TRAINING, INNOVATION, AND ORGANIZATIONAL PERFORMANCE

HIGH PERFORMANCE WORK SYSTEMS: A CAUSAL FRAMEWORK OF TRAINING, INNOVATION, AND ORGANIZATIONAL PERFORMANCE IN CANADA

By

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Abstract

The links between High Performance Work System (HPWS) practices and organizational performance have received considerable research attention as significant contributors to sustained competitive advantage. However, the processes that link HPWS practices and organizational performance are not fully understood. Using resource-based theory, this research focuses on training by separating it from other HPWS practices. The first purpose of my research is to examine the relationships between the HPWS practice of training, innovation, and organizational performance, and look at the mediating effect of innovation over time at the workplace level. The results indicate that the temporal pathway from training to innovation to organizational performance is positive and significant even after controlling for reverse-causality. Strategic activity is also explored and is found to be a significant moderator. This is an indication of the importance of aligning strategy with training, as well as other HPWS practices and innovation to achieve improved organizational performance outcomes. This study contributes to knowledge by identifying innovation as an important transmission mechanism between training (and other HPWS practices) and organizational performance, while allowing for business strategy contingencies. The second purpose of this research is to present an employee-level framework and to explore the factors that act to expand or limit the HPWS practice of training, with a focus on the outcomes of employers' decisions to offer training, employees' decisions to accept or decline training, and the job-related training received by employees. The results of this dissertation indicate that the employee-level factors: participating in HPWS practices, the use of technology, and using new

technology are significant contributors to employers' decisions to offer and employees' receipt of training. Further, employees' perception of the existence of a gap between the skills required for the job and their current skills contributes to employees accepting employer offers of training. The 2003-2006 Workplace and Employee Survey (WES) longitudinal dataset is used for the analyses.

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Chapter 1

Introduction

The main problem facing Canadian organizations is not just how to remain locally or regionally competitive, but how to remain or become globally competitive. Owners, managers, employees, policy-makers (including economic development-planners), and more broadly society, all have a stake in maintaining a competitive advantage in the global economy. Developing countries continue to diversify their economies, from a focus on labour-intensive goods production to higher technology goods (Durand, Madaschi, and Terribile 1998: 8; Greene, Dihel, Kowalski, and Lippoldt 2006: 5, 30). These countries, with emerging economies, are becoming increasingly competitive across industries and products (Greene, et al. 2006: 33; Rodrik 2006: 10; Yao 2009). One of the main options open to developed economies is to continue to focus on improvements in human capital and innovation as sources of competitive advantage (Bae, Chen, Wan, Lawler, and Walumbwa 2003; Greene, et al. 2006: 11, 16; Jenkins, Dahlby, Gutpta, Leroux, Naylor, and Robinson 2011; Wang and Wei 2008: 3, 6). A growing interest among managers and policy-makers on the relationship between human capital and improved innovation as the main sources of remaining competitive leads to the main research questions of my dissertation: First, does employer-provided training lead to innovation and subsequent higher levels of organizational performance when strategic activities are in alignment or are these relationships universal across strategic contingencies? Second, if training is a contributor to innovation and performance outcomes, then the following question becomes important: What factors facilitate employers offering training and employees accepting the training offer?

The current study emphasizes resource-based theory (RBT) (Barney, Ketchen, and Wright 2011: 1303) and, in particular, people's human capital as the main domain of interest. This theoretical perspective is used because it identifies employees and the resources they embody as a potential source of sustained competitive advantage, while providing a rationale for the link between human capital, human resource practices and the implementation of strategic choices (Wright, Dunford, and Snell 2001: 703; Wright, McMahan, and McWilliams 1994). The emphasis on RBT is not meant to suggest that RBT's focus on sustained competitive advantage is the only source of profitability and superior performance for organizations (Makadok 2011). However, RBT has emerged in the strategic human resource management literature as one of the main theories that identifies the importance of human resources and the role of human resource management practices. Thus, resource-based theory provides a framework within which to understand how human resources can provide a sustained competitive advantage and how human resource practices can help develop this advantage.

Resource-based theory suggests that internal organizational characteristics are the source of sustained competitive advantage. Sustained competitive advantage implies that other organizations or potential entrants cannot duplicate the resource (Barney 1991: 102). Thus, it is the rareness, inimitability, immobility, and non-substitutability of valuable resources that creates differences between organizations, with respect to physical, human, and organizational capital (Barney 1991: 105). In a world where technological spillovers and proliferation are difficult to stem and organizational resources, such as physical and organizational capital, can be duplicated or mimicked, traditional sources of competitive advantage, such as economies of scale, product differentiation, and technological progress may no longer be the most enduring sources of long-term competitive advantage. Thus, in an increasingly globally competitive environment an organization's human capital is the key source of becoming and maintaining competitive advantage.

Human resources and, in particular, human capital, can be developed into a source of sustained competitive advantage by understanding the value that more able employees can contribute to the organization (Schmidt and Hunter 1998; Wright, et al. 2001). Such value is predicated on the most able and skilled employees being rare and difficult to replace, that employees develop and retain unique knowledge and social relationships that are inimitable, and that employees can be induced to be immobile (Wright and McMahan 1992: 302-303). These conditions can be created by organizations through job-related training and more broadly, via the adoption of High Performance Work System (HPWS) practices to make human resources an organization's source of sustained competitive advantage (Pfeffer 1998: 32-33). HPWS practices are defined here as organizational practices directed at influencing employee behavior with the purpose of encouraging activities that fulfil organizational performance goals. Among HPWS practices, training is one of the most important for improving human capital levels within organizations. Thus, training can be used to maximize employees' unique skill and knowledge, and this improved human capital can be a source of improved organizational performance (Wright, et al. 1994: 318).

In the HPWS literature, the positive relationship between HPWS practices and organizational performance has been well established (Arthur 1994; Becker and Gerhart 1996; Becker and Huselid 1998; Combs, Liu, Hall, and Ketchen 2006; Delery and Doty 1996; Huselid 1995; Ichniowski, Shaw, and Prennushi 1997; Youndt, Snell, Dean, and Lepak 1996). However, many of the studies are highly contextual because the samples used either focus on the corporation as the unit of analysis (Huselid 1995), smaller/medium sized organizations (Thornhill 2006), emergent/younger organizations (Messersmith and Guthrie 2010: 248), or the samples are limited to particular industries or an industry group (Delery and Doty 1996; Ichniowski, Shaw, and Prennushi 1997; Li, Zhao, and Liu 2006; MacDuffie 1995; Thornhill 2006). Many of these studies identify the context of their sample as a limitation impacting the generalizability of their results (Delery and Doty 1996: 829; Ichniowski, et al. 1997: 291; MacDuffie 1995: 218; Messersmith and Guthrie 2010: 257).

The Importance of this Study and Contributions to the Literature

In the above identified literature on HPWS, the benefits of a narrow focus are traded-off for a limited ability to generalize the findings to other contexts and situations. My approach takes a broader focus, considering many regions and industries in Canada and various sizes and ages of organizations. This improves the generalizability of the findings. Thus, the above sample/contextual limitations are overcome while still being able to control for potential confounding effects of organizational size, age, and industry.

Studies on HPWS tend to emphasize a systems approach as opposed to isolating the importance of particular practices (e.g. Arthur 1994; Huselid 1995). Often the use of indexes of systems of human resource management practices implies that "more is better", and by implementing the system it will universally result in improved performance (Becker and Huselid 1998a: 65). A systems approach has received support in the literature. For example, a meta-analysis by Combs, Liu, Hall, and Ketchen (2006: 513) found that high-performance work practices deployed as systems (ranging between two to thirteen practices) had a stronger relationship with organizational performance than individual practices. A focus on systems has meant that clear prescriptions outlining what practices to use under particular strategies and contexts are not available to the practitioner. This has contributed to the systems approach critique, that it is not clear whether some practices have universal performance benefits in all contexts, or whether others only produce benefits in particular contexts or under specific strategies (Cappelli and Neumark 2001: 743; Kaufman 2010: 288).

My study addresses the universality critique (i.e. more is better) by taking a sub-bundle approach, where training and other HPWS practices are the two main sub-bundles of interest. This thesis investigates the HPWS practice of training and the pathways that lead to organizational performance within different strategic activity contexts. This more nuanced approach enables the variability across contexts to be better understood.

Studies that focus on HPWS have also tended to use cross-sectional data and have generally not been able to appropriately make conclusions with regard to causality, and could only make statements about associations between HPWS and performance (Wright, Gardner, Moynihan, and Allen 2005: 416). Within the last five years, several studies have called for further theory and analysis to more fully understand the causal linkages and avoid the weaknesses of reverse-causality (Becker and Huselid 2006: 899; Messersmith and Guthrie 2010: 258; Wright, et al. 2005: 418).

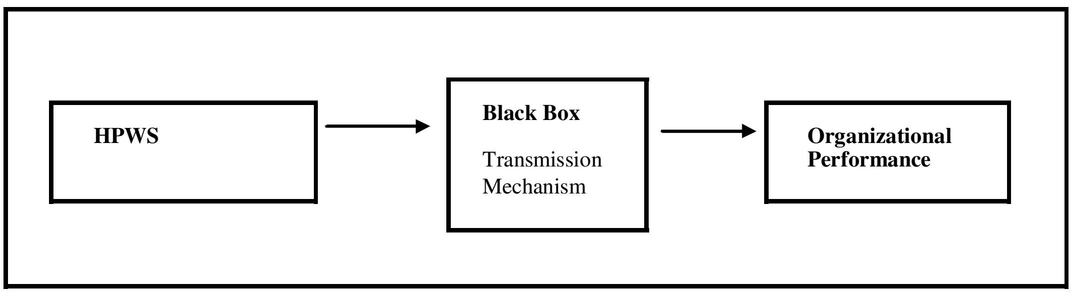
My study uses longitudinal data to empirically test a dynamic framework, which permits causal statements regarding relationships given the temporal precedence of determining factors. The proposed dynamic framework has a structural component, where the relationship between training and innovation and their joint effect on organizational performance through time can be understood. Further, the inverse innovation and training relationship is also explored. This framework permits the simultaneity of the links to be explored in addition to causal links.

Underlying most of the macro-level HPWS research is the implicit assumption that the HPWS practices themselves do not lead to or cause organizational performance. Instead, there is an assumption that this relationship is mediated by a pathway that includes effects on human capital and employee behaviour (Delery 1998: 290, 303). The nature of the transmission mechanism is receiving increasing interest in the literature. Initial research has referred to the transmission pathways as the "black-box" (Becker and Huselid 1998a: 96-97, 2006: 899-902, 908; Messersmith and Guthrie 2010).

Becker and Huselid (1998a: 96) argue the pathway between HPWS practices and organizational performance includes a process of strategy implementation. This process begins with firm strategic objectives, which get translated into lower operational unit objectives. The process then focuses on the inter-connected relationship of how employees' skills and motivation, within a work structure, affect performance drivers, and further, how the human resource system affects skills, motivation and structure of the workforce. Becker and Huselid (2006: 907) refine this process by emphasizing strategy implementation and implications for HPWS contingencies and fit (where fit focuses on a core and differentiated human resource architecture that varies to meet different employee requirements and business processes). In particular, the relationship between HPWS practices and organizational performance is mediated by strategic activities and capabilities.

Similarly, Messersmith and Guthrie (2010: 244) see firm processes as a part of the transmission linkage; they summarize the HPWS literature as generally theorizing that human capital (knowledge, skills, ability), social capital (relationships) and employee behaviours (innovation and strategically congruent behaviour) comprise the causal linkage. Of particular interest to my study is Messersmith and Guthrie's identification of human capital and innovation as elements of the black-box; however, no formal relationship identifying the pathways between these aspects was outlined. Figure 1 is adapted from Messersmith and Guthrie (2010: 244), but also illustrates the "black box" as a mediator of the HPWS practices and organizational performance relationship. The contribution of my study is that I identify the transmission process and explicitly establish the pathway from training to innovation to organizational performance. Further, no other HPWS study has developed a causal model that explores the transmission mechanism while controlling for other HPWS practices and strategic activities.

Figure 1: Transmission Mechanism Link between HPWS Practices and Organizational Performance



In the emerging micro-level HPWS literature, the transmission pathway linking HPWS practices to employee/organizational performance is also explored. The micro-level focus emphasizes employee-level relationships; however, some studies use mixed-level analysis because they can control for firm-level predictors and outcomes. For example, with regard to the transmission pathways, using national level employee survey data Macky and Boxall (2007) investigate the process by which the use of HPWS practices leads to employee affective and behavioural commitment. They identify the process of HPWS leading to commitment as causally flowing through the mediating effects of employee-level job satisfaction and trust in management (Macky and Boxall 2007: 553). An example of a mixed-level approach is the study by Ramsay, Scholarios, and Harley (2000: 506), in which the authors used the 1998 Workplace Employee

Relations Survey (WERS98) data to examine the mediating effect of employee-level outcomes (including extrinsic satisfaction, management relations, discretion, work intensification, insecurity, job strain and commitment) on the firm-level HPWS practices and organizational performance relationship. More recently, research using a single Japanese banking corporation (service industry), focused on the mediating effects of employee-level human capital, psychological empowerment, and perceived organizational support on the relationship between employee-experienced HPWS and supervisor-rated service performance (Liao, Toya, Lepak, and Hong 2009: 372). While controlling for employee group and bank branch-level effects, this study found that supervisor-rated employee human capital fully mediates the relationship between employee-experienced HPWS and types of service performance.

These types of micro-level studies provide the foundations for macro-level analysis in general. If relationships fail to hold at a micro-level of analysis, then macro-level analysis (where the relationships hold) could be viewed as an artefact of aggregation. These few micro-level examples are offered to provide insight into the nature of some of these initial micro-level inquires, and are not to be taken as complete examples of the full range and scope of the dimensionality of the transmission mechanisms or the methods that can be used in the investigation of the black-box at the employee level.

These micro-level studies hint at the concern of "road-blocks" or "barriers" in the transmission mechanism. In particular, employees' abilities and motivations, and the opportunities provided to employees (Boxall 2003: 6; Boxall and Purcell 2011), need to be aligned with the organization's strategic activities. This implies that an absence of alignment between employee and employer goals can create barriers in both the implementation of HPWS practices and the transmission mechanism. For example, organizations seeking to encourage innovation may want to focus on developing human capital levels by offering the HPWS practice of training. However, if employees decline training because it is not to their net benefit, the practice cannot be fully implemented and the organization may not be able to move toward its performance goals. Understanding what employee and employer characteristics are more likely to lead to an employer offering training and what characteristics are more likely to lead to an employee deciding to accept the training can reveal indirect factors that act to expand or limit innovation and improved organizational performance; one of the main contributions of my thesis is to clarify these factors. In this research, I investigate employer and employee decisions to train in a joint framework that considers workplace-level strategy, innovation, and organizational performance factors in addition to employee-level factors, which has not been previously explored in the literature.

In summary, the importance of this thesis and its contribution to the literature are that despite the abundance of macro-level studies focusing on the HPWS practices and organizational performance relationship very few studies have explored: (1) the causal direction of the training and organizational performance relationship (Becker and Huselid 2006: 899; Wright, et al. 2005); (2) the transmission mechanism by which innovation mediates the training and other HPWS practices link to organizational performance (Becker and Huselid 2006; Messersmith and Guthrie 2010); and (3) the generalizability of the relationship across various contexts (such as strategic contingencies and industry groups) all within a common theoretical framework.

This research will contribute to knowledge by: (1) using a dynamic multi-period structural approach that permits the identification of causal relationships between training, innovation and organizational performance; (2) identifying the transmission process by explicitly indicating the pathway from training to innovation to organizational performance while accounting for other HPWS practices; (3) accounting for moderating effects of strategic activity; and (4) by producing results that are generalizable, by using a nationally representative workplace data set and controlling for other contextual factors, such as industry and workplace size. No other HPWS study explores the transmission mechanism while controlling for other HPWS practices and strategic activities within a structural-dynamic framework that identifies causal linkages. The use of a unique workplace-level panel data set, the 2003-2006 Workplace and Employee Survey, also makes it possible to address several methodological challenges that have been identified in the literature, including omitted variable bias and simultaneity (i.e. endogeneity or mutual causation) (Becker and Huselid 2006: 910).

At a micro-level, little research has been devoted to understanding the factors that act to expand or limit training within a framework where both the employer and employee make decisions concerning training. Becker’s (1994) human capital theory is used as the basis for a theoretical framework that identifies factors affecting employers’ decisions to offer training and employees' decisions to participate in training. Becker's theory focuses on the costs and benefits to training in a framework, where the choices of the employer and employee are predicated on a commitment to profit maximization and utility maximization, respectively.

My research contributes to the literature by integrating employee-level factors with workplace-level factors (strategy, innovation, and organizational performance) identified in the macro-level framework. The importance of training for organizational innovation and performance implies that factors limiting employee training also limit organizational performance. Thus, my study contributes to the literature by identifying factors at both employee and workplace levels that act to expand or limit training and the subsequent effects on organizational performance.

Extending a recent study by Cooke, Chowhan and Brown (2011), my study contributes to the literature by integrating the decisions regarding human capital development into a HPWS context while accounting for strategic activity contingencies. Further, a comprehensive identification of the factors affecting employer and employee decisions to train, and the order of the decision-making process has not previously been combined into a theoretical framework. My proposed theoretical framework is empirically tested using employee-level survey data--to understand micro-level effects on the decisions to offer and participate in training. This micro-level focus provides complementary depth to the macro-level theoretical framework outlined above.

Purpose of Macro-level Study: Understanding the Transmission Mechanism

The purpose of this study is to contribute to understanding the factors that mediate the relationship between training as a HPWS practice and organizational performance within a dynamic framework that allows for causal inference while controlling for contextual factors. In particular, the main focus of this study is to test a macro-level theoretical framework of strategic human resource management that relates training as a HPWS practice to organizational performance, and that emphasizes innovation as the key mediating mechanism. This study separates out training from the traditional HPWS bundle of practices to enable an investigation of a key factor affecting the innovation and organizational performance relationship. Further, strategic activities are included as contingencies that moderate both the training and innovation relationship, and the innovation and organizational performance relationship. Organizational-level confounders are controlled for in the framework. The use of a predictive design of temporal precedence more appropriately assesses whether training and other HPWS practices are predictive of innovation and whether this innovation then leads to organizational performance.

The purpose of the macro-level study is to test the theoretical framework that presents a structural relationship (the causal pathway through time) between training and innovation, and innovation and training, and their joint effect on organizational performance. The recursive links will be explored in addition to adaptive causal links. It is expected that the structural relationship (mediation and moderation) between training and innovation will lead to higher levels of organizational performance. Specifically, it is proposed, within a temporal framework, that training will lead to innovation, and innovation to training, and that the effect on organizational performance will be positive. Thus, the framework recognizes organizational human resources as having strategic relevance (Barney 1991: 102), where strategic relevance implies that human capital can be used to improve organizational effectiveness and efficiency by enabling the formulation and implementation of innovation that impacts the organization's competitive position.

Purpose of Micro-level Study: Understanding Training Decisions

The micro-level study in my thesis integrates employee-level factors with workplace-level factors identified in the macro-level study. The purpose of the micro-level study is to show the factors that affect the employer's offer to train and the employee's decision to accept or decline training. The objectives of this study are to focus on the incidence of employer's decisions to offer employer-provided/sponsored training, employee's decisions to participate in the training, and the joint outcome the job-related training received by employees. In particular, the objectives are to examine: (1) the effects of workplace-level factors (i.e. strategic activities, degree of innovation, and organizational performance) and employee-level employment factors (i.e. the employee's participation in HPWS practices, use of technology, and technological change in their job) on the employer offer to train; and (2) the effect of these factors on the employee decision to accept or decline training. With regard to the employee decision, additional factors only known to the employee including their preferred hours of work, other training demands (including participation in career related training not sponsored by the employer and other training not directly job-related that is sponsored by the employer), and perceived need for training are examined. Thus, Human Capital theory (Becker

1994) is used to address the following key questions: Who is offered training, and who accepts/declines training?

Significance of Study

This study makes contributions to knowledge, practice, and government policy. The main contributions of the macro-level study to knowledge include: (1) a macro-level framework of the causal relationship between training and organizational performance; (2) a theoretical model that presents innovation as the transmission mechanism by which training and other HPWS practices link to performance; and (3) an empirical test of the framework that controls for strategic contingencies and contextual factors using a nationally representative data set, which permits strong assertions of the generalizability of the relationship across various contexts. The novelty of this model rests in unpacking HPWS practices and focusing on training as the key HPWS practice that affects innovation as the key transmission mechanism to organizational performance while accounting for strategic activity contingencies within a temporally dynamic framework.

This current research is timely and important for practitioners, in that it is a first step in identifying HPWS practices, in this case training, and the pathways by which this practice leads to organizational performance. The contingencies and context that are a part of the present study provides human resource practitioners prescriptive guidance on what, how, and when practices improve performance and contribute to a sustained competitive advantage. Moving away from a stringent focus on somewhat ambiguous human resource management systems and their "universal" effects, a focus on the particular practice of training, while controlling for other HPWS sub-bundles, provides managers with an opportunity to understand variation in performance across practices. This approach empowers managers to vary the adoption of particular practices in accordance with the levels of net benefit to their organization--because some practices may be more important contributors to performance than others in particular contexts.

