management hierarchy was set up such that control over the floor was shared. The plant manager and the production manager occupied parallel places in the authority structure so the former could not simply direct the latter to carry out ECT-related tasks. Moreover, the vice president often gave directions to the production manager, which were not shared with the plant manager. The plant manager explained the relevance of this for the ECT's work:

So the VP would be issuing directives or have initiatives that [production manager] would be carrying out for him of which I may not even be aware of. And even though I'm responsible for the plant, there's that one, one or two strings in the plant that report directly to the VP. Those things are outside of my control. So he had [his] initiatives out there and for a lot of these that we were colliding on what we were working on.

In several instances, the ECT's activities were directly hampered by the production manager's work. In one such episode, the ECT was trying to reduce the exertion related to handling parts in an area of the assembly department. After examining the work area, the ECT devised a way to reconfigure the lines to mitigate the strain on workers. Part way through its reconfiguration, the ECT discovered that the production manager was rearranging those lines as part of another, non-ECT related project. Consequently, the ECT's changes were undone by the product manager's alterations. In another instance, the ECT members examined a large press machine with the intent to

devise an easier way to load it with parts. As they finished the change, they became aware that the production manager's plant layout changes would eliminate that piece of equipment. In a third example, the ECT was trying to alter the manner in which workers fed parts into a machine. However, the production manager's planned changes to the layout restricted the space available in the area to such an extent that workers and lift trucks could not move around, which rendered the ECT's change unfeasible.

One of the team's worker representatives noted that the production manager was rarely positive about the ergonomic program and the ECT's proposed changes:

The production manager and I actually had a fight the one time because we [ECT] wanted to move something and I don't even remember what it was but and he didn't agree about where it should be moved. And I said, "Well...it has to be moved because it's one of our ergo projects...and we're going to be move it and we're going to put the lifter in there and see how it works ...". And he just didn't want to have anything to do with that and he goes, "You guys just can't come in here and tell me what to do. It's already costing me money on the lean program and the floor plan and I have everything planned out and you guys can't and I am going to go and talk to [OHS manager]."

The production manager's lack of support and involvement with the ECT had two consequences for the team's activities. Sometimes, the production manager's activities negated the ECT's activities when they were completed; other times, the manager disrupted the ECT's changes when they were partially finished. Regardless of the circumstances of the disruption, when it occurred the team was unable to make changes that addressed a hazard. Regarding these problems with the production manager as extremely important, the plant manager said that, "Without knowing what the production manager was working on, it was impossible for us to make improvements." Additionally,

sometimes the production manager, disagreeing with a proposed change, withheld his support of the project so it could not go forward.

5.3.3 Supervisors

To implement its solutions the ECT needed the cooperation of shopfloor supervisors; however, they typically were unhelpful, especially in the PE program's early months. In some instances, the supervisors did not understand the importance of ensuring that the workers set up new equipment the way the ECT installed it. In others, they failed to adopt the work processes that accompanied a new piece of equipment. In at least a couple of instances, a recently-added piece of equipment was moved out of the work area, as when the ECT introduced a lift table that minimized the need for workers to bend. A key feature of the table is that workers could adjust it to a comfortable working height. However, the department's supervisors failed to ensure that the workers could use the table and it remained at floor level, the very position that required workers to bend the most. Because of the supervisors' uncooperativeness in the intervention's beginning months, the ECT often found the machinery it installed was being removed, misused, or underused by workers.

ECT members distinguished between those supervisors who were helpful and others who were unsupportive. One of the ECT's worker representatives noted that, "I got no complaints for my supervisor. He comes to ergonomics. He's been pretty good..... He's one of the better ones from what I hear." But when he was asked about the support from other supervisors he recounted experiences working on one of the ECT's changes:

I don't think the support is that great.... When we were talkin' about the layout change... to line six and the first thing I showed

them a drawing, I said “what do you think?” and he said, “is it going to increase production at all?” I said no, so he says, “then why you doin’ it?” So I said, “it’s just ergonomics.” I go, “it MIGHT help.” So his main concern was the production and I think that’s the biggest problem with the supervisors like I can’t speak for all the rest I think that’s the biggest thing they want to see a CHANGE, but to increase production to make their numbers better, not so much to make it better for the employees.

Those supervisors who were unsupportive of the team’s work did not get involved for several reasons. The OHS manager noted that many supervisors felt that they were already doing many different jobs and resisted doing any more. Additionally, there were fewer supervisors than there had been in the past and thus fewer to both carry out regular activities and also to attend ergonomic changes. The environmental health specialist noted that, for supervisors, ergonomics was an additional responsibility that they had little time to perform, “So when people—there’s change when people don’t like it, it’s harder for them as supervisors because people complain more and its more time out of their day they have to train people on something, ‘here’s another thing, train them on this too.’”

There were also indications that for the supervisors, production rates took precedence over making ergonomic changes, and they did not want to adopt practices that jeopardized their throughput. This impacted on their support for the ECT’s changes. As one worker representative said, “I find a lot of supervisors just care about the numbers [pieces per hour] and are not so concerned about the ergonomics issues.”

5.3.4 Maintenance Manager Resistance

The maintenance manager needed to be involved in the vast majority of the ECT’s activities, and all aspects of implementation required the maintenance department’s considerable temporal investment. In many cases, prototypes, based on the

ECT's designs, were built from scratch. They then needed to be installed on the shopfloor and then tested (and in some instances, adjusted based on workers' evaluations). Typically, once workers had an opportunity to use a prototype and give the ECT some feedback, the team re-evaluated the change and tried to modify it accordingly. The plant manager, cognizant of the ECT's problems with the maintenance manager, noted that the maintenance department gave the ECT's activities low priority:

one of our largest stumbling blocks in the beginning was because they [maintenance department] weren't involved in the ergonomic change team....We were just amongst the rest of the priorities so if we [plant] had equipment breakdowns they would take that as first priority and they have a PM [preventative maintenance] program... So all of a sudden we [ECT] are the third person in line asked for those same resources. So it was slow.

Initially, the plant manager thought he could simply be an intermediary between the ECT and the maintenance manager. Typically, at the intervention's outset the plant manager took the ECT's recommendations for change to the maintenance manager and asked that these be carried out. However, the maintenance manager either did not comply with the ECT's requests or took what seemed to the ECT to be an unreasonably long time to do so. Therefore, approximately eight months into the intervention, the plant manager brought the maintenance manager on to the team. After several meetings it was evident that this only marginally improved the maintenance manager's cooperation with the ECT. The maintenance manager attended the ECT's meetings and participated, but remained slow or uncooperative in getting the maintenance department to assist the team. Frequently, the maintenance manager told the ECT what they wanted could not be done, often invoking reasons why, or telling the ECT its requests would only be done *if* there

was time. Other times, the maintenance manager said he was going to perform some activity but returned to the group without having completed the task.

ECT members described the maintenance manager's attitude toward the ECT in its first 12 months as "negative," and they understood that if the team had any chance of getting something done, it needed to ask repeatedly because the maintenance manager's initial answer was invariably "No."

Team members' frustrations about their lack of progress and the maintenance manager's lack of assistance came to the fore in one meeting. During a discussion of a specific change, the OHS manager – frustrated by the ECT's poor progress and the maintenance manager's repeated excuses for not accomplishing an implementation task— tersely told the maintenance manager to "just get it done!" The change was eventually completed but it took 12 months.

5.3.5 Production Pressure: "Keeping the Line Running"

The maintenance manager's unwillingness to arrange for time to carry out ECT activities was shaped by competing demands on the maintenance department's staff from production, which slowed the pace at which ECT-related projects were completed. The maintenance manager noted both during the change team meetings and in our interview that the ergonomic tasks received low priority because the maintenance department 's principal function was to ensure the line kept running. In an interview twenty-four months into the intervention, the maintenance manager described the situation in the following manner:

Usually... the guys ... [maintenance worker] ... in the morning he goes and does all the lubrication and oiling through the whole plant, so he comes back and then he works a few hours on it and

you're taken off—it's just not an easy task because it's not a primary function.

The time that could be allotted to fabricate, modify, or install ergonomic changes was limited. Typically, anything in the plant that needed to be dealt with, to keep production running, such as a machinery breakdown, took precedence over ergonomics. The maintenance manager was unequivocal about the maintenance department's priorities:

If I have to choose, I'll pick production. That's just the way it is. in general it's frowned upon having machinery down if, ..., in doing something that's an ergo issue, and having that machine out. We can't just let it go down; it's just not allowed, eh. Whether anybody actually would say that out loud, probably not. But like guaranteed it's a real (laughs) it's a real thing. We—everybody, every person that operates an industrial establishment is in business for one thing, that's to roll the machinery. If the machinery isn't putting out the product, you're not gonna make the customer's order.

Nevertheless, changes were made, but because of the subordination of ergonomic change to production goals, they typically took a long time to finish. In an interview twenty-four months into the intervention, the maintenance manager described the precariousness of the time allotted to work on ergonomic changes and how the maintenance department went about finding time for the team's projects.

What we do is we put the task out on the floor [of the maintenance shop] this is what we need to get done, work on it in our spare time.... So basically if they have— if they don't have a breakdown or anything to do other than that then that's what they work at. So that's why it ends up taking them so long. Because in some cases, for some of the guys, there virtually isn't any time.

Trying to find “spare time” for the maintenance staff to fabricate the ECT's changes or install them on the shopfloor was difficult. Additionally, the maintenance

manager noted that tending to ECT-related activities was difficult because there were not enough department personnel.

As a result of the limited time available and because that time could be interrupted by production problems, few projects were ever completed without some interruption to the process. Crucially, maintenance personnel were frequently distracted from ergonomic work by production concerns, left projects in the midst of working on them, and on resuming work had to retrace their work and figure out what they were doing prior to the interruption. When I asked the maintenance manager how he and his staff got things done he said

Well, I can virtually guarantee there isn't a project, unless it's a very short variation, that... gets done in one piece. It gets done in many, many starts and re-starts. And that takes a lot longer to finish the project for one, cause... every time you walk away from something and come back you have a reinitiate. Probably a third of the time of what you spent to get you back to where you were. ... this is common. So a job that would take normally forty hours of work, would take a hundred hours by the time you get on and off back and forth and put all your tools away. And for these guys [maintenance personnel] it's frustrating as hell sometimes we don't physically have the staff to leave those jobs, although we have a few people almost everyday now and then.

The many "starts and restarts" and the limited time that the maintenance staff had is illustrated by its attempts to build some workers an ECT-recommended adjustable table. The maintenance department took several months to fabricate a prototype of the table. One of the maintenance personnel spent about sixty hours trying to fabricate the table. According to the maintenance manager, "That's a horrendous amount of time to put it together. Plus, we had to design it, plus it's a prototype where we decided we're gonna have to make changes."

The maintenance manager also felt that it was not the maintenance department's responsibility to design and fabricate equipment for the team. This was, in his opinion the engineering department's jurisdiction. Often, as the ECT discussed its changes, the maintenance manager stressed that it would be better, if possible, to get a contractor outside the company to fabricate something or to purchase it directly off the shelf rather than have it built in house. During an interview the maintenance manager said,

if the company was, would be driven from the top down ergonomically they would probably say we need people just to do that. Or we'll put an engineer in charge of it and we'll get him to make drawings and send stuff out to get it manufactured outside. Where we have a committee to approve it or not, budget it, send it out, it's their job to get it done right now, that's their focus right. Our focus ISN'T building stuff in here, it's not a focus, and THAT'S a common issue. The maintenance department, as far as I'm concerned,... should never build anything. We're here to repair machinery.

In summary, for the program's initial fourteen months, the ECT's activities were hindered by key managerial personnel's lack of cooperation. The ECT did not have authority to make changes on the shopfloor; it had little control over the fabrication and installation of changes; and, once changes were installed, front-line supervisors gave little in the way of support to ensure that changes to the work process would be effectively incorporated.

5.3.6 Securing Authority to Make Change

Responding to their difficulties in securing support, and slow progress, ECT members carried out activities associated with articulation work. One important example of this is the health and safety manager and plant manager's recruitment of the production manager and maintenance manager onto the ECT. Their positions within the factory gave them capabilities not shared by other ECT members. Their involvement in the

ECT's meetings eventually changed the team's operation and, over time, improved its effectiveness and efficiency. I explore these changes and the activities associated with articulation work below.

5.3.7 Circumventing Roadblocks

When the ECT was floundering, the OHS manager was very aware that its operation would have to be changed if it was going to be effective. Moreover, she realized that part of the ECT's problem was its lack of requisite authority to make changes. As she said late in the intervention, referring to her efforts to speak on behalf of the ECT, "I can't walk up to a manager and direct him to do something." Moreover, she noted that when she was dealing with ergonomics it was not about "life and death," that is, musculoskeletal disorders did not pose the same imminent threat as traumatic injury posed to workers, and thus ergonomics had lower priority for managers than other safety hazards. To accomplish ECT-related activities, in spite of the challenges she faced, she developed an indirect approach by, in her words, "going around the official structures," or the regular chain of command.

Some of the OHS manager's articulation work was rooted in the relationships and alliances she built in the plant. She explained that, "if you align yourself with those people you get things done" and added that it was important to "foster those relationships." She described the influence that she had as "personal power" and differentiated it from power drawn from a title or position. Personal power was rooted in the collection of relationships that the OHS manager had forged and maintained in the plant that she deemed important for accomplishing work. She noted that personal power accumulated over time through her endeavours, and that the credibility the health and

safety department had built up rested on demonstrating that it was doing a good job. The result was that “people do stuff for you just ‘cause they think you’re doin’ a good job and they want to contribute.” The relationships that the OHS manager developed were important to her carrying out health and safety activities, and she said, “I’ve developed... relationships with other KEY people within this organization and you just know for the success of your career that’s what you do and you use those when you need them.”

When the OHS manager was confronted with an obstacle to making changes she sought alternative ways of completing the change. She said she went from one person to another, seeking someone who could push a change through. If that person could not provide the support she needed, “if he doesn’t give me the answer I want, I go over his head to the next person.” She continued, “If I can’t get it one way, I can figure it out another way and go get it.”

One of her most important relationships was with the production manager. Once recruited, the production manager collaborated on many of the ECT’s changes. The OHS manager explained that the production manager “will do anything for me.... We work very well together. I help him out and he helps me out. We’ve got the give and take built. So he can facilitate stuff for me that I need doing, and I know that sounds a little subversive, but that’s the way life is.”

The OHS manager said one of the things she did, even after the maintenance manager was on the team, was to use her connections in the plant to get around the delays that he created. When the maintenance manager was unacceptably slow to move on a project, the OHS manager bypassed him and went to the production manager to accomplish things. In reference to one of the excuses the maintenance manager

frequently invoked, the OHS manager remarked, “There was never enough staff, so I began not to trust that statement because maintenance has always said that whether they had 20 or 10 [personnel] that they never had enough help so I think those things were in the way.” Consequently, the OHS manager said she “shamelessly” manoeuvred around the maintenance manager at least a dozen times to increase the pace of change making activities.

Another strategy she used to move changes along was to talk to the plant manager and point out that the slow downs in the change process were directly affecting the company’s injury statistics and injury costs. The OHS manager explained this process:

you go to [the plant manager] and say this is an implication of [not addressing work hazard] We have to do this ergo project because I have three people with this injury that I can’t put to work and are showing up on your statistics as make-work people every month and you really don’t want that. And then bringing some of that information to bear on why we needed to get the next step done for an ergo project tended to move things.

5.3.8 Enlisting the Maintenance Manager’s Assistance

At about the eighth month of the intervention, and in an attempt to deal with the above concerns, the plant manager recruited the maintenance manager onto the ECT. In the first meetings he attended, however, it was obvious that merely having him in the meetings was insufficient to secure his cooperation and assistance. In the plant manager’s words, “Just having him on the team wasn’t working.” In an interview late in the intervention, the plant manager explained the maintenance manager’s orientation this way:

Because [the maintenance manager], like other skilled trades ... supervisors I’ve worked with before, their natural filter to find out where the priorities are is to say “no.” And if he says no and people go away, it’s not important. So, even though [he] was on

the team he hadn't really bought in yet and [he] was giving us the same answers in the team meetings as [he] was outside the team meetings.

To address the maintenance manager's lack of cooperation, the plant manager intervened and spoke to him about his reluctance to attend to the ECT's projects. In their conversation, the plant manager told the maintenance manager that he needed to prioritize the ECT's work just as he prioritized his regular plant duties. Recounting this meeting, the plant manager said

I tried to get him to look at all three inputs and say, "you got to balance them." [production and ergonomics] You can't just work on one and the other ones will be "when I get to it, when I get time," because the other two will never be done. Which means our projects and PMs [preventative maintenance] will just never get done if you just sit back and do your breakdowns... So, he's got to manage that, he's got to look at those three and say, "how to meld them together and work on all of them everyday?"

After their discussion, the maintenance manager soon became much more involved in the ECT meetings. This reduced, though did not eliminate, problems of getting maintenance personnel involved in ergonomic projects. He continued to stress that lack of enough maintenance personnel hampered efforts to handle both the company's work and the ECT's.

5.3.9 Getting the Supervisors Involved

Initially uncooperative, the supervisors eventually became involved for several reasons. The ECT arranged for ergonomics training for the supervisors. The team members closely monitored how its changes were being used and that supervisors were promoting the changes and intervened when necessary to assure that supervisors were taking the time to show workers how to properly use new equipment. The OHS manager pointed out in an interview that the supervisors' orientations toward the ergonomic

program changed over time because they realised that the program was not going away and that they were going to have to cooperate with its goals.

5.3.10 Production Manager

Approximately twelve months after the program began, the OHS manager and plant manager brought the production manager on to the ECT and he began to attend the meetings. The production manager put his recruitment this way: “the group was sort of working on their own and had a bit of a conflict with the things that I was doing so they asked me to join them so that... we’d be moving in one direction, which was a good idea.”

The production manager’s membership gave the ECT direct access to authority over work processes. No longer was there confusion concerning what the production manager and the ECT were trying to do. The production manager also brought with him access to material resources in the form of personnel who could fabricate the ECT’s solutions. The production manager said that getting someone to do the fabrication work was “a step in the right direction.” Without this person he said, “I just couldn’t get anything done.”

The production manager’s authority over the workers in his department and ability to control an employee who answered directly to him meant that there was less dependence on the maintenance department to fabricate and install ECT changes. In some instances, this lessened the time the team had to wait for its changes to be completed as the fabricator working for the production manager was less likely to be interrupted by machinery breakdowns or other unscheduled production demands in the same way maintenance personnel might be. The production manager understood that,

“the team couldn’t do it on their own really, unless they had somebody that would ... do that.”

Another advantage of having the production manager appointed to the ECT was that, in the health and safety manager’s words, the ECT could “piggyback” its own activities on to changes this manager was already undertaking independently of ergonomics. Piggybacking was a source of authority, opportunity, and money. Intent on incorporating ergonomic projects into other changes in the plant, the OHS manager recalled that she kept apprised of the changes underway by talking with the production manager: “I used to sit him down every few weeks and ask about what he was doing.” Armed with this information, she aligned the ECT’s work with the changes the production manager was leading, which improved the ECT’s efficiency and effectiveness. Because these projects were already underway, were approved by senior managers, and were being overseen by the production manager and maintenance manager, they presented opportunities for the ECT to become involved in activities that could support its agenda without having to go through the often protracted process the team experienced when it initiated changes. The OHS manager remarked that the production manager had the “money, mandate and time. And he’d pay for them [ECT changes] if you were going to tear it up [significantly alter a work area] anyway.”

Late in the intervention, the production manager’s ability to help the team actually increased when the company adopted lean production practices. The production manager kept the team aware of plant changes and how ECT might integrate its projects into these changes. Significantly, this meant the ECT did not have to seek legitimacy for its recommendations.

5.3.11 Securing Funding for the Ergonomic Changes

No monies were exclusively allocated for the ergonomic program, even though the OHS manager had repeatedly requested a \$100, 000 budget for occupational health and safety and the ECT's changes frequently involved significant investments of money to purchase expensive equipment or modify existing machinery. As a result, for each desired change, the ECT searched for money from various sources. The ECT used several means – both formal and informal – to secure the needed funding for changes.

When the money for the ECT's changes came from budgets that the maintenance, production, and/or plant manager had some control over, they often reapportioned funds from plant budgets not intended for health and safety. Once they determined the cost of a change, they looked for money that was not allotted for something else. The maintenance manager referred to securing money that was not originally intended for ergonomic changes as “stealing” or “robbing” and talked about how the ECT's management representatives' looked for money to the support the team's proposed changes:

Well, we look at the budget and say: 'Okay we can squeeze some from there,' [Plant manager] says: 'Well, I've got a little bit over here I can squeeze.' But... – that's what happens when upper management is promising you funding. If they truly believe in this, there would be some money, which would help us, I guess that's the long and short of it. So, if it doesn't start at the top, the funding is piecemeal. So, [the production manager] has to go and beg for money. And it has to come from somewhere else it wasn't intended to come from. I have to steal money from accounts – save money so my budget doesn't go over. [plant manager] has to do the same thing. [He] steals money from the same place where he has done well last month, so he'll steal money from there.

The maintenance manager described the work involved securing finances:

it's just juggling the funds all the time, trying to get things done. Sometimes it means we may have to wait a month. If I have a

bad month in maintenance, it means we don't have such a good month in ergo. That's just a fact of life. It's not – I find that an issue in all safety stuff and not just ergo, ergo's part of the safety program. So it's an issue for us because we don't have allocated funds specifically for that purpose.

In the quotation above, the maintenance manager talks about reallocating money from one budget and applying it to something else, noting that if there was a budget exclusively for ergonomics it would have been unnecessary to undertake these activities. Significantly, he also notes the precarious position of the ergonomics funding when he says, “if I have a bad month in maintenance, it means we don't have such a good month in ergo.” Additionally, he notes that if management genuinely supported ergonomics there would be money allotted specifically for ergonomics. His observations point to the low place of ergonomics in the company's priorities. Importantly, there was a connection between budget and the maintenance department's limited time to implement changes. For the maintenance manager, a dedicated pool of funds for ergonomic changes would have enabled him to outsource more of the ECT's projects, speeding up implementation because there were few maintenance personnel to handle it: “There's really no fund that's set up that says, ‘this is what were willing to spend on ergonomics this year.’ And then allow us [ECT] to use that to get things done quicker. Most of my stuff though doesn't get completed in a hurry because... the maintenance dept doesn't have any free time.”

The ECT also secured money by working through the organization's regular funding channels. One person who needed to be involved in this process was the company's Vice President, who oversaw many of the ECT's purchases and whom the ECT's management members frequently consulted. Both the maintenance manager and

production manager had close connections to the Vice President. In an interview, the Vice President discussed the process that has to occur and the sorts of information he needed to see before endorsing a request:

Well, normally I hear about it verbally and we discuss it verbally and I know there may be a problem there or, I may have known about the problem anyhow or somethin' or got feed back about it. so normally like I said we would sit down and discuss it verbally. With the sound enclosure out there, [OHS manager] spoke to me she had some hearing... testing done, and voice testing and came up with the recommendation. And then [maintenance manager] got involved in it, went out to see who supplies this type of stuff and what do they recommend and then it gets put down into what we call a CAR form.... a corporate capital appropriation request form... So that has to be filled out and then I have to... review it with the accounting department. And if it's just,... a safety upgrade there's no return on investment required on the form because ... it's just an upgrade. But I still need accounting's signature on it, I need about five people to sign it, the president, the VP of finance, the VP of engineering, I sign it, and so, it gets about 5 signatures on it and it gets attached, a number gets attached to it and then it goes through the system and from that, people like [production manager] or [plant manager] or [OHS manager] or whoever are given the okay to go ahead. So...normally if they come up with a recommendation that requires capital, THAT'S what you need to do. It takes a little bit to get through the system sometimes but normally I can't think of one right now that when it came to health and safety work that.... your team [ECT] has recommended that... got turned down.

Another way that the ECT found funding sources later in the intervention was to link its changes with changes in the factory that were already ongoing, or were scheduled to be undertaken as part of the plant's lean manufacturing, or continuous improvement program. The ECT was closely connected to this program because the production manager, as well as being a team member, oversaw continuous improvement. Not only was he cooperative when the ECT asked to integrate into larger continuous improvement changes, he also brought upcoming changes to the team's attention, often suggesting it

incorporate an ergonomic component into them. Indeed, in ECT meetings and in conversations with the OHS manager, the production manager noted what he was working on and that the team could “attach” its change to this project. By incorporating its changes into these larger plant alterations, the ECT did not have to independently pursue a project and do the accompanying paperwork and justification, both of which hampered the ECT’s efficiency.