At a micro-level, the significance of this study is that the factors that act to expand or limit training events are identified, for both employer and employee decision-making. This micro-level framework is novel in that it integrates macro-level factors (including organization-level innovation, performance, and strategy) into employee-level decision-making for both the employer and employee. Further, this theoretical framework makes a unique contribution to the literature by emphasizing a comprehensive set of factors that affect employer and employee decisions to train and the order of the decision-making process. The micro-level framework enables employers and human resource practitioners to understand the factors contributing to employee's decisions to participate or not participate in training, while understanding the effect of organizational-level factors.

With respect to government policy, a broader purpose of this research is to inform the policy debate around training, innovation, and organizational performance, and by doing so contribute to Canada's ability to maintain a competitive edge in the global economy. This research may be of particular interest to policy makers and government economic planners. For example, the Government of Canada, over the last decade, first through its Innovations Strategy and more recently through the 2012 budget plan, has identified investing in people's skills and learning as a key way to lead Canada toward becoming one of the most innovative and skilled countries in the world (Flaherty 2012: 59; Industry Canada 2002: 16-17, 2008; Jenkins, et al. 2011; The Institute for Competitiveness & Prosperity 2010). Further, to respond to the government's strategy, the Conference Board of Canada has identified the innovation "gap" as the key challenge that businesses need to address through a focus on the development of new skills and knowledge. However, they note "Canadian organizations have lower total training expenditures (per capita) than organizations in Europe, the United States, and Asia" (Guthrie and Warda 2002: 3-4). Thus, training is seen as a critical contributor to innovation, which leads to increased economic (or social) value.

Summary of Intent

To address growing concerns of sustained competitive advantage, my thesis has both a macro-level and micro-level component. The macro-level framework presents the mediating effect of innovation on the relationship between temporally preceding independent variable training and the dependent variable organizational performance, while controlling for the moderating effect of strategic activities. Innovation is viewed as the transmission mechanism between training and organizational performance. The micro-level study focuses on the factors that act to expand or limit HPWS practices with a particular emphasis on training. This study looks at: who is offered training and who accepts/declines training? In particular, employee participation in HPWS practices, use of new technology, and workplace performance, innovation, and strategic activities are the independent variables that are associated with the dependent variable employer decision to offer training. Whereas, for the employee's decision to participate in training, additional determinants affecting the employee's decision include work preference, competing training demands, and perception of training need. Thus, training is presented as a key determinant of innovation, which is transmitted into organizational performance. Further, any limits to training are seen as implicit barriers to innovation and subsequent organizational performance. The 2003-2006 Workplace and Employee Survey (WES) of Statistics Canada is used to empirically test the above frameworks. This study makes contributions to knowledge, practice, and government policy.

Chapter 2

Literature Review

Three main areas in the literature are relevant for this dissertation. Specifically, the strategic human resource management and human capital literatures are used to understand the relationships between training, other HPWS practices, innovation, and organizational performance. The strategic management literature is also used to understand the strategic activity contingencies that can affect these relationships. Relevant aspects of these literatures are reviewed to provide context for chapters 3 and 4, which define the main concepts used in this study, and present the theory and develop the hypotheses, respectively.

A focus on an individual (employee) level versus a workplace level unit of analysis is typically identified as the major feature distinguishing more traditional human resource management practice research from strategic human resource management research (Datta, Guthrie, and Wright 2005: 136). The human resource management practice literature will be discussed when micro-level factors affecting employees' decisions to participate in training are considered in the latter portion of this review. The strategic human resource management literature is relevant to the macro-level focus on the main HPWS practices and organizational performance relationship, contingencies, and context, and it is presented first. The development of human capital through training and its relationship with innovation and performance will be reviewed in the following sections: Human Capital and Training; Innovation and Training; Performance, Training, and Innovation; and Factors Affecting Training.

Strategic Human Resource Management

The strategic human resource management literature focuses on the management of personnel. A business's personnel management strategy is just one aspect of business strategy, which includes structure, technology, and finance (Boxall 1996: 60). Organizational strategies are typically developed to address identified goals or objectives. Boxall (1996: 62) highlights that organizations need to develop and choose strategies that are aligned; thus, human resource practices need to be designed and implemented to reinforce other strategic choices. An optimal business strategy is an aggregate of strategic choices that are systematically aligned--avoiding contradiction or incompatibility.

In terms of human resource management strategies, the set of approaches that organizations are often described as using range between control and commitment (Arthur 1994: 671). These approaches are important because an orientation toward any particular approach is associated with the adoption of specific human resource management practices. Commitment-management is often referred to interchangeably with high-performance work systems (HPWS) (Boxall 1996: 63; Frost 2008: 420; Kaufman 2010; Messersmith and Guthrie 2010: 246; Zatzick and Iverson 2011: 3462). This is often the case because HPWS that are commitment-oriented are typically related to investments in employees (Liao, et al. 2009: 373), which implies the conceptualization of employees as assets to be developed, maintained, and valued as opposed to seeing them as a variable-input that is a disposable portion of the production function (Wood 1999b: 370). Consistent with a resource-based theory emphasis, my study adopts the view of employees as assets and a source of value.

My study focuses on high-performance as opposed to commitment or involvement conceptualizations of practices. High-performance is the focus because performance is typically one of the main criteria organizations focus on when making strategic choices. The high-performance of the work system is seen as referring to organizational performance and not the work system practices themselves. Commitment is usually a mediator of the ultimate objective performance (Luchak and Gellatly 2007: 793). Thus, the use of the term high-performance refers to the desired outcome or intentions of the introduction of practices and not necessarily the actual outcome of the practices, and as such the outcome is not being pre-judged.

The relationship between HPWS practices and the processes leading to organizational performance needs to be evaluated within the context of the organization's business strategy. Several studies have found that business strategies have significant moderation effects (Delery and Doty 1996; Huselid 1995; Kaufman 2010; Youndt, Snell, Dean, and Lepak 1996). Thus, the alignment or fit of HPWS practices and strategic activities needs to be understood. Concepts of fit are most commonly explored as moderation--the interaction of two or more measures (Cappelli and Neumark 2001: 744; Huselid 1995: 649; MacDuffie 1995: 213). Typically, two types of HPWS fit have been explored in the literature internal and external. Internal fit focuses on the complementarity or synergy between HPWS practices, where the value of synergy is the incremental value created from the interaction of the practices that are implemented contemporaneously (i.e. value that is above the separate effect of each practice) (Huselid 1995: 649). External fit focuses on the alignment between HPWS practices and strategic activities. To assess external fit, the degree to which a basket of HPWS practices is implemented (i.e. the composition of the basket), is compared to the degree or prevalence of particular competitive business strategies. External fit is similar to the contingency approach, where a coherent link between HPWS practices and business strategies is associated with high performance outcomes. The present study's framework allows for the evaluation of strategic alignment and fit of HPWS practices, both internally and externally.

To be able to assess the fit between HPWS practices and business strategies the nature of the strategies needs to be understood. My study focuses on strategic activities of organizations to develop organizational strategic-orientations (discussed in chapter 3 in detail), and because this is a recent development in the literature, it is important to understand the strategy classifications that have been used previously. Within the strategic human resource management literature different approaches to conceptualizing business strategies have been used. For example, Arthur (1994: 680) and Huselid (1995: 650) identify three main generic competitive strategies, based on Porter (1985), that can create a unique and valuable position for an organization: cost leadership, differentiation, and focus. With regard to HPWS, Huselid argues that differentiation and focus strategies will require "more intensive" HPWS practices than a cost leadership strategy. However, Porter (1985: 3) only identifies "two basic types of competitive advantage: cost leadership and differentiation" with the organization's focus upon a broad or narrow range of industry segments moderating the basic competitive strategies in terms of scope (Porter 1985: 12). The nature of the focus strategy is determined by positioning, which includes variety of product, needs of customers, and access of product to customers (Porter 1996: 67). Strategic-choices lead to one of four possible competitive strategies for organizations: (1) cost leadership (lower cost, broad target), (2) differentiation (broad target), (3) cost focus (lower cost, narrow target), and (4) differentiation focus (narrow target).

It is important to identify the nature of the fit between HPWS practices and strategies. The nature of the fit or alignment of Porter's (1985) strategies with particular HPWS practices, or the intensity of use of HPWS practices, is not entirely clear or definitive. For example, it is not clear whether cost focus will have more intensive use of HPWS practices than broad differentiation. The use of other business strategy classifications may not add clarity. For example, organizational competitive strategies, which have also been used in the strategic human resource management literature, can be classified into three main categories: defender (stable narrow product and market segments); prospector (identify and exploit new markets with new products); and analyzer (exploits opportunities, but maintains a stable base product-market domain) (Miles and Snow 1984: 37-38; Miles, Snow, Meyer, and Coleman 1978). A fourth category of reactors is also defined to categorize organizations that have an inconsistent alignment between their strategy (technology, structure and processes) and environment (Miles, et al. 1978: 550). Even with this alternative strategy classification the fit between HPWS practices and strategies is not obvious.

Nonetheless, alignment has been suggested. For example, Delery and Doty (1996: 811) identify human resource practices as “(1) internal career opportunities, (2) formal training systems, (3) behavior-based appraisal, (4) hierarchy-based compensation (i.e. little profit sharing), (5) employment security, (6) employee voice, and (7) tightly defined jobs" as being appropriate for a defender strategy. In contrast, the following human resource practices were identified as consistent with the prospector strategy: "(1) few internal career opportunities, (2) lack of formal training systems, (3) output-based appraisal, (4) profit-sharing systems, (5) little employment security, (6) little employee voice, and (7) broadly defined jobs" (Delery and Doty 1996: 811).

To illustrate the difficulty in using aggregate business strategy classifications to access alignment consider the following example provided by Miles and Snow (1984: 43-44): Lincoln Electric is presented as a classic defender. On the one hand, the organization focuses on cost cutting, low prices, pay incentive systems (leading to relatively high-earnings for employees) and high-quantity output, while producing high-quality products for a narrowly focused niche market. In terms of HPWS practices, this defender strategy is accompanied by careful selection and placement of employees, a focus on training and development to aid internal progression, team-work, and job and work design enabling some autonomy and self-control. The degree to which cost focus and defender categories can be considered to be isomorphic begins to create an ambiguity in terms of obvious alignment between business strategies and HPWS. In fact, the Lincoln Electric example illustrates that alignment is likely best evaluated at a sub-aggregate level, where human resource practices are matched to the implementation of competitive strategies. A very high degree of aggregation can lead to abstraction, which masks complexity and idiosyncratic characteristics of organizations. This may imply that generalizations about the competitive strategy contingent HPWS practices and performance relationship are problematic. My study focuses on matching human resource practices to workplace-level strategic-orientations to avoid these aggregation concerns.

This approach appears to be consistent with Porter's (1985: 33) argument that a complete picture of an organization's strategy and source of competitive advantage can only be understood by focusing on separate operations across the value chain, from product design, production, marketing, logistics (inputs and outputs), and customer service. For example, a cost-leader will focus on low cost inputs, efficiency in production processes and distribution, and low prices. Focusing on the implementation of an organization's strategy was a prelude to a growing focus in the literature to link HPWS practices with strategic capabilities through their implementation. More recently, Becker and Huselid (2006: 903) have suggested a focus on strategy implementation as the mediating link between HPWS and organizational performance, where effective implementation is rooted in strategic capabilities. Strategic capabilities are activities including processes, product development, logistics (resource acquisition and distribution), decision-making, and relationships/alliances with customers and suppliers, for example. The implementation of strategic capabilities is a source of value and competitive advantage to the organization if these processes have an element that makes them organizationally-specific and thereby have the quality of being rare, inimitable, and non-transferable. Thus, Becker and Huselid (2006: 902) suggest that rather than undue emphasis on business strategy positioning and contingencies, greater focus should be given to "strategy-activity" and business processes, which builds on Porter's (1996: 64) concept that activities have strategic value. Strategic value rests on the variation between competitors' adoption and application of systems of activities. Adopting this approach, my study focuses on the differentiation of elements of a system as a source of competitive advantage and, as such, generic positioning of a business strategy does not imply a particular human resource system or a given strategic activity system.

Human Capital and Training

This study focuses on the effect of training on innovation and the transmission through to organizational performance at the workplace level and the factors that affect employer and employee decisions to train at the employee level. With these foci in mind, this section examines the training, and more broadly, the human capital literature. Special attention is given to the returns of training, types of training, necessary conditions for the various types of training to occur, and factors that affect employers' and employees' decisions to train. These aspects are important for both the macro-level and micro-level portions of this study. In the sections that follow, the effect of training on innovation in organizations, the effect of innovation on human capital improvements, and the effect of training and innovation on organizational performance are discussed.

Becker (1994: 11) identifies human capital as a composition of ideas, information, knowledge, skills, and health. Investments in human capital include education, training, healthcare, migration, and information search. All human capital investments influence either money, physical, or cognitive resources available to an individual; however, each differs in the degree to which it improves skills, knowledge, or health (Becker 1994).

Training is only one way to improve human capital; nonetheless, for this study, it is the main focus. Non-training and non-education investments in human capital will not be the focus of this review. Even education will only be discussed tangentially in terms of how it complements or substitutes for training.

Becker (1994: 31) begins his investigation of investment in human capital by exploring the effects of on-the-job training on employee earnings, where on-the-job training is broadly defined as the allocation of employee time and effort to the “learning of new skills and the perfecting old ones while on the job.” He presents a perfectly competitive labour market framework where profit-maximizing organizations take market wages as independent of their own actions and where the market wage, in equilibrium, is equal to the marginal product. A more complete equilibrium condition includes time, where the equilibrium in period t only depends on the flows in that period. When on-the-job training is considered, a connection across time is made because organizations now have the incentive to trade-off current output for increased future output. In equilibrium, the present value of the receipts equals the present value of the expenditures; thus, across all periods the marginal product equals marginal expenditure. Understanding these temporal dynamics is important given the longitudinal nature of my study.

When a worker receives training there are two types of cost: (1) an opportunity cost of time-use, and (2) the actual expenditure on the training. The opportunity cost is the time that a person spends on training that could have been spent on contributing to current output or, in other words, the difference between what could have been produced and what is actually produced. The organization's return for providing training to a worker is future receipts less future outlays. In equilibrium, what could have been produced plus the organization's return from providing training equals wage plus cost (opportunity and actual outlay costs) (Becker 1994: 33). Thus, the future anticipated return from training is a critical aspect of an organization’s training decisions. The theoretical relationship between training and future returns supports my approach of investigating the relationship between training and performance at the workplace level over time.

From an economic perspective, the returns to training for a worker are in the form of higher monetary earnings, which are typically related to a post-training increase in productivity (Becker 1994: 60). From the employer's perspective, the return to training is defined in terms of an increase in the present value of marginal product or receipts generated by the trained employee. Thus, the stream of future receipts from the training are considered in the employer's decision--after being adjusted for the probability of turnover.

The general framework outlined by Becker allows for a more nuanced understanding of an organization's decision to train. In particular, two main types of training define the boundaries of the on-the-job training continuum: general and specific. General training applies to skills that are useful in many organizations, not just the organization providing the training, and specific training applies to skills that have no use in any other organization (i.e. completely specific) (Becker 1994: 34). However, training is typically not perfectly general or completely specific; all skills, to varying degrees, are useful across organizations, industries (or major industry classifications), and sectors (Becker 1994: 40).

A brief review of the circumstance in which each type of training occurs provides important context for both the workplace-level and employee-level (i.e. macro and micro) portions of this thesis, and aids in the understanding of the conditions under which training is be observed. Becker's (1994: 34) theory suggests that no rational organization in a competitive market would provide general training, because general training is equally useful to all organizations. It is rational for organizations to not provide perfectly general training--organizations will only provide general training if the individual workers receiving the training pay for the training. Workers are willing to bear the cost of general training if they have the expectation that their future wages will increase. This implies that sub-optimal training levels can occur when employees are unable or unwilling to allocate resources to general training (i.e. receive wages below what they could receive elsewhere) (Becker 1994: 35, 84-85), or when employees are unable or unwilling to commit to staying with the organization that may sponsor the training.

Specific training increases productivity in the organization providing the training. If the training were completely specific, organizations would provide training to increase productivity and they would therefore pay the full cost of the training. Workers would have no incentive to pay for even a portion of the training because completely specific training would not be transferable, and as a result, the wage that an employee would receive is equal to their marginal product before the training. This implies that organizations capture all of the return and pay all of the costs (Becker 1994: 43).

The propensity of an organization to invest in specific training is related to the labour market conditions and the nature of the investment. Organizations in a competitive labour market would make fewer specific investments due to the constant threat of having their workforce raided (Acemoglu and Pischke 1998: 80; Becker 1994: 43). Organizations in a monopsony position would provide specific training, because they are insulated from competition and the associated raids or poaching of their workforce and are better able to counterbalance losses due to quits (Becker 1994: 43). It is this boundary condition of employee immobility that fits with the strategic human resource management focus on HPWS and sustained competitive advantage discussed above. Recent work by Campbell, Coff, and Kryscynski (2012: 385) has also identified labour demand and supply side mobility constraints as being a part of a comprehensive framework of human capital competitive advantage. Further, Acemoglu and Pischke (1998) argue that in labour markets where organizations have asymmetric/monopsony information on the abilities of their employees, those organizations will offer general training when quit rates are low (and when quit rates are high general training provision will be reduced). Thus, both Becker (1994: 43) and Acemoglu and Pischke (1998: 90) identify market imperfections as key contributors to training likelihood across the specific to general spectrum. This is important for my study because it suggests that the type of training being observed is not as critical as simply observing training. The fact that training is observed suggests that--whether the training is general or specific--the conditions exist that imply a net benefit.

Acemoglu and Pischke (1998) extend Becker's (1994) presentation by focusing on asymmetric information in terms of employee's ability (i.e. outside organizations do not have information on the employee's ability) as the source of labour market imperfection. The moderating effect of asymmetric information is a necessary but not a sufficient condition for organizations to engage in general training because the complementarity between employee ability and training is also required (Acemoglu and Pischke 1998: 90). The level of training provided to employees is negatively related to turnover rates which determine the equilibrium wage and, subsequently, the level of benefit (i.e. higher profits) that organizations can extract from providing training. Asymmetric information, employee ability, and turnover rates are all factors that contribute to training being of ambiguous value with regard to productivity improvements. This ambiguity is due to high turnover leading to better employment matches and increased productivity and conversely low turnover leading to high skill levels from training and increased productivity. Acemoglu and Pischke (1998) argue that the low turnover economy will have higher skill levels relative to the high turnover economy. The implications for my analyses, of these theoretical underpinnings, are that asymmetric information, employee ability and turnover rates are important factors to consider when investigating employer and employee training decisions.

Innovation and Training

This section focuses on highlighting the relevant literature that has established the link between innovation and training, and training and innovation. The relationship between innovation and training is often described in terms of complementarities or simultaneities (Bartel and Lichtenberg 1987: 3; Griliches 1969: 467). Initial research established the complementarity between physical capital and skilled labour (Griliches 1969: 467). Bartel and Lichtenberg (1987: 3) identify the simultaneity of the innovation and training relationship--training leads to the development and implementation of innovation, and innovations tend to require high-competency employees with a comparative advantage with regard to successful implementation. This relationship between technology adoption/change and innovation has been referred to in the human capital and training literature as the technology-specific skills hypothesis. This literature is important because it highlights the conceptual link between technology and innovation, and it suggests that a broad conceptualization of innovation, that includes technology adoption and change, is important for my study.

The link and complementarity between training and innovation has also been identified to lead to the establishment of high and low training and innovation outcomes for organizations and, by extension, even countries (Acemoglu 1997). Acemoglu (1997) presents a model of interaction between training and innovation, using the German case as an example of the theory, arguing that employers will want to train employees when they (the employers) are also innovating, thereby enabling employers to capture higher returns. Employees will agree to the general training related to general technological change because they will share in the additional surplus produced from the increase in productivity. Thus, the complementarity between training and innovation implies that organizations will want to innovate if employees have the skills to make full use of the technology. This model explains how in low turnover labour markets high levels of general training provided by employers can be observed (Acemoglu 1997: 454), and how the choices of training and innovation increase profitability and lead to socially efficient outcomes (Acemoglu 1997: 448).

However, Acemoglu (1997: 451) demonstrates that labour market frictions, such as a high probability of separation and the inability to write contracts with future employers regarding the sharing of the benefits of training, lead to an underinvestment in training (using the United States as an example). High mobility and search costs for the employee and other turnover-limiting factors encourage the high skill and high innovation outcome, whereas high turnover leads to the low skill and low innovation outcome. Further, labour market frictions are assumed to lead to probabilistic matching of employees and employers in the labour market. This causes a coordination failure where employers expect future employees to only have a low skill level, which results in them not innovating. Similarly, employees expecting a low level of innovation do not invest in training--this establishes a low innovation and low skills outcome. Thus, Acemoglu (1997) develops conditions under which high (and low) skills and innovation equilibrium can exist.

The above literature theoretically and empirically establishes several key relationships which are important for my study. First, the link between low training and low innovation outcomes and higher training and higher innovation outcomes is important for this thesis because these links are critical for innovation to mediate the training and organizational performance relationship. Further, there is generally a positive relationship between training and innovation and vice versa. Second, innovation in this literature also includes technology adoption and change as important elements of a broad conceptualization of innovation. Finally, this literature has also identified how market imperfections/frictions lead to employers willing to support general skills training. This implies that the nature of the training (i.e. either general or specific) is not as critical to identify, and that the focus can be simply on training, especially when considering outcomes for national economies with labour markets that have geographic, industrial, and occupational diversity.