5.3.12 Improvements in the ECT’s Capacity to Make Changes

With the maintenance manager and production manager recruited to the ECT and participating in its work, and the OHS manager continuing to push the ECT’s agenda, the team was able to accomplish considerably more and do so more efficiently than it had in the past. More than 24 months into the intervention, the OHS manager, who by this point was leading the team, stated that she wanted to make at least two work area ergonomic improvements per month. She updated the team monthly to show what had been accomplished and what needed to be done. The team members agreed that there was a substantial turnaround in the ECT’s work in its second and third year. The plant manager remarked that with the two managers on the ECT, “our success rate improved dramatically.” The ECT exceeded its goal of making twenty-four changes in its third year. Indeed, the changes that the ECT was making, both in number and efficiency, were impressive given their history. As in program’s third year, in its fourth the ECT averaged approximately two changes a month. Its capacity to make changes in this period contrasted sharply with the intervention’s first twelve months when few changes were successfully implemented. The OHS manager recounted how her feelings about the program changed over time:

There was a while there where it was terrible. I think that was last summer when we were ALL feeling like we hadn't made any DENT in this whole thing. Since the fall, when we started to see a little bit of momentum build and I think when we added [production manager] and ... [maintenance manager].

5.4 DISCUSSION

In Courier Co. and Furniture Co., issues around lack of authority for implementation were never directly resolved. In Courier Co., the locus of decision-making about the ECT's changes remained at the senior-management level and the authority to make change was never delegated to the team to a degree that enabled it to operate efficiently. Consequently, the ECT typically undertook time-consuming steps to negotiate with senior managers before it could make the appropriate changes. Additionally, management was often unaware of the ECT's activities, or if aware, unsupportive. To a lesser extent, management was not amenable to the ECT's suggestions. These issues were never resolved and the team continued to founder.

In Furniture Co., for approximately the first year and a half of the intervention, the ECT made insignificant progress in its projects. The process of change making, frustratingly slow for team members, led them to talk about the ECT's dissolution and prompted some senior managers to question its effectiveness.

The ECT's problems at the intervention's outset can be linked with not having the maintenance manager and production manager's support. These individuals, possessing considerable authority regarding changes on the shopfloor, were integral to the change process. Recruitment of the maintenance manager and production manager improved the ECT's change making.

The findings discussed in the chapter are consistent with those in the literature on joint health and safety committees (Walters, 1985; Walters *et al.*, 1995; Walters and Nichols, 2006). In particular, the ECTs' inability to make changes without being constrained by management is similar to a central tension that hinders JHSC policies: how much influence these groups have (Leopold and Beaumont, 1982; O'Grady, 2000; Tucker, 1995; Storey and Tucker, 2006).

The findings also speak to a theme running through the OHS program literature: that management commitment is instrumental to the effective functioning of OHS programs. Findings regarding the problems that the ECTs had in securing and maintaining management support converge with those in PE studies where there has been a lack of management support (e.g., Dixon *et al.*, 2009; Fulmer *et al.*, 2005; Liker *et al.*, 1991).

This chapter extends the literature on JHSCs and PE programs by looking at the activities – especially articulation work – of the ECTs. The chapter highlights the crucial role that both authority and articulation work played in the teams' pursuit of their objectives. In Furniture Co. and Courier Co., ECT representatives used several “interactional processes” to accomplish their goals. In the clearest instances of this in Furniture Co. the OHS manager, using her connections with power holders, ensured that ergonomic changes were prioritized. Additionally, she persuaded the plant manager to prioritize changes that she felt were encountering resistance. Similarly, in Courier Co., the OHS manager, and to a lesser extent, operations administrative assistant and ergonomist-facilitator used a mixture of persistence, lobbying, and allies to implement

changes. Evidence from both settings highlights the individual and group efforts to create and maintain arrangements that change making was dependent upon.

The findings regarding the activities the ECTs' members engaged in to accomplish changes are consistent with the literature on articulation work (Hampson and Junor, 2005; Strauss, 1993; Strauss *et al.*, 1985). The articulation work enabled the ECTs to create important links so that change goals could be accomplished. The interactional strategies used to forge the agreements crucial to articulation resemble those found in Prus' (1996; 1997; 2003) discussion(s) of tactical engagement. For instance, the strategies used by the OHS managers in both settings were similar to what Prus (1996: 157) refers to as the "influence or persuasion process" which, "reflects attempts on the part of people to 'gain the cooperation or commitments of others' with respect to both 'one to one' and more diversified 'group' situations." The findings regarding the ECTs' articulation work bear similarity to the research by Broberg and Hermund (2004) who found that the OHS practitioners they studied endeavoured to create and maintain a network of people to support incorporation of healthy workplace features into the construction of an airport check-in area and manufacturing setting. Though not discussing articulation work per se, these researchers suggest actors' attempts to improve working conditions are complex political endeavours.

The amount of effort and the specific activities that constituted articulation work differed between the settings. In part, this was due to differences in how the organizations were configured. In Courier Co., senior managers, who were outside the depot, needed to authorize the team's suggested changes thus, someone, usually the OHS manager, contacted these managers and made the case for change. In Furniture Co.,

managers who needed to be involved in the ECT's changes were within the factory and brought on the team so little time was spent seeking these people out and making a case for change to them.

Articulation work also differed between the sites in regards to its degree of permanence. Strauss (1993; 1988) points out that if arrangements are created and followed, less articulation work is necessary. In the courier setting, articulation work was done on a change-by-change basis very much akin to the "one-shot negotiation" that Strauss (1978) describes. These negotiations enabled the ECT, in some instances, to secure the support it needed to make changes. However, these arrangements were transient and lasted only long enough to ensure the activity on one project was done. Conversely, in Furniture Co. some of the articulation work, such as recruitment, resulted in a stable commitment from the managers who were needed to authorize and carry out the ECT's tasks associated with implementation. In the manufacturing setting a key consequence of this was that the ECT, at least after twelve months, did not have to start anew each time it requested a change and mobilize people. Thus, one aspect of articulation work was minimized.

Unions can play an important role in occupational health and safety programs. Indeed, there are many examples of union support, if not leadership, of health and safety programs (e.g., Fernandez *et al.*, 2000; Ochsner, 2002). Therefore, in light of the problems the team encountered, the lack of union involvement in the process may come as a surprise. However, if their lack of involvement is looked at within the history of health and safety committees in the settings, the inaction of the unions may make more sense. In both companies, the joint health and safety committees (JHSCs) were seen by

the unions as ineffectual. They may have seen the problems that the ECTs were encountering as paralleling the experiences of the JHSCs and felt intercession would have been non-productive. Sometimes when faced with obstacles to pursuing health and safety concerns by one means, such as JHSCs, unions have sought other avenues to address OHS matters. For instance, Walters (1987) reported that a union that encountered problems with management's support of a joint health and safety committee pursued other means of addressing their concerns.

Chapter Five discussed the challenges of implementing changes. Implementation was often constrained by the ECT's lack of authority. Nevertheless, employing an array of interactional tactics the ECTs found ways to achieve some of their PE goals. The division of labour is taken up in Chapter Six. Implementation activities were divided among ECT members based on their position within the facility.

CHAPTER SIX

“THAT’S THE CHAIN OF COMMAND”: EXPLORING THE DIVISION OF LABOUR IN IMPLEMENTATION ACTIVITIES

6.0 INTRODUCTION

Chapter Five explored the work the ECTs did to implement their changes and showed that the process was hindered by their lack of authority and budget. Reacting to the problems they encountered, the ECTs adopted practices that eventually enabled them to achieve some of their goals. This chapter extends the discussion in Chapter Five and focuses on the division of labour within the ECTs as they carried out their activities.

A key principle of many participatory ergonomic programs is that worker representatives are involved in all facets of workplace re-design,¹⁸ including the implementation of solutions to address hazards. For example, Imada (1991: 30), discussing PE, points out that “the end user is vitally involved in developing and implementing the technology.” Similarly, Wilson and Haines (1997: 492-493) state that PE should involve “people in the planning and controlling of a significant amount of their own work activities, with sufficient knowledge and power to influence both processes and outcomes in order to achieve desirable goals.”

Generally, participatory workplace schemes imply that there are opportunities for individuals to be involved in decision-making and to have a say in the organization of work in ways they do not under traditional Fordist production conditions. Participatory arrangements depend upon workers to do something that they generally are not

¹⁸ It is important to note that participatory ergonomic programs vary in the level of worker involvement. Moir (2005) provides a detailed discussion of this topic.

accustomed to doing: giving management input regarding the production process.

Typically, the relations of production have been the opposite. That is, management directs workers to carry out tasks, usually with little input from them.

An important factor that may shape individuals' involvement in these participatory arrangements and the form involvement may take are the workers' expectations of how others will respond to their requests and concerns. A crucial part of understanding people's willingness to negotiate with others is their "stance" (Strauss 1993: 88-89). Stance pertains to people's assessments of how much leverage they have on their object of influence and how well they think they will do in negotiating arrangements. Stance, as Strauss (1993:89) notes, is intertwined with context:

What enters into the stances are not only the perceptions of power to influence broader conditions but also the history of the workers' past interactions, the meanings of their arrangements to them, their perceptions of how arrangements should work, their knowledge about the nature of the work and what is necessary to carry it out, and also their personal or organizational values, ideologies, and interactional skills. Each arrangement is built also upon history, including personal histories, and the history of the organization, the interactions within and between departments, the power distribution within the organization, and the past experiences with both the current arrangement and similar ones.

Evidence in the health and safety literature supports Strauss' line of thinking. Some studies suggest that workers' willingness to approach management about OHS concerns is affected by their perceptions of how management will react. In a study by Gray (2002), if workers foresaw a conflict with management they tended not to pursue OHS concerns, or pursued them in ways that allowed them to avoid confronting management. Studying joint health and safety committees, Walters (1987) demonstrated that worker representatives who felt that management would listen to them participated to

a greater degree than those who perceived management as less supportive (Walters *et al.*, 1995). Moreover, as Walters (1991) has pointed out, many of the mechanisms outlined under the internal responsibility system¹⁹ ask workers to “depart from the typical social relations of production.” Therefore, if participatory OHS arrangements are going to be effective workers need to believe that managers will treat their suggestions fairly and that they can raise OHS concerns without fear of reprisal from or confrontation with management.

In this study, in both settings implementation activities were unevenly distributed among the ECTs’ membership; they were predominantly carried out by managerial personnel. I submit that both the trajectory of the change initiative as well as the initiative itself, in so far as it shaped the ECTs’ division of labour, were influenced by the interplay among three main factors: the type of activities that needed to be carried out, workplace hierarchy, and, stance, or participants’ views about their ability to act effectively. Although the types of activities required to implement change in the workplaces differed, they frequently involved coordinating with middle and senior managers to get permission to implement changes and organizing practical activities, such as gathering resources, to make changes. Involving worker representatives in these activities necessitated challenging the workplace hierarchy, which worker representatives

¹⁹ The internal responsibility system (IRS) is the philosophy that underpins OHS legislation in Canadian jurisdictions whose central premise is that both workers and employers have a responsibility in keeping the workplace safe. Emerging in the 1970s, the IRS is generally associated with three rights: the right to refuse unsafe work, the right to participate in decisions about OHS, which often takes the form of participation on a joint health and safety committee, and the right to know about work related health hazards (O’Grady, 2000).

were reluctant to do. Workers' reluctance highlights the important limits on agency in organizational programs.

6.1 COURIER CO.

As discussed in Chapter Five, at Courier Co. the ECT's implementation work involved conferring with senior management and often a good deal of negotiating which I referred to as articulation work. Articulation work was a response to the obstacles that the ECT encountered, in particular lack of authority to pursue changes independently of senior management. The ECT did not have the authority to unilaterally make changes and had to consult with local and, depending on the scope of the change, senior management, before it carried out its proposed changes. Usually, discussing potential changes with local managers was not a problem for the ECT, which was in regular contact with these managers and who were typically supportive of its recommendations.

However, consulting with senior managers was more difficult. Management was specialized, and various units in the company, such as fleet, facilities (depots), engineering, retail, and operations, were overseen by different individuals, meaning that the ECT had to confer with a different person for each of its projects. Additionally, senior management were located at corporate headquarters, approximately 180 kilometers from the depot and thus were spatially removed from the ECT. As discussed in Chapter Five, some senior managers were indifferent to the ECT's proposed changes while others were unaware that the participatory ergonomic intervention was in place in the company. Further, a small number of senior managers resisted the ECT's proposed changes. Consequently, when the work of implementation involved conferring with senior

managers, which over half of the ECT's proposed changes did, it had to be handled by someone with the requisite negotiating skills.

6.1.1 Delimiting Manager and Worker Tasks

Early in the intervention, an understanding developed among ECT members that the worker representatives would not contact management about proposed changes. In part, this understanding was based on the ECT worker representatives' difficulties carrying out implementation activities that involved contacting and communicating with senior managers. In a couple of instances, workers were unable to reach managers. In other instances, worker representatives were able to contact managers but unable to persuade them to accept the ECT's recommendations. Additionally, worker representatives were reluctant to take on these tasks because of their low position in the workplace hierarchy and their perceptions that management would not be receptive to their requests.²⁰ As a result, worker representatives eventually asked the ECT's management representatives to contact senior managers. Accordingly, it was the OHS manager, and to a lesser extent, the operations administrative assistant and ergonomist-facilitator, who typically consulted with management about the ECT's proposed changes.

One of the changes in Courier Co. in which the OHS manager intervened was the removal of equipment referred to as "reweigh stations" from the depot. These stations, no longer in use, had been used to weigh packages, and were positioned such that they forced dockworkers near the depot's main conveyor line to work in awkward, strain-inducing postures. The operations administrative assistant contacted a senior manager and requested that the stations be removed. This request was denied because the stations

²⁰ I explore this point in detail later in the chapter.

may be used in the future. She then approached the OHS manager for assistance, who then spoke with the manager involved, and, after some convincing, this issue was resolved and the reweigh stations were removed.

In another instance, a worker representative tried to remove from service delivery trucks that posed hazards to couriers. Phone messages left by the worker representative with the fleet manager responsible for such decisions received no response. After waiting several weeks and receiving no response, the worker representative became discouraged and asked the OHS manager to intervene and talk with the fleet manager. This turned out to be an effective strategy, as the trucks were removed from operation shortly thereafter.

The ECT management representatives' regular successes at completing implementation activities indicated to worker representatives that managers were effective at both contacting senior managers and pushing the ECT's agenda. One worker representative said that part of the management representatives' role on the team was to contact senior management, which was "natural," and the reason the team had joint management-labour composition. Another worker representative stated unequivocally that relying on management's assistance was the only way to effectively contact or negotiate with senior managers.

Several factors contributed to the understanding that the OHS manager was in the best position within the company's managerial structure, relative to other ECT members, to carry out the ECT's articulation work. In the ECT's meetings, the idea of using the OHS manager as a resource was reinforced in three ways. First, the ergonomist-facilitator frequently noted that the OHS manager was a "resource" to be used by the ECT when it came time to contact upper-level management. Second, the OHS manager

himself noted on a number of occasions that he talked to senior management informally during his regular duties. Often, the team would need to consult with a senior manager about a change, and the OHS manager would volunteer to do it, noting that he was going to be talking to a manager about another matter, unrelated to the ECT, anyway. The facilitator's promotion of the OHS manager as resource, and the ease that the manager would have had in talking to other managers combined with a third element: his consistent willingness to confer, and often, negotiate with senior managers.

Another factor that contributed to the ECT's uneven division of labour was that the team's membership was not trained in the steps necessary to acquire solutions. When the ECT required money to make a change, it needed to complete an acquisition form, which required the following pieces of information: a description of the item or service required, a rationale for the purchase, and an estimated cost. Once completed, it was submitted to a senior manager for his/her review. At least half of the ECT's changes required that the ECT complete paperwork for acquiring funding to make changes and seeking permission from managers outside of the depot. Most ECT members knew little about what went into completing the required paperwork. For the duration of the intervention, the operations administrative assistant and OHS manager typically executed these paperwork tasks.

Several months into the intervention a working style had evolved in which typically the OHS manager, and to a lesser extent, the operations administrative assistant and ergonomist-facilitator, were responsible for contacting and conferring with senior managers about the ECT's proposed changes. These roles were maintained from approximately the fourth month of the intervention to its termination 26 months later. In

the following section, I discuss the sources of worker representatives' reticence to become involved in implementation activities, which were linked largely to their lack of both connections with management and authority.

6.1.2 Connections with Senior Management

A theme running through the ECT members' interviews was that implementation tasks were divided among members, in part because of their differential links with management. In interviews with worker representatives, when asked why it was the OHS manager's responsibility to do certain tasks, they typically said that it was because of his "connections" to senior managers. About 16 months into the intervention, in a dramatic example of the importance worker representatives attributed to connections, an ECT worker representative who had hitherto enthusiastically headed up a project, relinquished the leadership role he had played. When asked whether he was continuing to lead the project, the worker representative said, "No, I am going to let the suits and ties handle this; they have the connections."

In another worker representative's words, the OHS manager seemed to "know everyone" in the company and because workers did not know those in senior management, using them to contact management would have been "counterproductive" and extremely time consuming. Therefore, involving workers would have delayed the ECT's already slow pace. The quotation below from a worker representative contains typical sentiments shared by other ECT worker representatives:

[OHS managers'] connections played a large part in getting things done. "You would never see me, lowly [dockworker] in [City], sending an email to [general manager]. [saying] "Listen, [general manager] buddy." It's not going to happen. [OHS manager], however... and the connections that [he] has can do something along those lines and with his connections come results, [he] can

go to somebody higher up and say, “Listen, we need this, this, and this and they’ll say, sure no problem.” [OHS manager] is part of that inner circle, the upper echelon, that gives [him] a certain amount of authority and flexibility that the rest of the group does not have.

Q: And, why doesn’t the group have it? You said that YOU couldn’t call [VP Operations]...

Theoretically, I could, but looking at it from an honest to goodness practical standpoint, an email from [OHS manager] versus an email from [dockworker], which one is going to get more priority? [OHS manager] every time. Why? [OHS manager] is IN management, [OHS manager] is someone that [VP Operations] knows because they run in the same circles. [Dockworker] is a faceless dockworker down in [City] and [as if senior manager is talking to him] ‘He’s on the change team, what’s he want?’ ‘Hmmm... yeah, whatever.’ It’s a simple fact of life, but it’s true.

The worker highlights several reasons for his reluctance to represent the team in its discussions with management, all of which centre on the importance that accompanied being known to senior management versus the low standing of being a production worker. First, the dockworker said he was “faceless” or unknown in contrast to the OHS manager who was, “in the same circles,” in the “upper echelon,” and in the “inner circle.” Second, the dockworker said that because of the OHS manager’s connections, he could get positive results. Third, because he was unknown to, and would not be taken seriously by, senior management it was impractical for him to try to contact senior managers because a response would not be forthcoming.

The OHS manager’s perspective on the situation corresponded to worker representatives’ views. Indeed, when I asked the OHS manager what he expected would happen if a worker representative tried to contact senior managers he said:

It would be difficult... if someone like a worker rep calls V.P. or a director of an organization it ends up as a phone message. The

first call is, “who the heck’s this and why are they trying to contact me?” Can you find this out for me? Whereas I may phone ... and they may say, “Oh yeah I know [OHS manager] we used to work over here and blah, blah blah.” And give me a call back and it’s a lot simpler process. It would be a lot more difficult and you may get the run the around. ...if it’s [a message] just sitting there as a note on someone’s desk saying, “so and so called” – “Who the heck is this?” It takes on a different face. The reality of the situation comes in because it might not have – if they can’t put a face to the name therefore, it might not be given the legitimacy it should be. I think a worker rep could do it, but it would be a lot more difficult getting stuff moved along...

Similar to other ECT members, the OHS manager noted that worker representatives would have found it difficult to gain access to senior managers. Notably, he said workers’ progress would be slow because management would not recognize them or, in his words, “put a face to the name,” again drawing attention to the anonymity of worker representatives versus their management counterparts. Conversely, the OHS manager’s shared history with the managers gave him some “legitimacy.” His affiliations with senior managers meant that his requests would receive attention faster than would worker representatives’.

6.1.3 “Lowly Workers,” Disparaging Managers, and Reluctance to Act

Low status also contributed to worker representatives’ lack of influence in the company. On several occasions, one worker member said that management would never listen to a “lowly worker.” Another worker representative said, indicating the different status between him and management, they were “the suits,” and, referring to the couriers’ uniforms, “at the end of the day, I was just a guy in the polyester pants and the funny jacket.” When I asked one worker representative about contacting senior management he said, “Would you, as an outsider, take me, a worker, seriously? I wouldn’t.” The worker

representatives' perceptions of their low standing weakened their willingness to contact management about the ECT's implementation issues.

Several of the ECT's worker representatives expected that their lack of status would prompt senior management to respond to their requests derisively. When I asked an ECT courier representative what would happen if he called a senior manager, he said:

Well, if you made a cold call like that, "Hi I'm [Courier], I'm a courier. I'm working on the Ergonomics Committee and we need funding for this," they'd go "YEAH, right," hang up the phone and then he'd get hold of the district manager and say, "One of your drivers just called me up trying to piss me off. Look after him." That's how it would work. I'm sure. ..[Interviewee takes on voice of manager] "Well, what's the Ergonomics Committee?" I'm sure that's the way it would work.

Worker representatives' expectations that management would respond to their requests disparagingly were intertwined with their belief that generally management's treatment of employees suggested that workers' value was limited to fulfilling roles outlined in their work descriptions for the attainment of production goals. One worker said management considered workers incapable of providing input about creating a healthier workplace and only wanted workers to get the parcels out the door. Similarly, another worker representative said that management undervalued the skills workers possessed to perform ergonomic activities and their regular jobs. This worker noted that management was unappreciative of worker representatives' ergonomics training and treated workers as only able to carry out their regular, presumably low-skilled, tasks.

They look at us as though we are all brain dead. Regardless of ergonomics. We're drivers. We're dockworkers... As far as they are concerned we're unskilled labor. We're lucky [in management's opinion] if we can wipe our own asses in the morning. They think we're idiots.

Significantly, the fact that worker representatives had received ergonomics training and were repeatedly told by the OHS manager and ergonomist-facilitator that top management was supportive of the ergonomic intervention did little to diminish their belief that management would dismiss their requests because of their low standing in the company's hierarchy and expectations of unfair treatment by management. Moreover, even a visit by the company's vice president of operations in which he invited members to call him personally for assistance with PE program needs did not alter the worker representatives' understanding that their attempts to contact and confer with management would go nowhere. The deep mistrust between workers and managers was not resolved throughout the duration of the program.

Worker representatives' understandings of their lack of influence on implementation activities were shared by others on the ECT, including the ergonomist-facilitator and OHS manager. When I asked the ergonomist-facilitator about the distribution of tasks among ECT members, he said that tasks concerning hazard identification and solution design were spread fairly evenly. However, the ECT's implementation activities were not, and these were typically performed by the OHS manager.

That poor guy [OHS manager] gets stuck every time because it revolves back at Corporate so he gets the .. tasks. Every other meeting he's running on ten things [he] needs to do. And [worker rep], who's a worker, didn't volunteer for anything. Why? Because he is gonna sit on the phone and wait. [OHS manager] gonna walk into the office and say, "[Vice President Operations], I need this." And [mechanic] gonna talk to corporate for 30 minutes and he's never gonna get by the secretary. So that is just, that's the chain of command in the company. And because we're doing this in [City] and not company-wide, how do you get up that chain of command?... how do you get past it? The secretary doesn't really know about it but [Vice President Operations]

knows about it. [Vice President Operations] says, “Go ahead and call me.” They called him, waited for half an hour, and he never got on the phone.

The preceding comments capture a number of points about how the company’s structure affected the ECT’s functioning. First, the ergonomist-facilitator acknowledges that the ECT’s worker representatives attempted, but were unable, to contact managers. Second, he acknowledges that the management’s centralization required that the OHS manager take on the responsibility of liaising with senior mgmt. Finally, like the worker representatives, he indicates that because of the “chain of command in the company,” the way the team was working was inevitably the only way it could productively implement changes.

In the intervention’s latter months, when I asked the OHS manager if the ECT relied on him, he said “yes” but noted that the extent of his involvement was related to the type of activity the group was carrying out. When the ECT assessed hazards and devised solutions to address those hazards, apart from getting some contact information, it typically did not need his assistance and functioned independently. However, when the ECT needed to discuss its proposed changes with senior managers outside the facility the OHS manager was clear about the team needing an “advocate” like him to act as a spokesperson.

Not for the [initial] stages [assessing and solution building], maybe for stages three and stage four [implementation]. You need someone who is an advocate. [Operations administrative assistant] could be that advocate. Absolutely. She doesn’t have to be at corporate. [Operations administrative assistant] has those connections. [Operations administrative assistant] has to understand is that, “No” isn’t “No.” For instance, the reweigh stations. I argued, I discussed.. It wasn’t an argument, with a senior engineer about why we needed the reweigh stations changed. [Operations administrative assistant] could definitely do

the advocate job if she just got a little more pushy. She needs to know how and where to push.

In the above excerpt, the OHS manager not only points to his crucial role in the ECT's activities, but also the necessity of persistence in the articulation work he was doing. In his view, worker representatives, already reticent to confer with senior managers, who were sometimes indifferent or resistant to ECT recommendations, would likely have greater problems with "arguing" when consulting with a senior manager or department head.

To communicate effectively with management and meet the challenges associated with senior management's offsite location, the ECT relied on its management representatives to bring its concerns to senior management. Although this way of working enabled the ECT to make changes, it severely limited worker representative involvement.

6.1.4 Summary

The allocation of implementation tasks among ECT members in Courier Co. was uneven. Generally, if implementation involved conferring with senior managers the worker representatives were only marginally involved and instead, the OHS manager, the operations administrative assistant, and ergonomist-facilitator were involved in this activity. Worker representatives stressed that when the team was engaged in certain types of activities, and specifically conferring with senior managers about potential changes, management representatives took on these responsibilities. Typically, it was the management representatives who possessed the connections and influence required for positive results. Worker representatives' inability to influence senior management was conditioned by both their lack of connections and their lower status, where were related.

Conversely, it was his affiliations with senior management and elevated standing that enabled the OHS manager to engage senior managers in discussions about the ECT's recommended changes and more significantly, gain their support for these changes.

6.2 FURNITURE CO.

In Furniture Co., the changes the ECT typically tried to implement involved introducing or modifying equipment and tools, and/or altering factory layout. These changes often required discussions with suppliers, consultations with those who had significant authority in the plant, and practical activities, such as the coordination of tasks to ensure changes were incorporated on the shopfloor. Typically, because of their authority and their expertise, only the team's management representatives undertook implementation activities. Worker representatives' lack of requisite authority and expertise led to an uneven task distribution within the ECT.

6.2.1 Delimiting Manager and Worker Tasks

The ECT's worker representatives were rarely involved in implementation, only infrequently playing a very minor role. For the program's first eight months, a management representative, usually the plant manager, brought solution designs to the maintenance department. After the maintenance manager and production manager were recruited, they were most often responsible for carrying out the ECT's implementation tasks. Regardless of the type of changes, the maintenance department was ultimately responsible and its manager was well aware of his integral role in the ECT activities:

I'm basically the go-to guy for anything that the committee invents. I'm the guy to follow it through to make sure it gets done even if it's stuff we buy. It's gotta get installed, right? ...you think of anything to be done on the committee, there isn't anything you can find that I haven't been involved with.

One of the ECT's management representatives distinguished between ECT members as "doers," and "thinkers." Doers were members who could productively carry out implementation tasks on the shopfloor, such as the maintenance manager and production manager. Thinkers were those who knew the production process and could participate in solution design. To use the management representative's classification scheme, a worker representative, who could be characterized as a "thinker," described a typical sequence of events: "For me to do something... I come up with a drawing or idea; I usually go to [production manager]. [Production Manager] will check with [maintenance manager] and then together they'll discuss if it's important and what's involved and where we're going to use it. Like that fold-up table, I drew it up; they did the rest." This account describes the process as it generally occurred: Almost always, once the team identified a hazard and agreed how to proceed, implementation activities were coordinated and carried out by management representatives.

Few opportunities arose in which the ECT's worker representatives could actually effect changes themselves, as the changes usually required the maintenance personnel's mechanical expertise. However, even for two changes that did not require technical expertise, the ECT workers' activities were hindered because they did not have the authority to acquire the resources to complete their implementation activities. During one project, the workers needed more supplies to complete the changes and were told by the purchasing department that they could not get supplies simply by purchasing through the maintenance department and that the proper paperwork needed to be completed. In the other project, the worker representatives struggled to free up time to put in place simple platforms to reduce workers' exposure to shoulder and arm injuries. In both

instances, the OHS manager had to intervene so that the tasks could be carried out successfully.

Worker representatives were further excluded from participation because much of the discussion about, and actual work on, implementation of changes occurred outside the ECT meetings among the plant manager, maintenance manager, production manager, and OHS manager, who were in regular contact with one another. Typically, worker representatives only learned about a project's status during ECT meetings, when managers reported on their findings and activities, or during chance encounters with the maintenance manager or production manager on the shopfloor.

6.2.2 It's Part of Their Job

When I inquired why implementation activities were carried out almost exclusively by management personnel, ECT members said that these activities were an extension of regular management duties and that the tasks required to implement changes necessitated particular skills. Noting that the division of labour was natural, the OHS manager said, "all the upgrades regarding production are going through the [production manager] and the maintenance manager is the one who coordinates any outside contracts and his own people would be doing the fabricating changes."

The OHS manager said the work that the managers were doing on behalf of the team "just fits with what they do on a day-to-day basis." Because of their positions within the plant they had discretionary time, knowledge of suppliers and how to order from them, and technical expertise concerning the complexity of the changes. One of the ECT's worker representatives, echoing other representatives' views, remarked that there

were certain implementation tasks that could *only* be done by specific team members on account of their position in the plant:

... certain tasks like fabricating of anything can't be done by just anyone on the team, That IS A MAINTANENCE ROLE... so [the maintenance manager] may have a lot of that thrust on him or certain things may be thrust on [the production manager] because of their roles here at work...

6.2.3 Lack of Authority

Another reason why implementation tasks were also concentrated among ECT management members was because of the authority associated with their plant position. When I asked one worker representative why manager representatives were often most involved in implementation activities, he said “authority.” Asked to expand on that he said, “[The production manager] has the most authority to get things done on the shopfloor. [The plant manager] he has got the most authority to get cash.” Echoing responses to this question from other team members, the worker stated that he could not perform some of the tasks that the management representatives were doing.

When I asked one of the ECT members about the distribution of tasks and why the maintenance and production manager were so heavily involved she said,

‘Cause they’re the supervisors for the employees that do the work. ...especially if it’s doing any actual... installations or anything. It’s [maintenance manager’s] guys that do the installations so he’s the one to tell them to do it. “These are your jobs for today, and this is what I want you to do.”

Importantly, she noted that in terms of installation, it would have taken her significantly longer to track down people and have them move equipment. Conversely, the management representatives had decision-making authority associated with their plant position, which gave them the opportunity to be involved in implementation. This

lack of authority excluded other representatives, and especially worker representatives, from implementation activities.

The OHS manager noted that she had little power in situations that involved asking for changes to be made and said that, because of her position, she was unable to directly ask the supervisory staff to adopt new work practices or change a work area's layout, but that the production manager could. In an interview with the OHS manager, she said that, "The [production manager] walks into any area like the press shop and says, 'This needs to be changed.' And people say, 'Yep, No problem.' And it gets done."

When I asked the OHS manager about task distribution, and in particular worker representatives' involvement in ECT activities she noted that their limited influence within the plant circumscribed their ability to accomplish implementation tasks independently and that other ECT members were better suited to make changes:

... what I have found is as good as those people [worker representatives] are, because they bring intimate knowledge of the...product [and]... how we make it, they don't have the power to get anything done. And it ends up being ME pulling them off their jobs, talking to the supervisors and saying we need this much time to do this, ... and it's a LOT of hassle getting them off their regular hours and giving them projects to do. And then empowering them to do it and basically going around and making sure they've got everything they need. A salaried person on the team can go get their project done. They've got the power to go ask the RIGHT people. Nobody worries about them being off the line. ... that's a whole lot easier for me as the chair than it is for the hourly people. Although they make a good contribution, I would not—I do not necessarily feel any compulsion to add more hourly people to our team. We go and ask people [workers] and certainly bend their ear and ask their opinion if we're working on a project on someone's line but they don't have the resources to really pull their weight as a team member, and that's for me that's been a HUGE drawback, 'cause none of us do this for fun. We all have other things to do, so.

The quotation above contains a number of important elements pointing to the fact that although worker representatives made important contributions in assessing hazards and devising solutions to address them, their low position in the plant's hierarchy diminished their involvement in implementation tasks. This is evidenced in the OHS manager's comments that relieving the worker representatives from their regular duties was a "hassle," and "empowering them" so they could carry out tasks was time consuming. Conversely, management ECT representatives completed their projects in part because of their shopfloor influence, areas of expertise, and discretionary schedules, which enabled them more easily to integrate ergonomic tasks into their regular daily duties.

6.2.4 Summary

To a large degree, worker representatives' involvement in the ECT's implementation activities was influenced by the types of activities required, which in turn affected which team member was perceived to be most capable to get the work done. Importantly, the team members' perceptions of what personnel could effectively carry out implementation tasks were shaped by the lack of authority they felt that worker representatives' had on the shopfloor. The heavy involvement of the maintenance manager and production manager and to a lesser extent, the plant manager and OHS manager in the implementation of the ECT's changes enabled implementation activities to proceed, but worker representatives were generally excluded from the process.

6.3 DISCUSSION

In both settings, worker representatives rarely partook in the implementation of changes. In Courier Co., the majority of the ECT's changes were discussed with senior

managers because the ECT did not have the decision-making latitude to proceed independently. Frequently this meant contacting and often re-contacting managers about changes as some were unaware and/or indifferent while others, to a lesser extent, were resistant to the ECT's suggestions. Typically, when the ECT aimed to make a change that involved conferring with senior managers only the ECT's management representatives carried out articulation work and were involved in implementation activities.

Implementation played out differently in Furniture Co. In this setting, the ECT needed to consult with management, but unlike in Courier Co., those who had to endorse changes were within the factory; in fact, some of the managers who needed to be included in discussions of the changes, such as the plant manager, maintenance manager, and production manager, were ECT members. Because the ECT's changes in Furniture Co. often required both expertise and a level of authority that only some managerial personnel possessed, usually only the team's management representatives were involved in implementation. They coordinated implementation with actors outside the company, supervised the in-house modification and fabrication of equipment, and arranged its integration into the plant's work processes.

What were the reasons for the sharp demarcation in worker involvement in design and implementation responsibilities? Worker representatives' lack of participation in implementation was connected to the type(s) of tasks that constituted implementation, to their lack of influence, and to their position in the plant/depot hierarchies. At Courier Co. worker representatives said they lacked the connections and authority to effectively represent the ECT's concerns to senior management. Therefore, worker representatives

did not discuss the ECT's changes with management when these discussions needed to include upper-level management. Similarly, at Furniture Co., worker representatives noted that it was the day-to-day responsibilities of the managerial personnel to undertake implementation activities. Additionally, they noted that they themselves did not have the influence on the shopfloor to do so.

The division of labour in the ECTs was also conditioned by the workers' and managers' understandings of their typical workplace roles. At Courier Co. in particular, worker representatives were uncomfortable with the idea of consulting with senior managers, expecting them to react to their requests with derision and enmity, and doubting their conversations with management would be productive. Additionally, worker representatives felt they did not have the influence or the connections to communicate with senior management to secure their endorsement of changes. In Furniture Co., the team's task distribution was unquestioned, and worker representatives and management said that the management representatives' day-to-day jobs corresponded to the types of tasks that were necessary for the ECT to implement changes. Further, the OHS manager, who had a key role in arranging when and what tasks were done, found it difficult to involve worker representatives in implementation activities.

The types of work that were required to carry out implementation in both companies configured the division of labour among the ECTs' members, which supports Strauss' (1978) suggestion that circumstances can limit what is negotiable. He pointed out that context will affect what topics can be negotiated and even whether the actors decide to negotiate. As Strauss (1978:254) notes there are several

[r]elevant impingements on negotiation: (1) the organizational setting within its intraorganizational properties, (2) the external setting “within” which the organization is located, (3) the large-scale setting (for example, national), (4) historical as well as contemporary considerations, and (5) power, dominance, and political considerations.

In Hall and Spencer-Hall’s (1982) words, the context for “negotiative activity” is of fundamental importance for understanding whether there is negotiation and the form it takes. A negotiative context has multiple-layers – immediate, organizational, and structural – and this chapter’s findings make clear that elements of all three influenced how the division of labour was worked out in these case studies. In the immediate context, the ECT members in their interactions with each other and with those outside the change team concluded that making use of the established division of labour was a practical way to share responsibilities. Organizationally, in neither setting was there a history of participatory decision-making. On the structural level, the companies were functioning according to the economic imperatives of the capitalist mode of production, which meant that time was devoted to production rather than other concerns. ECT members were aware of time constraints and anticipated that management would place limitations on them.

An implication of the findings is that while there may be spheres where participatory activity is declared, such as within PE programs, factors at the organizational or broader level may subvert participation. Instructive here are studies on employee ownership in which conditions are favourable for participation. Grunberg’s (1986a) study of occupational health and safety in an employee-owned company found that although workers highly valued OHS, attention to conditions that exposed workers to injury suffered because of worker concerns about the company’s market position. In

Russell *et al.*'s (2004) study of a worker-owned steel mill, the authors found that programs set up to facilitate participatory decision making were displaced by management's responses to market pressures. Grunberg (1986a) and Russell *et al.*, (2004) remind us that even under the most favourable conditions for worker participation, contextual elements external to the workplace can influence negotiative activity.

An element of both management and worker ECT representatives' perspectives on the division of labour was the element of time. In both settings, actors' views on task distribution were influenced by concerns about the extra time it would take worker representatives to carry out tasks that management representatives could readily undertake. This concern was part of the context and it was connected to the pressures to produce in the capitalist mode of production. Team members were aware that the change process was protracted and time was limited. Individuals on both teams were responsible to carry out their change team related tasks with the least amount of intrusion – time wise – on their regular duties, thereby mitigating any infringement on production. The responsibility “to get things done,” in Strauss *et al.*'s (1985) words, and do so in a timely fashion undermined worker representatives' more direct participation in implementing changes.

Revisiting a principle that underlies many definitions of participatory ergonomics, PE typically involves including workers in the design and implementation of workplace changes that reduce MSD. As the findings presented in this chapter highlight, workers were only partially involved in implementation: they were kept apprised of what went on and infrequently carried out some tasks related to implementation but typically were on the sidelines. In each setting, the level of involvement was defined by the type of work

required, representatives' perspectives about their level of influence, positions in the organizational hierarchy, and the requisite skills needed to make changes.

Findings concerning worker representatives' limited involvement correspond with other literature on participatory arrangements. Specifically, these findings are consistent with other examples of how the typical relations of production affect joint labour-management committees, both in the literature devoted to participatory workplace arrangements and in the literature on teamworking aimed at enhancing quality and production (Ollilainen and Rothschild, 2001; Ollilainen and Calasanti, 2007). The findings also converge with the literature on elements of participatory occupational health and safety schemes such as the right to refuse (Gray, 2002; Walters, 1991) and participation in joint labour-management OHS committees (Hall *et al.*, 2006; Tucker, 1995; Walters, 1985; Walters *et al.*, 1995). The authors of these studies point out that the utility of these participatory OHS schemes are conditioned by workers' positions of power vis-à-vis management. Additionally, the findings with regard to the limitations on worker representatives' involvement concur with findings from studies by Thompson and Wallace (1996), Dunphy and Bryant (1996), and Delbridge *et al.*, (2000). A common theme in these studies, which corresponds to findings reported here, is workers' lack of autonomy and failure to transfer responsibility to production workers. In Delbridge *et al.*'s (2000: 1474) examination of lean teamworking in several automotive parts manufacturers they note the following,

[T]he technical role [quality inspection, rework effort, maintenance activities and machine setting] of production workers is rather limited. Operators have responsibility for routine quality tasks but have not been upskilled in order to play significant roles in activities such as maintenance. Neither do operators have significant responsibility for production

activities... These findings question the claim that workers in teams have substantial autonomy and that lean teams are self-managing in a meaningful way.

The influence of organizational hierarchy on the ECTs' functioning raises questions about the nature of participation in joint labour-management occupational health teams. It prompts us to examine the diversity of tasks involved in making changes and to distinguish between those that workers may have some reasonable likelihood of participating in and those that they do not. If worker representatives in a PE program are to be involved in the tasks required for implementation they must have the latitude to do such tasks. At a more fundamental level, the typical social relations of production must be transformed, or at least bent, in such a way that workers are enabled to perform tasks beyond their regular duties and management cedes some of its control over the workplace. In the settings examined in this dissertation, such was not the case. Worker representatives had a good deal of involvement when it came to identifying hazards and discussing how they might be addressed but were excluded from many of the activities required to implement changes. The typical relations of production, or in the words of an interviewee, "the chain of command," challenged the ECT's ability to fully incorporate workers' potential to implementing workplace change.

The uneven distribution of tasks across the ECTs' membership was the subject of Chapter Six. Worker representatives had limited involvement in the ECTs' implementation activities. Largely, this was attributable to the hierarchical relations in the settings between management and workers and worker representatives' expectations about their ability to successfully carry out implementation tasks. Departing from

previous chapters, which discussed matters around change design and implementation, Chapter Seven will focus on whether the PE programs were able to continue over time.

CHAPTER SEVEN

SUSTAINING THE PARTICIPATORY ERGONOMIC PROGRAMS

Veritas dies aperit

Time reveals the truth

(Tattoo on a worker representative's forearm in Courier Co.)

7.0 INTRODUCTION

In Chapters Four through Six I examined the ergonomic change teams' (ECTs') design and implementation activities and the contextual factors that influenced these activities. Chapter Seven continues the discussion of how the ECTs functioned by examining how they were able to acquire and maintain the resources required to continue their programs over time.

The chapter gives a strong indication of the ways that social structure influences the participatory ergonomic (PE) program. It also highlights the role that influence work played in negotiating the PE programs' continuation²¹ and the impact of power on the ECTs' activities. Further, the central role multiple social worlds and their different definitions of results play in continuation is illuminated. Crucially, the analysis connects management's assessment of the PE programs to the broader social context and especially the regulatory environment.

Evidence from the literature on sustainability suggests that just because a program is working well does not necessarily mean that it will be maintained. Rather, there must

²¹ When I am using the words continuation or sustainability I am referring to the maintenance of the PE programs over time not individual changes the ECTs' made and whether these changes received continued use.

be some advocacy on behalf of the program to maintain a sponsor's continued support (Goodman and Steckler, 1988). For example, Nilsen *et al.*, (2005), in a study of community-based injury prevention programs noted that factors such as social networks that advocated on behalf of the programs were better predictors of sustainability than objective evidence of the programs' outcomes.

An important part of achieving sustainability may be convincing the people in a setting's multiple social worlds²², who may have incompatible views, of a program's worth. People in a work setting, especially management, who have the authority to continue or suspend a program, have to be persuaded that an injury-prevention program, such as PE, is a viable means of reducing injury or more simply, is a good investment. Strauss (1993) and others (Clarke, 1991; Fujimura, 1987) have pointed out that when activities involve participants from multiple social worlds, persuading those participants to pursue a course of action typically involves a range of interactional strategies, such as negotiation and lobbying. These activities are shaped by local circumstances and broader social factors.

Building on the aforementioned literature and insights from negotiated order theory and a critical perspective, several questions guide this chapter. What activities did the PE program supporters engage to endeavour to sustain the programs? What conditions shaped the form that these activities took and what were their outcomes? The outcomes differed: in Courier Co. the program was discontinued, whereas in Furniture Co. it was maintained. I suggest in both settings the PE programs continuation was

²² "Social worlds are loosely or rigidly structured units in which people share resources and information. They are characterized by a commitment to common assumptions about what is important, and what should be done" (Garrety, 1997: 731).

affected by the program supporters' activities, and that the form these actions took and their outcomes were shaped by conditions both internal and external to the organizations. Foremost among the conditions were management's view of health and safety and the occupational health and safety regulatory framework.

The chapter proceeds as follows: First, I discuss some of the salient macro conditions under which the ECTs' attempted to sustain their PE programs. Then, I present the narratives from each setting concerning the ECTs' activities intended to sustain the PE programs and what organizational-level factors affected these processes. I conclude by comparing some of the key findings across the sites.

7.1 EVALUATING AN OHS PROGRAM'S WORTH

Program maintenance requires a continuous flow of resources, which itself often needs stimulation through demonstration of a program's impacts to key organizational decision makers. Demonstrating program viability can be difficult because different actors judge its value differently. Actors in multiple social worlds may have discrepant and sometimes conflicting views about whether an endeavour, such as an organizational program, is worth pursuing or maintaining (Clarke, 1991; Garrety and Badham, 1999; 2004; Fujimura, 1987; Prus, 2003; Strauss, 1993). Keeping with the negotiated order approach, one social world may use one set of evaluative criteria to assess a project, while constituents of other worlds may use others, with radically different assumptions about what is important, leading to discrepant valuations of a program. Successfully demonstrating an OHS program's worth may involve highlighting program outputs that appeal to an organization's multiple social worlds. Typically, to do so, actors need to

convince benefactors, for example, that a project is a viable means of achieving objectives.

Although an OHS investment may bring about a healthier workplace, this is usually not a central criterion in management decision making. Determination of the worth of an OHS program is shaped by the extent to which health and safety is valued. Critical theory would see occupational health and safety as contested (Krahn *et al.*, 2007; Smith, 2000: 43) as capital may see investment in health and safety as a “surplus value loss” (Schatzkin, 1978; Walters, 1985). OHS investment may be evaluated based on cost-saving value and not as something good in itself; in this instance it is likely to be subjected to a cost-benefit analysis as would any other business cost.

Workplaces embedded in the capitalist mode of production face competitive pressures that encourage managers to minimize their OHS expenditures (Littler and Salaman, 1984; Nichols, 1997; Spencer and Carlan, 2008; Walters, 1985). But, as some researchers in the critical perspective have reminded us, managers cannot neglect OHS in order to meet economic imperatives without the risk of threatening future production. Rather, to sustain capital accumulation, managers need to ensure that health and safety conditions are maintained to a certain degree. Hall (1993; 1999) notes that health and safety programs are affected not only by their link to economic imperatives but also by management’s concerns about maintaining production. Management’s decisions about investing in health and safety, though influenced by maintaining profitability and a competitive market position, are also conditioned by an awareness on the one hand that health and safety costs can be substantial and on the other that injuries can negatively affect capital accumulation (Hall, 1993; 1996; Walters, 1985).

7.2 CALCULATING THE COST-SAVING OF HEALTH AND SAFETY PRACTICES

Evidence suggests that management is often not convinced that an occupational health program may reduce physical demands (Cole *et al.*, 2003: 398; Hendrick, 2003; Kerr *et al.*, 2008; Oxenburgh and Simpson, 2005). Often, management wants a cost saving to be associated with OHS investment. Calculating the effects of OHS programs is not straightforward, however (Cole *et al.*, 2003; Kerr *et al.*, 2008; Oxenburgh and Simpson, 2005; Tompa *et al.*, 2008). Kerr *et al.*, (2008) and Hendrick (2003) note that assessing the financial benefits of an ergonomics intervention is generally difficult, and can lead to an “underestimation” of these benefits. Compounding this problem, calculating the costs of an ergonomics intervention may be easier than calculating its benefits (Koningsveld *et al.*, 2005: 577-578).

One feature of evaluating the benefit of OHS programs that affects a cost-benefit analysis is the type of injury under examination. The nature of musculoskeletal disorders (MSDs) poses some challenges for cost-benefit calculations. Due to the long onset of MSDs there is a time lag between introduction of an ergonomic change and improvements in health outcomes. As a result, managers often do not see a short-term return on their investment in ergonomic changes to reduce MSDs. Moreover, because MSDs are often created by a multiplicity of factors (Norman and Wells, 2000; Shainblum, *et al.*, 2000), addressing a hazard may not fully address the causes of musculoskeletal strain and therefore not reduce OHS costs because workers continue to be exposed to myriad sources of injuries.

Management’s appreciation of the full range of OHS program outcomes may also be limited if only decreases in compensation costs are considered (Dempsey, 2007;

Tompa *et al.*, 2006; Tompa *et al.*, 2008) rather than other measures such as workers' reports of pain reduction and pain reports. Some researchers (Kerr *et al.*, 2008; Oxenburgh and Simpson, 2005; Tompa *et al.*, 2006: 376) have suggested enlarging the scope of effects that are measured to include benefits, such as productivity improvements, decreased re-training costs, reduced costs associated with absenteeism, reductions in filing of injury claims.

7.3 REGULATORY PRESSURES

Examining features of the regulatory environment clarifies why both compensation costs may be of more importance to employers than workers' reports of pain reduction and how regulatory pressures may shape management decisions to continue an OHS program. Germane to this chapter's analysis are the links between the principles underlying Ontario's OHS policies and how these policies are enacted by workplace personnel. A central part of the occupational health and safety system in Ontario is the internal responsibility system (IRS). Two tenets underpinning the IRS that are relevant to this analysis are that workers and management are responsible for monitoring health and safety and that government should not interfere with day-to-day workplace operations (Storey and Tucker, 2006; Nichols and Tucker, 2000; Tucker, 1995; Walters, 1983). The premise that underlies mandated self-regulation in Ontario is that employers will act to address health concerns to meet broad OHS targets rather than yield to regular inspections of their facilities by health and safety inspectors (Storey and Tucker, 2006). Importantly, regulators are more concerned about employers meeting health and safety standards, *not* how the standards are met (Nichols and Tucker, 2000); consequently, employers are relatively free to develop the means they feel are necessary

to create and maintain healthy workplaces (Nichols and Tucker, 2000). Managers may have even more latitude when addressing MSDs versus other types of injuries because there are so few enforceable MSD exposure regulations.