Several Canadian studies have looked at the effect of innovation on training, the general finding is that technology use and innovation positively affect training incidence (Chaykowski and Slotsve 2006; Turcotte, Léonard, and Montmarquette 2003; Zeytinoglu and Cooke 2009) and intensity (Chaykowski and Slotsve 2006; Chowhan 2005). Further, Walsworth and Verma (2007: 229), find a mixed causal relationship between training and innovation; in particular, the previous year's training had a positive effect on 2002 product innovation and 2000 process innovation, but the relationship was not significant for 2000 product innovation and 2002 process innovation (Walsworth and Verma 2007: 238). Nonetheless, these findings highlight the importance of considering reverse-causation when modelling the training and innovation relationship, which is a key part of this thesis. Further, Thornhill (2006) focuses on Canadian manufacturers and finds that organizational knowledge assets and training are positively associated with innovation, and that the interaction of training and innovation is substantially positively associated with performance (measured as growth in revenue). Thornhill (2006) did not control for other HPWS practices or strategy contingencies in the analyses. Given the importance of training and innovation as moderators on organizational performance, this interaction is also included as an element of my model.

Not all studies have found a relationship between innovation and training. Hansson (2007: 314, 318), using the 1999 cross-section of the Cranet company-based survey (n=8,487 from 26 countries), found that innovation measured as "the importance of innovations on competitive success" did not have a significant positive relationship with either of the dependent variables: (1) the percent of wage bill spent on training, or (2) the proportion of employees trained. Both of these regressions controlled for training policy, training needs, internal labour market, union, percent of employees over 45 years of age, percent with a university degree, firm size, prior profit, and staff turnover. Some detail has been provided here to highlight how the context of the sample and the measures used to explore the training and innovation relationship can impact the results observed. This indicates the importance of being careful when linking concepts, data, and measures, while still including factors that control for context within the analyses.

Some studies have explored the relationship between human resource management practices and innovations, where training was only one practice of many others considered to affect innovation. For example, Therrien and Leonard (2003: 46) looked at the effect of human resource management practices on innovation novelty and found that as the number of human resource management practices increased the probability of a novel innovation also increased (training was enumerated among the list of human resource management practices in addition to employee suggestions, information sharing, problem solving teams, flexible job design, labour-management committees, and self-directed work groups), and this finding holds across industries. Further, from a strategic human resource management perspective, Beugelsdijk (2008: 822) found that training and schooling were substantially and significantly positively related to incremental innovation, but not with radical innovation (Beugelsdijk 2008: 833). Other HPWS practices were also found to be relevant. Job autonomy was the only other human resource practice that was more substantial related to innovation than training. These studies illustrate the relevance of considering both training and other HPWS as factors affecting innovation.

In the economics literature the relationship between training and innovation are often explored without consideration of other HPWS practices. This is in contrast to the strategic human resource management literature where training and other HPWS practices are usually conceptualized as either separate practices or as one aggregate HPWS bundle. My study adopts the strategic human resource management literature approach of considering both training and other HPWS as relevant factors. Regardless of the disciplinary focus of the literature the general trend is that there is a positive training and innovation relationship; however, there is some variability in this relationship across different measures of training (i.e. technical or professional, and classroom or on-the-job) and different measures of innovation (i.e. innovation type, impact, or novelty).

Performance, Training, and Innovation

The relationship between training and performance can be explored at various conceptual and operational levels. The individual employee level typically looks at the effects of human capital development, such as education and training on employee wages or productivity. An employer-level of analysis looks at the effects of training on organizational performance outcomes. Both levels are important to discuss in the context of my study. However, in this section, greater focus is given to the relevant literature that has explored the relationships between training, innovation, and performance at the employer-level of analysis.

The early individual level literature typically looked at the effects of human capital education and training investments on wages, where wages were often used as a proxy for productivity (Mincer 1989; Tan 1991: 394). The general implications of Mincer's model are that the distribution of earnings depends not only on the distribution of training but also on the distribution of the rates of return, and the correlation between costs and return. The main predictions are that "individual differences in ability create greater relative (and absolute) differences in earnings at higher levels of schooling, and differences in schooling create greater differences in earnings at higher levels of ability" (Mincer 1970: 10). The employer or plant level literature often includes productivity, but also other performance measures such as wage growth, and turnover. In particular, Mincer (1989: 33) demonstrates that higher proportions of workers receiving training, higher cost of training per worker, and higher cost of training per new hire are observed contemporaneously with higher productivity growth, higher tenure-wage growth, and lower separation rates. Thus, the links between training and performance, both at the employee and employer-levels, have a long established history.

More recently, studies have begun to explore the relationship between a broader basket of HPWS practices, in addition to training and performance at an organizational level of analysis. Ichniowski, Shaw and Prennushi (1997) investigated whether combinations of HPWS practices or individual HPWS practices increase productivity. After controlling for four different human resource management system variables, individual effects of practices were found to have little effect on productivity, which indicates that complementary practices bundled together are the main factors affecting productivity (Ichniowski, et al. 1997: 310). Even though bundled practices were strongly related to productivity, some individual practices still stood out. It is important to note that among the individual effects, having "at least some operators receiving off-the-job training" (i.e. low training) was one of the few individual practice variables that had a positive significant and substantial effect on productivity (Ichniowski, et al. 1997: 310). This study is important because it identifies the significance of bundles, but also that some individual practices, such as training, have incremental explanatory power beyond the effect of human resource management system bundles on productivity. The system and individual practice approach used by Ichniowski, Shaw, and Prennushi (1997: 309) provides some support for the use of other HPWS bundle and individual training index measures used in my thesis.

The relationship between training and performance appears to be strong across various cross-sectional and longitudinal data sets that explore various contexts (i.e.

organization size, industries, and countries). For example, Bartel (1994), using 155 manufacturing organizations from the 1986 Columbia Business School longitudinal survey, found a positive effect of training on productivity growth. Barrett and O'Connell (2001) using longitudinal Irish enterprise survey data found a statistically significant positive effect on productivity for all training and general training, but not for specific training. This last example demonstrates that differences in construct conceptualization does impact the training-performance relationship and can create some variability in the relationship. Turcotte and Rennison (2004: 21), using a representative cross-sectional sample of Canadian workplaces, looked at the effect of training on productivity and found receiving formal training is a significant determinant of productivity and wages (increases of 3.5%) (Turcotte and Rennison 2004: 25). Li, Zhao, and Liu (2006: 691) use a cross-sectional sample of 194 Chinese high-tech organizations and find a significant positive relationship between training and innovation scales and a subsequent significant positive relationship between innovation and performance scales. Using U.K. industry level longitudinal data, work-related training was found to have a positive substantial significant effect on a direct measure of productivity (Dearden, Reed, and Van Reenen 2006: 407). Similarly, Birdi, Clegg, Patterson, Robinson, Stride, Wall, and Wood (2008: 486), using a sample (n=308) of U.K. manufacturing companies and a Cobb-Douglas production function framework, found HPWS practices such as training have a direct positive effect on value-added productivity. These examples illustrate that the positive relationship between training and performance is robust across data types, organizational size, industries, and jurisdictions. This is important for my study because it suggests that the training and performance relationship should be found in the nationally representative, longitudinal, multi-organization-size, multi-industry, and multi-jurisdictional data used for this thesis.

The relationships between 1) technological change and performance and 2) innovation and performance have also been explored in the literature. The following studies are examples that capture the general direction of the literature, while exploring the complexity of the dynamics of the relationship. These studies are relevant for my study because they suggest that any comprehensive model looking at the relationship between training and innovation and innovation and organizational performance needs to consider the reverse-causal effects within its framework.

The dynamics of the innovation and performance relationship imply that innovation can lead to improved performance but also that performance can impact innovation outcomes. For example, the determinants of technological innovation effort and output have been linked to the disparity between performance and performance aspirations, where performance greater than aspirations was found to be negatively related to innovation launches and R&D intensity (Greve 2003: 694-695). Prospect theory suggests that managers become increasingly risk-seeking as performance declines, where risk-seeking is assumed to be associated with investments in innovation. Thus, prospect theory proposes that declining performance will lead to increased innovation effort (Ahuja, Lampert, and Tandon 2008: 50). In contrast, the theory of "threat rigidity" has been used to suggest that a firm's inward focus reduces novelty, leading to poor performance reducing innovation (Ahuja, et al. 2008: 50). The effect that dominates is contingent on where the organization is in its life-cycle (i.e. new versus established entity) and on the resources it controls (Ahuja, et al. 2008: 50). The dynamics of the innovation and performance relationship also has support from the technological change and endogenous growth literature from economics, which identifies that the interplay between innovation and productivity improvements is a key aspect of the growth process (Acemoglu and Cao 2010: 1). These studies suggest that the reverse-causal relationships between training and innovation and innovation and organizational performance need to be included in a comprehensive framework.

Factors Affecting Training

As identified above, employees make choices regarding whether or not to participate in training. These decisions are based on a series of factors that determine willingness and ability, where ability here implies having prerequisite knowledge and skill. Further, employers make the decision to offer training to employees. The above literature has identified both the benefits of training to employees (such as higher wages) and the benefits to employers (such as higher productivity and profit). Factors related to expanding or limiting training can arise both on the employer and employee sides of the decision-making process. For example, limits to training can occur on the "offer-side" when employers do not perceive a net return to training, and on the "takers-decliners-choosers-side" when employees evaluate their net benefit from additional training (Cooke, et al. 2011). The emphasis in this section is on employee-level factors that are related to differential training outcomes across employees. By understanding the factors that expand or limit training, the accelerators and barriers to innovation and organizational performance can be understood, by extension.

Brown and McCracken (2009) provide a useful review of the literature on pre- and post-training barriers and they present a conceptual model of the relationship between participation factors and the training event, and the transfer of training factors and the degree of transfer. Their study contributes to a rich literature on training motivation (notable contributors to this literature include Baldwin and Ford (1988), Burke and Hutchins (2007), Colquitt, LePine, and Noe (2000), Gegenfurtner, Veermans, Festner, and Gruber (2009), Gist, Bavetta, and Stevens (1990), and Haccoun and Saks (1998)). My study focuses on the effect of pre-training barriers, which are typically the focus in the training participation literature (Noe and Wilk 1993; Renaud, Morin, and Cloutier 2006; Tharenou 1997; Tharenou, Latimer, and Conroy 1994; Zoogah 2010). However, it is recognized that post-training barriers may emerge from transfer of training factors that feedback to affect future participation (Brown and McCracken 2009: 500). Brown and McCracken's (2009) main contribution was a model identifying that barriers to participation can become barriers to training transfer that then can feedback and lead to barriers to subsequent training participation. Although how the factors differentially affect participation and transfer were not explored empirically. Generally, training participation factors include intrinsic employee characteristics (perceptual, emotional, motivational, and cognitive), training design characteristics, and extrinsic work environment characteristics (organizational culture, development culture, and workload pressures) (Brown and McCracken 2009: 500).

Factors affecting employees' decisions to participate in training, from the perspective of employee-acceptance of training can be linked to the early human capital production literature. A human capital production framework (Barcala, Pérez, and Gutiérrez 1999; Ben-Porath 1967; Heckman and Jacobs 2010: 23; Mincer 1997; Nishimura, Yagi, and Yano 2004) will be used to present why individuals train or do not train. Ben-Porath's model of production of human capital focuses on the life cycle of earnings linked to the time profile of investment in human capital, and suggests that individuals make additions to their human capital (using their time and other market resources--opportunity cost and training cost) in order to improve individual utility (i.e. wage profile or earnings) (Ben-Porath 1967: 353; Griliches 1997: s330). This model is analogous to firms investing in machines to improve profit outcomes. Factors affecting the production of human capital need to be included in any model of employee training decisions.

Human capital theory argues that knowledge, skills, quality, or capacities are the main source of an individual's productivity (Becker 1994). These characteristics are traditionally developed through education, training, experience, and migration (labour mobility), and each of these activities involve both direct and indirect expenses. Direct expenses include the costs of purchasing the formal or informal investment and indirect expenses include the forgone earnings (and subsequent fall in consumption of goods or leisure) by stakeholders (families, students, trainee, or worker). When the costs of training are shared by the organization and the employee, the employer offers the training if they perceive a net benefit and the employee accepts if they perceive a net benefit

(Becker 1994). However, each party has different factors entering their evaluation of whether there is a net benefit. To address these differences between employers and employees, my study explores separate models and sets of factors affecting employer and employee decision-making.

For example, the employee not only considers the return on investment within the organization, such as higher wages and career progression, but also considers the investment of these scarce resources in alternative investments, including household (family time or leisure), health (physical exercise, better diet), and other human capital (schooling) (Becker 1994: 55). Often these alternatives are only known to the employee. If the employee perceived these other investments to have a higher net benefit than investing in workplace training, then the training would not be accepted. An employee can decline training even though the productive benefits to the organization may be relatively high. Thus, my study includes demographic and family characteristics in an attempt to proxy measure some of these alternative investments.

The relative bargaining power of each party in the employment relationship will also affect the negotiation of the acceptance or declination of training by the employee (Chaykowski 2005: 1; Cooke 2007: 10; Golden and Appelbaum 1992: 479). Characteristics that capture the nature of the employment relationship (e.g. standard and non-standard employment types) and, in particular, the relative power or precariousness of the employee are also important to include in a comprehensive model of employee decision-making (Cooke, Zeytinoglu, and Chowhan 2009; Cranford, Vosko, and

Zukewich 2003; Saunders 2003, 2006; Vallée 2005; Vosko, Zukewich, and Cranford 2003).

The early human capital production literature provided empirical findings to answer the question: Who is more likely to receive job-related training? The empirical findings indicate: training rises with education, it falls with age, its incidence is greater for married men, its incidence is smaller for women and even lower for married women, and it is higher in larger capital-intensive workplaces (Mincer 1989: 28). These findings are consistent with theory suggesting that those with high ability accumulate more education and that education is a complement and substitute for on-the-job training. It is also consistent with worker continuity or sporadic life-time work scheduling leading to uncertain payoff periods for employers (i.e. expectation of turnover for older workers and women) (Mincer 1989: 28). These empirical findings have also been supported in more recent work (Zeytinoglu and Cooke 2009). These studies suggest that--in addition to considering theoretical justifications for the inclusion of factors in a comprehensive model of employee decision-making--empirically relevant factors should also be included.

Several other factors receive empirical support for inclusion when modelling employee decision-making. Lower mobility likelihood and turnover were also established to be associated with higher training outcomes in the human capital literature. Using the Panel Study of Income Dynamics (PSID-1976) data, Mincer (1989) argues that worker attachment to the firm increases with training; quits and layoffs appeared to be reduced by training and over longer periods turnover of workers from firm to firm is lower. Mincer (1989) suggests that stable workers are more likely to be offered or selected for training (if their firm trains). He indicates that the evidence shows less mobility prior to training for those who receive training than others, and that this training leads to further reduced mobility after training (Mincer 1989: 29). Workers who are mobile tend to have flatter wage profiles (less wage growth) despite gains obtained in moving (Mincer 1989: 30). These findings suggest that employee tenure at a workplace should be associated with an increased likelihood of training, and is an important factor to consider in employer and employee training decisions.

Low and high training states have often been associated with education- and wage-levels (Cooke, et al. 2009: 22). For example, higher levels of education have been found to be associated with a higher likelihood of receiving on-the-job training, with the highest odds of training occurring for employees with some post-secondary education or for those with a university degree or higher (Zeytinoglu and Cooke 2009: 106). Further, with regard to wage-levels, decomposition analysis has demonstrated that the gap in the incidence of informal (i.e. on-the-job) training between higher- and lower-paid employees was associated mainly with the behaviours (decisions/choices) of employers and employees within these wage groups and not individual employee endowments or characteristics (Zeytinoglu, Cooke, Harry, and Chowhan 2008: 20). The Zeytinoglu, Cooke, Harry, and Chowhan (2008) study contributed to further identifying the nature of the polarization in working conditions in the Canadian labour market with a particular emphasis on low-paid and higher paid employees.

Differences in employee outcomes have been linked to employer "high road" or "low road" approaches, where high-road approaches emphasize high-commitment or involvement work practices (Godard and Delaney 2000: 492; Osterman 1994; Pfeffer 1998: 56). Further, some research has found that the implementation of elements (i.e. benefits packages) of high-road and low-road approaches tends to vary by groups of employees (Zeytinoglu and Cooke 2005). The common thread through these approaches and categorizations of employees is that some employees receive or participate in rewards and practices while other employees do not. Targeting resources and rewards to particular employees has recently been re-framed as emphasizing strategic jobs by disproportionately investing in employees that are in strategic positions in the business process (Becker and Huselid 2006: 909). Thus, my study considers the degree to which employees participate in HPWS practices as an indication of the employer's categorization of the employee.

In summary, factors affecting employees' decision to participate in training are not only rooted in organizational strategic choices and human resource system architectures, but also in the individual's decisions concerning the production of their own human capital. Thus, tying the above literatures together, factors affecting employees' decision to participate in training can be factors that indirectly affect innovation, which can further affect organizational performance. These are the key relationships that will be developed in the following section.

Chapter 3

Definitions and Concepts

This section presents the definitions and concepts that are used in this thesis. This section has been included separately from the literature review so that differences from previous approaches can be highlighted and briefly expanded upon. Further, assumptions that are relevant for the study are also presented and discussed.

Training

For the purpose of my study, training is defined as the learning of new skills and the improving of old skills. This definition follows Becker's (1994: 31) definition of on-the-job training, but for my study it applies generally to all job-related training (formal and informal) and not just on-the-job training. Further, my definition is consistent with other definitions of training. For example, Haccoun and Saks (1998: 34) define training for work as including the updating of existing skills and the equipping of workers with new skills. They identify skills as being either hard (i.e. a set of skills that focus on a task) or soft (i.e. skills that aid personal interaction, such as effective communication) and either general or specific to the firm (Haccoun and Saks 1998: 34). I define formal training as activities that have clear pre-defined objectives, structure, content, and feedback (e.g. evaluation, assessment, or comment on development). Some examples of formal training include classroom instruction, workshops, and seminars. In contrast, informal training is more ad hoc and is not typified by a pre-determined design. An example of informal training is on-the-job training that is often provided by co-workers (Berg and Frost 2005: 667-668).

It is assumed here that training requires both time and effort from the employee, and that it always results in higher skill levels for those trained (i.e. there cannot be zero or "negative" learning on balance resulting in either no change in skill level or lower skill level). Further, it is assumed that there is a positive amount of transfer of training, where transfer of training is defined as the application of skills acquired as a result of the training. The implication is that it is the application of skills that are the contributor to outcomes and not the act of training in and of itself. Thus, training leads to human capital development, and it is the application of human capital that is the contributor to outcomes. For the development of this framework a more nuanced conceptualization is not essential. The framework requires only that the definition of training includes the development of higher skill levels and their application. The literature review above suggests that the nature, degree, and type of training within organizations will be contingent on the degree of labour market imperfection, including asymmetry of information and the bargaining power of participants.

Types of training that are voluntary in nature, as opposed to mandatory or obligatory, are the focus of my study. Defining voluntary and mandatory is not as straight forward as it may seem. It would be inappropriate to characterize behaviours as either entirely voluntary or entirely mandatory. Rather voluntary and mandatory training behaviours more likely exist on a continuum. It is assumed that mandatory training likely has higher participation rates relative to non-mandatory where employees are "free" to exercise discretion and either choose to accept or decline the training. Further, my study uses a broad concept of training by focusing on both formal and informal; however, it is not all inclusive because the focus is limited to non-mandatory, employer-sponsored, and job-related training. This conceptualization is useful because it enables the analyses to focus on job-related training that both the employer and employee have discretion over and where the expected net benefits are zero or positive for both the employer and employee.

Other High-Performance Work Systems Practices

My study adopts a highly aggregated approach to investigating HPWS practices (Guest, Michie, Conway, and Sheehan 2003; Huselid 1995; MacDuffie 1995; Youndt, et al. 1996). This is in contrast to dis-aggregated conceptualizations of HPWS practices (Ichniowski, Kochan, Levine, Olson, and Strauss 1996; Macky and Boxall 2007; Mohr and Zoghi 2008). In other words, HPWS practices are included in the analysis as an aggregate system distinct and separate from training. The composition of the other HPWS bundle of practices is drawn from the existing literature (Subramony 2009; Wright and Boswell 2002: 253).

The separation of other HPWS and training is done with the goal of more appropriately matching the broader organizational strategy of the workplace to the other HPWS, and thereby more directly assessing the complementarity across sub-bundles of HPWS practices with organizational strategy. An emphasis on the training and other HPWS sub-bundles will enable a more nuanced differentiation of the human resource architecture (Becker and Huselid 2006: 904) by acknowledging that human resource systems are inherently multi-dimensional, which will allow for the identification of value provided to organizations across sub-bundles due to variability in the use of practices (Becker and Huselid 2006: 905) (i.e. as certain practices or combinations of practices become widely used by organizations the competitive advantage provided and the subsequent value of practices will dissipate--economic returns will approach zero). In summary, training is considered a separate and distinct practice or "sub-bundle", see training discussion above. Other HPWS practices are aggregated into another sub-bundle--see detailed discussion of indexes and aggregation below in Chapter 5.