Another assumption underpinning the IRS is that employers will attend to OHS matters based on the financial importance of OHS, also known as the “safety pays argument,” that employers invest in health and safety because doing so will lead to considerable cost saving. Although intuitively “safety pays” may make sense, when safety pays policies are actually put into practice they may not serve the interests of workers and protect them from harm (Cutler and James, 1996; Frick, 1990; Hopkins, 1999). For instance, management may avoid investing in OHS because they do not expect to incur the costs of hazards (Cutler and James, 1996). Cutler and James (1996: 761) point to the vital issue that underlies the safety pays argument, “namely... the identification of potential costs of accidents. This in turn requires that those making the case (e.g., safety officers) and those to whom the case is made (e.g., business managers) operate within a common framework of ‘rationality.’”

In Ontario, one way the safety pays thesis is enacted is in the form of workers’ compensation boards’ injury insurance schemes, which include the experience-rating compensatory system. In this system, the premiums that employers pay annually to the workers’ compensation board are in some degree tied to a business’s health and safety performance. The amount of premium a firm pays is determined by its injury rate, relative to the average for similar companies in the same sector. Firms with above average injury rates pay higher premiums and surcharges, while firms that report lower than average injury rates receive rebates from the board. The experience-rating system is

based on the idea that a taxation system linked partly to an individual organization's performance or injury rate "experience," rather than solely on universal tax, will spur companies to address health and safety conditions (Thomason and Pozzebon, 2002; Tompa *et al.*, 2007).

Although the threat of higher premiums and surcharges is intended to induce employers to commit resources to health and safety, a key problem with experience-rating is that employers' efforts to reduce reported injury rates and thereby their premiums may not take the form of improved health and safety conditions (Harcourt, 1996; Kralj, 1994; 1995; 2000; Lanoie, 1992; Thomason and Pozzebon, 2002). Instead of addressing workers' exposure to the risk of injury, employers may use short-term claims management practices, such as placing workers on modified duties to reduce the reported number and severity of recorded lost-time claims²³ (Thomason and Pozzebon, 2002). As a result, an employer's claims on paper are reduced but workers' risk of injury and illness may remain. The significance of this feature of the experience-rating system is threefold. First, it links the definition of health and safety to reported compensation claims and not to the creation or maintenance of healthy workplaces. Second, activities devoted to reducing claims may channel resources away from OHS programs that actually address the source of health and safety problems, such as PE programs, which jeopardizes the establishment and continuation of these programs. Third, OHS programs are evaluated based on the degree to which they reduce compensation claims not by how much they reduce work hazards.

²³ Lost-time injuries are those for which an employee is off work due to work-related illness or injury. While an injury may be recorded in a company's health and safety statistics generally it is not viewed as serious unless a worker has to take time off because of it.

7.4 DIFFERING LEVELS OF ORGANIZATIONAL POWER

In addition to the challenges of establishing a program's worth, individuals attempting to maintain a health and safety program may also face problems if they have low status within the organization. In work organizations, as power is unevenly distributed among organizational subunits, not everyone has the same authority to advocate for the adoption of occupational health programs. Management may consider that some organizational subunits are more valuable than others to an organization's workflow or survival. These more valuable subunits generally have more control over resources and more authority than other lesser counterparts (Ranson *et al.*, 1980: 7-8). Other subunits, such as a health and safety department, may not be regarded as contributing to an organization's central activities (Frick, 1990; Fulmer *et al.*, 2006; Liker *et al.*, 1991; Perrow, 1983; Thomas, 1994), and so their requests for funding and other forms of support may be rejected or at least questioned. If those who favour sustaining occupational health programs have low status, limited capacity to advocate, and cannot adequately lobby key decision makers, the likelihood of program continuation is diminished.

7.5 SUSTAINING PE PROGRAMS IN THE WORKPLACES

In both settings, the ECTs and the research team hoped that the programs would be continued as a permanent part of each company's health and safety management system once the research team, represented by the ergonomist-facilitator, had withdrawn. However, in Courier Co., support for the PE program waned over time, and it was eventually discontinued. Initially, in Furniture Co. support for the program was weak, but it increased over time and the PE program was maintained for a number of years.

The analysis below shows that the PE program was weakly integrated into the organizational structure at Courier Co. in part because of management's perspective on its worth; conversely, the PE program in Furniture Co. was well integrated into the company, due, in part, to the ECT's alignment activities and the company's increasing need to address musculoskeletal injuries.

7.6 COURIER CO.

Courier Co.'s top management, intent to address the high injury frequency and severity rates plaguing the company, was supportive of the intervention at its outset. The company was spending a great deal of money on injury claims, so reducing injury rates would result in a significant cost saving. In fact, during an interview, Courier Co.'s national health and safety director estimated that, on average, a single lost-time injury cost the company approximately \$16,000. Therefore, the company had an interest in addressing its high injury burden through the participatory ergonomic program.

Between the intervention's twelfth and eighteenth months, the ECT met but was unable to make genuine progress on its projects. As discussed in Chapter Four and Five, the ECT's activities were dogged by attendance problems that began around the twelfth month of the program and by managerially-induced headwind that slowed project implementation. Both the depot manager and a more senior manager noted that the ECT was not working well.

7.6.1 Senior Management's Ebbing Support: Questioning the Deliverables

By the program's twelfth month, senior management's initial support had begun to wane, giving way to concern about lack of results, and the PE program's continuation

was in jeopardy. Specifically, the PE program's value was questioned by both a key senior manager and locally from the depot's district manager.

Approximately ten months into the intervention, the company hired a new national director of health and safety, and part of his responsibilities was to oversee the ergonomic project. Initially an enthusiastic supporter of the PE program, the national OHS director, on a visit to an ECT meeting, noted that he liked the participatory format and praised its members for how well they functioned as a team. However, about two months after, he indicated he wanted, to see "results," that is, indications that the program was making a genuine impact on the company's injury statistics. At the same time, he reiterated his support for the program and noted that other senior managers eventually would ask questions about the program's value. The regional OHS manager, who was championing the PE program, said that the national OHS director, "could not get past the need to see RESULTS." He noted that he and the national OHS director frequently talked about the ergonomics program, and the national director regularly asked, "How many injuries have we stopped?" and "What benefit are we getting out of this?"

The national OHS director's questions concerning productivity were not unreasonable: the PE program was both a significant temporal and financial investment for the company, and he wanted to see positive outcomes. The director was particularly interested in whether the PE program was decreasing the frequency and severity of injuries in the depot and much less in whether the ECT was addressing the depot's sources of injury. This narrow definition of results reflected the evaluative criteria that the province of Ontario's Workplace and Safety Insurance Board (WSIB) uses to assess a company's health and safety record: injury frequency and severity rates. As explained in

the preceding discussion, if a company is able to keep its injury frequency and severity rates low, it stands to decrease the costs of its WSIB premiums.

Approximately sixteen months into the initiative, in a meeting held to discuss the PE program's continuation, the national health and safety director told the research team that other senior managers in the company wanted to see that the ECT's activities and the time and money invested in PE were reducing the injury frequency and severity rates and/or leading to decreases in production costs. In other words, he wanted to know that the PE program was having an impact on revenues. He said that the company measures the success of initiatives, such as the PE program, in "dollars and cents." That managers wanted to see if the program was having a positive financial effect and to evaluate it primarily on its economic impact corresponded to the company's concerns. When I asked the OHS director where health and safety ranked on the company's priority list he said, "Probably I'd say fourth. Productivity number one, costs slash profits number two, quality number three, safety number four. That's the reality. It's like any company, 'safety is number one' right, but it's not." In an interview eighteen months into the intervention, the national OHS director noted that managerial personnel needed to be convinced that there were outputs coming from a project that had a direct bearing on their performance; otherwise, they were uninterested in supporting the projects.

They [production managers] are very much hard numbers people. "What kind of numbers are we getting out of it [ergonomic program]?" We have a scorecard here [in the company]. Every manager is measured on their scorecard, and if it's not affecting the numbers on their scorecard, they don't see a direct link. As far as they are concerned, there's no value in it.... If you could show them that connection, then they're supportive. If you can't show them that connection, then they don't have any time for it. They have way too much on their plate already.

To demonstrate the success of an OHS initiative, the director said that a “business case” needed to be presented for OHS investment because that was what management understood. Further, he pointed out that even in instances in which managers were told they needed to invest in OHS because it was law, which had been the traditional approach within the company to address OHS concerns, it had little persuasive impact on management.

A problem for the members of the ECT was that the benefits of their work were not easily measured or quantified in ways that satisfied management. Their activities did not easily or immediately translate into decreases in injury frequency and severity rates. Typically, the time between when an ergonomic change is introduced and when workplace parties see a difference can be lengthy (Dempsey, 2007; Koningsveld *et al.*, 2005: 569-578; see also Tompa *et al.*, 2006), and this may have been the case with some of the ECT’s changes. Further, the number of changes the ECT was able to undertake was hindered in part by its slow progress. Lack of authority to make changes and the previously discussed problems in accessing members’ time to make changes were the sources of the ECT’s slow progress. Its limited headway, lessened the likelihood management was going to see significant reduction in injuries, decreased production costs, and/or increased production, all key elements in calculating a good return on investment. The PE program may initially have been attractive to management because the ECT’s changes potentially improved productivity. However, these improvements also were difficult to discern. In the courier depot, the ECT’s changes potentially could reduce the amount of double handling and rework necessitated by the depot’s poorly designed work methods and layout, which in turn could increase productivity. The

district manager and senior managers, however, did not see these benefits. Regarding one change, the district manager said:

So as much as the process suggested that it would save rework, and reduce whatever, I haven't seen it yet. Now, I am not complaining because it did lessen the stress on the employees working there six and half hours a day, so to me that is a benefit. But, from the numbers on paper I am not seeing anything.

The ECT measured its successes by examining the feedback from depot workers about the changes it was making, and decreases in the biomechanical loadings on employees (Reid *et al.*, 2003; Rivilis *et al.*, 2006). Additionally, the ECT fought an uphill battle against statistics. Some of the ECT's projects, modest in scope, impacted a small number of the depot's personnel and therefore their effects did not register on frequency and severity measures. As Wells *et al.*, (in press) note, there are problems with seeing positive health outcomes of PE interventions because of the multiplicity of MSD sources, the fact that some injuries may not be reversible, so workers will continue to report pain regardless of the change, and the possibility of an insufficient intensity of change to create positive health outcomes changes.

7.6.2 Diminishing Returns

Around 18 months into the intervention, the national OHS director concluded that the ECT's work had "plateaued" or progressed as far as it was going to and that further investment would have diminishing returns. According to the director, the fact that the program had plateaued prompted, or at least underlined, the view that it should be re-evaluated, an opinion connected to his idea that programs had a regular evolution; in his experience, a program initially accomplishes things and then its worth needs to be reassessed, and if need be, in his words, "reinvented." From the director's perspective,

the project's benefits came in the program's first 12 months when the team had, in his words, picked "all the low hanging fruit." Additionally, eighteen months into the program, he noted that the project's timeline had been too long and should have been assessed for its benefits at the one-year mark: "I think... it's been too long – two years is too long." In an interview 18 months into the intervention, the national OHS director elaborated on his perspective that the intervention had reached a point where management should reassess its value:

I think we also have to realize like with any initiative it starts off ... and you are going to be doing great things and you are going to hit a point where it's going to be an S-curve where you are going to slow down and you're going to have to realize that at that point you have to celebrate its successes, cut it off, and say, "Thank you for your involvement, it was a great success, now going forward it's going to be something different." And I think that my vision of that timing is that from what I've seen at [City depot] that probably happened within, that plateau probably started happening around nine months, a year, fifteen months somewhere around there. And I think that at point you had to sort of cut it off and ... celebrate the successes and then change the way you do it... That's the other component. We see that in all safety programs, ... where you can develop great programs and get them out there and get them implemented and they go great guns and we get great results, but they always tend to plateau at some point.

He acknowledged that the ECT faced hindrances from within the organization, such as the team's relation with the engineering department and the attitude of the depot's district managers, but did not think these were important considerations when evaluating the program's worth. Instead of reviewing the challenges the PE program faced and adjusting it accordingly or addressing conditions in the organization that hindered progress, he felt the program had run its course.

In the project's eighteenth month, the national OHS director said that his support was conditional upon seeing the program's value: "As far as continuance, I will need to be convinced that there is a reason to continue the project in [the depot]. If there is value, then I would support it."

Importantly, at the same time he started to express reservations about maintaining the PE program, he was developing a company-wide return-to-work initiative. He ushered this new initiative into company depots in the last days of the PE program and later touted it as a significant cost-saver for Courier Co. The return-to-work program had substantial cost savings for the company in terms of its potential to reduce lost-time numbers and did not require addressing root causes of injury the way the PE program did.²⁴ The director was becoming invested in this return-to-work initiative, which had goals that potentially reduced injury costs, as did the PE program, but with fewer investments. Significantly, this initiative was related to his waning interest and/or support for the PE program.

7.6.3 Depot-Level Support

At the twenty-month mark of the program, not only was senior management support for the PE program ebbing, local level support also became tenuous. As discussed in Chapter Four, after the initiative's twelfth month the district manager had difficulties relieving workers from their regular duties to attend the ECT meetings and later began to complain that the ECT's activities were producing limited outcomes. From this point in the intervention, the district manager said on several occasions that the team

²⁴ During the period 2002 to 2005 the number of days lost to injury was reduced from 9,721 to 6059. This reportedly saved the company an estimated 10-15 million dollars.

should be combined with the joint health and safety committee and meet once a month. Such a plan would reduce the hours that he would have to relieve worker representatives from their regular duties. As evidenced by this argument, similar to the national OHS director, the district manager was concerned about the ECT's cost effectiveness.

The district manager was also concerned that the ECT was not making adequate progress given the time it was spending in its meetings. Approximately 14 months into the intervention, the district manager attended one of the ECT's meetings and said that, "it was stuck in the mud" and that "it was stalled." He attributed the ECT's meagre progress to team members' lack of motivation. He did not recognize that the team's problems were, in part, beyond its control. Nor did he recognize problems were rooted in senior management's lack of support for the team and his own inability to relieve worker representatives to attend ECT meetings and carry out ergonomic activities. Both of these problems contributed to the protracted change making process.

To address what he saw as the team's poor motivation, which otherwise might be seen as declining morale the district manager said members needed to be "rejuvenated." In an interview, however, he noted that he was not prepared to rejuvenate the team in his depot and suggested that the program be tried elsewhere:

We've burnt the resources and spelled off drivers to get you [ECT] the people you need for the meetings, but from my perspective I'm reading the same thing [in the minutes] that was there three weeks ago. They didn't seem to be going anywhere. They were reviewing it and they were meeting, but I didn't see anything happening. So that was what made me say ... [to the ECT] "take a look" and say, "Where are we?" Like maybe this group has had enough and it's time to get a fresh group, a group with new ideas, more energy...

The district manager's sentiments about the ECT's lack of progress contrasted with those of the ergonomist-facilitator and OHS manager, who lobbied for the PE program's continuation. Attempting to garner support from senior managers, the ergonomist-facilitator emailed two of Courier Co.'s senior managers and the health and safety manager and apprised them of the ECT's difficulties. The ergonomist-facilitator noted that he did not question the district manager's endorsement of the ECT, as he had been very supportive of it. However, the ergonomist-facilitator was concerned that the district manager may not fully appreciate the challenges and resources involved in initiating and maintaining a PE program. He explained to the managers that the complexity of the program, the resources required, and the lengthy timeframe needed to for an ECT's efficient operation meant moving it elsewhere would be a waste of resources and little would be accomplished. He suggested that to ensure the PE program's continuation the ECT remain in the depot and engage with senior management to discuss ways to support the program's sustainability and future development.

The district manager's concerns about the team's lack of progress were partly connected to his unease about the ECT's effects on production. He was having trouble relieving worker representatives so they could attend ECT meetings, and at the same time, meet production goals. In a meeting in which the continuation of the program was discussed that included members of the research team, the ergonomist-facilitator, and the national health and safety manager, the district manager made it clear that production was the main priority.

The participatory ergonomics program faced considerable neglect in its later months. The outcomes of the ECT's activities did not convince the company's key

managers that the program represented a genuine benefit to Courier Co. These managers were increasingly reluctant to support investment in the participatory ergonomic program. With few demonstrable outcomes that could be linked with cost savings for the company, key local and senior managers treated the program as a hindrance to production goals and a drain on the company's resources rather than something consistent with reaching revenue goals.

7.6.4 Reluctance to Take on Leadership

In the later part of the intervention, ECT members struggled with lack of leadership and ownership as it attempted to meet regularly. Their capacity to negotiate the PE program's continuation was affected by their limited power. When the ergonomist-facilitator withdrew from the setting in the twentieth month, the OHS manager became the ECT's unofficial leader. For him, if a committed group of individuals from within the depot coalesced, the PE program could be sustained. In a conversation about 18 months into the intervention he said, "we need a core group to lead things," and explained:

So we need them [local members] to take charge... [operations administrative assistant], [dockworker] , and [courier]. It'll be good if [courier] stays. They need an identity, it's not my team. The nucleus that the team had has broken apart... [ops administrative assistant] will be a good person to keep them on track...

However, no one in the depot would agree to take a leadership role and no one had the authority to call and schedule meetings and ensure that the team's worker representatives were relieved to attend.

Reluctance to take on key leadership roles was not openly discussed among the ECT members: it was not discussed at ECT meetings and worker representatives did not

convey their unwillingness to the OHS manager or ergonomist-facilitator, neither of whom fully appreciated the barrier the ECT members' reluctance posed to the team. Instead, there was talk among team members about how the team could be rejuvenated. In another conversation 18 months in, the OHS manager said, "When we get into the New Year we will put on the 'renaissance' and get new members," noting that to regain some momentum the team would have some weekly meetings. The New Year began auspiciously, with a string of weekly meetings but after a couple of months attendance problems re-emerged. The OHS manager and the ergonomist-facilitator discussed getting the ECT "leadership training" or "team training" several times but not with other ECT members, except in passing. In these discussions, the ergonomist and health and safety manager assumed that team members lacked knowledge about how to properly function in a group, which was not the case; ECT members, though not experienced meeting attendees or ergonomists, nevertheless could ably run a meeting, identify MSD hazards, and devise solutions based on ergonomic principles. Rather, the problem was that the ECT's survival was contingent on a member possessing the authority to schedule meetings, to take action to carry out its activities, and to relieve workers. Team training would not have addressed these contextual factors. In the end, the OHS manager requested a training course for the team, but management did not approve this request.

Worker representatives' views on change team leadership were contrary to the OHS manager's. Worker representatives believed that the role could not be filled by just anyone on the team, or even from within the depot but needed to be filled by someone in a managerial position. In one worker representative's words

Well, you need a guy like [OHS manager]. You need a guy, if it isn't [OHS manager], you need somebody else that has an idea of

what's going on. If he gets another job within the company, he doesn't want to do this anymore, that is DEFINITELY gonna be the death of this. It's on its last legs now, it's hanging by its fingernails... but if he leaves, it's gone. It's toast, it's finished. It's gone.

Another worker representative agreed that management needed to be involved to keep the ECT going but specified that it had to be a management representative who was interested in ergonomics:

It would mean more to them [manager who is interested in ergonomics] than to... a management member who was outside the ergonomics team who would be like, "Oh that's fine, that's nice, however I have ten couriers that I have to deal with right now." It's not as high on the priority list and yeah they might be interested and "Yeah it could work, we should keep it going." But whether or not they do anything beyond that, yeah fuck, doubtful. I think mostly any management member who is involved in ergonomics would be more likely to put forth an effort to continue it.

Although workers felt the team needed someone in management, local management was not interested in pursuing the ergonomic program, which was significant because without upper management support, the program likely would fold. The ECT needed management personnel who possessed the necessary connections to lead the team, and, in particular, negotiate for the PE program's continuation. Worker representatives, when interviewed, agreed that the likelihood of program sustainability would be increased if a supportive senior manager was involved: in one worker representative's words, "at that [local] level you are really limited ...because cost wise, hourly wise, to take time off you have to work with the depot [personnel]. If you can't go above that, you have to do whatever they say at this level."

The OHS manager was aware of his seemingly contradictory position. On one hand, he knew that his participation was absolutely essential for the group's progress. On

the other hand, he knew that local membership needed to take control of and lead the team if it were to continue. Members were never in a position to formulate a plan for taking control of the ECT because many of them lacked the influence to determine if and when the ECT could continue. Unfortunately, there were never discussions about these structural constraints among the ECT's membership.

7.6.5 “It’s Their Show”

By month twenty-four, the intervention was in its last days. At this point, the ECT worker representatives did not negotiate with management about the PE program's continuation, but instead said it was management's to do with as it wanted. For them, management's ownership of the means of production was incontestable, and they were generally fatalistic about their chances of success in negotiations with management regarding the ECT's continuation. One worker representative, resigned to the fact that management controlled the program and that worker representatives had no influence, said,

None of the employees are gonna fight for it because there's no use fighting for it. They're [management] just gonna tell us that the problem's solved. ... It's their [company] initiative, and [OHS manager] is the leader on this as far as that's concerned. He's gone, we're gone.

Similarly, another worker representative articulated the constraints of his position:

I can't go tell employees to come to the meetings, I don't pay their wages, [Courier Co.] does. And if they were paying the people to attend, to me it was up to them, but with the team, sit down and say, “Look, we can't have three drivers here. We can't just take them off the road. But we can have one at a meeting.”

Noting that, above all else, management was interested in production, and that the ergonomic program was under management's control, a worker representative said it did not matter what he, or the rest of the ECT members, thought the program achieved:

It's just their game, it's their show. They can call the shots. I mean regardless of how good this can be or how bad it is, or how awful it is or what a money- saving thing it could be, it doesn't matter. The bottom line is... that if things don't get delivered, if the freight sits on the floor, somebody's ass is going to be in a sling.

One worker representative stated that it was management's prerogative to allocate resources so the ECT could function:

The employee group – I feel – in this terminal can't take leadership. The leadership, even though it's supposed to be an equal partnership, the natural leadership comes from the company. And it didn't come from them. ...because they have all the resources basically, all the power to say, "Ok it's going to go, this is what we are going to do." You know for me as a courier, [courier] as a courier, [dockworker] as the chairman even didn't have the ability – I don't think – or the confidence to say to [district manager]... "Hey ...we are having a meeting next week," or call [OHS manager] and say "Hey, you know what? This thing is going to roll. We are going to do this next week."... I don't know what the right word is, but we didn't have the confidence to do that, even though it's supposed to be an equal partnership I think the management has the better ability to take the bull by the horns in that instance and make it happen, where it is a little harder for us. ... we could have called [Vice President] and said, "Do you know what? Let's go." And you know he would have then jumped on management and said, "Let's get this thing rolling." Probably. In my mind it's more their role ...to keep this thing alive and moving and on track and I think they've failed. All I can, all we can do as members is... say, "Hey, ...what's going on? We want to get this thing rolling." We don't write the cheque, which is the bottom line, right. We have very little power.

Clearly, then, the idea that the ECT's members could take on key leadership positions and lobby for the PE program's continuation was hindered by members' limited

say in the PE program's sustainability. Workers' lack of ownership of the ECT's direction was tightly connected to their limited workplace power and lack of ownership of the means of production. They said management controlled the resources that the ergonomic program needed to function, and thus by extension ultimately "owned" and controlled the program as well.

7.6.6 Discontinuing the PE Program

Approximately 24 months into the intervention, the OHS manager's attendance at the ECT meetings became more infrequent and this contributed to the ECT's lack of activity. The team depended on him to be a conduit of information between it and senior managers; thus when he was absent, communication broke down and the ECT's work slowed. At this point, the ECT was having great difficulty organizing meetings, and when it did, the meetings were rarely productive. Around this time, as well, the national OHS director withdrew his support and instructed the regional occupational health and safety manager to cease traveling to the depot and assisting the ECT.

Two and a half years after it had been introduced, the ergonomic program at the depot ceased operating. There was no formal announcement of cancellation, no consultation with the ECT's worker or management representatives, and no meeting to inform them of management's perspective on the program – meetings were simply not scheduled anymore. Even the visible evidence of the ECT was removed from the building. Worker representatives recalled their surprise when they arrived for the beginning of their shift and the "ergonomics board," a large bulletin board that was a central means of communicating with employees in the depot, had been removed. Around this time, a new district manager was brought into the depot who knew little

about the ergonomics program. One worker representative indicated his surprise to learn the PE program had been shut down and said that, “according to the new manager, the project’s dead, and that’s news to me.” Other worker representatives also indicated their surprise that no cancellation announcement was made, and expressed they were disappointed to see the program’s ending, especially in such a manner; in one worker’s representative’s view

The end of it was dealt with piss poor... Very unprofessional from a company standpoint that prides itself in ...couriers’ professional appearance and all that stuff but everything they do internally is very unprofessional at times. I’m very disappointed in the company for the fact that they just let it die a natural death. Not happy at all with – if it was going to be finished they should have had everybody together or whatever or something. Some sort of communication to people that, “Look this is what is going on this is what we should do?” Do you want it to continue or you don’t want it to continue. It’s your ball type of thing. Let’s see what happens. They didn’t do it they didn’t bother so it’s they get a new guy [district manager] in town and he knows NOTHING absolutely NOTHING about it other than it’s not there anymore and [OHS manager] gets a new boss and you haven’t seen him in months, no communication, no nothing. I’ll have to get myself on the health and safety committee I guess to find out if anything else is going to happen. But very poorly handled, very unprofessional....

Some of the ECT’s projects remained unfinished. At the point when the PE program concluded, change to one of the depot’s workstations that the ECT was in the midst of investigating was incomplete, a cart for pulling freight that the team had invested much time and energy into and waited months for, was delivered to the depot but went unused by couriers because it was awaiting modifications that never came, and an investigation that the ECT was in the middle of into the hazards associated with courier trucks was not completed.

7.7 FURNITURE CO.

The sustainability of the participatory ergonomic program in Furniture Co. changed over time and was influenced by: (1) the company's organizational environment, and, in particular, by occupational health and safety regulatory bodies, such as the workers' compensation board; (2) the company's restructuring efforts; and, (3) the ECT members' attempts to integrate the PE program into the plant's existing health and safety programs. Attempting to align itself with elements of the corporate structure, the ECT raised awareness of the PE program and complemented extant OHS programs, enhancing their worth. In this section I describe the ECT's endeavours to maintain the program and how they were affected by the factors noted above.

7.7.1 Lack of Progress

Initially, support came from some of Furniture Co.'s management in the form of provision of time for workers to meet and carry out ECT activities, but as discussed in Chapter 5, managers did not initially provide the personnel and necessary authority to implement changes. After approximately twelve months, because of the slow process by which it was making changes, the ECT had little to show for its efforts. Despite early setbacks, the ECT's output increased over time, and the program continued for approximately 40 months.

The ECT's inability to make change in its first twelve months was noted by some of the plant's managers. In fact, the team's progress was so slow in its initial year the plant manager noted that, "It took forever to get through things" and that was thankful that it was he, and not another more senior manager, in the ECT's meetings. Similarly, the human resources manager said to the OHS manager that the ECT appeared not to be

making any progress. In an interview twenty months into the intervention, the health and safety manager described this concern and her response: “My boss asked me at the end of the first year whether [the ECT] had done ANYTHING at all because as far as she was concerned she couldn’t see anything...And I was conscious after that, that we needed ‘A,’ to be visible, and ‘B,’ to prove that we’d done something.”

Responding to the challenges to maintaining the PE program, the ECT developed a set of strategies in an effort to ensure its long-term viability. Some of these strategies were aimed at demonstrating to management that the ECT was having a positive impact.

7.7.2 Promoting and “Proceduralizing” the PE program

Attempting to preserve the PE program, the OHS manager endeavoured, in her words, to “integrate” the program into the plant’s existing health and safety practices. Integration, she said, was difficult but would ensure the PE program had enough status that managers would not treat it as a “flavour of the month.” As part of integrating the ergonomics program into OHS practices, she, in her terms, “proceduralized,” the PE program in a set of practices that could be evaluated by company personnel. As part of this, she put together an “Ergonomic Policy” in a document that codified the PE program’s procedures and protocols. It outlined what the ergonomics program was, what it aimed to achieve, what it needed to function, and who was responsible for its operation. This document was reviewed and signed by both the VP human resources and company president. Additionally, she attempted to regularly share information about the ECT’s goals with the plant’s senior management. When I asked the OHS manager about integrating the PE program into the OHS practices she said:

Well, to make it part of the workplace culture you have to make a procedure... and in the procedure it says what you’re gonna do

and then you have to do that stuff, and PROVE that you do it. When you're in safety and you're dealing with regulatory agencies and external audits you have to PROVE everything. There has to be signatures, and dates and proof of training and a document trail and all the rest of it. Now in ergonomics it's not as if I'm gonna kill somebody so... it's a little less onerous than it would be to keep the machinery guarded, for example. But if it doesn't say who's responsible for what, and there isn't any accountability to hold people responsible for this thing, it's just gonna die. And if I ever change ROLES, the ergo program would just go boom. So for me it was really important to write it up with all those responsibilities of what we're doing and put it together. And MAKE it just part of how we live our life here, which is then in practice, which is impacting our culture... Annually, I have to prove that I reviewed them all as part of my program; that they're still current and they're still functional. If it gets put in with those procedures it'll become part of that regular review process. ... that's how everything functions here so it has to be put into the way we do our business...

In addition to proceduralizing the program, the OHS manager tried to create and maintain awareness about the PE program among management at various levels. She spoke about the ECT in the plant's weekly Safety Committee and Return-to-Work Committee meetings. Frequently, she informally talked to the Vice President about the ECT's work to keep him apprised of its activities. Another way that the OHS manager kept management informed about the ECT's activities was to create an "Ergonomic Audit and Evaluation Sheet" (Figure 7.1), which detailed what the team had done, what projects it was currently working on, and what prospective projects it was looking to undertake. Copies of these documents were regularly circulated to managers. Further, the OHS manager organized ergonomic training for the plant's workforce, in part to highlight the fact that PE program was not just another initiative but that it was a primary component in the facility's OHS management system.

Table 7.1 Ergonomic Audit and Evaluation Sheet

Activity Measures						
	Ergo Program Written	Employee Suggestions Received	Ergo Training: Workers, Supervisors, Managers, Engineers, ECT Members	Job Safety Analysis Complete 2/month	Ergo Projects Complete	ECT Meetings Held
2003	Oct '03	5	0	38	4	25
Jan '04		9	Production Supervisors, Hourly Workers			3
Feb '04		2				3
Mar '04		1				3
Apr '04				48		2
May '04				13		2
June '04				29	2	1
July '04		2		14		1
WSIB Firm Profile						
	# NLTI	# LTI	# Fatal LTI	# Total Injuries		
2004 (as of May 26)	19	1		20		
2003	102	20	0	122		
2002	143	28	0	171		
2001	211	28	0	239		

ECT – Ergonomic Change Team

NLTI – No Lost Time Injury

LTI – Lost Time Injury

Table 7.1 Ergonomic Audit and Evaluation Sheet (con't)

Project List Update			
Project	Description	Champion	Status
1	Loading skids – fold-up table prototype for 3000 ISL Line.	WR/PMgr	ETA June
2	Jig Project. Unable to change station. Added PHAU's instead. Re-design of line pending.	Sup	Complete
3	Tilt Stand Project	OHS Mgr/ WR/WR	Hold
4	Plating Project – hold No easy answers! Test Tilter there for unranking.	MMgr/Sup	Hold
5	Tilt stand and fixed platform – Press 135 done, Presses 70, 138 & 85 in May '04.	Sup/PMgr	ETA May
6	Half bin project – recommendation to management. Cost prohibitive.	OHS Mgr	Complete
7	Personal Height Adjustment Units provided in 9000 and Assembly	Sup/WR	Complete
8	Ergo Chairs – Fast Track project. Provided throughout plant.	OHS Mgr/WR	Complete
9	Plastics work stations – chairs, adjustable tables, chutes done. Degaters being added may '04.	PMgr	ETA Aug '04
10	3000 Narrows – grease, ball sizes, layout changes, automation	PLntMgr/ MMgr/WR/WR	
11	Plating – lazy Suzan, ball sizes, layout changes, automation	Env H&S Mgr	ETA shut-down '04
12	Welders #12		
13	Plastic Retainer Press – changes to cart to eliminate need for bending to pick product	Claims Mgr	ETA Aug '04
14	Office Workstations – reception workstation complete	Eng/OHS Mgr	
15	Press 9 – elevate 4 inches	MMgr	Complete June '04
16	Foot Pedals – matting with Velcro attached	WR/WR	ETA Aug '04
17	Rod Machine – modifications based on Ergo assessment	Claims Mgr	Complete
18	Vacuum ball bearings	PMgr	
19	General Welding – lifting arm, combining processes	PMgr	
Workstation Changes (Goal: 2/month)			
2002	Workstation change for Worker, Ergo chairs investigated and purchased for plant		
2003	Personal Height Adjustment Units provided in 9000 and Assembly, workstation change for Workers		
Jan '04	Toolroom computer station set up correctly; Press 52 tilter installed		
Feb '04	Plastics workstations – chairs, adjustable tables, chutes		
Mar '04	Press 135 platform & tilter/ crimping of narrow channel/ reception workstation re-design/ foot pedal		
Apr '04	None		
May '04	6 Retainer press guards installed/ 3 Press platforms with tilters (70, 138, 85)		
June '04	4 Degating units/ 3000 ISL Line layout improvements		
July '04	Retainer press cart re-design/ Turn Lift Table – Keyboard Tray Assembly		
Aug '04	Plating 6800 Line Changes/ 3402 adjustable table (Slide Assembly/ Press 9 replaced for height issues)		

WR – Worker Representative

PMgr, MMgr, PLntMgr, – Production Manager, Maintenance Manager, Plant Manager

Sup – Supervisor

OHS, Env H&S, Eng – Occupational Health and Safety, Environmental Health and Safety, Engineer

ETA – Estimated Time of Arrival

The ECT, and, in particular, the OHS manager, through both promotional activities and the “proceduralization” of the PE program, attempted to define it as an important part of the plant’s regular operation and thus to “routinize” (Pluye *et al.*, 2004) it as something that could not be easily sidestepped or neglected. The OHS manager’s attempts to secure support for the PE program unfolded in a facilitative context in which the plant’s restructuring efforts and the workers’ compensation board put pressure on plant management to take ergonomics more seriously than it previously had. These topics are discussed further in the next sections.

7.7.3 Restructuring

The plant’s reorganization in reaction to market changes is a pertinent part of understanding management’s acceptance and continuation of the PE program. Decreasing product demand, rising global competition, and soaring material costs translated into layoffs and a push to increase the plant’s operational efficiency. A side effect of restructuring was that it complicated the company’s accommodation of injured workers and, as I demonstrate below, this provided an important condition contributing to the PE program’s relevance. Laying-off employees significantly reduced the spots in which modified-duty personnel²⁵ could be accommodated, or given a task, which had previously been plentiful. Late in the intervention, a senior manager remarked, “It’s just most of those jobs have been eliminated because of a drop in volume. So you may still have one person [performing a task] when you had three people, six people doing it before.” When I asked one of the plant’s senior managers about that he said,

²⁵ Modified-duty personnel are individuals suffering from either permanent or temporary injury who need to be assigned work that does not lead to re-injury. Modified-duty personnel may also be referred to as light-duty and restricted-duty personnel.

Well,... first of all we had about 700 employees here 3/4/5 years ago. Today we're down to about 260 hourly employees. So... there's been 450 jobs that have been lost here and by those jobs being eliminated it certainly has -- along with those being eliminated there's a number of jobs that maybe were just putting washers on a riveter or something that was quite light work and ... it was jobs that we used when people had injuries. Some of those jobs have disappeared now so that's made it... more difficult to find work for these people.

Plant management also considered the financial ramifications of laying-off injured workers. Laying-off injured workers resulted in extra costs for employers due to Workplace Safety and Insurance Board (WSIB) policies. Under the WSIB policies, employers are obligated to try to "provide injured workers with work that is both safe and restores their earnings before the injury" (WSIB, 2006). If an employer is unable to do so then an employee enters the "labour market re-entry program" for retraining (WSIB, 2006). Although employers do not directly pay for rehabilitation and retraining costs, the inability of employers to accommodate injured employees is recorded in WSIB appraisals of a plant's health safety record and may result in increased premiums. Thus, laying-off employees who were injured meant an added cost. With fewer places to provide workers who suffered from permanent injuries, management was aware of the importance of preventing such injuries and creating work areas where injured workers could be accommodated. As a senior manager in the plant said,

I am comparing it to other companies, we're still higher and we still have more lost-time injuries or injuries that require some type of modified work restrictions. And, like I said, it's very costly. For a young worker if they're injured to go into the market [need to be retrained] it... may be the only alternative but... it costs several hundred thousand dollars to retrain a worker to do something else.

7.7.4 Surcharges: Making Management “Stand Up and Take Notice”

Another, more direct way that Furniture Co. was affected by the plant’s regulatory environment was through the surcharges it incurred under the experience-rating compensation system. During the intervention, the plant received a series of penalties for its high lost-time injuries rate. These encouraged senior management within the plant and at corporate levels to carefully consider how musculoskeletal disorders were addressed.

As mentioned in the previous description of the experience-rating system, the Workplace Safety Insurance Board imposes a surcharge on companies that have higher than average injury rates. Furniture Co. had received rebates due to its low injury rates for several years prior to the PE intervention. However, the plant’s injury numbers increased over time; mid way through the program, they exceeded the average injury numbers for its rate group, the rebates stopped, and Furniture Co. incurred three consecutive hefty surcharges from the WSIB, each close to a million dollars.

The surcharges affected Furniture Co.’s profitability and pressured plant management to focus on health and safety and decrease injury costs. Company officials considered the surcharges to be very serious, and in the words of the OHS manager, they made managers, “stand up and take notice.” Further, the surcharges also produced pressure from Furniture Co.’s parent company. The company’s other plants, located in the United States and Taiwan, had significantly lower health and safety costs than Furniture Co. did, adding to the pressure on plant management to control OHS costs.

The fact that plant and corporate management regarded the surcharges as a substantial and avoidable cost gave justification for investment in MSD prevention and

increased the legitimacy of the participatory ergonomic program. I asked a senior manager about the corporation's response to the state of health and safety and he said

...they have a real concern... that we could spend eight or nine hundred thousand dollars on a – just on a surcharge fee this year and that comes off the bottom line. So they're very concerned about it, I mean that's what drives businesses.

The plant manager recounted how corporate management responded to the surcharge, and how it gave the factory's management some leverage in terms of their spending on ergonomics:

...it [surcharge] was eight hundred thousand dollars and went right to our CEO of our corporation in the United States. He was not blaming us but blaming himself, more or less saying as a company, wouldn't it have been smarter for us to spend that eight hundred thousand dollars in interventions and improvements rather than spending it on fines. Now we have to do both. We got to still pay the eight hundred thousand dollars, but we should be budgeting and spending money in a way as we move forward to avoid that from occurring. So that's what allowed us to then put forth better budgets for spending to say we were going to spend a hundred or two hundred thousand dollars a year on making improvements.

Within this context of high surcharges and management's eagerness to address them, the ergonomic program was seen as one means to decrease the high numbers of injury claims and reduce, if not avoid, future surcharges.

Pressure from the WSIB and an intensely competitive market motivated the plant's management to make changes, which affected the participatory ergonomic program's status. The surcharges encouraged senior managers to reassess how they addressed work-related musculoskeletal disorders. Downsizing and a shift to lean manufacturing had previously reduced the spots where employees hitherto worked on modified duty. These pressures meant that the ergonomics change team's activities were

considered a viable part of the way the plant was to reduce OHS costs. They also created conditions under which the participatory ergonomics program's and management's interests could be aligned and created opportunities for the ECT to gain more legitimate status.

7.7.5 Demonstrating the PE Program's Utility

In the context of plant restructuring and surcharges, linking the ergonomics program to other parts of the plant's health and safety framework would highlight its utility and lend it some security. To this end, the ergonomics team attempted to demonstrate its relevance to management, and show itself as a viable injury-prevention program.

The ECT's efforts to link its activities to the pre-existing health and safety framework could be seen in the team's meetings. A pattern emerged approximately 18 months into the intervention, whereby at the beginning of the ECT's meetings, the team reviewed the plant's weekly "accident report," a record of any injuries reported to the health and safety personnel. As each of the injuries was described, team members deliberated and decided whether and how it could address the circumstance that had led to the injury. In reviewing the weekly accident report, the ECT was attempting to directly reduce the facility's musculoskeletal hazards.

The ECT also enhanced its profile as an effective injury-reducing and cost-saving mechanism by capitalizing on return-to-work concerns. The ECT did this by modifying work areas so that employees who had musculoskeletal injuries could work safely. It was able to do this by responding to issues that arose in the plant's "Return-to-Work Committee," (RTW) a group consisting of management and labour representatives

devoted to arranging work with minimal risk for employees on modified duty due to work-related injury.

Ideally, in RTW programs, employees who have been injured are brought back to work as quickly and safely as possible when they are ready. Injured workers may benefit as they can slowly transition back to work, receive better pay than workers' compensation may provide, and, generally, improve their physical and emotional state as they recover from injury; employers may benefit in that workers are doing value-added tasks and their lost-time claims are reduced (Baril *et al.*, 2003; Loisel *et al.*, 2005). Meeting the goals of return-to-work programs can be challenging, as reintroducing employees to work requires consideration of several factors, such as availability of positions, union concerns that employees receive pay similar to what they did pre-injury, and reinstating employees before they have fully recovered (IWH, 2005: 39-43; Krause *et al.*, 2001; MacEachen, *et al.*, 2006)

In its decisions concerning the placement of workers, Furniture Co.'s return-to-work committee considered the employee's work restrictions, the availability of spaces to do value-added work while on restricted duty and the influence a worker on modified duties may have on production. Contractually, the company was obligated to give employees who received layoff notices the option between being laid off or "bumping," transferring from one job to another in a different area of the plant and thereby displacing the employee in that area who had lowest seniority; whether an employee could bump was based on his/her seniority. In the area a worker decided to transfer into, a worker for whom the opportunity was available would either exercise his/her own bumping option or be laid off. Therefore, each round of lay offs typically triggered bumping, which had a

cascading effect in which workers bumped others until the lowest-seniority employee was laid off. If an injured worker was bumped, had enough seniority, and chose to exercise her/his bumping option, the RTW committee searched for a place on the shopfloor where s/he could be accommodated.

Layoffs, bumping, and the reduction in positions that were suitable for modified duty employees complicated the RTW committee's work, making it difficult to assist workers with physical restrictions. The OHS manager described the RTW committee's deliberations concerning where they should place modified duty workers, as "painful" and a "nightmare." She said that, "the ergonomic team became a mechanism to deal with" these staffing issues as it altered work areas to accommodate injured workers. With its mandate to improve working conditions, the PE program gave the RTW committee more options of where workers could be placed and thereby relieved some of the pressure on the committee.

The ECT's change-making activities not only allowed the company to accommodate modified-duty employees, but also ensured the work that these employees were doing was value-added. In one work area in particular the plant manager noted accommodating modified duty workers paid back in big dividends:

The biggest example here is the systematic machines... where the systematic machines requires people to bend into bins, lift quantities of parts, put them on a shelf, feed them through an automatic machine, they [parts] go through the machine and back into a bin, they [operators] got to reach down again and try to straighten them around. So they [ECT] are coming up with lifting devices, lift and tilt devices to bring the parts right up to the employees' level and then all you got to do is to pick parts one at a time out of a container and place them on a conveyor and feed it in. Then people we had on light duty at the time could go in and do the job. ...we [company] had two of them [machines] running

on two shifts at a time, so really that that creates some employment for three people that we were taking off of light duty job and they were now on direct work. So it wasn't a lot of investment but it was probably six or seven or eight thousand dollars worth of lifters and modifications and things like that. So that would be very quick payback.

The ergonomic change team's ability to create spaces for modified duty workers improved its profile among management. When asked about whether the ECT's activities were facilitating the placement of modified duty workers, the plant manager was categorical about this, "Oh most definitely. I mean THAT'S the focus that we used in a lot of cases. It was justification to spend the money [on changes]." He noted that the high numbers of employees on modified duty meant that, "we had to look at making improvements, we had to look at doing things differently because not only have we got a lot of people on light duty that we now have to somehow accommodate but the workforce is getting older." Significantly, management understood the participatory ergonomic program to be one important means to address a key issue arising from workplace injuries: financial costs.

7.7.6 The Upshot of "Trending Downward"

One of the most convincing pieces of evidence for maintaining the ergonomic program was that the injury rates had fallen since its initiation. During the time that the ECT had been operational, the number of both lost-time and no-lost-time injuries were decreasing, or as the OHS manager said, the injury numbers were "trending downward." Indeed, the number of lost-time injuries in the plant had consistently dropped, from 28 in 2001 to 10 in 2004.

Crucially, the plant's senior management felt that the ECT's activities reduced injury numbers. In a visit with the team, the company's president praised the ECT's

work, noting that it was integral to the company's health and safety practices. Late in the intervention, one of the company's Vice President's noted that the ergonomic program had value but confessed that he was surprised there were still such a high number of repetitive strain injuries given the company and ergonomic team's efforts to reduce injuries. He noted that, "if we hadn't have done those things we [the company's injury numbers] could've been right off the radar. So it's hard to say, BUT IT HAS TO. IT DEFINITELY has improved. I mean just the way people work today on those workstations that we changed versus the way they worked a year – two years ago. It's much better." When asked about his impressions of the group over time the company Vice President said:

...at first I thought this was going to be great and then it sort of hit a bit of a lull where I thought, "is anything really happening?" Is anything good coming out of this? ... and then you know you see some of the things that are changing and you say, "Yeah it is good. It's been a worth while program."

The plant manager was seeing results too. He explained that injury reduction was due to several factors, including not only the ergonomics program but also the plant layoffs and the other elements of the health and safety system in the factory:

When we first started this we were between six and eight hundred hours a week in light duty costs – indirect costs. And through a combination of three things. ... Part of work also working with them is to let them know that we have to try to find some work for these people and get them on direct work even though we can modify the workstations so that they can do the work which would incorporate some ergonomic interventions and try to come up with some different ways so they are not lifting and bending and twisting. So if we come up the ideas as supervisors where we can make improvements and we'll [ECT] work on them in the group if necessary to make improvements getting them to do direct work rather than [can't understand] So, that month after month after month we could see that that was getting better.

Another indicator that the company's approach to health and safety was improving was that it scored high on an external review of its occupational health and safety (OHS) program. Because the company had high injury rates, it was subject to a WorkWell audit.²⁶ In this audit, carried out by a WSIB assessor, a company's OHS program is reviewed and if improvements are required, these are stipulated and then an inspector returns six months later to see if these recommendations for improvements have been acted on. The company successfully passed both audits; part of the reason for this, according to the OHS manager, was the plant's ergonomics program that was reducing risk of injury.

7.8 DISCUSSION

The chapter began by describing the difficulty encountered when a group attempts to satisfy multiple social worlds that may have interests that are inconsistent with its own. Despite the changes that the ECT made, the participatory ergonomic program was not accepted by management in Courier Co. as a worthwhile way to address OHS concerns. Support for the program's maintenance, strong in the beginning, receded over time and management was unprepared to provide for its continuance. Conversely, in Furniture Co., support grew over time and management accepted the PE program as an important means of addressing high OHS costs. The chapter's findings demonstrate how the programs' sustainability differed and how these variations were related to (a) the ECTs'

²⁶ In Ontario a WorkWell audit is conducted if a company routinely has an unsatisfactory health and safety record. See <http://www.wsib.on.ca/wsib/wsibsite.nsf/public/Workwell> . The consequences of failing the audit on the return visit by the assessor are considerable. If a company fails the second review, its principal annual insurance premium can increase from anywhere between 10%-75% in addition to already imposed surcharges.

capacity to make a case for PE program continuation and (b) the organizational and broader social context in which the programs were embedded.

In both settings, actors' perspectives in different social worlds played a role in shaping program continuation. The physical demands on workers were lessened through the ergonomic change teams' activities. The reduction in the physical demands on workers in Courier Co. did not, however, coincide with a discernable drop in lost-time injury rates. As a result, management did not deem the PE program a success. Congruent with a negotiated order perspective (Strauss, 1978; 1993), alignment of the PE program's aims with the perspectives of multiple social worlds was necessary. Management wanted to see that there was some impact on lost-time injuries for the investment in PE. This made making the case for the PE program's utility difficult for the ECT in Courier Co. as it was unable to address those concerns.

The findings concerning how the PE program results were evaluated based on reductions in lost-time injury rates draw attention to the connection between what is interpreted as positive OHS program outcomes and the external regulatory environment. Managements' decisions about the PE programs' continuation were shaped by the prevailing occupational health and safety regulatory context, which emphasizes evaluating an OHS program's viability by the extent to which it reduced lost-time injury rates. Moreover, judgements about the PE programs' worth were affected by concerns related to OHS investment; specifically, minimizing this investment. This finding is congruent with Walters' (1985; see also Hall, 1993) contention that managers' choices concerning workplace hazards are embedded in the structural contradictions between capital's interests and the promotion of and investment in health and safety.