My composition of the aggregate training and other HPWS practices bundles and their sub-bundles are based on a meta-analytic investigation by Subramony (2009). Subramony's (2009) findings identified the content of HPWS as containing three main human resource management bundles: empowerment-enhancing, motivation-enhancing, and skill-enhancing. Other studies have also identified similar HPWS bundles (Delery, Gupta, and Shaw 1997; Wright and Boswell 2002: 253). In this thesis Subramony's (2009) definition of HPWS bundles is adopted. The empowerment-enhancing bundle focuses on autonomy and responsibility practices such as: employee involvement in work processes, formal grievance or complaint resolution procedures, job enrichment, self-managed teams, employee decision-making, and feedback systems. The motivation-enhancing bundle focuses on practices that help direct and encourage intensity and persistence of effort such as: appraisals of performance, incentive plans, pay linked to performance, promotion opportunity, and benefits. The skill-enhancing bundle includes practices that develop or improve organizational knowledge and skill levels, such as: the development of large applicant pools to select from, and the use of valid selection practices (Subramony 2009: 746). It is important to note that Subramony's (2009) original skill-enhancing bundle has been adapted, with the main adaptation being the exclusion of skills training. The training element of this bundle has been separated to be considered independently. These sub-bundles are the "building-blocks" for the compilation of the other HPWS practices separate from training. In summary, the human resource management bundles used in this thesis focus on two main sub-bundles: (1) the sub-bundle of training; and (2) the other HPWS sub-bundle comprising empowerment, motivation and skill enhancing practices.

An implicit assumption that is common in the HPWS literature is that HPWS practices that are observed as existing at a workplace have a positive benefit to the organization (Becker and Huselid 1998b: 5). This assumption implies that a minimum level of practice efficacy needs to exist (in addition to the practice's place within the workplace's configuration of practices and competitive strategy) for the practice to be able to contribute to the organization's performance. Thus, if the practice did not have a positive benefit to the organization the practice would be discontinued. In this dissertation, I assume that each practice that is implemented has a net positive benefit to the organization. This assumption does not imply that organizations are necessarily selecting the most effective practices or idiosyncratic implementations of their practices (i.e. the "best practice" of a practice given the organization's context). However, it is expected that when organizations select practices that they are implemented to align with other organizational policies and practices (Becker and Huselid 1998b: 5-6; Becker and Huselid 2003). The implication of this assumption is that the quantity and intensity of practices implemented by the organizations are the focus of this study and not the quality or effectiveness of the practices themselves. This approach is consistent with the focus in the literature on quantity and practice intensity (Arthur 1994; Delery and Doty 1996; Guest 2001: 1097; Huselid 1995: 636; Ichniowski, et al. 1997; MacDuffie 1995: 199-200; Messersmith and Guthrie 2010; Youndt, et al. 1996).

Innovation

Innovation is defined in my thesis as either new products and processes, improved products and processes, or the implementation of new technology; where processes are related to production. This definition is narrower than the broad conceptualizations that can be found across both strategic human resource management and economics literatures. Broad conceptualizations of innovation are often similar to the following definition provided by Hage (1999: 599): "the adoption of an idea or behavior that is new to the organization" (where ideas and behaviours relate to new products (goods and services), new technology, and new organization/administrative practices). The degree of process or product innovation is captured by whether the innovation is argued to be incremental or radical (Pries, Chowhan, and Mann 2009; Zahra, Neubaum, and Huse 2000: 959). A new pioneering or premiere discovery, creation, or change of processes or products is defined as a radical innovation, whereas incremental innovations are defined as evolutionary improvements in production processes or products. Radical innovation implies a degree of newness and incremental innovation can imply new improvements. Some studies use external benchmarks to identify newness, for example, whether the innovation is an industry first or only a firm first (Beugelsdijk 2008: 827). In this thesis the importance of the innovation is defined in relation to the market, specifically by examining whether it is a world, national, or local market first.

Broad conceptualizations of innovation often include workplace practices, work organization, or administration. For example, workplace practices such as self-directed work teams, job rotation, employee problem-solving groups (or quality circles (QC)), and total quality management (TQM), have been described as innovative work practices (Osterman 1994: 176). Other research frames these types of workplace innovations as employee involvement or participation (Ichniowski, et al. 1996: 300). Whether an innovative work practice or workplace innovation, these types of practices are often included as elements of HPWS. For conceptual clarity, these HPWS practices are not included in the definition of innovation used in this thesis.

In my study, new and improved process and product innovations, and the implementation of new technologies define the innovation domain. This narrow conceptualization is used to maintain a distinction with HPWS practices, and as a result the multi-dimensionality of innovation is not ignored. Thus, the emphasis is on innovation as a response to changing product and labour market circumstances. In other words, organizations develop goods and services not previously offered to the product market; they redeploy reconfigured goods and services, and/or the processes by which goods and services are produced are re-invented or reconfigured within the organization or they implement new technology.

Organizational Performance

With regard to organizational performance, performance has been conceptualized as profitability, productivity, revenue/sales, return on assets, wage growth, turnover, innovation, and quality (Aragon-Sanchez, Barba-Aragon, and Sanz-Valle 2003; Arthur 1994; Huselid 1995; Ichniowski, et al. 1997; Messersmith and Guthrie 2010; Wood 1999b: 405). In this research I focus on a narrower conceptualization of organizational performance: gross profit per employee. The narrow focus allows for turnover and innovation to be determinants of financial performance.

The profitability ratio return on assets (ROA) (or net operating profit divided by total assets) is not used as a measure of performance because of the wide variability across industries (Hawawini, Subramanian, and Verdin 2003: 4, 8). For example, the greater the capital intensity of industries the lower the ROA ratio will be because of the greater material investments initially required. Further, using gross profit per employee as the main measure of performance in my thesis is consistent with previous research (Richard, Devinney, Yip, and Johnson 2009: 724). A focus on people/employees and work organization systems implies that emphasizing a return per employee shifts the focus to human "assets", and away from physical assets within the organization. Nonetheless, factor analysis of performance measures indicates that measures that focus on net income returns (such as profit margin, return on shareholder funds, return on total assets, return on capital employed, and Tobin's *q*) tend to load onto the same latent organizational performance construct (Richard, et al. 2009: 742).

This study follows prior research (Datta, et al. 2005: 139; Huselid 1995: 651) that measures performance as an outcome divided by number of employees. Datta, Guthrie, and Wright (2005) and Huselid (1995) use productivity as the logarithm of the revenue (or sales) divided by number of employees instead of profit. This is a relatively crude measure of labour productivity and it does have some limitations. The main limitation is that costs are not included in the calculation. Not including costs implies that value-added productivity is not being considered. For example, the costs per employee to increase HPWS practices may be more than the potential gains in revenue. Focusing on a value-added or profit-based measure may address some of the ambiguity generated by not including cost. Further, with regard to the denominator, any measure using number of employees should make sure the number of employees estimate used is a full-time equivalency count. Otherwise, firms that use higher proportions of part-time employees will have their labour productivity relatively under-estimated as their denominator is inflated. This is a concern with corporate or firm level analysis that is not able to distinguish between full- and part-time employees and that focuses on total employment.

Strategic Activities

In my study, the conceptualization of strategy is more nuanced than the traditional competitive strategies as defined by Porter (1985, 1987, 1996) or Miles and Snow (1984) and Miles, Snow, Meyer, and Coleman (1978). Rather than positing positioning strategies as the source of contingencies, this study emphasizes strategy implementation in particular strategic business activities (Becker and Huselid 2006: 908), which permits the nature of the contingencies to be more nuanced. In particular, a two-dimensional strategy space focusing on operational excellence and product leadership is adopted (Thornhill and White 2007: 554-555). By focusing on operational excellence and product leadership, my study's conceptualization of strategy is based on Thornhill and White's conceptualization (2007: 556). Thornhill and White (2007: 556) identify operational excellence and product leadership as the two main distinct strategic factors emerging from a representative sample of Canadian workplaces. These strategy dimensions are consistent with Treacy and Wiersema's (1997) identification of operational excellence and product leadership as distinct "value disciplines" or business unit strategies. The authors define value disciplines as a central choice that shapes all planning and decision-making. Similar to strategies, value disciplines identify how the organization will operate in the market place and what the value proposition will be for its customers. The Treacy and Wiersema strategy typology of operational excellence and product leadership is similar to Porter's cost-leadership and product differentiation strategies both in content and outcomes (Thornhill and White 2007: 554).

Operational excellence is characterized by mass-marketing, "middle-of-the market" products, at a low price, and with hassle-free service. The focus is on removing variety from operational processes--"do it one and only one way" (Treacy and Wiersema 1997: 59). Product leadership focuses on product performance that pushes boundaries with persistent innovation year over year by remaining committed to new ideas and protecting the entrepreneurial spirit (Treacy and Wiersema 1997: 38-39). This bi-dimensional approach avoids issues of having to categorize workplaces into groups that are characterized by their strategic purity. Categorization by strategic purity ignores the concurrent complexity present in strategy selection and positioning. Rather, this approach permits workplaces to exist in a strategy space that has 'pure' operational excellence and product leadership as the polar outcomes on the strategy continuum. Workplaces can adopt aspects of each strategy that align with their particular context. Thus, workplaces are allocated along the continuum allowing for a balance between strategies contingent on the workplaces' focus.

Levels of Analysis

Levels of analysis that are often used in the literature (such as workplace and corporation) are a part of an integrated structure ranging from the smallest unit to the whole. For example, location, establishment, company, and enterprise are all levels within a business structure (Statistics Canada 2010a: 4). An enterprise is composed of a hierarchy of legal entities, a company is an investment and profit centre (where operating profit can be calculated and capital employed measured--assets and liabilities), an establishment is a profit centre that can provide information on value added (outputs and inputs), and a location is the lowest entity in the structure (a revenue or cost centre) (Statistics Canada 2010a: 4).

In terms of the organizational level of interest, the workplace unit is more likely reflective of a division or operational unit than the organization as a whole (or aggregation at an enterprise level). The macro-level study of this thesis uses the workplace as the unit of analysis. Workplace is synonymous with location defined above (i.e. the lowest entity in the structure of the whole business entity). The use of the workplace as the unit of interest minimizes the potential heterogeneity of systems. Thus, the HPWS practices and other concepts and constructs that are of interest are being measured at the appropriate level (Delery 1998: 295). This is in contrast to more global approaches that focus on the firm, company, corporate, or enterprise level (Becker and Huselid 1998a: 55, 70), and the proportion of employees affected by practices at these higher levels of aggregation (Huselid 1995). It is often suggested that the global or overall approach maximizes the generalizability of findings across firms and industries. However, the global approach is typically used when practices could not be more narrowly linked to production processes in a way that is more likely at a workplace or plant level analysis. A workplace or plant-level analysis more clearly establishes a connection between practices and production processes. Ichniowski, Kochan, Levine, Olson, and Strauss (1996: 303) identify the use of corporate level data as problematic in that the effects of practices that are only implemented at particular workplaces are masked by an analysis that focuses on aggregate corporate-level measures. It is possible that corporate-level analysis under-estimates the workplace-level effects of HPWS practices on organizational outcomes by averaging over workplaces (Ichniowski, et al. 1996: 308). This study addresses the unit of analysis with more comprehensive precision and suggests that future research could also benefit from greater attention to levels within organizational structures.

A workplace-level approach is preferred to a corporate-level approach because focusing on the workplace level allows for variability across units in practice implementation. This is in contrast to a corporate level of analysis, where HPWS practices are likely to vary in their implementation and utility across business units and occupations/job-groups. The following example illustrates the potential underestimation of the effects of HPWS practices on performance when the analysis is focused on the corporate level instead of the workplace level. An analyzer corporate strategy (Miles and Snow 1984) may be observed at a corporate level with the defender and prospector strategies implemented by separate business units. Suppose the corporation has two workplaces, separate both physically and in terms of the HPWS practices implemented. In terms of employment, the corporation has 75% of its employees in the defender workplace and 25% in the prospector workplace. Further, suppose only the prospector workplace implements HPWS practices so that the proportion of the workforce affected by the HPWS practices at the corporate level is 25%. Then suppose the implementation of the HPWS increases productivity by 20% in the prospector workplace, while the defender workplace's productivity remains constant. Assuming sales proportional to the employment distribution across workplaces, the gain in corporate productivity is only 5%. Thus, at first glance, it appears that the introduction of HPWS practices only increases productivity by 5% at the corporate level, a lower-bound that is substantially below the true effect of 20%. This example illustrates how corporate level analysis can lead to relationships being confounded.

For micro-level studies, the definition of the unit of analysis is more straight forward. Often employees or groups of employees are used in analysis. For my study, individual employees are used as the unit of analysis. Further, workplace-level characteristics are included in the analysis at the employee level.

Principles and Practices

There is a need to differentiate between principles and practices, and between intention and behaviour. Principles are the foundation of human resource system architecture; they establish which policy mix and eventual practices can be implemented (Becker and Gerhart 1996: 786). Any specific human resource architecture will be limited to a set of policies that align, creating both internal consistency and, by extension, external consistency between the human resource system and positioning business strategy. Practices are the implementation of the policy, with an emphasis on techniques that are appropriate given the human resource architecture. The emphasis in my study is on practices and behaviour, and not directly on principles and intention. Nonetheless, principles and intentions can often be inferred from practices and behaviour.

Chapter 4

Theory and Development of Hypotheses

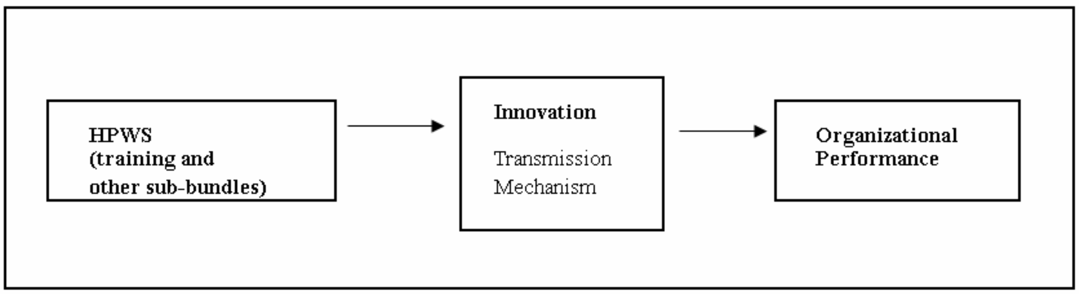
This thesis uses resource-based theory (RBT) as an over-arching justification to identify human resources as an enduring source of an organization's competitive advantage (Barney, et al. 2011: 1303; Wright, et al. 2001). In particular, the development of people's human capital (i.e. training) is hypothesised to be a source of organizational success. As discussed in the introduction, the resource-based theoretical perspective provides a rationale for the link between human capital, human resource practices and the implementation of strategic choices (Wright, et al. 2001: 703; Wright, et al. 1994). Specially, human resource management practices that are aligned with organizational strategy are seen as critical to offering a potential source of persistent competitive advantage for organizations. In particular, the use of the human resource practice training to develop human capital leads to increases in knowledge and skills that can be rare and difficult to replace. When workplaces use practices to retain people the employee's unique knowledge and social relationships become inimitable; when HPWS practices are used to induce employees to be immobile organizations can create conditions within a strategic context that are the source of an organization's sustained competitive advantage.

The above literature provides the foundation for the development of a framework that identifies the effect of training, other HPWS practices, and innovation on organization performance, where innovation mediates the training and organizational performance relationship. One thing that the studies in the above literature review have in common is that none have explicitly explained the causal relationship through time between training and innovation, and their effect on organizational performance within a strategic context. A framework is developed (detailed below) that provides an explanation for the following question: what are the dynamic structural relationships between training and innovation that lead to organizational performance? The simultaneity of the links will be explored in addition to adaptive causal links. It is expected that the structural relationship between training and innovation will lead to higher levels of organizational performance. Specifically, that training will lead to innovation, and innovation to training, and that the effect of these relationships on organizational performance will be positive. Further, none of the studies discussed above have controlled for HPWS practices and strategic activities within a structural framework.

Macro-level Theoretical Framework and Hypotheses: Understanding the Transmission Mechanism

In this section, a theoretical framework that describes the black-box transmission mechanism is proposed. The framework integrates the above literature review and the preceding key construct conceptualizations, and identifies the relationships between training, other HPWS practices, innovation, and organizational performance, see Figure 2. Notice that innovation is proposed to be the main transmission mechanism between training and organizational performance. Innovation is the main mediator between the HPWS practices, with a focus on training, and organizational performance.

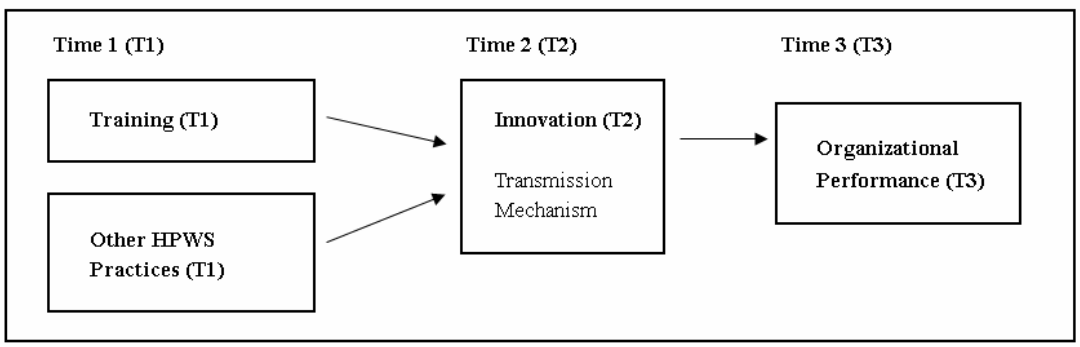
Figure 2: Basic Transmission Mechanism Model of HPWS Practices, Training, Innovation, and Organizational Performance at the Workplace Level



However, this basic model is further enhanced to include temporal precedence of key variables of interest, including training and other HPWS practices. The model considers three main periods of interest--time 1, 2, and 3. This dynamic structure implies that the model is causal--see Figure 3. Training in time 1 and other HPWS practices in time 1 are determinants of innovation in time 2 and innovation leads to organizational performance in time 3. It is proposed that training leads to the development of innovation (Acemoglu 1997; Bartel and Lichtenberg 1987; Beugelsdijk 2008; Walsworth and Verma 2007). The relationship between training and innovation is a distal process, where higher levels of human capital (knowledge and skills) are required before innovations can begin to emerge. Training stimulates continued learning, which fosters innovation. In other words, innovation becomes more likely when competencies and capabilities are enhanced. Further, innovation has been linked to organizational performance (Acemoglu and Cao 2010; Delery and Doty 1996: 822; Thornhill 2006), where innovations enable more efficient and effective processes or superlative products. These findings lead to the following hypothesis:

Hypothesis 1: The positive effect of training in time 1 on organizational performance in time 3 will be mediated by innovation in time 2.

Figure 3: Dynamic Transmission Mechanism Model of Training, Other HPWS Practices, Innovation, and Organizational Performance at the Workplace Level



Despite the frequent reference to the relationship between training and innovation in the literature, the relationship between other HPWS practices and innovation has rarely been studied. The studies that have explored the relationship have tended to focus on a systems approach to measuring HPWS practices, and these studies have mainly been cross-sectional. More sophisticated systems of human resource practices have been found to be associated with higher levels of novel innovation (Therrien and Léonard 2003: 34), where sophistication was measured in terms of the number of practices used by a workplace. Another study focused on an index of practices based on the proportion of employees covered by each practice and found that HPWS practices were positively associated with overall innovation, but only significantly related to product and organizational innovation sub-scales and not process innovation (Messersmith and Guthrie 2010). Thus, based on the well-established relationships between HPWS practices and organizational performance (Delery and Doty 1996; Huselid 1995; Ichniowski, et al. 1997; Youndt, et al. 1996) and innovation and performance (Delery and Doty 1996; Thornhill 2006), and given these recent results (discussed above) indicating a relationship between HPWS practices and innovation, it is expected that innovation is also a part of the transmission mechanism mediating the relationship between HPWS practices and organizational performance.

Hypothesis 2: The positive effect of other HPWS practices in time 1 on organizational performance in time 3 will be mediated by innovation in time 2.

In addition to the above framework, the effect of strategy also needs to be considered for the framework to be comprehensive. Focusing on strategies at the workplace level allows for alignment at the level at which competition tends to occur. Enterprises or corporations that are diversified cannot be said to compete in markets. It is their business units that compete, and, as such, strategies need to be aligned to focus on performance at the business-unit level (Porter 1987: 46). This linkage between level of competition and strategy is rooted in a distinction (suggested by Porter (1985: 364-368)) between corporation strategy and business unit strategy, where corporate strategy emphasizes the overall plan in a large diversified enterprise, and business unit strategies focus on a particular business unit and can vary across the array of units within an enterprise; however, this does not exclude horizontal strategy, which maintains a degree of co-ordination and interrelationship.

The alignment and fit of HPWS practices and strategy have been identified as having a positive effect on organizational performance (Delery and Doty 1996; Huselid 1995; Kaufman 2010; Youndt, et al. 1996). The existence of HPWS's within an organization implies the workplace has made strategic-choices and implemented supporting HPWS practices. Thus, strategic activities are taken as given and are not determined within this framework. Youndt, Snell, Dean, and Lepak, (1996: 854-856) found strategy moderated the relationship between the human resource system and operational performance, and thus, following Youndt et al. (1996: 846), only the "external fit" (i.e. moderating) effect of strategy on the human resource system and organizational performance relationship is of interest in the current study.