Another finding is that the strength of the efforts to maintain the PE programs by the ECTs differed markedly. The ECT in Courier Co. did not demonstrate to the company that it was a viable part of the health and safety system and could provide a good return on investment. Part of the reason for this was worker representatives' reluctance to take their case for PE program continuation to management; the main reason for this was their lack of influence. In contrast, in Furniture Co., the OHS manager and plant manager pursued ways of integrating ergonomics into the company's OHS system. They did this in three ways: they attempted to promote awareness about the PE program, they proceduralized the program, and they established PE as complementary to the plant's OHS programs, and specifically its Return-to-Work program. Moreover, they aligned participatory ergonomic program goals with key organizational objectives, in particular the reduction of health and safety costs. As a result, the PE program was considered by management as one way to address high OHS costs.

The findings regarding the differential outcomes in the programs are consistent with some of the factors identified in the public health literature that support sustainability (Goodman and Steckler, 1988; Nilsen *et al.*, 2004; Schreir, 2005). Three factors identified in this literature are particularly relevant to the findings here: a program needs to be (a) seen as fitting with an organization's goals, (b) advocated for by program supporters, and (c) producing benefits for an organization that are apparent to key organizational benefactors. In Courier Co., according to management, the program did not converge with the organization's goals, there was little campaigning on the part of the ECT for the program's continuation, and the benefits of the program were not immediately apparent to key managers. Conversely, in Furniture Co., the PE program

was aligned with the organization's cost-saving goals, advocated for by the ECT, and especially the OHS manager, and recognized by senior managers as benefiting the plant.

Consistent with the literature that points to influences on the sustainability of health programs from sources external to an organization (Buchanan *et al.*, 2005a; Pluye *et al.*, 2004; Shediac-Rizkallah and Bone, 1998), the organizational environment played an important role in creating the conditions under which the ECTs' functioned. The experience-rating system affected management's orientation to the PE programs in dramatically different ways. In Courier Co., the company sought to handle its injuries in a different way than through the PE program. In Furniture Co., the ECT was able to align its interests with larger company objectives. The findings highlight the importance of examining the influence of government health and safety policy on programs which may be enacted within workplaces. These findings also suggest the importance of attending to the unintended consequences of policy on programs such as OHS.

The regulatory environment was also important in terms of its influence on multiple levels of management in Furniture Co. In Furniture Co., the PE program's relevance was enhanced when pressure was put on local management by senior management, who were reacting to the poor health and safety record and attendant surcharges from the province's compensation board. The company also sought to accommodate injured employees, an objective that restructuring and lean manufacturing made more difficult because they reduced the number of positions in which workers could perform light work. These factors, related to the regulatory environment, gave the problem of soft-tissue injuries more legitimacy and contributed to management's decisions to continue supporting the PE program as they saw it as one way that injuries

could be addressed. The ECT's capacity to alter workstations so that modified-duty workers could be accommodated and perform value-added work enhanced the PE program's legitimacy.

In Furniture Co., senior managers felt that the PE program decreased injury numbers and that the program contributed to the improvements in the plant's health and safety record. The PE program's positive impacts encouraged management to maintain the program, despite its slow start. In particular, the PE program enhanced the company's capacity to decrease the financial costs by reducing modified-duty hours. This status gave the ECT the recognition and resources it needed to continue. In sum, management's continued support of the participatory ergonomic program was linked to the local context and broader regulatory climate and the alignment of the ECT's and organization's objectives.

One of the central ideas underpinning Ontario's regulatory environment is that safety pays, or that if organizations attend to health and safety they will benefit financially. A key aspect of the safety pays approach is experience-rating. As Thomason and Pozzebun (2002: 287) explain

The link between the employer's claims experience and workers' compensation assessments provides employers with incentives to reduce the frequency and severity of claims. Broadly speaking, there are two ways in which employers may do this. They may improve the health and safety conditions at the workplace, which reduces the probability that worker will suffer a workplace injury or disease and possibly the severity of injuries that do occur. Alternatively, firms may engage in a variety of practices known as *claims management*, which reduce the cost of injury or disease without necessarily affecting workplace health and safety. (emphasis in original)

Both of the companies engaged in claims management. Experience rating did not encourage Courier Co.'s management to continue the PE program, which was intended to address the source of injury. In the final months of the PE program, management was in the process of adopting a large-scale return-to-work program: a claims management approach to reducing OHS costs. In Furniture Co., management was interested in claims management as well, and in addressing this accommodated modified-duty employees. However a feature of their approach was to address the source of injury through the ECT's activities, enabling modified-duty workers to perform value added tasks. That the companies engaged in claims management is consistent with literature on experience-rating (Kralj, 1994; 1995; 2000; Thomason and Pozzebon, 2002).

The different outcomes between Courier Co. and Furniture Co. are partly attributable to whether the ECTs could demonstrate they were addressing health and safety costs. In Courier Co. there were no indications that the PE programs were reducing OHS costs; conversely, in Furniture Co., management saw the program saving OHS costs. These companies' different reactions to the regulatory environment highlight that local circumstances mediated how the experience-rating system was translated within the organizations. The complex interactions between internal and external conditions, multiple, competing valuations of the OHS programs, and different actions by the ECTs that led to the differential outcomes in the workplaces are in accord with the findings of Buchanan *et al.*'s (2005) survey of sustainability studies. They (203) note,

No simple prescription for managing sustainability emerges from this review. However it seems appropriate to recommend strategies sensitive to context, complexity, ambiguity, uncertainty, competing stakeholders and to the range of potential interlocking influences. It is also evident that sustainability depends on a

number of externalities beyond direct management control and manipulation.

Given that unions are generally supportive of initiatives to protect workers' health (e.g., Becker and Morawetz, 2004; Johansson and Partanen, 2002), it was unexpected that they did not get involved in efforts to sustain the PE programs in Courier Co. or Furniture Co. In Courier Co., the union steward was on the team, saw the ECT and PE program as a good thing and was upset about its demise. Nonetheless, he did not make efforts to alter the course of the program. Perhaps there was no protest from the union in Courier Co. because it saw the program's discontinuation as another example of program that had been started and then discontinued as so many other programs had in the past and therefore felt that protesting the PE program's cancellation would have been futile. In Furniture Co., perhaps the absence of involvement of the unions was due to the fact that the PE program was receiving continued support from management and no union assistance was required.

Chapter Seven described the challenges that the ECTs encountered while attempting to ensure the PE program continuation. In Chapter Eight, the dissertation's significant findings, lessons for practitioners, and future research directions are discussed.

CHAPTER EIGHT

DISCUSSION AND CONCLUSION: ENCOUNTERING LIMITATIONS AND OVERCOMING OBSTACLES

8.0 INTRODUCTION

This dissertation examines two participatory OHS programs designed to reduce the incidence and prevalence of work-related musculoskeletal disorders. Employing direct observations recorded over the course of the programs and interviews, I examined the participatory ergonomic (PE) programs. The dissertation addressed the following research questions: What actions were undertaken by individuals to ensure the PE program's functioned and continued? How did the organizational and societal context enable or constrain, the pursuit of PE program activities? Considering the influence of both the actors and the structural conditions in the settings, the dissertation's analysis draws on insights from negotiated order and critical theory frameworks.

This chapter discusses some of the key findings in light of the theoretical lens that guides the analysis as well as some of the literatures relevant to the dissertation. The chapter begins with a brief review of the theories and a presentation of the key findings. Then I discuss themes that permeate the dissertation's findings. Following that, I consider the issue of the success or failure of the interventions. In the chapter's penultimate section I discuss the dissertation's contributions to the participatory ergonomics literature. A brief discussion of future research directions concludes the chapter.

8.1 RESTATEMENT OF THE THEORETICAL FRAMEWORK

I examined the ECTs' activities using conceptual material from two perspectives. The first is negotiated order theory, which focuses on the micro and macro aspects of

phenomena. Negotiated order considers organizational life as an ongoing accomplishment. In terms of organizational programs, the perspective does not see them as pre-given but as enacted by those in the setting. Negotiated order considers organizational life as unfolding in ways that may differ from stated organizational rules or regulations. Instead it considers these as being ambiguous and possibly unknown to some actors. Even actors who are familiar with rules and regulations may interpret them in different ways. Negotiated order theory presumes organizations are composed of heterogeneous actors whose interests are myriad. In part, because of these diverse interests among actors and that different actors carry out distinct tasks, actors need to forge agreements about how they will achieve goals. There may be, to borrow Strauss' words, multiple "social worlds" in a setting and these worlds may be in conflict. Moreover, actors may have varying levels of interest in a program and therefore treat it with indifference or even resist it. Also, differential distribution of power in workplaces among groups can affect a program's functioning and outcomes.

Critical theory also offered important insights that informed the dissertation. I used critical theory to locate the analysis in the economic conditions affecting the PE programs. The critical paradigm has been used successfully to understand OHS conditions and their alteration. As it applies to OHS, it predominantly considers the influence of structure and economic and political factors involved in the creation of hazards and how and if they are addressed. Using the framework, I consider the important role that the profit motive may play in the realization of OHS intervention goals or health and safety generally (Grunberg, 1983; Littler and Salaman, 1982; Nichols, 1997). The critical paradigm also presents a framework for understanding labour and

management's asymmetrical access to resources that affect their power, and, in turn, how differences in power affect the capacity of each to alter the workplace. With respect to OHS, the paradigm highlights the differences in resources among groups within workplaces. It also considers the role of the economic conditions that shape the decisions of management; most importantly, about production. Finally, it highlights the fact that management and worker interests are not always shared when it comes to health and safety concerns.

By considering an organizational change program from negotiated order and critical perspectives, the dissertation focuses on how individuals and groups carry out activities that are required to achieve program goals. These activities entailed establishing and maintaining the arrangements that these programs relied upon to function. To describe how these arrangements were forged, I looked at the actors' interactional strategies, or the means employed to advance agendas, such as persuasion (Strauss, 1988; 1993, Strauss and Corbin, 1993).

8.2 RECAPPING THE FINDINGS

Chapter Four explored how different types of and access to knowledge affected both the levels of worker participation and the solution design process. Workplace features such as design parameters, production pressures, the nature of the knowledge required to design solutions, and the differential distribution of that knowledge among workplace personnel, influenced involvement and solution design.

In keeping with the precepts of participatory ergonomics (Wilson *et al.*, 2005), the teams drew heavily on workers' knowledge of the production process and combined this with ergonomic knowledge in their attempts to effectively address musculoskeletal

disorders. Having been provided with an introduction to ergonomic principles and task analysis techniques, the ECT members recognized hazards and incorporated worker knowledge of job tasks into their thinking. Workers' experiential knowledge, although crucial to understanding job tasks was, at times insufficient to devise solutions. This had important consequences on workers' involvement during solution building. In the case of Furniture Co., in the intervention's initial months, because the development of solutions required more specialized technical knowledge than was available to the ECT, ECT members had great difficulty designing practicable solutions to address hazards. In part, this was because the vast majority of changes involved alteration of the production process which was mechanized and production flow interdependent, so the ECT needed to consider in its solution design many features of the production process, such as the movement of parts and functionality of machinery. Conversely, in Courier Co., the nature of the labour process involved predominantly manual hand tools and only infrequently required that the team engage in complex tasks such as integrating or altering machinery.

In Furniture Co., the team's capacity to generate workable solutions was vastly improved when the maintenance manager and production manager were brought on to the ECT because of their formal training and practical knowledge of machinery, production processes, and factory layout. However, their increased involvement diminished the participation of the worker representatives in the design process.

Chapter Five described the ECTs' activities when trying to address the hazards they had identified and created solutions for. In both settings, the ECTs' difficulties securing permission from management to carry out changes and lack of budgetary

authority led to protracted change initiation and implementation processes and, on occasion, resulted in no change at all. The sources of this problem differed for each setting. In Courier Co., the problems resided primarily with the fact that senior managers were located outside of the depot but had authority over the depot's work processes and equipment. In Furniture Co., it was middle management who either resisted or were indifferent to the ECT's recommendations and therefore impeded the ECT's implementation activities for the intervention's first 12 months. Protracted processes of change implementation led to a set of common consequences in both settings: frustration among team members and questions from managers and non-ECT workers in the facilities about the ECTs' slow progress.

The ECTs reacted in different ways to the problems that they encountered. In Courier Co., the OHS regional manager, and to a lesser extent, other team members employed a set of interactional strategies to secure management's endorsement for changes. In Furniture Co., the OHS manager and the plant manager recruited the maintenance manager and production manager onto the ECT and secured their cooperation. Although change making progressed more smoothly with the presence of the production manager and maintenance manager, it was not without its problems. The OHS manager still had to shepherd ergonomic changes around some roadblocks after the managerial personnel's enlistment.

Chapter Six examined the ECTs' division of labour during the change process. Implementation tasks were unevenly distributed across members, with management personnel typically carrying them out. The ECT members' stances, or their perspectives on who would have success in carrying out implementation tasks, profoundly affected

who came forward to act. The workplace's hierarchical nature and members' understandings of the typical relations of production contributed to their perspectives and subsequently to the division of labour.

Chapter Seven discussed the fate of the PE programs. Like so many organizational programs that are short lived (Beer and Nohria, 2000), the PE program in Courier Co. was discontinued after approximately 30 months. Conversely, in Furniture Co., at the conclusion of the research, 48 months after it had started, the PE program was still operating.

Senior management in the settings took different attitudes toward the programs' sustainability. In Furniture Co., senior managers were supportive; conversely, in Courier Co., senior and local managers were not. In Courier Co., the national health and safety manager did not consider the program to have achieved valuable results. Primarily interested in whether the program reduced the depot's lost-time claims, this manager did not support the continuation of the program. In Furniture Co., WSIB surcharges and plant restructuring prompted management to continue to invest time and money in the PE program.

In neither company were the programs evaluated based on whether they were having a positive effect on worker health, as reported by workers' self-reports of pain.²⁷ Instead, a key criterion in management's thinking about the PE programs' continuation was that they should reduce the lost-time injury rates. I suggest that the experience-rating system's emphasis on the importance of reported lost-time claims for assessing the utility

²⁷ However, in Courier Co. the research team examined the PE program's impacts on workers' self-reports of pain. The results of this analysis are reported in Rivilis *et al.*, 2006.

of a prevention strategy diminished the significance attached to other criteria, such as worker self-reports of their health. These regulatory conditions affected management's orientation toward OHS and willingness to continue the programs in each setting, although in markedly different ways.

In both of the settings, managers' decisions about program continuation can also be linked to the fact that the partial self-regulation model of OHS legislation in Ontario does not specify what companies should do to reduce high lost-time rates (Nichols and Tucker, 2000; Storey and Tucker, 2006). As a result, managers are relatively free to decide how they will endeavour to ensure their companies stay under the average injury rates for their industry sector. They may choose to engage in short-term claims management practices without addressing the sources or primary causes of injury. Importantly, the ways that management choose to address injury did not necessarily focus on addressing root causes of MSDs.

The ECTs varied in the ways that they sought to continue the PE programs. In Courier Co., the ECT did little to push for the PE program's continuation. Worker representatives supported the program, noting it had achieved some successes; however, they did not petition management for its continuation, citing the fact that their opinions would do little to sway management. The OHS manager assisted the ECT into its twenty-eighth month, but at the national health and safety manager's direction, ceased championing the PE program after that point. Conversely, in Furniture Co. the OHS manager pushed strongly to ensure that middle and senior managers understood the PE program's relevance and that the program was integrated into the plant's health and

safety management system. She strove to have the PE program recognized as supplementary to other programs as well as worthwhile for its own sake.

8.3 REVIEWING CROSS-SITE THEMES

In my description of the cases, I did not adopt a standard set of dimensions upon which to compare the settings. Instead, in each of the findings chapters, I looked at the two cases independently and discussed some of the relevant similarities and differences between them. In doing so, I endeavoured to minimize the chance that an important distinguishing feature might be ignored, downplayed, and/or rejected. I hoped to allow salient elements to be given the attention they deserve, thus contributing to the validity of the overall study's results. In this section, I turn to a more extended discussion of the common themes that arose across sites.

8.3.1 Participatory Ergonomics Programs Unfold in a Social Context

Scholars such as Collins (1998) and Dawson (2003a; 2003b) suggest that organizational change programs do not exist independently of the dynamism that characterizes organizational life: scarcity of resources, multiple and conflicting interests, and the capacity of actors to hinder or facilitate a program's functioning. Rather, elements such as these shape programs over time. The PE programs were conditioned by actions of those within the settings as well by organizational and societal conditions. In particular, the study demonstrates how the PE programs were affected by discrepant interests, power, and the actions of "interested parties," to use Strauss' (1993) terminology.

Agreements regarding how the PE programs would operate were in place at the outset of the interventions: the arrangements were made with management for time and

finances; the teams were composed, were trained in ergonomics and were assisted by an ergonomist-facilitator for more than a year and a half; and the ECT had a plan to follow in the form of the blueprint. However, some key elements of the agreements concerning the support the programs would receive were challenged in practice. The teams' design, implementation, and continuation activities changed markedly over time as contingencies arose and the ECT members responded to these. Alterations to the way the ECTs operated over time are consistent with Strauss' (1988: 163) line of thinking:

Projects characteristically have narrative histories: they evolve over time. While that evolution may entail the alteration or elaboration of the original goal or goals, the work and the work itself and the work relationships of project members do develop over time. Hence their efforts to achieve and maintain the "fitting together" of their work are permeated by temporal considerations. Any analysis of the "fitting together" must take that temporality into consideration.

Structures in the settings had erosive effects on some agreements, which in turn influenced the PE programs' functioning and continuation. For instance, the production imperative limited the available time to carry out changes. Additionally, the uneven distribution of power played an important part in the ECTs' attempts to make changes. This was manifest in management's control over the time that actors could devote to the programs and affected how implementation activities proceeded. Variations in actors' perspectives regarding the importance they deemed health and safety and PE influenced the programs. In particular, PE program support differed among different managerial levels and responsibilities. Conditions internal and external to the organizations, such as production pressures, managerial indifference and resistance, and economic imperatives all shaped the programs. One of the main consequences of these influences was that participants continuously faced contingencies, such as scarce resources, which they

responded to by attempting to “work things out” in order to meet PE program goals. Ultimately, the programs did not function according to plan or the precepts of participatory ergonomics alone; rather, they operated as a product of ongoing arrangement making of the ECTs within their organizational and structural contexts. These findings align with the literature referred to in the dissertation’s introduction, which suggests that organizational change is fundamentally social, emergent, and processual (Dawson, 2003a; 2003b; Dawson, 2005; McLoughlin, 2005; Thomas, 1994).

The findings also point to the micro-politics of change or individuals’ activities directed toward making change and continuing the programs. The significance of these factors converges with the insights of the negotiated order framework (Fine, 1996; Garrety and Badham, 1999; Strauss *et al.*, 1985). ECT members’ understandings that the programs were not operating effectively motivated them to alter course and modify their operation. For instance, the slowness and ineffectual functioning of the teams’ implementation of changes prompted them to adjust their activities accordingly. The ECTs’ reactions to the contingencies they faced and their ability to create new ways of operating highlight the local creativity that shapes organizational programs. The next section explores some specific instances of the dynamics of micro change by examining change work.

8.3.2 Activities Involved in Making Change

Regarding change making as interactional directs attention to the arrangements participants make in order to ensure program goals are accomplished. The findings demonstrate the practice of change as a product of agreements sown and maintained among various heterogeneous groups in the settings, each with their own interests and

perspectives. Agreements amongst the groups often resulted from the interactional strategies adopted by the ECTs. I submit that in the same way that the production of art (Becker, 1974; 1982), theatre (Lyon, 1976), science (Fujimura, 1987; Sundberg, 2007), and policy (Hall and McGinty, 1997; Prus, 2003) are wholly reliant on a number of actors' collaborative endeavours, so too is making workplace changes. Admittedly, the idea that accomplishing program goals requires group collaboration is not news; indeed, it might even be a sociological truism. The analysis of organizational change is not merely about identifying the multiple parties that are involved; it is also about examining what these people are doing, the agreements that they construct among themselves about a course of action, how these are maintained over time, and the conditions under which these understandings can be reached.

As Strauss (1988) has pointed out "fitting together" lines of action involves getting people moving toward a common objective. Gathering material resources, coordinating who would physically carry out a change, scheduling time to meet and design changes, and getting permission to alter the workplaces were all practices of making change that typically required the involvement of multiple individuals and interactional strategies, such as persistence. In various ways, making change was about the continuous forging of arrangements and aligning the different activities that needed to be carried out, to ensure that organizational change was possible with interactional strategies that would promote change work.

The dissertation provides insight into the interactional strategies used to meet the goals of an organizational change program. To overcome the roadblocks they encountered, the ECTs, in Prus' (1999: 167-208) words, "engaged in a tactical

enterprise.” Recall that Chapter Five examined how the ECTs drew on a number of strategies to overcome problems with managerial indifference and resistance to the team’s recommendations. For example, persuasion was used at times. In other cases, the ECTs used persistence and in still other cases, they used allies by enlisting others who had influence in the setting. Frequently, more than one strategy was used simultaneously. In Furniture Co., much of the team’s energy was directed to attempting to institutionalize the PE program in the company. In this effort, the ECT drew on a wide array of tactics such as educating personnel about the benefits of the PE program, drawing attention to the ECT’s accomplishments and goals, promoting the complementary nature of the programs to already institutionalized OHS programs, and what the OHS manager referred to as, “proceduralizing,” or formalizing the ECT’s activities so they would be readily integrated into the company’s policies.

The ECTs’ activities highlight that change making was a political venture. The complexity of these activities is consonant with Strauss’ (1993: 92) comments:

To actors themselves, the working out-process appears to be a series of strategies and counterstrategies aimed at convincing, educating, discussing, negotiating, threatening, extracting, demanding, and/or dominating. By interacting strategically, they are attempting to shape the specifics of a given arrangement, thus to exert control over the work, resources, and working conditions.

Treating the PE programs as negotiated orders foregrounds the interactional strategies involved in the establishment, maintenance, and occasional re-establishment of agreements. Evidence of the politics that are involved in health and safety is found in other studies, although many of these do not focus on micro dynamics of organizational life per se. Walters *et al.* (1995) discussed some of the ways that joint health and safety committee members go about pushing the health and safety agenda. Gray (2002)

highlights the strategies workers undertook to ensure their safety while avoiding confrontation with management around the right to refuse unsafe work. More recently, Hall *et al.*, (2006) illuminated the activities carried out by joint health and safety committee members as they attempted to gather information about health risks, which could be used as resources in the struggle to alter the workplace. These studies and the dissertation's findings remind us that making change involves interactional work.

According to Strauss (1993:89):

Interaction refers first of all to the articulated collective act of work performance. Interaction also refers and [sic] to the strategies used in working out the arrangements that allow for the articulation of those collective acts within any given structural /organizational context.

8.3.3 Moderated Autonomy

There were very few attempts by ECT worker representatives to participate in implementation activities. Generally, the division of labour during implementation mimicked the typical relations of production in that worker representatives did not take on tasks that were usually carried out by management, such as ordering equipment from suppliers. Similarly, we saw that the change team's worker representatives in Courier Co. did not attempt to negotiate with management about extending the PE program's tenure, in large part because they doubted the likelihood their efforts would be successful. In both settings, worker and managerial representatives felt that using worker representatives for implementation activities would have delayed the process and reduced the probability of success. Organizational hierarchies structured which personnel carried out the integration of the ECTs' preferred changes. In particular, ECT members' perspectives concerning the success they would experience in articulation work affected what they offered to undertake. Prus' (1999: 167-168) comments on tacticians are

helpful in understanding both management representatives' assumption of the majority of tasks and worker representatives' reluctance to undertake certain tasks:

it is important to recognize that people may engage human targets with a wide range of stances. Thus, tacticians may sometimes envision themselves as exceedingly advantaged relative to the other, as implied in notions of being in total control, being resource-laden, having authority, being revered, or being able to apply extended sanctions to the other. At other times, tacticians may see themselves on comparatively equal grounds relative to those they encounter, or they may see themselves as both advantaged and disadvantaged relative to the targets they plan to engage. In still other instances, tacticians may view themselves as greatly disadvantaged or essentially powerless relative to prospective targets.

Chapters Four through Seven provide examples of the conditions, at multiple levels, that shaped the ECTs' activities. The ECT members encountered constraints in various forms and were compelled to circumvent these to achieve their goals. For example, the production imperative shaped management's willingness to invest time to the projects. The low priority that OHS was given in the settings affected the ECTs' functioning. The OHS regulatory climate also had a role in shaping the PE programs. Additionally, the physical environment affected the level of difficulty of the changes that the ECTs sought to make. In examining these concerns, the dissertation provides evidence that social life is nested amidst local physical structures and the local and larger societal structures.

Consistent with the negotiated order approach, negotiative activity evolved within an organizational and broader context (Fine, 1994; Hall, 1997; Maines, 1982;

Maines and Charlton, 1985; Strauss, 1978:248-254).²⁸ A number of studies have examined the limitations that mark negotiations in different settings. In their comparative study of the functioning of school boards, Hall and Spencer-Hall (1982: 344) noted that negotiative activity was linked with a number of organizational-level conditions:

(1) the nature and organization of operational tasks; (2) the organizational size and complexity; (3) the distribution, use, and effectiveness of power; (4) the leadership and administrative style; (5) the degree of organizational change; (6) the nature and relationships of organizational personnel; and (7) the number and significance of organizational problems.