Further, strategic alignment--in terms of formality and structure--with innovation has been found to have positive effects on organizational performance (de Brentani, Kleinschmidt, and Salomo 2010; O'Regan, Ghobadian, and Gallear 2006; Terziovski 2010). The positive moderating effect of strategy implies organizations with strong alignment are more able to identify, adopt, and implement change, compared to organizations that have a weaker alignment (see Figure 4). In particular, organizations that have stronger alignment between strategic business processes and training and other

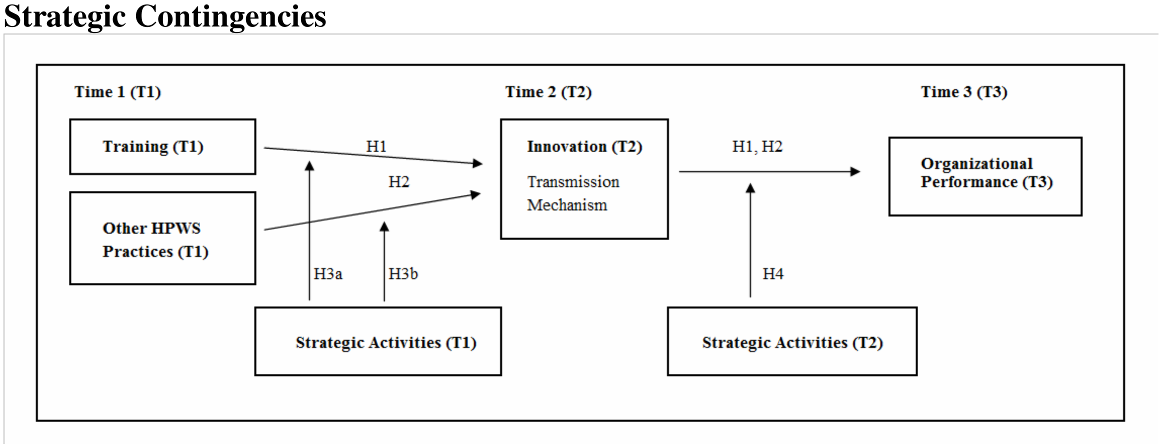
HPWS practices are more likely to convert human capital into innovation that leads to positive returns. This leads to the following hypotheses:

Hypothesis 3a: The positive effect of training in time 1 on innovation in time 2 will be contingent on alignment with strategic activities in time 1.

Hypothesis 3b: The positive effect of other HPWS practices in time 1 on innovation in time 2 will be contingent on alignment with strategic activities in time 1.

Hypothesis 4: The positive effect of innovation in time 2 on organizational performance in time 3 will be contingent on alignment with strategic activities in time 2.

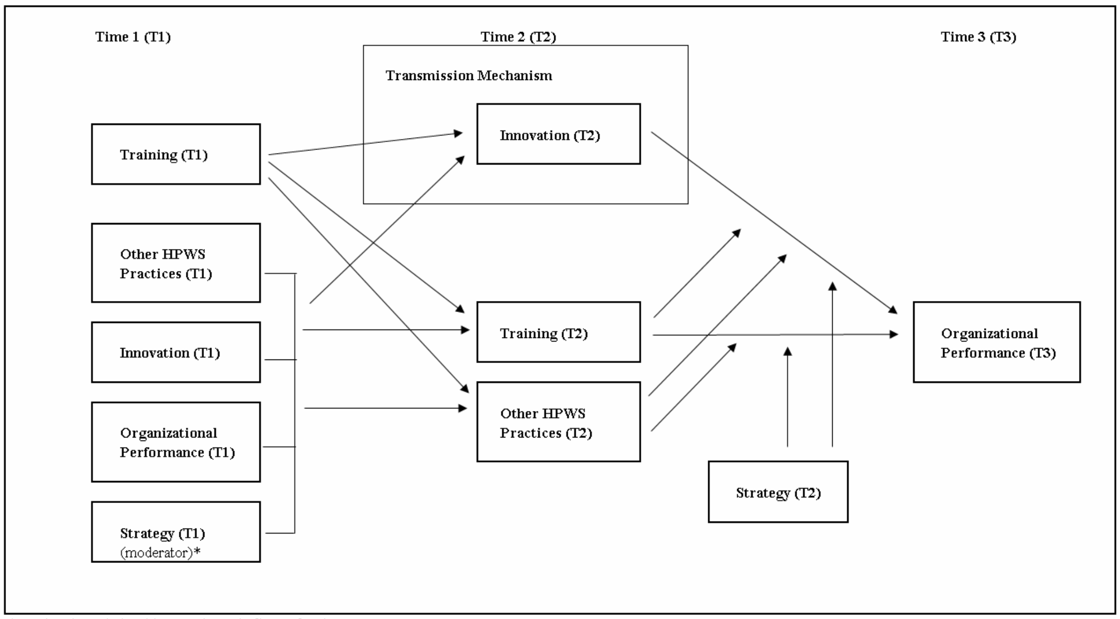
Figure 4: Dynamic Transmission Mechanism Model of Training, Other HPWS Practices, Innovation, and Organizational Performance at the Workplace Level with Strategic Contingencies



By separating out the effect of training, this study purposefully is not focusing on a strict systems (of human resource management practices) approach. This nuanced approach will permit strategic activities to be a moderator of both training and other HPWS practices. Thus, focusing on training separately allows for the moderating effect of strategy on the mediation relationship of training, innovation, and organizational performance to be explored. Further, avoiding a HPWS practices systems approach implies the findings will be more prescriptive for practitioners and policy-makers.

Finally, the following framework is proposed to extend the above core theoretical model. In particular, innovation in time 2 is included as a determinant of organizational performance in time 3. Both training and other HPWS practices in time 2 are moderators of time 2 innovation's effect on organizational performance in time 3. This framework allows for alternative explanations, such as reverse-causation, by acknowledging the temporal precedence of training, other HPWS practices, innovation, and organizational performance and strategy (as a moderator) in time 1 and their effect on time 2 factors (see Figure 5).

Figure 5: Dynamic Structural Transmission Mechanism Model of Training, Other HPWS Practices, Innovation, and Organizational Performance at the Workplace Level with Strategic Contingencies



* Moderating relationships not shown in figure, for time 1.

Empirical studies have identified a relationship between HPWS practices and training incidence. For example, using workplace-level data from the 1994 Educational Quality Workforce National Employers Survey (EQW-NES) from the U.S. Bureau of the Census, workplace practices such as benchmarking and total quality management were found to be positively related to the incidence of computer training and teamwork training, and these practices also were positively related to training intensity (i.e. proportion of workers trained), especially in manufacturing establishments (Lynch and Black 1998: 73). More recently, using a cross-sectional sample of Canadian workplace-level data, a study looking at the effect of a select grouping of individual practices (flexible job design, problem-solving teams, labour-management committees, and self-directed work groups) found that problem solving teams was the only positive significant practice related to training (Chaykowski and Slotsve 2006: 62, 83). Conversely, studies looking at the relationship between training and other HPWS practices are rare. This relationship is important because one would imagine that the managers of organizations would want to train employees in preparation for any introduction of new work organization practices or structures.

With regard to the innovation and training relationship, workplace-level increases in the number of innovations types has been found to have a positive relationship with employee on-the-job training incidence (Zeytinoglu and Cooke 2009: 106). Studies focusing only on the workplace level have found that any innovation (i.e. new or improved product or process) has a positive significant relationship with the incidence of both classroom and on-the-job training (Turcotte, et al. 2003: 48). However, the presence of innovation was only positively associated with on-the-job training intensity and was not found to be significantly related to classroom training after controlling for selection bias (Turcotte, et al. 2003: 59). A similar pattern for incidence and intensity was found using a sample of small and medium sized firms (Baldwin and Johnson 1995: 3). Baldwin and Johnson (1995: 17) found that innovation was significantly and positively associated with the incidence of training.

I am not aware of any studies that have focused on the reverse-causal relationship between organizational performance and training, other HPWS practices, and innovation, all within a common framework. However, these individual relationships have been explored (if only in a limited way) in the studies to follow.

Focusing first on the relationship between performance and training, one study has explored the effects of performance on training. In particular, the effects of several different firm performance measures on formal and informal training have been investigated. The performance measures explored include turnover, investment in machinery, and labour productivity. Baldwin and Johnson (1995: 17, 24, 28) found no significant relationship between turnover, investment in machinery, or labour productivity performance measures and the various outcomes for training (incidence, number of employees training, and training expenditures).

Only a couple of studies have looked at the causal and reverse-causal relationship between HPWS and performance (Guest, et al. 2003; Wright, et al. 2005). For example, Guest, Michie, Conway, and Sheehan (2003: 296), using a sample of 610 firms (manufacturers and service sector), focused on the effect of prior performance on HPWS and the subsequent effect on performance in the following year. They found that the high use of human resource management practices had a positive significant effect on profit per employee for manufacturers; however, after controlling for previous performance the effect was no longer significant or substantive. It is also interesting to note that prior performance becomes the dominant predictor of following period performance (Guest, et al. 2003: 306). Guest et al. (2003: 293) identify that it is important to study not only the manufacturing sector, but also the service sector particularly as more developed economies shift to services from manufacturing.

Further, using employee-level human resource practices measures, archival company records for measures of performance, and a three time period measurement approach, Wright, Gardner, Moynihan, and Allen (2005) found that human resource practices have a stronger correlation with the following period's profitability performance than they do with the prior years' performance. Again, once prior performance was controlled for the correlation between human resource practices and following performance was no longer significant (Wright, et al. 2005: 429). In contrast to my study, the Guest et al. (2003) and Wright et al. (2005) studies do not explore the "black-box" between HPWS and performance, whereas my framework includes the transmission mechanism between the HPWS and performance relationship. In addition, my study can consider the causal relationships and the moderating effect of strategic activities. Thus, the framework that I propose in Figure 5 is more comprehensive because it tests the alignment between HPWS practices and strategic activities across the three time periods.

Regarding the relationship between performance and innovation, Greve (2003: 692) found that growth in annual income of the organization was positively correlated with the number of innovation launches; however, once the relationship was explored in regression with controls, the relationship was found to be negative and not significant. The caveat with these findings is that the author used a unique sample of Japanese shipbuilding firms. These results may fail to generalize to other industries or sectors because of different product design and production cycles in shipbuilding relative to other industries.

The relationships identified above lead to the following hypotheses:

Hypothesis 5: a) Training, b) other HPWS practices, c) innovation, and d) organizational performance in time 1 will positively affect innovation in time 2.

Hypothesis 6: a) Training, b) other HPWS practices, c) innovation, and d) organizational performance in time 1 will positively affect training in time 2.

Hypothesis 7: a) Training, b) other HPWS practices, c) innovation, and d) organizational performance in time 1 will positively affect other HPWS practices in time 2.

Turning to the moderating effects of training and other HPWS practices on innovation, Boothby, Dufour, and Tang (2010: 656) identify the relationship between the adoption of new technologies and the corresponding training provided to employees (which they refer to as "strategic-training"). Organizations that took advantage of the complementarity between the adoption of new technology and strategic training were found to be more likely to have higher productivity gains than organizations that did not emphasize strategic training and only adopted new technology (Boothby, et al. 2010: 658). Strategic training is defined as "those types of training whose provision is most influenced by the technology" (Boothby, et al. 2010: 659). The interaction of human resource practices and innovation, and their relationship with performance, was investigated by Delery and Doty (1996: 814), using a firm-level sample of banks. They found that training was not related to performance, but that results-oriented appraisals and profit-sharing practices were positively and significantly related. Innovation moderated by human resource practices positively affected performance relative to the no innovation or human resource practices reference group (Delery and Doty 1996: 822).

The relationships identified above lead to the following hypotheses:

Hypothesis 8: The positive effect of a) training, b) other HPWS practices, and c) innovation in time 1 on innovation in time 2 will be contingent on alignment with strategic activities in time 1.

Hypothesis 9: The positive effect of a) training, b) other HPWS practices, and c) innovation in time 1 on training in time 2 will be contingent on alignment with strategic activities in time 1.

Hypothesis 10: The positive effect of a) training, b) other HPWS practices, and c) innovation in time 1 on other HPWS practices in time 2 will be contingent on alignment with strategic activities in time 1.

Hypothesis 11: The positive effect of training in time 2 on organizational performance in time 3 will be contingent on alignment with strategic activities in time 2.

Hypothesis 12: The positive effect of innovation in time 2 on organizational performance in time 3 will be moderated by training in time 2.

Hypothesis 13: The positive effect of innovation in time 2 on organizational performance in time 3 will be moderated by other HPWS practices in time 2.

Hypothesis 14: The positive effect of training in time 2 on organizational performance in time 3 will be moderated by other HPWS practices in time 2.

In summary, this framework emphasizes both the causal link between training and innovation, and the complementarity between training and innovation that is identified through the moderation effect of training on innovation. Thus, training leads to innovation, but it also enhances the gains by contributing to a more successful implementation of innovations.

The above proposed framework enables the evaluation of alternative hypotheses/explanations, which has been identified as adding value to research (Wood and de Menezes 2008: 640, 673). Becker and Gerhart (1996: 793) identify a key alternative explanation as reverse-causation, and they provide the example of profits and profit-sharing (i.e. are firms with higher profits more likely to offer profit-sharing or does profit-sharing lead to higher profits?) to illustrate the need for future research to consider alternative explanations. Being able to test and reject alternative hypotheses increases the internal validity of the current study. External validity can be increased by testing causal links in the relationships and thereby providing prescriptive results that generalize beyond the reference sample (Ichniowski, et al. 1996: 305).

The ideal time frames for which to empirically test this model may be unique to each industry and organization. Timing may depend on production cycles, types of training, and the idiosyncratic implementation of HPWS practices. For example, quarterly data may be best for organizations in dynamic environments with high levels of competition. Wright, Gardner, Moynihan, and Allen (2005: 422) identify 6-month intervals as an appropriate time interval when looking at the employee-level effect of time 1 organizational performance on time 2 HPWS practices and the subsequent effect of time 2 HPWS practices on time 3 organizational performance. Annual data may be more appropriate when examining business unit level aggregate effects--a year is likely aligned with planning, production, budget (financial), and other reporting cycles. As discussed below in more detail, my study uses annual data for the analyses.

Several contextual factors will be included in the model to avoid model mis-specification biases. Rooted in contingency theory, accounting for contextual influences controls for aspects of the environment within which organizations operate. A focus on various contexts will help to identify under which conditions training, other HPWS practices, and innovation provide the most benefit.

Micro-level Theoretical Framework and Hypotheses: Understanding Training Decisions

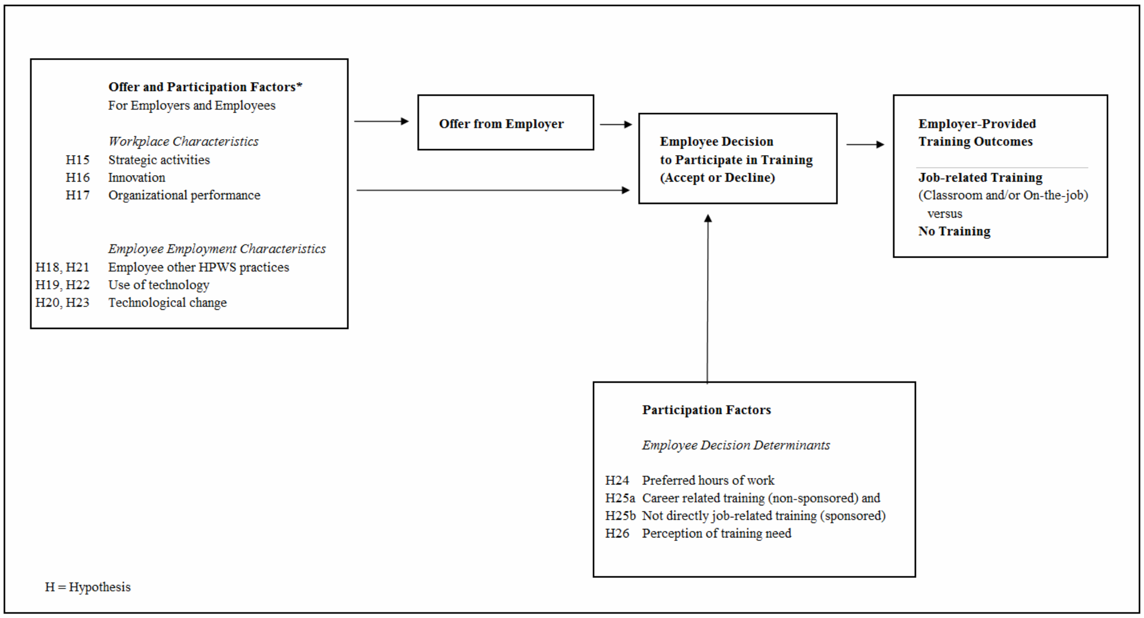
The second main objective of this research is to examine factors that expand or limit employee training events, and that can act as indirect accelerators or barriers to innovation and performance. The following framework focuses on employee and workplace characteristics that are related to an employee-receiving employer-provided training. Here the employee is the unit of interest, which is in contrast to the above framework. Workplace and employee characteristics can affect both the employer's decision to offer the training and the employee's decision to accept or decline the training. The above macro-level framework (in addition to strategic human resource management and Human Capital theory, see the discussion below) provides the theoretical underpinnings to support the following related questions: (1) what are the factors related to employees receiving an offer to participate in employer-provided training? Furthermore, (2) what participation factors (such as employee demographic characteristics, competencies, employment status and preferences) lead to the decision to accept/refuse training?

Similar to the above framework, employer-provided training includes both formal and informal types of training (e.g. classroom and on-the-job training) (Becker 1994: 20; Zeytinoglu and Cooke 2009: 96; Zeytinoglu, et al. 2008: 7). The outcome for any given employee includes receiving or not receiving employer-provided training. These outcomes depend on: (1) whether or not the employee is offered training (if training is not offered the employee cannot participate in it); and (2) whether or not the employee accepts or declines the training.

Some implicit assumptions regarding employee choice are being made. In particular, not all offers of training are presented as voluntary and at the employee's discretion. From this perspective training is either mandatory or non-mandatory. When a non-mandatory offer to train is made to an employee they are free to exercise discretion and either choose to accept or decline the training that is being offered. Mandatory offers of training likely lead to higher participation rates relative to non-mandatory offers. For example, orientation training or health and safety training are often conditions of employment or required by legislation, respectively. My study focuses only on voluntary training as opposed to mandatory training.

Both employee-level and employer-level factors have been identified in the literature as having a significant relationship with employees receiving training. These factors will be included in the model as control variables and discussed in detail in the methodology section. However, many key factors have not yet been explored in the literature. In particular, there are many factors proposed to affect both the employer's decision to offer training and the employee's decision to accept or decline training. Employee-level factors include: the employee's participation in HPWS practices, use of technology, and technological change in the employee's tasks. Workplace-level factors include: organizational performance, degree of innovation, and strategic activity. In addition to these, several more factors affect the employee's decision, including work preference, competing training events, and the employee's perceived need for training. Each factor is discussed and hypotheses of the relationships are proposed (see Figure 6).

Figure 6: Training Decisions and Employer-provided Training



*Control factors that affect both the employer's decision to offer training and the employees training decision include the following: workplace characteristics including industry group, size (employment), workplace age, and turnover rates; employee employment characteristics such education, occupation, tenure, employment type, wage, and collective agreement coverage; and employee demographic characteristics such as age, gender, marital status, dependents, and immigration status.

Employer's decisions regarding access to training have recently been qualitatively explored using critical incident techniques and semi-structured interviews (Coetzer, Redmond, and Sharafizad 2012). I have summarized their findings into the following four step decision-making process: first, employers identify a need for the training and make a decision to train employees; second, after identifying the training need, the employer identifies the resources available to support the training; third, employees are selected on the basis of maximal organizational benefit; fourth, the decision-maker assesses the risks associated with recouping their return on investment from the training of particular employees.

Employers who have chosen strategies that require work re-organization--which in turn, necessitate employees having and improving their levels of human capital--will be more likely to offer training than employers who have not made similar strategic-choices. In particular, organizations that have chosen strategic activities that support HPWS practices will be associated with higher levels of training than organizations that do not have these strategic orientations (Rademananjara and Parsley 2006: 13). Similarly, the workplace's level of innovation will require that employees remain capable with respect to these changes. This fact implies that employers with higher levels of innovation will likely have higher levels of training than employers who are not as innovative, leading to a higher probability of training for any given employee (Turcotte, et al. 2003: 18; Zeytinoglu and Cooke 2009: 106). This leads to the following hypotheses:

Hypothesis 15: Strategic activities that support workplace other HPWS practices will be positively related to employees being offered employer-provided training.

Hypothesis 16: Workplace innovation will be positively related to employees being offered employer-provided training.

Training requires resources; on-the-job training often requires accepting lower productivity during the training period, and classroom training requires lost productivity, while both can also incur direct costs of training (Becker 1994). The more profitable and productive an organization the more likely it is to have resources available for distribution or investment. With regard to the employees, organizations can distribute higher profits in the form of higher wages or benefits, or the organization can make investments in training and the development of other HPWS practices (Wright, et al. 2005: 419). Higher investment in training following performance improvements can come in two forms: (1) increases in the number of employees trained, and/or (2) an increase in the amount spent per trained employee. In contrast to higher organizational performance being associated with more training, lower performance is associated with lower training levels (i.e. reduce the number of hours employees are trained (Wright, et al. 2005)). Organizations that are in decline or experiencing negative profit or declining profit growth will likely train less given their resource constraints. Training is often one of the first expenditures to be reviewed in a cost-containment environment (McIntyre 1992).

Hypothesis 17: Organizational performance will be positively related to employees being offered employer-provided training.

Employers are less likely to offer training to employees when they believe they will not receive a return on their investment. Following Becker and Huselid's (2006) discussion of strategic activities and strategic jobs, employee-level employment characteristics are proposed to be key characteristics in affecting the employer's decision to offer training. In particular, an employee's participation in HPWS practices is an indication that the employer has already identified the job as requiring certain levels of ability, motivation, and opportunity to achieve optimal effectiveness (Lynch and Black 1998). The use of technology often requires high levels of human capital (Rademananjara and Parsley 2006: 15; Wannell and Ali 2002: 21). Technology use was found to be associated with higher incidence of employee training --very few studies are available that look at the effect of technology use on training at an employee-level of analysis (Magnani 2011: 43-44). Further, the adoption or implementation of technology also often requires skill improvements (Lillard and Tan 1986: 19, 67; Tan 1991). Changes in technology can result in employees' skills becoming less relevant than they were before the new implementation. Organizations need to address knowledge and skills gaps related to technology change by providing training to develop and improve human capital levels to a threshold that will make the technological implementation successful by improving organizational efficiency and effectiveness. Several hypotheses follow from the preceding:

Hypothesis 18: Employee participation in other HPWS practices will be positively related to being offered employer-provided training.

Hypothesis 19: Employee use of technology will be positively related to being offered employer-provided training.

Hypothesis 20: Employees experiencing technological change in their jobs will be positively related to employees being offered employer-provided training.

As just identified, training participation is associated both with organizational strategic choices and human resource system architectures, but it is also related to individual decisions concerning their own learning and development. Underlying the employee decision portion of the model is the Human Capital Production (HCP) framework. The HCP identifies investments in human capital as being accompanied by costs, and that individuals have to assess the net benefit of an investment (Ben-Porath 1967). Factors that are considered in the decision to train include family time, leisure time, health (physical and mental), and competing human capital development activities.

This typically implies that older employees, females, un-attached individuals (i.e. not married or common-law), and employees with dependents will all face fewer training opportunities (Barcala, et al. 1999; Cooke, et al. 2009). For example, older employees may not see any return to engaging in additional training beyond a certain point in their work-life. Further, the closer an employee gets to their expected retirement date the lower the perceived return will be to the employee. Family commitments can also compete for time and employees make choices on how to allocate the time. Often individuals (male or female) that are primarily responsible for the care of dependents, both elderly parents or children, have limited time remaining to devote to training (Peters 2004: 21). Further, these additional roles can increase the employee's cognitive load, resulting in training being declined to avoid additional information to process. More recently, some studies have found females are being trained with higher likelihood than males (Jones, Latreille, and Sloane 2008: 296; Peters 2004: 7; Renaud, et al. 2006: 673-

674). As noted above, many of these factors are included in the model as controls because they have been identified as relevant in previous literature.

In addition to the above factors, employee participation in HPWS practices, technology use, and technological change are also expected to affect an employee's decision to accept training. These factors have not been commonly included in employee-level studies of determinants of training. However, the positive relationship between HPWS and human capital found by Liao, Toya, Lepak, and Hong (2009) suggests that a positive relationship should exist between HPWS and an employee's decision to train. Similarly, higher levels of employee commitment created within a HPWS environment may also lead employees to be more likely to accept training (Macky and Boxall 2007). In particular, organizational commitment has been identified as being positively and significantly correlated with motivation to learn (Colquitt, et al. 2000: 683, 687). Nonetheless, the positive link between HPWS and psychological empowerment may also suggest a greater likelihood of the employee declining training (Liao, et al. 2009). Further, the positive relationship between HPWS and training has been identified at an establishment level analysis. Thus, on balance, the following hypothesis is proposed:

Hypothesis 21: Employee participation in other HPWS practices will be positively related to the employee’s decision to accept employer-provided training.

No studies that I am aware of have explored the employee-level relationships of an employee's use of technology and the impact of technological change on an employee's decision to accept or decline training. The few studies that do explore the factors that affect whether or not employees decline and accept training have not considered the role of technology (Cooke, et al. 2011; Noe and Wilk 1993; Tharenou 1997; Tharenou, Saks, and Moore 2007). It is expected that employees are more likely to accept training when the job requires the use of technology. Further, if an employee's job is affected by technological change it is expected that an employee is likely to accept training, rather than decline, in order to remain capable of performing their job. These relationships are aligned with the employer's need to maintain high skill levels that are complementary with investments in technology.

Hypothesis 22: Employee use of technology will be positively related to an employee's decision to accept employer-provided training.

Hypothesis 23: Experiencing technological change in the job will be positively related to an employee's decision to accept employer-provided training.

Turning to factors that affect the employee's decision to participate in training and that are only known to the employee, three main factors are considered: preferred hours of work, alternative training participation, and employee's perception of need for training. A human capital production framework can also help in understanding the contribution of these factors to employee decision-making. Employees face both direct costs and indirect opportunity costs of training. Direct costs, such as lower wages or fees, can result from the bargaining between employer and employee, and the proportions of costs allocated. The indirect costs include preferences for time-use, development goals, and net benefit assessment, which the above three factors address, respectively. Other than the general human capital literature there are very few studies that provide a conceptual framework to directly examine accepting or declining training (Cooke, et al. 2011; Noe and Wilk 1993; Tharenou 1997). In fact, most studies that look at participation in training focus on training transfer and motivation to transfer without much consideration to training choice (Brown and McCracken 2009; Burke and Hutchins 2007; Gegenfurtner, et al. 2009; Russ-Eft 2002).

An employee's preference for hours of work is an indicator of time-use preference, where hours of work preference includes working more or less than the current status quo. Employees who prefer less hours of work are expected to also prefer less training, where training would contribute to time-use pressures and a feeling of being "too busy" (Sussman 2002: 8). Whereas employees who prefer more hours of work are expected to not have similar time constraints, and would be more likely to take advantage of an employer's offer(s) to invest more into the employment relationship.

Hypothesis 24: Employees' preference for more hours of work will be positively related to an employee's decision to accept employer-provided training.

Another factor that can affect the acceptance of an offer for employer-provided training is an employee's focus on their own training agenda as opposed to an employer-needs-focused agenda. When employees take competing training programs it is proposed that they are more likely to decline training that an employer believes is needed. Again, this fits into a human capital production framework, in terms of time constraints, time-use preference, and net benefit maximization (Becker 1994).

Hypothesis 25: Employee participation in a) career related training (non-sponsored) and b) not directly job-related training (sponsored) will be negatively related to an employee's decision to accept employer-provided training.

Psychological factors may also affect the decision to participate in training. The main factors identified in the literature include perceptual, emotional, motivational and cognitive factors (Brown and McCracken 2009: 496). My study is limited to a focus on the perceived need for training. In particular, the employee's assessment of whether the demands of their job are such that they require more training to function effectively. Noe and Wilk (1993: 299) found that two measures of perceived development needs (career exploration and employee-firm development need match) generally had a positive and significant relationship with developmental activity intensity (both average hours spent per year and number of activities participated in, including workshops, courses, and seminars). Employees with a higher need for training will also likely attribute a higher value to receiving training (Colquitt, et al. 2000: 689; Noe and Wilk 1993: 299). The higher utility will more frequently result in a positive net benefit to the employee; and therefore, be associated with higher levels of accepting offers to train (Noe and Wilk 1993: 299).

Hypothesis 26: The employee's perceived need for training will be positively related to an employee's decision to accept employer-provided training.

In summary, the micro-level framework integrates key aspects of the macro-level framework, including other HPWS practices, innovation, organizational performance, and strategic activities. These key elements link the frameworks conceptually and enable a deeper understanding of the relationships between these important contributors to addressing growing concerns of sustained competitive advantage. The development of human capital through training is presented as a key determinant of innovation, and subsequent organizational performance. Thus, any factors affecting employees' decisions to participate in training and human capital development can be seen as factors affecting both innovation and organizational performance.

Chapter 5

Methodology

The data that are used to empirically test the above theoretical macro- and micro-level frameworks are discussed in this section. The selection of a for-profit sample of workplaces is explained. The variables from the data and the measures that are used in the analysis of the model are presented and discussed below. In particular, the variables for the macro-level study are presented as follows: training, other HPWS practices, innovation, organizational performance, strategic activities and control variables. In addition to the macro-level variables, the following micro-level study variables are discussed: (1) the employers' decisions to offer training, employees' decisions to accept or decline training, and the job-related training received by employees (these are the dependent variables), and (2) employee participation in other HPWS practices, employee technology use, technological change, hours preference, alternate training, and perceived training need (independent variables). An ordinary least squares system of equations is used to estimate the model for the macro-level study and probit regressions are used to estimate the model for the micro-level study. These quantitative techniques are discussed in detail below. Finally, the appropriate use of the Workplace and Employee Survey data is discussed in the last sub-section.

A quantitative analysis approach is used for both the macro and micro studies. A quantitative approach is viewed as the most appropriate given my study's focus on a large number of organizations and a large number of employees (i.e. the macro-level study and the micro-level study, respectively). The use of large nationally representative data sets permits a degree of generalizability to be inferred from the results. An important contribution of this thesis is generalizability of its results to Canadian private sector workplaces, given the focus of previous studies on single firms, clusters of firms, and single industries or sectors.

Data

The Workplace and Employee Survey (WES) 2003-2006 from Statistics Canada is used to address the questions identified above. The WES is a nationally representative data set of workplaces and employees that includes all non-government business sector employers stratified by industry, region, and workplace employment size (Statistics Canada 2007: 19). The strength of the WES is that employer and employee responses are linked over a seven year period (1999-2005). This allows researchers to control for workplace characteristics in the analysis of employees as the unit of interest over time.

In my study, the WES workplace-level data are used for the macro-level analysis, and the employee-level data are used for the micro-level analysis. However, for the micro-level analysis several workplace-level variables are used in the analysis as factors contributing to the employer and employee decisions to train. At the macro-level, some employee-level variables are used to verify the use of HPWS practices in workplaces and have an indication of the degree to which policies are practiced in the workplaces, because both workplace and employee-level observations are collected for HPWS practices questions.

The response rates for both the workplace and employee portions of the survey are relatively high over the entire panel, ranging from 75% to 95%. For the initial sample, the major source of the non-response was "owner-operators with no paid help and in possession of a payroll deduction account" (Statistics Canada 2007: 19). However, there was increasing attrition in the workplace sample as the survey progressed year over year, see Table 1. Attrition was due both to workplaces going out-of-business, being inactive, or non-response. The attrition was addressed through the collection of "top-ups" or birth panels to the workplace sample in 2001, 2003, and 2005. The macro-level analysis uses years 2004 to 2006 for the estimation. The 2003 and 2005 employee-level data are pooled for use in the micro-level analysis. For both the macro- and micro-level analyses these are the most recent years of data.

Table 1: Workplace and Employee Survey Response Rates and Sample Sizes for All Reference Periods

	Response Rates		Sample Sizes	
Year	**Workplace**	**Employee**	**Workplace**	**Employee**
1999	95.2	82.8	6,322	23,540
2000	90.8	86.9	6,068	20,167
2001	85.9	86.9	6,207	20,352
2002	84.0	90.9	5,818	16,813
2003	83.1	82.7	6,565	20,834
2004	81.7	85.7	6,159	16,804
2005	77.7	81.2	6,693	24,197
2006	74.9	--	6,312	--

With regard to sample selection, the Business Register, a list maintained by Statistics Canada of all businesses operating within Canada, was used to create the workplace survey frame. The employee survey frame was created based on lists of employees made available from the workplaces selected. In any given workplace, up to a maximum of 24 employees could be selected depending on the size of the workplace. For small workplaces with less than four employees all employees were selected into the survey. For the workplaces, a stratified sample design was used with 252 strata based on the combination of 14 industry groups, 6 regions, and 3 workplace sizes (number of employees) used to define the strata, and a Neyman allocation was used to select the workplace sample (Statistics Canada 2007: 19). The Neyman allocation determines an optimal sample size for stratum h, by assigning more sample units to larger strata and fewer units to smaller strata, and more sample units to strata with high variances and less sample to strata with lower variances: $nh = n * (Nh * Sh) / [\Sigma (Nh * Sh)]$ where h=1, 2, 3, ..., H strata, nh is the sample size for stratum h, n is total sample size selected, Nh is the population size for stratum h, and Sh is the standard deviation of stratum h (Statistics Canada 2003: 171) . The employees were selected using a probability mechanism. Sample weights are available with the data set to account for unequal probabilities of selection. The use of weights in the analysis is discussed in more detail below.

The target population of the workplace survey was "all business locations operating in Canada that have paid employees in March" of the reference year. The reference year refers to the 12 month period ending in March. There were geographic and industry group exceptions to the above target population. In particular, employers in Yukon, Nunavut and Northwest Territories were excluded; and employers in the following industry groups were also excluded: crop production and animal production; fishing, hunting and trapping; and private households, religious organizations, and public administration (Statistics Canada 2007). The survey documentation does not directly discuss why the above regions and industries were excluded. Private households, religious organizations and public administration being non-business or quasi-business organizations were likely reasons to be excluded due to the survey's focus on "businesses operating in Canada" (Statistics Canada 2007: 18). However, with regard to the regions and industries that were excluded, a balance between high collection costs, respondent burden, and data usability likely contributed to these exclusions from the target population. For employees the target population was all employees working or on paid leave, in the month of March, who received a Canadian Customs and Revenue Agency T4 supplementary form. Questions for employees concerning employment had a reference period of March of the reference year.

In Canada, about 99% of business entities (2.2 million) are considered simple, which implies a single operating unit comprises the enterprise, whereas the remaining 1% (20 thousand enterprises) are complex (Statistics Canada 2010a: 2). Complex business enterprises have more than one operating entity (totalling about 170 thousand operating entities). Simple entities represent 48% of Canadian business total revenue, and complex entities represent 52% (Statistics Canada 2010a: 2). To understand these complex organizational structures Statistics Canada imposes a statistical structure on the organizational hierarchy with the "enterprise" encompassing the entire hierarchy, the "company" identifies different sub-businesses, the "establishment" is the operating entity, and "location" is a geographic location. For simple businesses, the enterprise, company, establishment and location are all the same operating entity. For complex businesses, locations are within establishments, establishments are within companies, and companies are within enterprises. The WES is an establishment survey and can be considered an operating entity or business unit survey. Statistics Canada uses workplace and establishment interchangeably in its documentation of the survey. Throughout this study, the terms workplace, employer, and organization are used interchangeably to refer to the establishment level, in reference to the data analysis.

The WES is an ideal survey for the current study because the workplace unit of analysis is likely more reflective of a division or operating unit of a business rather than the organizational whole (or aggregation at an enterprise level). The use of the workplace as a unit of analysis assumes a high level of correspondence between the workplace and business or production unit (Statistics Canada 2010a: 4), thereby minimizing the potential heterogeneity of systems at the workplace and by extension minimizing the heterogeneity human resource systems.

For the workplace survey a "primary respondent" was used to provide the requested information, however, if the primary respondent was unable to respond other appropriate respondents were identified and followed up with to obtain responses (Statistics Canada 2007: 27). To complete the questionnaire, approximately 20 percent of the workplaces sampled required more than one respondent, these were mostly large workplaces (Haines III, Jalette, and Larose 2010: 234). Zatzick and Iverson (2011: 3466) identify that, in many cases, multiple respondents would report information, including senior managers, general managers, and owners, and that who responded depended on the size of the organization. Haines III, Jalette, and Larose (2010: 234) further identify that the general managers were the typical respondents of small workplaces while human resource managers were the typical respondent of larger workplaces. For the employee questionnaire only a single respondent was used. Computer Assisted Telephone Interviewing (CATI) was used for both the employer and employee surveys. The CATI tool performs "validity, range, inter-field and historical edits" that enable quality controls to be used during the interview to reduce and resolve response or typographical errors (Statistics Canada 2007: 27).

With regard to data quality, and in particular the quality of key variables, such as revenue and expenses and other financial measures, Statistics Canada compared these estimates to other surveys including the United Enterprise Survey, the Annual Retail and Wholesale Trade Survey, and the Census of Manufacturing to ensure the validity of the estimates the data would produce. Further, to validate the coverage of the sample (i.e. to appropriately account for workplace births and deaths), the workplace sample was compared to the Longitudinal Employment Analysis Program (LEAP) data, which is a panel, starting in 1991, that has information for every business in Canada that employs workers. The employee survey sample was compared to the Survey of Labour and Income Dynamics (SLID) and the Labour Force Survey (LFS) to ensure data validity (Statistics Canada 2007: 21).

The relatively high response rates, combined with a high quality survey frame and complex survey selection, suggests that there is likely limited response bias, which adds to the accuracy and utility of these data. Further, the additional characteristic of a large random sample satisfies Ichniowski, Kochan, Levine, Olson, and Strauss's (1996: 307) criteria for "desirable features" making these data a "best solution" with regard to addressing the appropriateness of sample data. The inherent utility of these data should not be underappreciated, particularly given the increasing difficulty organizations are having meeting survey requests in environments of increasing workloads and staffing constraints (Becker and Huselid 1998a: 67). Typical response rates for employer surveys range between 5% and 30% (Becker and Huselid 1998a: 67).

Imputation of Macro-level Observations and Data Quality Issues

To enhance the usability of the WES data, Statistics Canada reviewed and edited the data, used outlier detection algorithms, and used imputation strategies to produce a high-quality product. Thus, to avoid controllable non-sampling errors, records were checked for consistency at both data collection and capture to ensure non-sampling errors are not introduced. Missing data are either randomly or systematically missing. Some choices to handle the problem are to: ignore the issue, deletion (pairwise or listwise), or imputation. Statistics Canada used carry-over, distributional, weighted hot deck and nearest-neighbour as the four main imputation methods for the employer and employee data. See the WES users guide for a detailed discussion of these activities (Statistics Canada 2007: 27).

For the employer sample, systematic non-response occurred over several years for several categories of variables used in the current analysis, including the human resource practices, work organization, business strategy, grievance process and compensation practices variables. Respondents were not asked in even years (2000, 2002, 2004, and 2006) to answer questions in the above categories. For this analysis, this only impacts 2004 observations. To address this issue observations for 2004 are imputed for the affected questions that are used in the analysis. The mean value of 2003 and 2005 reported values is used as the value for 2004 for all of these categories of variables. This imputation method is similar to the carry-over method. The carry-over method is the use of historical data. However, future data is also used and the average between the two is used to impute the missing fields.

Sample Selection for Analysis

Recent research suggests that non-profit organizations, when categorized using the Miles and Snow (1984) strategic typology, may not have a similar alignment of chosen strategies with human resource management practices as for-profit organizations (Akingbola 2006: 1720). The operating environment for non-profit organizations is substantially different implying that a different strategic framework, and in particular, one that reflects the environment within which non-profit organizations operate would be more appropriate. Thus, even though managers of non-profit organizations in Canada are increasingly identifying strategy as providing necessary structure in their unique operating environments, not all human resource management practices align with a chosen strategy as defined by Miles and Snow (1984). For example, prospectors would be expected to have a limited training programme, however, they have been found to have higher training levels than defenders and analyzers that are non-profit organizations (Akingbola 2006: 1715). Non-profit organizations also have systematically different training outcomes than for-profit workplaces (Knoke and Kalleberg 1994). This is likely because non-profit workplaces are not motivated by profit growth in the same way as for-profit organizations and as a result their objectives and constraints are different. With regard to training decisions, non-profit organizations may offer training based on alternative motivations, including social concerns such as individual employee enrichment. Thus, only for-profit organizations and employees in for-profit organizations will be included in the macro- and micro-levels of analysis, respectively. The investigation of non-profit organizations will be left to future research.

The pooled WES data over all years includes 50,005 workplaces, which gives an average number of workplaces surveyed per year of 6,251. These counts include the original 1999 sample in addition to the 2001, 2003, and 2005 top-ups. After only keeping workplaces that are observed in the data as entering the sample in 1999, 2001, and 2003 47,652 workplaces remain. Dropping the non-profit workplaces removes another 6,002 observations, and excluding workplaces with less than 10 employees removes 13,036. It is necessary to exclude these smaller workplaces because they did not respond to questions on work organization (i.e. empowerment-enhancing sub-bundle). After removing observations on the above criteria, 28,614 workplaces remained in the pooled dataset, and these records are for 5,020 unique workplaces. Then, only workplaces that have observations in each of the years 2003, 2004, 2005, and 2006 are retained--for a sample size of 3,176. Finally, workplaces that have any missing values for any of the variables used in the analysis were dropped, and this left a final sample size of 3,154, which is used in all of the macro analysis. This sample is nationally representative of 146,627 workplaces.

For the micro analysis, only employees in the 3,154 workplaces retained in the macro-level analysis are used. This was done to allow for sample consistency across the two levels of analysis and comparability. In particular, two separate employee samples from 2003 and 2005 are pooled into one dataset. The data set includes 24,977 observations; this is the final sample used in the analysis after selecting on the workplaces in the 3,154 sample. This sample is representative of an average population of 6,085,774 employees over the reference periods 2003 and 2005.