In his analysis of restaurant workers, Fine (1996: 3) notes that the influential backdrop against which human action plays out goes beyond the organizational level:

People are able to define situations but these definitions have consequences. For organizations, ecology, political economy, and authority hierarchy have this character. Micronegotiations that are so compelling to interactionists are organized by an obdurate, enveloping reality. To understand persons and their settings, we must oscillate between their “free” acts and the larger environments in which these actions occur.

The findings regarding the constraints on the ECTs’ functioning are also consistent with those found in studies of joint health and safety committees (JHSCs)²⁹ (Lewchuk *et al.*, 1996; Milgate *et al.*, 2002; Tucker 1995; Walters, 1987; Walters, 1985; Walters, *et al.*, 1995; Walters and Nichols, 2006). A common thread in these studies is that JHSC activities played out under circumstances in which the committees had limited influence or authority to take actions independent of management. In the present

²⁸ Or, in Strauss’ (1978) words, “negotiative,” “organizational,” and “structural” contexts.

²⁹ The findings of the dissertation also converge with some studies in the PE literature, which have found that management commitment is integral to the success of PE programs (Fulmer *et al.*, 2006; Laitinen *et al.*, 1997; Motamedzade, 2003; Van Eerd *et al.*, 2008; Whysall *et al.*, 2006; Westlander *et al.*, 1995) and the OHS literature more generally (e.g., Shannon, 2000).

analysis, an uneven power distribution in the workplaces manifested itself perhaps most significantly in management's control over the means of production and lack of worker participation in addressing health and safety, both of which affected the ECTs' functioning. The findings highlight that for some managers OHS was not a priority compared to other concerns in the settings, in particular production. As a result, the process of change making was often slowed. Tucker's (1995: 256) words well summarize what bodies such as JHSCs and ECTs are up against in terms of the imbalance of power:

Management guards its control over basic investment decisions, including what, when, where and how to produce. JHSCs have been unable to change these prerogatives and are unlikely to be able to do so unless there are dramatic and unexpected changes in the direction of more economic democracy.

The findings in this study support Tucker's assertion that "management guards its control" over the production process. However, the findings presented here also indicate that managerial control varied; the ECTs had some room for manoeuvring. The latter point is consistent with Shain's (1999: vi) argument that OHS is the only domain in which management rights, as laid down in common law, can be encroached upon at all. Management was more protective of some features of the production process than others. If the ECTs' activities did not interfere with production they more often were able to carry on. Further, management exercised control by limiting what the ECTs' could spend. There was money to invest in changes though management was reluctant to relinquish budgetary control; they preferred to oversee the financing of the ECT's projects rather than giving the ECTs a pool of company money and the discretion to spend it as they required.

An important element of the dynamics of organizational change explored in this dissertation is that the changes the teams sought to make often were somewhat removed from what management deemed most important. Generally, the teams were “free” to design the solutions that they felt best suited the ergonomic problem that they aimed to address, so long as this did not interfere with production. One expects that if the ECTs proposed changes that significantly threatened to decrease capital accumulation then there would have been more management resistance.

The interventions highlighted the importance of management’s control over the production system. The ECTs did not have authority to change what they reasoned should be changed without first consulting with management. This consultation was, at times, a drawn out process and, at other times, an unsuccessful one. Under current conditions, workers’ reports of pain, injuries and illnesses are generally insufficient to alter the production processes. A similar problem has faced, and continues to face, joint health and safety committees since their widespread introduction in Canada and other jurisdictions in the 1970s (Tucker, 1995; Walters *et al.*, 1995; Walters, 1985, Walters and Nichols, 2006). Under current legislation these committees often do not have adequate power to intervene in the workplace and management can ignore their recommendations. The problems that bodies such as ergonomic change teams and joint health and safety committees encounter reflect the link between ownership over the means of production and ownership over the means of prevention. Workers’ and non-production managers’ lack of ownership over the means of production makes it difficult for them to control the means of prevention.

8.3.4 PE Programs: Creating and Partitioning Participatory Spaces

One of the key concerns underlying this analysis is worker participation: what it entails and how it is enabled and constrained. Participation can be examined along different dimensions. There is both shallow and deep involvement in participatory programs. In some PE and OHS interventions a practice is to consult with workers, with no, or at least few, provisions for following up on those consultations. Others attempt to fully involve workers in the processes of identifying hazards, designing solutions, and implementing those solutions (see Moir, 2005 for a discussion of this). St. Vincent *et al.*, (2006: 125-127) provide a detailed description of how they attempted to involve workers and managers in a series of PE programs. Participation can be looked upon as a staged continuum, such as the one provided by Tybjerg Aldrich *et al.*, 1995 (cited in Jensen 1997: 1079-1080). These authors describe five stages of involvement: “(1) consultation, (2) active involvement in gathering information about injuries’ causes and how to address them, (3) development of a strategy to address injuries, (4) recommendations regarding the best solution, and (5) implementation of a change.” In the settings examined here, the ECT members were quite involved in stages one, two, three, and four, although less so in stage four at Furniture Co. In both settings, worker representatives had limited involvement in stage five.

In this study, as mentioned above, participation varied based upon the stage of change making that the ECT was undertaking; in some stages, the ECT members had more involvement than in others. In large part, the examples of limitations on worker representatives’ participation can be connected to the underlying problems of differential access to knowledge and material resources, which was linked to the division of labour within the facilities, and managerial control over the production process.

Focusing on the different ways in which workers and others are involved in the participatory OHS programs and how they contribute may reduce the ambiguity that presently exists around the notion of participation (Granzow and Theberge, 2009). It may force us to ask whether worker representatives are merely sources of information or sharers and appliers of their knowledge. Investigations of these concerns will get us closer to understanding how participation actually is enacted in practice. Is participation the equivalent to being involved in all the stages of change making? Is it having the responsibility and the necessary power to not only identify hazards and design solutions to address them but also implement these changes? Is participation episodic and dependent on what stage of change a group such as an ergonomic change team is working through?

George Strauss (2006: 779) helps to answer some of these questions by distinguishing between involvement and influence:

For me the distinction between “influence” and “involvement” is significant. Involvement is often passive; influence is active. I may be involved in a sporting event or a good book; I don’t influence them. Many forms of “financial participation,” such as stock options, may involve workers, but make no provision for them to exercise influence.

In this study, as noted above, worker representatives’ opportunities for influence varied based on the stage of change making in which the ECT was engaged. For instance, for implementation tasks, worker representatives were in a position of involvement rather than influence, if Strauss’ distinction is used. Research that conceptualizes participation as involvement and influence and then examines the conditions, which enable involvement and/or influence is central to furthering our understanding about participation in OHS programs.

8.4 MANAGEMENT

Management support was crucial for the PE programs to function, which is consistent with other studies on OHS (e.g., Shannon, 2000). Support among managers varied on a number of counts. Discrepancies in support among managers are partly attributable to the fact that managers have diverse responsibilities, they have limited time to attend to these, and they have to attend to pressures from changing organizational conditions, all of which may affect their willingness and capacity to support organizational change programs, such as PE.

The dissertation's findings demonstrated that managers were embedded in organizational and societal contexts that made maintaining their long-term support for the program difficult. Significantly, there were competing demands placed on managers to both maintain production goals and support the PE programs. Often, the needs of the program were subordinated to those of production. The finding that managers face choices between attention to production and other concerns, such as health and safety or ergonomic programs is consistent with evidence in the literature on organizational change (e.g., Balogun, 2003; Harley *et al.*, 2006).

Additionally, as I noted earlier in the dissertation, there were differences in power among managers. Generally, managers who are involved closely with production have more power than non-production managers, such as those in human resources and occupational health and safety. Those managers with less power have less ability to undertake activities, such as the marshalling of resources, required for organizational change programs to function or continue (e.g., Dawson, 2003b). Generally, OHS managers have a weak power base and because of this have difficulty addressing health

and safety concerns (e.g., Fulmer *et al.*, 2006; Garrigou and Piesel-Cottenaz, 2008; Perrow, 1983). In part, their lack of power is explained by the fact that the activities they oversee are non-essential to production and this affects how other managers respond to their concerns.

The dissertation also shows that notwithstanding their limited power base, OHS managers played a crucial role in the activities of the ECTs, frequently pushing the teams' agendas forward. The OHS managers were able to use interactional processes, such as persistence and lobbying, to advocate for ergonomic changes. Such findings show that actors who do not possess institutional power can nonetheless affect the operation and outcomes of programs, such as ergonomics initiatives. These findings contrast with evidence in the literature, such as Fulmer *et al.*, (2006), concerning OHS managers' lack of influence regarding their recommendations to address occupational health and safety matters.

A detailed examination that focuses exclusively on the strategies that managers might use to advance OHS goals would contribute to improved understanding of how OHS programs evolve. One research direction of possible interest is to examine how OHS managers' activities are influenced by different organizational contexts; for example it would be of interest to examine differences between organizations that predominantly attempt to reduce injury numbers by addressing the sources of injury and organizations that for the most part intend to reduce OHS costs through claims management. Another possible avenue of research is to examine the broader conditions that influence managers' actions. For instance, in jurisdictions, where MSD legislation is present, such as British Columbia, the legislation may influence managers' choice of

strategies to reduce MSDs and the outcomes of these efforts. Does the presence of MSD legislation enable OHS managers to make a stronger case to other managers for investment in measures to reduce injury?

8.5 UNION INVOLVEMENT IN THE PARTICIPATORY ERGONOMIC PROGRAMS

Nichols (1997) notes that the presence of unions can counteract management's unilateral control over health and safety. Empirically, Nichols' argument is buttressed by studies that demonstrate joint health and safety committees (JHSCs) function more effectively in unionized workplaces than non-unionized settings (Reilly *et al.*, 1995; Walters, 1996). In both of the workplaces examined in the dissertation the unions were involved in the agreements struck with management at the outset of the PE programs. However, they figured little in the story of how the interventions unfolded. The literatures on organizational change and JHSCs offer some insights into why unions do or do not get involved that may help understand their non-involvement in the settings examined here. Drawing on this work, below I discuss possible reasons why the unions were largely uninvolved in the period following ECT formation and reflect on some actions the unions may have undertaken had they been more involved.

One possible reason for the unions' lack of involvement after the initial phase of the intervention was that labour never came to see the PE programs as related to its interests. In some other settings in which OHS programs have been attempted, the fear that labour's interests were infringed on became a hurdle to program functioning; indeed, in some cases it threatened to derail the projects entirely. St Vincent *et al.*, (2001) recounted how labour-management relations prevented ergonomic teams from functioning effectively. Yassi *et al.* (2004) reported that trust between union and

management also affected a participatory health and safety program in the health sector. The broad societal context influenced their project in that recently introduced government legislation “allowed employers to reframe or dismantle existing contracts, close all or parts of hospitals and lay off workers” (459). Under these circumstances, labour did not trust management’s motivations for adopting the project and accordingly did not act cooperatively. In an OHS intervention in a newspaper setting, Rosecrance and Cook (2000: 261) observed that worker and manager committee members were initially skeptical about each other’s motivations for participating as there was a history of acrimony between the two. In Rosecrance and Cook’s study, over time, as ergonomic changes were made, relations within the committee improved and labour and management came to an understanding that the committee’s activities served both groups’ interests. In the above cases, the OHS programs were seen at least initially as a mechanism by which management could further its interests at the cost of workers’. In the cases examined in the dissertation, labour-management relations did not pose a hurdle to the teams’ functioning. Although the trust between union and management at Courier Co. was low and there were lay offs at Furniture Co., which may have made the union suspicious of whether recommendations from the ECT would result in elimination of tasks and jobs and ultimately to laying off more workers, in neither of the settings was there evidence that the PE program was seen as threatening to workers’ interests.

Another possible reason that organized labour did not get involved in the PE programs was because ergonomics was not defined as a central issue, such as wages, or as a threat to other issues that the union was invested in and thus not an issue they wished, or had the capacity to, invest energy and resources. Studies on joint health and

safety activity highlight that union representatives' activities may be shaped by the leverage workers have (Walters *et al.*, 1995). Frost (2000), in a study of a workplace restructuring, concluded that union involvement was contingent on labour's power in the organization. In his examination of a workplace change program, Vallas (2003), evaluating the influence unions had, suggests we need to look beyond whether a union is present in a setting; we need to ascertain whether they were actively involved in program-related activities and if so what specifically their role was.

In the present analysis, if the worker representatives had acted as formal entities working on behalf of their fellow workers, and had they recognized the PE program as a key part of protecting workers' health, they may have advocated for the extension of the program in their collective agreement. They may have also sought to set-up a union-based ergonomic training program in which workers were educated about MSD hazards (e.g., Becker and Morawetz, 2004; Rosen, 2005). Additionally, the union could have offered "politically-active representation," in the words of Hall *et al.* (2006), and confronted management on a range of concerns about the program such as management's failure to adequately support the initiative. As politically-active representatives they may have sought to mobilize workers to report any MSD-related pain they were suffering, requested the Ministry of Labour to evaluate employees' exposure to MSDs, and possibly even refused to perform tasks that were exposing employees to MSDs.

Future research may want to examine the relationship between unions and participatory health and safety programs in greater depth with a wide variety of unionized settings. An obvious question is, "why it is in some settings do unions participate actively in OHS programs, whereas in others they do not?" Investigations of this topic

may enable us to understand the conditions under which unions become actively involved in OHS matters. For instance, we could get a better sense of how union participation in OHS programs is influenced by contract negotiation, economic transformations, and the regulatory environment. An additional line of inquiry would explore differences between non-unionized employees and their unionized counterparts in regard to participation in OHS programs. Are there conditions under which non-unionized workforces effectively act to participate in OHS programs? And if so, what are these conditions?

While the dissertation research was carried out in workplaces with organized labour, the vast majority of Canadians are employed in non-unionized settings. Indeed, in Canada, in 2004, 30.6 percent of employees were unionized and this percentage has declined 7 percent since 1981 (Krahn *et al.*, 2007: 364). Workplaces with organized labour may likely have different dynamics than non-unionized settings and by researching both we may develop a more comprehensive understanding of OHS programs.³⁰ Non-union settings may pose challenges to PE program functioning. There is evidence that non-unionized workers are often less likely to report MSDs (Morse *et al.*, 2003) and have more difficulty advancing the OHS agenda than their unionized counterparts (Walters, 2006), both of which may hinder the effective functioning of PE programs. It is difficult to overestimate the importance of power differences in workplaces and the influence these may have on the activities of worker representatives in participatory OHS programs, such as PE. In a non-union setting, workers may have been even more reluctant to come forward, or participate at all, than the worker

³⁰ Polanyi *et al.*, (2005:106-107) point out that researchers need to ensure that understandings of how interventions' unfold are based on studies that involve populations that are representative of the workforce. This includes looking at both unionized and non-unionized workplaces.

representatives in Furniture Co. and Courier Co. Typically, workers in non-unionized settings have fewer protections regarding job security than those in unionized settings and this is likely a source of reluctance to request health concerns be addressed. In these settings, to ensure there is sufficient participation for the PE program to function, interventionists will need to devote particular energy attending to concerns workers may have that discussing OHS matters with management will not negatively affect their employment status and will be considered by management.

8.6 GENDER AND WORKPLACE PARTICIPATORY PROGRAMS

Understanding the dynamics of organizations and the functioning of organizational programs within them can be improved by taking into account the role that gender plays. While the significance of gender was not explored in this dissertation, it is definitely a topic worthy of examination. Organizations often create and maintain policies and practices that channel women into different occupations than men, and different jobs within those occupations (e.g., Messing *et al.*, 1992) and obstruct women's pathways to advancement. Additionally, if we look at other studies on teamwork such as the research by Ollilainen and Calasanti (2007) and Ollilainen and Rothschild (2001) we can see that gender influences task allocation on these teams. A finding in these studies was that men and women's expectations about what tasks were best suited to males and females influenced the division of labour, the form that participation took and, importantly, limited meaningful participation. For instance, in Ollilainen and Calasanti's (2007) research into self-managing teams, they noted that women in their study typically undertook tasks that required interpersonal skills and this had the effect of reproducing women's inferior status and failed to achieve the participative goals of the team ethos.

One topic that may have been explored in the dissertation is the relevance of gender to the division of labour within the ECTs. In both settings, there were both female and male workers; however, in Courier Co., the workforce, especially among couriers, was predominantly male. There were few female managers in the companies. Those women who filled management positions were generally health and safety and human resource personnel. Indeed, only one female manager representative, who came on to the ECT in Courier Co. in its last days, was a production manager. The ECTs' composition generally reflected the make up of the workforce in the settings, although the two worker representatives in Furniture Co. were women. Notably, during the fourth year of the PE program in Furniture Co., these women were laid off and were replaced by male worker representatives. In both settings, the minutes of the ECTs' meetings were recorded and then circulated by women. And, once the ergonomist-facilitator had left the setting, female team members were often responsible for preparing meeting agendas. As I did not follow this line of inquiry I cannot say with any certainty as to why these responsibilities rested with female ECT members.

With the above in mind, one might ask, did the ECTs' female members carry out tasks that are assumed to be better suited for women? For instance, were there assumptions among team members that female members would take on some tasks because they were better at secretarial work? Are female members expected to carry out tasks such as surveying workers in the facilities because they are seen as possessing better interpersonal skills? Both minute taking and surveying workers are important parts of participatory ergonomic interventions but they lack the influence of a position such as chair of an ECT. Future studies should examine the influence of gendering processes on

OHS programs with an eye to how gender may affect the functioning of bodies, such as ECTs, and also how it influences equality.

8.7 EVALUATING THE PARTICIPATORY ERGONOMIC PROGRAMS' OUTCOMES³¹

I have had the opportunity to listen to and to give presentations on participatory ergonomics several times in the past five years. During these occasions I have often felt unease when an audience member asks the “success question,” which is some variant of “So do these programs work?” It is a loaded question. In this section I discuss the sources of my unease which are rooted in the (a) the various criteria for evaluating program outcomes, (b) the difficulties researchers have had determining success or failure even when a single group of “objective” criteria are used, and (c) the potential consequences of labelling these endeavours as unqualified failures or successes.

In reflecting on the PE programs' outcomes one can look at a range of dimensions. Success and failure is not a simple dichotomy (Cole *et al.*, in press). Evaluating whether the interventions were successful may mean examining a range of dimensions including: the number of changes made, whether they were ‘genuinely’ participative, and the extent to which biomechanical outcomes (i.e., the amount they reduced biomechanical loadings) or eventual health outcomes (i.e. reductions in worker reports of pain) changed. Ergonomists, ECT members, management, and non-ECT workers may use different criteria for assessing success or failure. Moreover, there are no definitive answers about whose criteria are best. Workers may rely on what their

³¹ I was hesitant to include a section regarding the relative success or failure of the PE programs as the dissertation's focus is on the process of change rather than on outcomes. In the end, I included the section, but I do not definitively state whether they were a success or not. This determination, I think, is left to the reader.

bodies tell them as to whether they experience less pain or exertion. Management might look at the number of hours devoted to the process, costs of changes and whether injury numbers were reduced. One consequence of this is that satisfactorily meeting the evidentiary requirements of one group may not convince others of the success of a PE program, due to different “cultures of evidence” (Cole *et al.*, 2003).

Using different criteria one can come up with a different answer regarding the relative success or failure of these interventions. A number of observations about the ECTs argue against judging the programs as a failure. If one evaluated the PE interventions based on whether they educated workers about musculoskeletal hazards and encouraged them to view the workplace through an ergonomic lens, then the interventions could be seen as successful. The ECTs received training and effectively identified musculoskeletal hazards with the assistance of workers from the facilities and the ergonomist-facilitator. The ECTs also effectively designed solutions, though this varied over time in Furniture Co. With regard to participation, worker representatives were very involved in both hazard identification and solution building, although generally uninvolved at the implementation stage. So, in terms of involvement, one could point to these outcomes of the PE programs as a partial success. In each of the settings, the ECTs implemented a number of changes and in both settings, the feedback the ECT received was that workers liked the changes and they lessened physical demands.

Conversely, there are a number of indicators that could be judged to demonstrate relative failure. The companies invested large sums of money so that the ECTs could be trained, meet, and then make changes to the workplace. This meant scheduling workers off their regular duties, tying up skilled trades’ personnel, and expending money on

purchasing products or services to make changes. This was done to make what many observers might consider a modest number of changes over a lengthy period of time. In other words, based on a rough set of economic criteria, the PE programs might be judged quite inefficient. Moreover, in an analysis of the changes in Courier Co. little or no impact on health outcomes was found despite the changes made (Rivilis *et al.*, 2006).

An important consideration in evaluating success is who decides whether the projects were a success or failure. Even when one steps away from the fact there are numerous sets of criteria by which to assess PE programs there are problems with evaluating relative success or failure. A few recent studies indicate that even when interventions make changes they fall short of having a positive health impact. In a recent randomized control trial of PE programs in 60 kitchens in which 402 changes were made, Haukka *et al.* (2008) found little improvement in reported health outcomes. Similarly, Wells *et al.* (in press) reports on a series of studies in which PE programs integrated both worker and management perspectives in making physical changes but in which intensity of biomechanical changes and health impacts were limited. Success, at least based on the measures used in these studies, remained elusive. Difficulties in producing the desired health outcomes may have to do with how the programs are evaluated, timeframes and the scope of change required to effect improvements amongst employees (Wells *et al.*, in press).

A final consideration regarding labelling programs a failure or success concerns the potential consequences of doing so. Researchers may gain little if they adopt an “all of nothing style” in their critiques of OHS programs such as PE programs. By this, I mean that the larger project of protecting workers may not benefit from sweeping

criticism, which fails to take into account some of the improvements that new health and safety programs may foster, or from focus on a narrow definition of success.

One of the criticisms of many workplace OHS programs is that they fail to achieve their promise. Moir (2005) has explored the ideological underpinnings of PE programs, and notes that depending on someone's values s/he will have very different valuations of PE. She notes (22), "a spectrum of social visions [exist] from equity and industrial democracy to productivity and efficiency. At either end of the spectrum ideologists would likely challenge each other's intent. From the right: 'Idealism doesn't get the job done.' From the left: 'Tinkering is not real change.'" Both of these statements could be applied to the PE projects investigated in the dissertation. However, these assessments gloss over the impacts of the programs and do not recognize that in both cases the PE programs yielded changes and these affected workers. Moreover, by clinging to values in the way Moir describes, we may miss an opportunity to examine what aspects of a program worked and what did not: we lose a nuanced picture of the PE programs.

Different groups have different stakes in workplace programs and stating that a program is a success or failure can be used by groups as an argument to bolster claims that these programs universally do not function well, that funding should be cut, that participatory endeavours do not lead to valuable workplace change. Sociologist Joel Best (2001: 10), discussing the pessimism sociologists seem to write with as they describe social policy and progress, notes the problems of telling stories in negative language and failing to recognize social progress as positive when it is warranted:

Pronouncing social progress as trivial and social policies as ineffective may not be the best way to encourage commitment to new policies and further progress. In particular, liberal activists and social scientists whose rhetoric denies that there has been social progress should not be surprised when conservatives use lack of progress (i.e., claims that nothing works, that social programs have made things worse) as a justification for opposing new social policies. Pessimism and paranoia seem at least as likely to foster disillusionment and despair as they are to inspire any sort of enthusiasm for further reform. Sociologists need to acknowledge social progress and to stop fearing that that acknowledgement will somehow make things worse.

A different but no less serious problem emerges when these programs are deemed successful without reflecting on what that label means or completely telling the story of change. The fact that the ECTs' change making was inefficient and fraught with obstacles are important elements of a full description of these programs. Considering the fact that some ECT representatives only had marginal involvement and that the teams never did really gain independence from management might lead one to conclude that the PE programs were not wholly successful in achieving participation. Another way of looking at the latter point is that usually design and implementation of change requires the involvement of numerous constituents from different social worlds, which will require arrangement making (Broberg and Hermund, 2004; Garrety and Badham, 1999; Strauss, 1993). Given this, perhaps the better question is not whether there were obstacles but rather what obstacles arose, how did they shape the change-making process, were they overcome, and if so, how?

Easy answers exist for responding to the "success question." However, both yes and no responses, unless contextualized and qualified, are fraught with problems such as those, which I have touched on above. When asked, "Do PE programs work?" perhaps the best answer we can give at present or one least likely to produce anxiety is, "These

programs can work.” “They can work under certain circumstances. It depends what you intend to achieve and how success is measured.”

8.8 A DIFFERENT KIND OF HAZARD MAPPING³²: LESSONS FOR PRACTITIONERS

This dissertation contributes to the growing literature on participatory ergonomics in several ways. It explores in detail the significance of contextual factors to the manner in which programs operate. In so doing, it enhances our understanding of the barriers that PE interventions encounter as well as the actions that may help to overcome those barriers in order to establish and maintain effectively operating programs. In the following section I discuss the implications of the dissertation’s findings for (a) the nature of making change and (b) the techniques that interventionists may use as they endeavour to make change.