Measurement and Variables

The measurement approach used for the current study is presented within the context of a discussion of the various approaches to measurement that are used in the HPWS practices literature. In particular, the measurement discussion uses key HPWS practice variables that are often used in the literature to motivate the measurement discussion for all composite variables used in the analysis.

All the variables that are used in the analysis are discussed in this section. Particular attention is given to the main variables of interest. These variables are discussed in detail. As each variable is presented issues of measurement and index development are also presented. The variables for the macro-level study are discussed first, followed by the variables used in the micro-level study.

Measurement. The following review of measurement and measurement issues focuses on HPWS individual practices, bundles, and aggregate indexes. In my study, the index approach is used for the measurement of key concepts of interest--training, other HPWS practices, and innovation. I will first explain the index approach followed by a discussion of why this approach is used in my research rather than other data aggregation and measurement approaches (i.e. factor analysis, latent variable models, and grounded approaches).

The measurement of HPWS practices can be approached in several ways: (1) individual practices; (2) focus on sets of practices and complementarities for particular bundles (i.e. a sub-bundle approach) (Subramony 2009: 746); and (3) a systems approach that takes practices that pertain to individual employees to generate an organizational measure by combining practices additively, multiplicatively (de Menezes and Wood 2006: 108; MacDuffie 1995: 204), or through the use of other composition models (Chan 1998: 236). Both binary and continuous variables have been used in the literature as measures of individual practices or as items used to develop scales or indexes. Regardless of the nature of the item variables comprising scales or indexes, the final composite variable used in the analysis is typically continuous (Becker and Huselid 1998a; Datta, et al. 2005; Huselid 1995). The use of indexes in the measurement of HPWS is becoming more common (Delery 1998; Guest 2001; MacDuffie 1995: 207;

Youndt, et al. 1996: 849). A higher index score implies an outcome that is better than a lower index score. Thus, higher index values can come from more practices being used, a higher proportion of employees covered by practices, or from "more" dollars spent (per employee or per total cost) at the organization for the implemented practices—these outcomes are all seen as "better".

In my study, an index approach is used for the development of all aggregate measures of key concepts in the macro and micro models. Items are combined based on a theoretical basis and the previous empirical literature. This practice follows Becker and Huselid (1998b: 6), Delery (1998), and Macky and Boxall (2007); no assumptions are made about whether the items are measuring the same construct (i.e. whether the item practices have high inter-correlations). Further, confirmatory factor analysis and bivariate correlations are used as a secondary approach to statistically assess the combination of items. A theoretical approach to aggregating practices combined with a statistical analysis to evaluate the composition follows approaches used by Subramony (2009), Macky and Boxall (2007: 546), Guest (2001: 1099), Youndt, Snell, Dean and Lepak (1996: 850), and MacDuffie (1995: 204, 207, 210).

In this study, indexes are defined as the combination of practices into single more aggregated scores, where practices can be weighted multiplicatively by information indicating the intensity of their use within the organization or across employee groups; and further, where items of differing categorical or continuous scales are standardized (i.e. z-score transformation) before being combined to avoid undue importance being given to items that have higher magnitudes only as an artefact of scaling during measurement. The practice of transforming all variables into z-scores, before combining them additively into an index (e.g. bundles or aggregate HPWS index), was adopted from Appelbaum, Bailey, Berg, and Kalleberg (2000), and Macky and Boxall (2007: 546). This practice also accounts for the differing response formats of the variables used in the compilation of the indexes (i.e. the transformation adjusts for both response format and magnitude of the responses).

With regard to weighting measures in order to capture the intensity of the implementation of HPWS practices within organizations, the proportion of employees covered by practices is used to multiplicatively weight the existence of practices within the workplace. My approach is consistent with Huselid and Becker’s (Becker and Huselid 1998a: 72; Huselid 1995) focus on producing a (mean standardized) continuous measure of HPWS practices additively combined from questions that capture the intensity of the implementation of the policies. Similarly, Datta, Guthrie, and Wright (2005: 139) use the proportion covered by practices within two groups "exempt" and "non-exempt". I adopted this approach to avoid a dichotomization of information, which by definition prohibits nuanced results from being revealed.

In my study, all indexes are aggregated using equal weights in the compilation of the elements of key concepts (e.g. HPWS sub-bundles). This will be true unless it is appropriate to use an alternative weighting approach, for example, in situations where clear information indicates the importance of one item over another item (MacDuffie 1995: 207). Guest (2001: 1097, 1100) identifies this as a limitation of human resource management research--the lack of information on the distinct qualities and characteristics of practices that could be used to differentially weight the elements of each bundle. This question of equal weighting applies at the HPWS practice-level where many questions are used to develop a measure of a given practice (Guest 2001: 1097), and at the sub-bundle level (for example role, motivation, and competencies (Guest 2001: 1099), or empowerment, motivation, and skill (Subramony 2009: 746)).

Finally, all index scores used in the analysis will be transformed (centred or standardized) so that their units are meaningful in terms of the interpretation of effect sizes (Becker and Huselid 1998a: 68-69). For a variable of interest, the z-score or standard score is equal to the raw score minus the mean (of the raw scores observed) divided by the standard deviation (Meyers, Gamst, and Guarino 2006: 129). Further, for the macro-level study's variables, all standardized scores are derived by industry group. This implies that the mean and standard deviation used in calculating the z-score for a particular organization relies on the workplace's industry group mean and standard deviation, and not the total workplace sample's mean and standard deviation for the measure of interest.

Adjusting the standardized scores for differences across industry is useful because it corrects the scores for practices that may not be contextually relevant (i.e. practices that are not used) within a particular industry, and, as a result, does not "penalize" and put a downward bias on a workplace's standardized score for an industry group's idiosyncrasies in HPWS adoption, for example. Thus, the standardized z-scores are being calculated based on industry clusters (Becker and Huselid 1998a: 88-91; de Menezes and Wood 2006: 109-110). This allows for the industry group "contextual alignment" to permeate the main variables of interest (Becker and Huselid 1998a: 81-83). Controlling for these contextual differences does have some support. Becker and Huselid (2006: 904) suggest that the nature of HPWS may vary by industry mainly due to differing strategic capabilities, activities, and business processes. The result is that the definition of a HPWS across industries may vary and that whether a work system is considered high- or low- performance should be considered within the context of the organization's industry--standardizing by industry allows for this variability in human resource architecture to be considered.

One unavoidable drawback to using standardized variables is that it is often not clear, for example, what the degree of HPWS practice changes that are necessary to achieve meaningful performance change. This drawback is common to all research that uses standardized variables and not particular to my study. For example, a one standard deviation change is often used in the literature for comparing differences across outcomes for predictor and criterion; however, how a one standard deviation change is converted into changes in practice is not obvious (Becker and Huselid 1998a: 70).

Scales are often used as an alternative aggregate measure of HPWS practices and factor analysis is often used as an empirical justification of the calculation (Becker and Huselid 1998a: 80-81; Guest, et al. 2003: 301; Huselid 1995: 645; Liao, et al. 2009: 378; Messersmith and Guthrie 2010: 250; Wood and de Menezes 2011: 1595; Zatzick and Iverson 2011: 3467). An exploratory factor analysis (EFA) approach assumes that you do not know the number of factors that may be revealed and you do not know the nature of the factor structure (i.e. which items will load onto what factors). EFA is preferred if you want to determine the factor structure empirically. Huselid (1995: 645) used EFA principal component extraction to "uncover the underlying factor structure associated with these practices." The inductive EFA strategy is in contrast to the deductive confirmatory factor analysis (CFA) approach that is based on a postulated theoretical structure where indicator variables and the factors that determine them have hypothesized relationships with other factors. CFA is used to estimate parameters that will either validate how well the theory fits the data or lead to the hypothesized relationships being rejected—many studies have used a CFA approach (Delery and Doty 1996: 819; Wood and de Menezes 2011: 1594-1595; Youndt, et al. 1996: 849; Zatzick and Iverson 2011: 3467-3468, 3476).

The literature suggests that factor analysis should only be used to aggregate conceptually similar items, and items should not be excluded strictly on empirical evidence when theory suggests concepts should be included in the analysis (Becker and Huselid 1998a: 73). When using either Principal Components Analysis (PCA) or Principal Factors Analysis (PFA) (or principal axis factor analysis) the main assumption being made is that the latent variable is determining the practices or that the practices are measuring the same HPWS construct (i.e. whether the practices have high inter-correlations), respectively (de Menezes and Wood 2006: 109; Delery 1998: 299; MacDuffie 1995: 204). Becker and Huselid (1998a: 76) suggest that ultimately the composition of a HPWS is an empirical issue. Nonetheless, Guest (2001: 1099) suggests that it is not uncommon for factor analysis to fail to reveal bundles of practices that are easily interpreted. This occurs because items are not always conceptually similar, and often practices are substitutes. The theoretical absence of an underlying common factor is one of the main arguments for using an index approach.

Other data aggregation techniques have also been used in the literature, such as cluster and latent variable analysis. Osterman (1994: 177) used cluster analysis to understand the penetration of job rotation, quality circles (QC), total quality management (TQM), and teams. Latent variable models have also been used to establish the structure of the pattern underlying HCM practices (Wood 1996: 59-60, 1999a: 399-400; Wood and Albanese 1995: 226). This technique is not commonly used in the literature (Guest 2001: 1099). Wood and Albanese (1995: 226) argue that it is an appropriate technique when the observed measures are binary or categorical. More qualitative aggregation approaches include a grounded approach and ad hoc approaches. Grounded approaches focus on the use of extensive qualitative work to reveal practices that are commonly used (MacDuffie 1995: 203). This grounded approach is distinct from more ad hoc approaches including inter-rater categorization (Arthur 1994: 677) or ocular inspection of distributions (Ichniowski, et al. 1997: 296).

Indexes are different from scales, the use of an index is not accompanied by assumptions, noted above, regarding causal relationships between the HPWS construct and the component practices. For a scale the addition of practices (i.e. items) implies an improvement in measurement of the common factor or underlying orientation, whereas for indexes an additional practice implies an increase in the level of the construct (Delery 1998: 299; Macky and Boxall 2007: 544). Even though the use of HPWS practices by an organization may be due to an underlying approach or orientation (i.e. a common factor), observed HPWS practices may not necessarily be correlated (Guest 2001: 1099). Correlations may be weak if practices are implemented with different frequency across employees (i.e. occupation groups or management/non-management employee groups), or if there is idiosyncratic implementation across organizations and employees. Correlations may also appear weak if numerous item measures are used in the measurement. For example, over-arching motivation practice measures such as "total average employment cost accounted for by bonus or incentive payments" (Arthur 1994: 676) or the "proportion of workforce who have access to company incentive plans, profit-sharing plans, and/or gain-sharing plan" (Huselid 1995: 646) essentially require an average to be reported for the company, thereby reducing variability due to differences in implementation across employees and organizational units. Further, the variability in the implementation of HPWS practices is likely more common in samples that are nationally representative across geographic regions and industries. Thus, quantitative data aggregation techniques (i.e. factor analysis and cluster analysis, for example) that rely on convergent variability or practice grouping patterns will tend to be more empirically useful in smaller, more homogeneous samples, which are more typically used in the literature (e.g. region cluster of organizations, single industries, industry group, etc.).

In summary, the two main reasons for the use of an index approach include: (1) the absence of a common factor or construct that unifies all of the practices into a single concept; and (2) the use of a nationally representative data set that includes organizational size, industry, and regional heterogeneity as a results of the complex multi-stage design of the survey.

Macro-level Study Variables: Understanding the Transmission Mechanism. For the macro-level study variables, the variables are presented in the following order: training, other HPWS practices, innovation, organizational performance, strategic activities, and control variables.

Training. The training variable has three main components that measure both the breadth and intensity of training. The three components are: types of training, number trained, and expenditure on training. Training breadth is measured by looking at whether or not various types of training are taken within the workplace. The possible types of classroom and on-the-job training include: managerial/supervisory; professional; sales and marketing; computer/hardware; computer/software; other office and non-office equipment; group decision-making or problem-solving; and team-building, leadership, communication (Statistics Canada 2005b: 16). It is important to note that types of training that are more likely to not be mandatory have been included, whereas training that is more likely to be mandatory have been excluded (i.e. orientation for new employees; apprenticeship training; occupational health and safety, environmental protection; and literacy or numeracy). Further, "other training" has also been excluded because of its conceptual ambiguity. For both classroom training and on-the-job training organizations report whether any employees at the workplace have received any of the various types of training (1=Yes, 0=No).

Employers report the number of employees who received classroom training and the number who received on-the-job training separately. In these counts all employees are included, such as full-time, part-time, permanent, and non-permanent employees, (where full-time employees are defined as those working 30 or more hours per week and permanent employees have no set termination date, for example). The total direct costs of classroom training are also captured (i.e. total dollars expended). These measures are used to generate measures of training intensity (i.e. number trained over total workplace employment and total training expenditure over total gross payroll plus total expenditure on non-wage benefits). Total gross payroll is the total remuneration paid to employees before deductions, and total expenditure on non-wage benefits includes contributions to pensions and other benefits (Statistics Canada 2005b: 10, 14). Thus, training intensity is measured by looking at the number of employees receiving classroom training, in addition to the number of employees receiving on-the-job training, and the workplace's total expenditure on classroom training (in dollars) is also used as a training intensity measure.

The use of three different measures of training (types of training, number trained, and expenditure on training) each have support in the literature. Types of training or the binary outcome of whether training has occurred has been used in the literature (de Menezes and Wood 2006: 112; Delery and Doty 1996: 815; Ichniowski, et al. 1997: 294; Wood and de Menezes 2008: 679; Wright, Gardner, and Moynihan 2003: 28; Youndt, et al. 1996: 849). Most studies typically do not include both measures of breadth and intensity of training. Of these two types of measures, the intensity measures appear to be the most commonly used, particularly the proportion of employees trained or the number of hours of training (Guest, et al. 2003: 298; Huselid 1995: 646; MacDuffie 1995: 208;

Wright, et al. 2005: 425; Zwick 2006: 35). Although the use of expenditures as an intensity measure is not common, it is included in my study because expenditure is an indicator of value of the knowledge received. This expenditure as a proportion of employment cost is conceptually similar to benefits and bonus measures used by Arthur (1994: 676). Using intensity measures that assess the degree of participation in training addresses a common concern in the literature, namely, only using information regarding the existence of practices (Macky and Boxall 2007: 543).

With regard to measurement, confirmatory factor analysis is used to empirically validate the items used to compose the training index (see Appendix 1, Table A1.1). Even though an index approach is being used and confirmatory factor analysis is not necessary, it is included in the presentation of indexes to allow for comparability to the existing literature that uses a scale approach (Guest 2001: 1099). The confirmatory factor analysis indicates sufficient reliability with Cronbach's alphas of α=0.86 and α=0.87, for 2004 and 2005, respectively. Further, excluding any of the items does not result in substantial improvements. Thus, the types of training for both classroom training and on-the-job training types are additively combined to create a score ranging from 0 to 16. The proportion of employees receiving classroom training and the proportion of employees receiving on-the-job training are also additively combined. Finally, the training index used in the analysis additively combines the three standardized z-scores for the types of training, the proportion trained, and the training expenditure measure. The implicit assumption being made is that the types of training breadth measure and both the intensity training measures all have equal importance in contributing to the *training index*.

Other High-Performance Work Systems Practices. For the other HPWS practices index, the index is compiled using empowerment-enhancing, motivation-enhancing, and skill-enhancing sub-bundles as the main building-blocks. Each sub-bundle is calculated and then these three bundles are additively combined to create the *other HPWS practices index* variable that is used in the analysis. The following paragraphs discuss the items included in the development of these sub-bundles.

The empowerment sub-bundle includes three sub-bundles focusing on: (1) work practices, (2) autonomy, and (3) grievance process. The work practices sub-bundle includes six items: employee's suggestion program, flexible job design, information sharing with employees, problem-solving teams, joint labour-management committees, and self-directed work groups. The employee's suggestion program includes employee surveys. Flexible job design includes job rotation, job redesign (redefining scope), and job enrichment (variety or autonomy). Information sharing with employees includes the dissemination of information regarding organizational performance information, technology changes, and organizational changes. Problem-solving teams are work groups with responsibilities to address narrowly specified issues or concerns (e.g. quality or work flow). Joint labour-management committees are teams that consult on a broad range of issues and concerns, these groups may be either non-legislated or legislated in origin. Finally, self-direct work groups are teams that have a high level of responsibility for a broad range of issues with semi-autonomous decision-making authority. Employers report whether or not these practices exist (yes or no). To calculate the work practices sub-bundle, these practices are additively combined and weighted by the proportion of non-management employees (relative to total workplace employment) that participate in the practices. All alpha reliability estimates for the HPWS bundles are presented and discussed below.

The autonomy sub-bundle measure is based on a series of questions that identify the stakeholders who are responsible for decision-making across a variety of activities. The stakeholders include non-managerial employees, work groups, work supervisor, senior manager, individual or group outside workplace, or business owner. The activities over which decision-making are reported include: (1) daily planning, (2) weekly planning of individual work, (3) follow-up of results, (4) customer relations, (5) quality control, (6) purchase of necessary supplies, (7) maintenance of machinery and equipment, (8) setting staffing levels, (9) filling vacancies, (10) training, (11) choice of production technology, and (12) product/service development (Statistics Canada 2005b: 21). These practices are aggregated into five conceptually distinct categories to avoid "over-weighting" areas of practice that are conceptually similar, and where the items within the area of practice are highly correlated (Guest 2001: 1097). The five categorizations include planning (1 + 2), customer relations (3 + 4 +5), input management (6 + 7), staffing (8 + 9 + 10), and production (11 + 12) (where the numbers indicate the item from the numbered list above). If either non-managerial employees or work groups are identified as making decisions in these categories then a value of one is assigned and zero otherwise. The additive combination of these categories creates a measure of non-management and work group decision-making autonomy, where the score ranges from 0 to 5.

To measure the sub-bundle grievance process, two measures are used. The first measure indicates whether a dispute, complaint, or grievance system for employees is formal, informal, or does not exist. The following scale of 1=does not exist, 2=informal system, and 3=formal system is used to identify the outcomes. The second measure indicates who has final authority to settle the disputes, complaints, or grievances. The following scale of 1=management, 2=labour-management committee, and 3=outside arbitrator is used to identify the settlement authority outcomes. The grievance system and final decision authority measures are combined multiplicatively creating a scale ranging from 1 to 9.

For the empowerment sub-bundle's component sub-bundles (work practices, autonomy, and grievance process) each score is standardized before the three measures are additively combined.

Similar to the empowerment bundle, the motivation-enhancing bundle has three component bundles: (1) direct compensation, (2) promotion opportunity, and (3) benefits (i.e. indirect compensation). With regard to the direct compensation practices, the proportion of employees at the workplace, by occupation type, that are covered by the following incentives are used: (1) individual incentives (bonuses, piece-rate and commissions) (i.e. performance linked to pay), (2) productivity/quality gain-sharing and other group incentive plans, (3) profit-sharing (receive a share of workplace profit), (4) merit pay or skill-based pay (qualities, abilities or expertise are rewarded), and (5) employee stock plans (stock purchase plans, ownership plans, or stock options). The workplace identifies the number of employees covered by each system by occupation groups (managers, professionals, technical/trades, marketing/sales, clerical/administrative, production workers with no trade/certification, and other). These coverage numbers are used to calculate the total number of employees at each workplace that are covered by the five different direct compensation practices. The direct compensation sub-bundle score is calculated by additively combining the proportion of employees covered by each practice.

The promotion opportunity measure looks at how the vacant positions are usually staffed for each of the occupation groups (managers, professionals, technicians, sales, administrative/clerical positions, production, and other). The outcomes reported by the organizations are the most frequently used method for staffing vacant positions within each occupation group: (1) from within the workplace, (2) from another workplace within the same legal company or business enterprise, or (3) from outside the company. For each of the occupation groups' the promotion opportunity equals one if positions are filled either from within the workplace or from another workplace within the same legal company or business enterprise, and equal to zero otherwise. The final promotion opportunity score for a workplace is the additive combination of each occupation's promotion opportunity, thereby creating a score that ranges from 0 to 7.

The benefit sub-bundle measure is derived by additively combining the proportion of permanent full-time employees that are covered by each of the following indirect compensation benefits: pension plan, group RRSP, stock purchase, life insurance, dental care, supplemental medical, and supplements to employment insurance benefits (e.g. leave benefits such as parental/maternity, or lay-off leave). Workplaces report the number of managers, non-management unionized, and non-management non-unionized employees covered by each of the benefits. These counts are used to calculate the proportion of employees covered by each benefit. Then the benefit sub-bundle is calculated by additively combining these proportions for each employee type. The benefit sub-bundle score ranges from 0 to 7, where a score of seven implies that all employees at the workplace receive all of the available benefits.

Finally, the compensation, promotion opportunity, and benefits sub-bundle scores are standardized (z-score). Again, standardizing the scores before additively combining them to generate the motivation sub-bundle index is important to avoid undue importance being implied by differences in measure format, range, and item inclusion (i.e. number of items included). Further, this sub-bundle approach to derive indexes implicitly assigns equal weight to any of the components that are combined additively (Delery 1998: 297, 299, 300; Guest 2001: 1097).