The dissertation has implications for discussions about the nature of change. As Collins (1998:83) asserts we need to be sceptical of simple models of change because “a failure of these approaches to analyse social factors in any real depth, treating the problems of organization and change as if they involved the combination of molecules of cookery ingredients rather than the skilled interaction of humans, we might refer to these approaches as change formulae or ‘recipes.’” One of the main insights from this dissertation is that change making is complex, a point that practitioners would do well to keep in mind despite their understandable desire for simpler solutions.³³

³² Hazard mapping is a technique often used by health and safety practitioners to identify and inventory potential workplace dangers. In this section the hazards I refer to are those difficulties that emerge out of social activity that may impinge upon the operation of a PE program.

³³ In my own experience, in several venues presenting to practitioners, they have expressed their want of a magic bullet to enable them to make programs work – something which, I argue, does not exist.

In emphasizing the complexity of change, the dissertation makes clear that this complexity derives in good measure from the fact that implementing ergonomic change programs is a “social activity,” involving a group of actors with different and sometimes competing interests. In a discussion of “methods,” which they define as programs to foster participatory design, Garrety and Badham (1999: 288) rightly suggest that

[t]he idea that human factors experts will eventually be able to develop methods that will remove the politics from sociotechnical change is an illusion. As long as there are several people involved – and there usually are – there will be negotiation, persuasion, and lobbying. Exclusion, manipulation, deception, and conflict are always possible.

Garrety and Badham go on to note that methods are not “useless.” Methods, they argue, are integral and can provide people with opportunities to collaborate and in this way may help to overcome barriers among diverse groups. I would agree with Garrety and Badham and add that lists of prerequisites, which are often used in PE (e.g., Haines *et al.*, 2002), are useful as well. Nevertheless, these aids need to be employed with the recognition that programs are contextually bound and that organizational change involves power and conflicting interests. Moreover, the fact that change is emergent means that factors that are unforeseen at the intervention’s outset will shape the use of these methods – in some cases rendering them meaningless, in other cases acting to facilitate their use.

A key outcome of the analysis is that some of the activities that Star (1991) would refer to as “invisible work” are revealed. Rendering these activities visible increases the likelihood that practitioners can get a more complete picture of the nature and extent of the activities that need to be undertaken in order to establish and sustain a PE program and the circumstances that influence that program. I note two features of change making that practitioners may want to keep in mind. First, the hidden work tasks involved in

articulation work were revealed. Articulation involved making and maintaining arrangements among actors from multiple social worlds who had discordant, and sometimes conflicting, interests and perspectives regarding how the PE programs should function. Second, the difficulties associated with workplace personnel's differential access to resources were highlighted. These differences in access translated into some groups being better able to shape the PE programs than others.³⁴ During interventions, practitioners should be aware of the need to forge and maintain agreements among actors and be mindful of the differences in power among groups. Further, they need to find ways to avoid problems that can arise from eroding agreements and unequal power sharing in the workplace, such as difficulties securing permission to implement changes.

Another feature of the PE process that we need to rethink concerns what personnel should be involved in PE program teams and what they should be doing. Practitioners should plan on including certain key actors in their change initiatives but also continuously examine who might need to be involved as the program unfolds and perhaps changes how it functions. Plenty of papers recommend what personnel need to be involved in PE programs (St. Vincent *et al.*, 2006; Vink *et al.*, 2008). Frequently, the required personnel include worker representatives, management personnel, and technical personnel, such as mechanics and engineers. Recently, Vink *et al.*, (2008) drawing on interview data, attempted to specify the responsibilities of those involved in ergonomics interventions. Although considering the personnel who should be involved in PE and the tasks that generally rest with them are important for program design and change

³⁴ Other researchers, such as Badham (2006), Badham and Ehn (2000), Collins (1998), Dawson, (2005) and Garrety and Badham (1999), have talked about similar issues though not in reference to PE programs.

implementation stages, they require re-visiting in any particular program. The lack of discussions about how to address personnel needs as PE programs evolve over time, particularly the unavailability of personnel integral to the PE, is a gap in the literature to which this dissertation has responded. In the programs examined here, when key actors were unwilling to participate or their involvement was limited by their workload, other strategies were pursued.

Considerations of the personnel required to enable PE program functioning should recognize that people ultimately act in a social context, which can be enabling or constraining. By thinking of context and the obstacles that workers and managers may encounter, we get a sense of what factors may hamper or enable their participation. Considering the hindrances labour and management can face may also motivate us to think about what recourse there is if representatives from either group are unavailable? If the situation arises in which workers are unable to be freed from their regularly scheduled jobs to participate in ergonomic activities, how will a practitioner address this?

As the activities of people in committees such as ECTs are reconsidered we need to reflect on the responsibilities and challenges they face. What is the distribution of the tasks? What does worker representatives' participation entail in practice? Are there barriers to participation? If so, can they be removed? What sort of effects, if any, are representatives' abilities having on their team's functioning? What influence is the productivity of the group having on members' perspectives?

Talk of reconceptualizing how we think of PE program implementation broadens our understanding of program functioning but does not put techniques into interventionists' hands. A full-blown discussion of how lessons learned from

interventions such as those I examined should be translated for practitioners but is beyond the dissertation's scope. Therefore, I will only offer some brief comments here.

One way interventionists may be able to improve intervention outcomes is to reconsider their responsibility in the implementation process. That is, interventionists need to realize they have an active role to play in program change. As Strauss (1993) suggests, projects do not unfold "automatically," they do so according to the actions of interested parties. Interventionists are one such interested party and to potentially improve PE program success they need to adopt interactional strategies and forge arrangements as the ECT members did. According to Badham (2006), if organizational change is considered as involving the straightforward implementation of ready-made solutions then the role of change agents is a relatively passive one. Conversely, if implementation is considered as a social activity then the change agent is recast as an actor playing a much more complex, involved role. Features of organizational change, such as its conflictual and emergent nature, mean that the change process is better led than managed. Key to Badham's argument is that these programs are not "pre-given" to be shepherded by managers. Rather, organizational change is socially constructed and requires the activities of well-oriented, socially adept leaders to put them into action.

Badham (2006: 242) points out,

The leader of changing institutions is one who seeks to socially construct and temporarily achieve a degree of cooperative endeavour from and within a complex and often highly conflictual social setting, explicitly recognizing its limited role as one influencing factor in an ongoing process that is not under control nor the only essential source of meaning for organizational personnel.

A redefinition of the role that interventionists play, similar to the one that Badham suggests, could be integrated into the array of skills which ergonomists and other health and safety practitioners should develop and maintain.

Practitioners may also be assisted by the publication and dissemination of “failure stories.” In contrast to success stories, which often gloss over the difficulties that change programs typically encounter these would discuss change in all its messiness. From these “complete” accounts, practitioners can take up the lessons learned by those who have attempted projects. Part of this, congruent with the dissertation’s theoretical lens, would be to treat organizational change as something that is carried out by individuals as a collective activity and which frequently involves contestation, negotiation, and usually a degree of accommodation.

Another step that could be taken to improve PE program outcomes is for interventionists to incorporate an examination of organizational power and inequity. One way to do this is to use tools such as “power maps,” which Noy (2008:4) defines as,

strategic tools by which actors within political fields (or other fields) assess the social terrain in which they exist, and how they can best move forward their personal or their organization’s agenda within the terrain. Power mapping... identifies key actors within a particular field of action, defines the power that these actors have in relation to particular decisions or resources, and assesses the relationships of these actors with each other and with oneself.

Tools such as power mapping can give interventionists, whether they are lay individuals or ergonomists, a means of identifying the hindrances they face in change making and developing plans for their circumvention.

Finally, an additional exercise that may be used by interventionists is to send out hypothetical recommendations for change to management in an intervention's early stages. This exercise to "test the waters" would enable PE interventionists to identify trouble spots prior to requesting management's endorsement of a change. The first step would be for a change team to send a hypothetical recommendation to management. Next, the team would follow the path of the recommendation, documenting what personnel needed to be included and identifying any hiccups that hindered the progress of the change. It would also describe what information those who needed to be involved required, such as arguments regarding return on investment. The final step of the process would be to create a flow chart that team members could use in their change making activities. Importantly, this chart could be adjusted over time if new challenges arose. The practice would flush out problems in the implementation process and enable efforts to respond to them. Another consequence of the exercise could be that all team members, not just managers, learn about what is involved in implementing a change. In the end, this practice would be what Strauss *et al.*, (1985: 155-160) refers to as a "standard operating procedure," which may decrease the amount of alignment work that is required, at least for as long as the organizational context remained sufficiently unchanged.

One could suggest that conceiving of the change agent in the way I have above relies on assumptions of voluntarism and underplays the role of structure. Following the negotiated order framework some topics are non-negotiable and what is negotiable at one point in time may not be later. I concede that even if there were more recognition of structure and the complex nature of change and if interventionists adopted more explicit leadership practices, actors' abilities to construct goals and objectives will continue to be

shaped by organizational and societal conditions. Admittedly, the problems that occupational health interventions may face are tied to structural constraints, such as employers' economic imperatives and regulatory climate.

Nevertheless, raising awareness among interventionists and those with whom they collaborate may improve their chances to make changes, design intervention programs that account for obstacles, and enhance intervention outcomes. In this regard it is important to note that activities, in Hall's (1997) words, "are shaped by conditions but outcomes are not determined." To create a more facilitative context in which interventionists can attempt to address MSDs, changes may also need to be made at the policy level and workers may need to be given more authority over health and safety. As mentioned earlier in the chapter, in the province of Ontario, no specific legislation currently exists that governs exposure to MSD risks, though in 2005 the province launched a campaign to reduce the prevalence of MSDs.³⁵ Enacting regulations concerned specifically with MSDs may influence managers to take MSDs more seriously and give bodies such as ECTs and innovations such as ergonomic programs more leverage in negotiations for workplace improvements.

8.9 FUTURE RESEARCH DIRECTIONS

The dissertation's findings suggest that examining both the structures and micro-dynamics that shape OHS programs enables us to delineate the numerous activities that bodies, such as ECTs, undertake to achieve their goals. We need to be attentive to the

³⁵ The Ontario government launched a "sprains and strains campaign" in 2005 intended to curb the prevalence of MSDs. There is also a guide available to business and workers concerning MSD prevention, entitled, "MSD Prevention Guideline for Ontario" (Occupational Health and Safety Council of Ontario, 2007). There is however, no specific MSD legislation.

influence of factors internal and external to organizations, such as the differences in power between workers and management, and among organizational subunits and their varying access to resources.

The negotiated order framework and critical theory were useful for examining the PE interventions. Further work regarding OHS or PE interventions may endeavour to theorize the relationship between interventions and the organizational and societal conditions. An important consequence would be that explanations of PE program outcomes are not related only to the idiosyncrasies of a setting such as the specific concerns of a manager. Theorizing the relationships between context and program would have the effect of embedding the discussions of program outcomes within the broader economic and political conditions. Use of the negotiated order perspective as it attends to interaction amidst circumstance could be used to further our understanding of not only what individuals in bodies such as ECTs are doing to make changes but also what organizations are doing to move forward policy changes to support such work. Investigations with an eye to interactional strategy could provide insights into what deals are being made, what allies are being sought, and, in general, what tactics are being taken up by individuals and organizations trying to make changes. Differences among PE processes in large, resource-rich companies and smaller businesses (Eakin, 2000) could also be compared. Findings of such research could serve to build theory around what actors are doing in participatory OHS projects and also assist practitioners in learning what works in what contexts in the pursuit of change.

Another research track that may offer fruitful insights into how OHS programs function is to compare programs across jurisdictions that differ in their policies regarding

OHS. For instance, are there differences in the support that management would provide in an organization in British Columbia, which has MSD regulation, compared to an organization in Ontario where no such legislation exists? Such comparisons may yield insights into the ways that variations in regulatory environment affect the enactment and maintenance of OHS programs.

My approach in the research was to let events unfold as naturally as possible, without trying to influence the OHS programs. In contrast to this “traditional” approach, others, such as Beirne (2008), Neumann *et al.*, (2008), McLoughlin *et al.*, (2000), Broberg and Hermund (2004), Jensen (2002) have suggested taking an action research orientation, whereby researchers assist those in the setting aiming to make changes. An avenue for future research would be to adopt an action researcher role and support the interventions. One could draw on tools such as power mapping to assist workplace partners with overcoming the challenges that are faced during OHS interventions. This process would involve iteratively examining the organizational landscape and adjusting activities to the emergent and processual nature of change and in particular to the actions of management and other stakeholders.

The analysis presented here investigates one approach to addressing occupational health hazards: participatory ergonomics. The adoption of other types of health and safety programs, such as wellness programs, seems to be on the rise in many jurisdictions (Frick and Wren, 2000). Nichols and Tucker (2000) suggest that some of these programs individualize risk and seek behavioural changes in workers rather than work environment to address hazards. An avenue of potential research would be to critically analyze OHS programs and policies to improve our comprehension of how workers are

experiencing health in changing workplaces and under changing economic and social conditions. In particular, do OHS programs grant workers more control over health and safety or diminish it? One might examine whether these programs are supplanting, hindering, or enhancing the role of the three rights (to know hazards, refuse unsafe work, and participate in OHS management) that constitute the internal responsibility system.

8.10 CONCLUSION

Establishing and maintaining workplace programs is a complex process. Although goals and tools to reach those goals may be outlined, rarely is it clear to actors in the planning stage how a program will function in practice. Consequently, actors will have to work to make concrete the agreements and arrangements necessary for the program to reach its goals. Forging such agreements and arrangements is fraught with challenges as actors have different, and sometimes conflicting, interests and ideas about how programs should operate, and even whether they should operate. The functioning and the longevity of the program are not predetermined. Moreover the arrangement making required to establish and maintain these programs is affected by local and broader social structure. As Strauss (1988:176) noted, a large part of the work that actors do will be around arrangement making.

What we wish to know, following the processual model, is how organizations manage to achieve the degree of articulation they do, and what their members must do to maintain it. We also wish to know what happens when that degree of articulation is estimated differently by different participants, with different stakes and influences in the definitions.

Answering the questions that Strauss poses needs to be recognized as part and parcel of the approach to comprehending organizational change to improve workplace conditions and ultimately employee health.

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APPENDIX

APPENDIX A – INFORMATION LETTER AND CONSENT FORM

Dear Furniture Co. Employee,

I would like to thank you for taking the time to participate in this interview. The interview is a fundamental component of my Doctoral research at the University of Waterloo in the Department of Sociology under the supervision of Dr. Nancy Theberge concerning the ongoing ergonomics initiative at Furniture Co. The purpose of the interview is to examine how you feel about the ergonomics change initiative and get a better sense of the workplace in general.

Work related injuries have serious consequences for individuals both on and off the job, and they also account for a major cost to employers due to lost time and worker compensation costs. According to ergonomics literature, participative ergonomics initiatives can reduce injury. However, less is known about how these ergonomics' interventions work. The purpose of this dissertation research is to analyze some of these factors and attempt to answer what means are effective as well as what factors lead to a sustained ergonomics initiative. The best way to understand these influences is from the point of view of those most affected by these changes – the employees.

Participation in this interview is completely voluntary. The interview is expected to take about an hour of your time. You may decline to answer any question, and you may stop the interview at any time. A decision to participate or not, will not effect your job status. All the information you provide will be held in the strictest confidence. Although Furniture Co. and [the union] jointly support this initiative, neither party will have access to the information collected in the interviews. *Only* myself and the research team will view the data in raw form. Further, all information will be locked in a filing cabinet with access limited to myself and for data in electronic copy on a password protected disk. You will not be identified in any thesis, report or publication resulting from this study. There are no known risks to you as a participant and nothing you say will affect your job status.

With your agreement, I would like to audiotape our interview to facilitate data collection and to ensure the accuracy of the interview data.

I hope that the results of my study will benefit organizations directly involved in the study, other ergonomics initiatives not involved in this project as well as the broader research community. This research study has been reviewed by, and received ethics clearance through the Office of Research Ethics at the University of Waterloo.

If you have any comments or concerns resulting from your participation, please contact Dr. Susan Sykes, the Office of Research Ethics at (519) 888-4567 ext. 6005.

If you have any questions regarding the research itself, please contact either Nancy Theberge at (519) 888-4567 ext. 3534 or by e-mail at theberge@uwaterloo.ca, or myself, Shane Dixon at (519) 888-4567 ext. 2606 or by e-mail at sm2dixon@uwaterloo.ca.

Yours sincerely,

Shane Dixon M.A.

Department of Sociology

University of Waterloo

APPENDIX B – CONSENT OF PARTICIPANT AND CONSENT TO USE INTERVIEW EXCERPTS

I agree to participate in a short interview being conducted by Shane Dixon, a Ph.D. student in the University of Waterloo’s Department of Sociology who is working under the supervision of Dr. Nancy Theberge and in co-operation with the Ergonomic Initiative in Injury Prevention. I have read the information presented in the participant information letter about the procedures and risks involved in this study. I have received satisfactory answers to my questions related to this study. If I have additional questions at a later date, I can contact Dr. Nancy Theberge at 519-888-4567 ext. 3534, or email theberge@uwaterloo.ca. I am aware that I may withdraw from the study without penalty at any time by advising the researchers of this decision.

This project has been reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo. I understand that if I have any comments or concerns resulting from my participation in this study, I may contact Dr. Susan Sykes, Director, Office of Research Ethics at (519) 888-4567 ext. 6005.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

Print Name

Signature of Participant

Dated

I have read the information in the participant information form and agree, of my own free will, excerpts of the audiotaped interview, with the understanding that the quotations will be anonymous, may be included in the thesis and/or publications to come from this for research purposes only.

Print Name

Signature of Participant

Dated

APPENDIX C – INTERVIEW QUESTIONS

Begin with information letters and consent letters and introductory statement.

What is your job? How long have you been in this job?

How did you come to be involved with the change team?

How long have you been involved with the change team?

THE ERGONOMIC PROCESS

What, in your own words, is your understanding of “ergonomics?”

The initiative/group followed particular process, the blueprint [at this point I showed the interviewee the blueprint]. What do you think of this process as a means of reducing work-related injuries? Was it effective?

Did the blueprint match your experience of making change? Did the group follow the blueprint as it attempted to make changes?

Were there things done by the team in the course of making change that weren't included in the blueprint?

Were there any parts of the blueprint you think should have been changed?

Whose interests were represented by the ergonomic intervention? That is, who benefits from the changes that are made?

ECT MEMBERSHIP

There are representatives from different parts of the facility (management/labor) on the team. Do you think the correct positions were represented on the team?

Attendance – were people able to get to the meetings? Why/ Why Not?

Can you take me through the process you typically go through when needing time off for an ergonomic task?

Who was involved in that?

Does your work schedule allow for enough time to accomplish ergonomic tasks?

Will moving the schedule help?

RELATIONS WITHIN THE ECT

Who took a leadership role(s) within the ECT?

What sorts of things did they do that made them a “leader”?

What role did you see... Ergonomist-facilitator playing? OHS manager playing? Yourself playing?

Were there others who played key roles?

What are your thoughts about the organization of the meetings (who sets the agenda, levels of participation, flow of the meeting [did the team stay on or stray off topic?] etc.)

Did you feel you had enough input in the meetings?

Do you think the tasks were distributed evenly among team members?

PROBE – Typically, What sorts of tasks were you responsible for?

PROBE -- Was there any reason (s) you were responsible for those tasks?

PROBE – Were there certain tasks workers did and certain ones that change team members did? And if so, Why? [Were some tasks better suited to some people and some tasks better suited to others?]

Did you feel you had the authority to make decisions? If not you, than who?

Was the managerial-worker hierarchy that exists outside of ergo “flattened” in the meetings?

Why are meetings needed? Why can’t you just talk to people outside of the meeting time?

DECISION-MAKING (CONTENT)

What types of risk-of-injury problems were examined in the ergonomics work? (courier tasks, dockworker tasks)

What was the basis (identify some of the elements that influence) for deciding what would become a change project and what wouldn’t?

PROBE (e.g., cost; need to show results; severity of problem (e.g., NIOSH/Snook calculations, injury reports) – what constitutes risk?)

PROBE – We had suggestions from workers. Some were taken on and others weren’t. What were some factors that lead to turning a suggestion into a change project?

Was it type of injury, cost of a change, same as above?

What are some good reasons for examining a suggestion or risk area?

What was the difference(s) between health and safety and ergonomics issues?

There were “quick fixes” and “full process” changes. How did the group decide what was a quick fix and full process change?

ERGONOMIC TOOLS

Checklists and one-minute surveys were used to examine potential risk-of-injury problems. Did you have a chance to survey [or do a checklist] anyone?

How did that go?

Were these tools useful?

Snook and NIOSH equations were used to investigate areas of risk...

What was your experience using them?

What role did they play in the process? [Why bother doing a Snook or a NIOSH?]

Solution-building (e.g., “brainstorming sessions”) was used to identify potential solutions to ergonomics problems. Was this a useful way of coming up with solutions?

Documentation was used in the ergonomic process....

What do you think its purpose was?

Who was the documentation for?

Where was it sent?

What was it intended to do and did it achieve that purpose?

Was it used as “proof” to corporate?

Did you ever have to fill out any documentation? If so, what was it?

Once completed, where did you send it/who did you give it to then? Why there?

MAKING CHANGE /ACQUIRING SOLUTIONS

OK, after the group investigated a potential change area and came up with a solution, it tried to “get that solution” (order it or have the garage or local people fix it) so the ECT could implement it....These are questions about that part of the process. The “post-solution and pre-implementation” stage....

MAKING CHANGE (FORM)

Once the group identified a solution, what was the process for making change?

Were you involved in this part of the process

Why/why not?

Who was involved in making changes that required communication with senior management?

Is there any particular reason why they were involved (and not someone else)?

PROBE Were there obstacles to this (e.g., time consuming)? – Why do think that was?

Do you see any way of doing this differently?

What role did worker team reps play in this?

Could a worker phone up and request something fixed/ get information about a solution?

If so has it ever been done?

MAKING CHANGE (CONTENT)

BEFORE going to senior management and requesting an ergonomic change be made, what elements (e.g., proper investigation, consultation with workers to be effected) needed to be included in that request to ensure the request was successful?

Were there things, besides the results of Snook, NIOSH and one-min surveys that needed to accompany a request for change?

PROBE -- What role, if any, did quantification play in this relationship?

Documents were sometimes submitted to management to make requests. Do you know what completing that documentation involves?

A few times the team ran into obstacles (e.g., receiving the incorrect cart or the AFAR dragging on for an extended period).

What do you make of that?

Are there ways around this?

What does corporate “need to hear” (what pieces of information) in order to make change?

RELATIONS WITH THE ORGANIZATION

Some questions about the relationship between the team and the organization...

What was the level of support among the different groups in the company for the ergonomics process?

Level of support from... workers outside the change team? ... local management? ...senior management (corporate)?

PROBE – What were the ways in which this support/lack of support was demonstrated?

Were there times when you doubted management’s commitment?

What power/authority does the ergonomic group have to influence management?

Why\why not?

Are there any particular people who need to be involved in this initiative?

Can worker reps do this alone?

Have non-change team members discussed the ergonomics program with you?

What types of things have they mentioned?

COMMUNICATION / PARTICIPATION

ERGONOMIC AWARENESS

A few methods were used to raise awareness (shift meetings, ergo board) about the ergonomic process, were these effective?

Among the depot’s workers

Among the larger organization

What other means might have been used?

Several times, team members had to gather input from those in the workforce (using e.g., checklists, one-minute surveys). What was the reception to these information-gathering tasks by people outside it?

Were these effective?

Did these documents cover all of the people's concerns/views?

The group worked independently of workers until they reached a solution... What did you think of that?

Were there other ways people gave their input to the team?

Was this process participatory? [Did it involve workers from outside?]

OUTCOMES

What was the effect of the ECT on...

Risk of injury/quality of job

Have you learned ergonomic knowledge? Have workers outside of the team?

Have you learned organizational skills? (e.g., organizing meetings)

Have you learned about the bureaucratic structure (e.g., "selling a request" – any more aware how the bureaucracy works at this company)? Who do you need to go to get things accomplished?

Appreciation for other people's jobs (including management)

Has ergo effected the communication within the facility between labor and management [worker groups]

Has trust between management and labor been effected?

Is there trust for the ECT?

SUSTAINABILITY

What elements are most important to sustainability? (keeping this initiative/ergo group going).

Are there barriers to sustainability?

How could these barriers be overcome to achieve sustainability?

To achieve sustainability, do changes need to be made to this process?

PROBE -- And if so, could you identify some.

Recently, it was noted the ergo group was “stalled.” – What is your opinion of that? If it was, what were some indicators that it was stalled? How could it be fixed?

What will happen when the ergonomist-facilitator leaves the change team?

Why?

Transfer of leadership – has that happened?

CONCLUDING REMARKS

Is there anything else you wanted to add about the ergonomics process or the workplace in general?