The skill-enhancing sub-bundle focuses on selection methods, recruitment methods, and unfilled position vacancies. For the selection methods, the following hiring practices are observed: tests for specific skills; aptitude or other personality testing; tests administered by a recruitment agency; other type of testing or screening; personal interview; test on job-related knowledge; and test on general knowledge or literacy skills. Workplaces are identified as either using a practice or not using a practice. The identification for each of these items is based on whether or not employees reported being required to participate in these practices when hired by the organization (Statistics Canada

2005a: 7). These binary variables are additively combined to create a selection methods score ranging from 0 to 7.

The recruitment methods include the following items: help wanted ad, on-campus recruitment, news story, job fair, recruitment agency (head-hunter), directly recruited by employer, and internet. Similar to the selection methods, workplaces are identified as either using the recruitment practices or not using the practices. For each item, the identification of workplace use of the practice is based on employee responses as to whether or not they learned of their entry position by any of these recruitment methods (Statistics Canada 2005a: 7). These dichotomous items are additively combined to create a workplace-level recruitment methods score ranging from 0 to 7.

Two measures of position vacancy are used to assess the effectiveness of the recruitment and selection practices at filling positions across occupation groups. The first measure is the total number of vacant positions that are currently unfilled at the workplace (at the time the survey was taken). The number of vacant positions is divided by the sum of the number of new hirers at the workplace plus the total number of employee separations (turnover) for the reference year. This proportion is a measure of the organization's current labour market demand relative to total potential demand over the reference period. The second measure looks at the reasons for the positions not being filled for each occupation group. For each occupation the reasons the positions that are related to the nature of applicant pool (i.e. recruitment) are not filled, include: too few applicants, most applicants lacked educational requirements, and most applicants lacked job experience. The three reasons for not filling positions, for each of the seven occupation groups, are additively combined producing a measure ranging from 0 to 21. To create a measure of vacancy, both measures' scores are standardized, and the “reasons for position not filled” measure is multiplied by -1 before the standardized scores are multiplicatively combined to create a score of position vacancy. This final measure is an indicator of the effectiveness of the workplace's recruitment and selection practices to generate sufficient applicant pools that enable the workplace to fill position vacancies, given their level of demand. The final measure weights the proportion by the degree to which positions are difficult to fill across the occupational groups within the workplace. Finally, the standardized selection, recruitment, and position vacancy measures are combined additively to create a score for the skill-enhancing sub-bundle.

The aggregate *other HPWS practices index* is derived by additively combining the empowerment, motivation, and skill enhancing sub-bundles. To avoid assigning more importance to one sub-bundle over another when the sub-bundles are combined each of the three sub-indexes are standardized (z-score). This implies that the differences in variable formats and ranges will not affect the importance of the sub-bundles. Each of the three sub-bundles has the same unit of measurement--standard deviation units.

To empirically assess each of the sub-bundles comprising the other HPWS practice, bundle confirmatory factor analysis is run (see Appendix 1, Table A1.2). For the empowerment sub-bundle the Cronbach’s alpha is 0.75 and 0.73 in 2004 and 2005, respectively. In 2004 and 2005, the motivation sub-bundle has Cronbach’s alphas of 0.77 and 0.76. The skill sub-bundle that includes selection, recruitment, and vacancy measures had a relatively lower reliability of 0.57 in 2004 and 0.60 in 2005. Alpha reliability estimates below the commonly accepted threshold of 0.70 are not uncommon in the literature for HPWS scales or sub-bundle scales (Delery and Doty 1996: 819; Godard 2010: 472; Guest, et al. 2003: 301; Huselid 1995: 646; Liao, et al. 2009: 377; Walsworth and Verma 2007: 230; Wood and de Menezes 2011: 1595; Youndt, et al. 1996: 850).

The above variables that are used to compose the other HPWS practices bundle include all of the most critical content identified by Subramony's meta-analytic investigation (Subramony 2009: 746). The content is also similar to that identified by Becker and Huselid (1998a: 79). They suggest the following human resource system variables to consider: selection ratios, use of validated selection test (or other tools), internal promotions, basis of promotion (merit, seniority), human resource staffing plan (e.g. succession), training (hours of, per year, by employee type), job rotation, performance appraisals, merit/incentive pay determined by performance appraisal, rank in wage bill compensation, compensation plans (incentive plans, profit-sharing, or gain-sharing), information sharing program (topic relevant to business and operations), attitude surveys, formal job analysis, quality of work life, quality circles, labour/management programs, and formal grievance system. This list of practices is also similar to a set of practices proposed by Boxall and Macky (2009: 7) and to those discussed above. Where possible, measures that capture the intensity of practice use are preferred to simply identifying the existence of a practice at the workplace. My study, where possible, has used measures of how intensively a practice has been used by the organization, and this is often done by weighting the measure by the number of employees covered by the practice (Huselid 1995: 646; Macky and Boxall 2007: 543).

Innovation. The innovation index is comprised of five measures of innovation and three measures of new technology implementation. With regard to the innovation items, four items measure the existence of product or process innovation and the fifth item measures the importance of the most important innovation. Employers were asked whether their workplace introduced any of the following innovations: (1) new products or services, (2) improved products or services, (3) new processes, or (4) improved processes. Employers responded 'yes,' they introduced this type of innovation, or 'no,' they did not. Further, they were asked whether their most important innovation was: (1) a world first, (2) a Canadian first, (3) a local market first, (4) not a first (i.e. none of the above), or (5) no innovation (not applicable). This scale is inverted to range from 0 to 4, from no innovation to world first, so that a higher value indicates the importance of the innovation. These measures assess both the nature and novelty of the innovation. New products or processes were defined as being significantly different in character or intended use than previous products or processes. Improved was defined to identify significant enhancements or upgrades to products or processes (Statistics Canada 2005b: 33).

With regard to new technology use, employers were asked whether they implemented any of three types of technology: (1) computer hardware or software, (2) computer controlled or assisted technology, and (3) other technology or machinery. Employers responded 'yes,' they implemented this type of technology, or 'no,' they did not implement this type of technology.

Each of the four dichotomous innovation items, one innovation novelty scale, and three new technology dichotomous items are separately standardized (z-score) before being combined additively to derive a single *innovation index*. The alpha reliability estimates for 2004 and 2005 are 0.75 and 0.73, respectively (see Appendix 1, Table A1.3).

Organizational Performance. My study focuses on a narrower conceptualization of organizational performance: gross profit per employee. Employers were asked questions on both gross operating revenue and gross operating expenditure. These two measures enable the generation of a gross profit measure, which can then be divided by total number of full-time workplace employees. In the absence of a reliable measure of full-time equivalence for part-time employees, part-time employees have been excluded from the denominator to avoid a downward bias in the gross profit per employee measure for workplaces that more intensively use part-time employment. To control for the use of part-time employment, part-time employment as a proportion of total employment at the workplace is included as a control variable in the models. This specification of *gross profit per employee* also avoids issues of multi-collinearity by not including the number of part-time employees on both the left and right sides of the equation (i.e. part-time employees are only included on the right side).

An emphasis on organizational measures that are managerially relevant is important because their operational validity adds to the study's objective interpretability and encourages practical application of possible prescriptions. This is the main reason it is important to use a performance measure that is linked to human resource management (Guest, et al. 2003: 301). Deflating profit by the number of employees creates this link between performance and HPWS practices. Further, this dependent variable is not standardized; it is not standardized so that the relationship between training, other HPWS practices, and innovation can be evaluated in profit per employee units.

Other measures of organizational performance that are common in the literature include return on assets (ROA--the ratio of net income to assets) and market capitalization (or market value) of the organization (Becker and Huselid 2006: 907). These measures are not available in the WES. Combs et al. (2006: 513), in their meta-analysis, found no significant difference in the relationship between HPWS practices and organizational performance for operational and financial measures (where operational measures include productivity and employee retention, and financial measures include accounting returns, growth, and market returns (Combs, et al. 2006: 506)).

Strategic Activities. Becker and Huselid (2006: 903) identify strategic activities as a set of processes that may include product development, strategic decision-making, and partnering or alliance-building. Similarly, in the WES, employers were asked how important the following strategic activities were in their general business strategy: (1) undertaking research and development, (2) developing new products / services, (3) developing new production / operating techniques, (4) expanding into new geographic markets, (5) total quality management, (6) improving product / service quality, (7) reducing labour costs, (8) using more part-time, temporary or contract workers, (9) reducing other operating costs, (10) reorganizing the work process, (11) enhancing labour-management cooperation, (12) increasing employees' skills, (13) increasing employees' involvement / participation, (14) improving coordination with customers and suppliers, and (15) improving measures of performance. The scale of importance used includes the following six-points: crucial, very important, important, slightly important, not important, and not applicable. The scale values for each item are re-assigned as follows: 4=crucial, 3=very important, 2=important, 1=slightly important, and 0=not important or not applicable.

Exploratory factor analysis (EFA) is used to identify distinct strategic factors. For all years two factors emerged--1999 to 2005 using full samples. Only results from the strategic activities EFA in 2005 are presented for brevity; results from other years had similar outcomes. For 2005, using principal factors both of the emergent factors had an eigenvalue greater than one (Meyers, et al. 2006: 522; Tabachnick and Fidell 2007: 617, 644). The third factor had an eigenvalue of 0.54, which was substantially below the second factor's eigenvalue of 1.23. The gap between factors one and two compared to factors three through to fifteen is also substantial providing additional support for two factors emerging (Tabachnick and Fidell 2007: 644). Further, to reveal more interpretable factors, a principal factors extraction method is used with an oblique oblimin rotation. The EFA method was used because (1) the strategic factors are assumed to be theoretical constructs that underlie the items, (2) a theoretical solution is being sought, and (3) the factors will be used as subscales in the analysis. The oblique rotation is used because the sub-facets of strategy are likely to be highly correlated. The oblique rotation accounts for a degree of correlation among the general business strategies and allows this additional information to be incorporated in the factor solution--the factors are not assumed to be independent. For the two main strategy factors, all items had communalities that are greater than 0.20, across all years. Communalities are the percent of variance in an item that is accounted for by variance in the factors. Higher communalities imply the strategy item contributes to explaining the variability of the factors (i.e. the rule-of-thumb, if the communalities <.2 the item should be dropped) (see results presented for 2005 in Appendix 1, Table A1.4).

The first factor that emerged included the following items (1) undertaking research and development, (2) developing new products / services, (3) developing new production / operating techniques, and (4) expanding into new geographic markets. This bundle of items is similar with what Thornhill and White call product leadership (2007: 556). The alpha reliability estimates are 0.81 and 0.79, in 2004 and 2005, respectively (see Appendix 1, Table A1.5).

The second factor that the EFA revealed included the following items: (5) total quality management, (6) improving product / service quality, (10) reorganizing the work process, (11) enhancing labour-management cooperation, (12) increasing employees' skills, (13) increasing employees' involvement / participation, (14) improving coordination with customers and suppliers, and (15) improving measures of performance (notice the item numbering from above is maintained). These items are similar with the strategic factor operational excellence that Thornhill and White identify (2007: 556). The alpha reliability estimates are 0.88, in both 2004 and 2005 (see Appendix 1, Table A1.5).

Not only are these factors comparable with Thornhill and White's (2007: 556), but the product leadership and operational excellence strategies have an established use as generic strategies (Treacy and Wiersema 1997). Further, the items that comprise these factors are also commonly included in the strategy domain (the list of references are not repeated here, see Thornhill and White (2007: 556), for a list of references). Finally, based on the empirical EFA analysis and following Thornhill and White (2007: 556), the cost focused strategic items listed above (including (7) reducing labour costs, (8) using more part-time, temporary or contract workers, (9) reducing other operating costs) are not included in the current analysis. The empirical support is mainly based on low communality values for item eight of <0.20 in both 2004 and 2005 (i.e. high uniqueness values >0.80, see Appendix 1, Table A1.4). Further, a selective focus on particular strategic orientations is not uncommon in the literature, for example Huselid (1995: 650) focuses only on differentiation and focus strategies rather than the cost leadership strategy by arguing a closer relationship exists between the former and HPWS practices than the later.

The product leadership (PL) factor is derived by additively combining the four identified items into a scale ranging from 0 to 20. The operational excellence (OE) factor is the combination of eight items resulting in a scale ranging from 0 to 40. Both of these scales are multiplied by a factor so that their ranges are equivalent (0 to 15). Having equivalent units of measurement is necessary for the calculation of the strategy measure used in the analysis. The calculation of the strategy measure is based on Thornhill and White's angular measure of strategic purity (SP) (Thornhill and White 2007: 555).

The angular measure of *strategic activities* assumes the strategy space has two orthogonal dimensions. The two dimensions that have been identified are product leadership (PL) and operational excellence (OE). From these two measures a composite strategic orientation can be calculated as follows: SP = arctan(PL/OE). PL is on the vertical axis and OE is on the horizontal axis. SP is the angular measure of the workplace's coordinate with respect to the horizontal axis. For example, an SP value of 22.5 degrees implies a vector for a workplace halfway between the 45 degree line and the OE horizontal axis, implying the workplace is more focused on OE relative to PL. As SP approaches 90 degrees the workplace's strategic orientation approaches pure product leadership, whereas as SP approaches 0 degrees the workplace's strategic orientation approaches pure operational excellence. Thus, strategic purity is relative to the SP value in the PL and OE space. Workplaces in between the 90 and 0 degree lines, and that are close to the 45 degree line, are "in-the-middle" and have adopted a hybrid strategic orientation (Thornhill and White 2007: 554). For use in the analysis the angular measure is standardized. The standardization of the strategic orientation measure adds to the interpretation of the results, because a value one standard deviation or greater can be thought of as relatively pure PL, minus one standard deviation or less can be thought of as relatively pure OE, and in the middle can be thought of as a hybrid strategy (Thornhill and White 2007: 558). Over the 2004 to 2006 period, the average SP is 35 degrees with a range of 11 to 70 in the PL/OE space.

A workplace-level strategic activities approach is preferred to a corporate level business strategy approach because of a better alignment between strategy and level of analysis. Generating a strategy orientation at the workplace level allows for variability across workplaces or imperfect implementation of corporate-enterprise level strategies at the workplace-level of analysis. See Appendix 1, Table A1.6 for descriptive statistics on all of the items used to derive the indexes discussed above.

Control Variables for the Macro-level Analysis: Understanding the Transmission Mechanism. In addition to the main variables identified above, several variables will be used as controls to avoid a mis-specification of the model and omitted variable bias in the estimation. In the macro-level analysis, the control variables include measures of unionization, employment relationship, turnover, workplace size, workplace age, and industry group (see Appendix 1, Table A1.7 for descriptive statistics on all control variables used in the macro analysis).

Two measures of unionization are included in the analysis. The first identifies whether or not any employees are covered by a collective agreement at the workplace (i.e. the *presence of collective agreement at the workplace*) (1=yes, 0=no). The second measure is the *proportion of employees at the workplace that are covered by a collective agreement*. These are the only measures available in the WES data set. Measures of union coverage are commonly used in the literature (Cappelli and Neumark 2001: 760; Frost 2000, 2001, 2008; Guest, et al. 2003: 302; Huselid 1995: 653; Walsworth and Verma 2007: 232). The direct effect of unionization and the moderation effect on HPWS practices and organizational performance outcomes are ambiguous. Frost (2000, 2001) found that outcomes following the implementation of HPWS practices vary across unionized workplaces. The resources and capabilities of the local union have been identified as the key factors affecting the success of workplace restructuring. In particular, successful implementation of practices and benefits to workers and management are associated with local unions that are better able to engage with management by: (1) accessing information from internal and external networks; (2) taking an active role by educating members on the nature of the reforms and mobilizing support among their members; (3) accessing decision-making at multiple points of the management hierarchy to help design and implement changes; and (4) balancing the tensions of cooperation and conflict in the labour and management relationship (Frost 2000).

The nature of the employment relationships at the workplace are also controlled for in the analysis, including non-permanent and part-time employees. Employees that are in continuous employment relationships are considered regular and employees in casual, on-call contracts, or term employment are considered non-permanent. The number of non-permanent (or temporary) employees divided by total employment is used to derive the *proportion of non-permanent employees*. The *proportion of part-time employees* is the ratio of the number of employees working less than 30 hours per week to the total number of employees at the workplace, where full-time employees are those that work 30 hours or more per week (Zeytinoglu, Cooke, and Mann 2009: 559). These types of measures are not often included in models (Walsworth and Verma 2007: 230); however, they are critical to include to control for the degree to which the workplace may employ core and non-core employees (Osterman 1994: 175; Zeytinoglu, et al. 2009: 556) and, by extension, as a proxy for the prevalence of strategic jobs (Becker and Huselid 2006: 905).

With regard to separations, the positive effect of HWPS on turnover is well established (Delery and Doty 1996; Huselid 1995). The effect of turnover on performance (productivity and scrap rates) measures tend to be ameliorated by the use of HPWS practices (Arthur 1994: 674). Further, Morissette and Rosa (2003: 36) find that quit rates are related to human resource practices bundles used and their effect varies by industry group. For example, the greater the number of human resource practices used is typically associated with lower quit rates in both high-skill and low-skill industries. In particular, the practice of profit sharing or gain sharing appears to be a main contributor to lower quit rates in high- and low-skill industries (Morissette and Rosa 2003: 23, 35).

In my study, two separate measures of turnover are included in the analysis: (1) employee-driven separation, and (2) employer-driven separation. Employers report the number of employees that leave for each of six possible reasons. The reasons for separation include: (1) resignations, (2) lay-offs, (3) financial incentive resignations or retirements, (4) dismissal for cause, (5) retirement (no incentive), and (6) other permanent separations (Statistics Canada 2005b: 7). The ratio of the total number of resignations and retirements to total employment is used to derive the *proportion of employee driven turnover*. The ratio of the total number of lay-offs plus the incentive encouraged retirements or resignations plus dismissal for cause plus other turnover to the total number of employees is the *proportion of employer driven turnover*. The use of employee turnover as an independent variable is common in the literature (Arthur 1994:

673, 682; Huselid 1995: 658); however, it is often used as a measure of performance (Guest, et al. 2003: 305; Huselid 1995: 657). No studies, that I am aware of, differentiate between the types of turnover. One study does identify that there are differences between voluntary (quitting) and involuntary (firing) departures, but they were not able to separate out these differences from a total turnover rate in the analysis (Huselid 1995: 651). Thus, typically turnover is referred to ambiguously as "employee turnover" without further clarification being provided on the nature of the separation.

Workplace size is measured using total employment at the workplace. The total employment count includes full-time, part-time, permanent, temporary, managers, and non-managers. Often a single measure of organizational size is included in the analysis, either as the total number of employees (a raw count) or transformed using the natural logarithm (Arthur 1994: 678; Datta, et al. 2005: 139; Guest, et al. 2003: 301; Huselid 1995: 653; Youndt, et al. 1996: 850). In my study, to measure the potential non-linearity across the organizational size distribution, workplace size is measured using a series of dichotomous variables measuring workplace size from small to large. Five workplace size categories are defined. Three small categories with the following total employment ranges: (1) *>=10 & <25*, (2) *>=25 & <50*, and (3) *>=50 & <100*. *Medium* is defined as total employment greater than and equal to 100 and less than 500. Finally *large* is defined as total employment greater than and equal to 500. This typology for workplace size is consistent with Statistics Canada's definitions (Chowhan 2005: 19).

Workplace age (i.e. how long the workplace has been in operation) is included as a control variable in the analysis. It is particularly important to include this variable in the innovation model as a proxy for rigidity and inertia that may emerge over time and constrain innovation (Thornhill 2006: 695).

Industry groups are also included in the analysis. Datta, Guthrie, and Wright (2005: 141-142) found support for the moderating effects of industry capital intensity, industry growth, and industry product differentiation on HPWS relationship with labour productivity (sales per employee). No significant effect was found for industry dynamism as a moderating effect. These industry-level relationships support the contingency approach over the universal approach by suggesting there is some role for industry and environmental conditions to affect the HPWS link to organizational performance (Datta, et al. 2005: 143). Combs et al. (2006: 514), using meta-analysis, found organizations in the manufacturing industry group had a stronger relationship between HPWS and organizational performance than the service industry group. The industry groups that are available in the WES data are aggregations that are based on three and four digit North American Industry Classification System codes (NAICS 2002) (Statistics Canada 2007: 23). The fourteen industry groups that are identified in the data include: (1) forestry, mining, oil, and gas extraction, (2) labour intensive tertiary manufacturing, (3) primary product manufacturing, (4) secondary product manufacturing, (5) capital intensive tertiary manufacturing, (6) construction, (7) transportation, warehousing, wholesale, (8) communication and other utilities, (9) retail trade and consumer services, (10) finance and insurance, (11) real estate, rental and leasing operations, (12) business services, (13) education and health services, and (14) information and cultural industries. These will be included in the model separately as binary variables.

Micro-level Study Variables: Understanding Training Decisions. For the micro-level variables, the dependent variables on employer and employee training decisions are presented, and independent variables covering workplace characteristics, employee employment characteristics, and employee decision determinants are discussed. The independent variables are presented in the following order: employee-level other HPWS practices index, employee technology use, technology change, hours of work preference, training alternatives (career related and not directly job-related training), and perceived need for training. The workplace-level variables, such as strategic activities, performance, and innovation, are the same as those for the macro analysis, discussed in detail above. The control variables that are included in the model are also discussed. The control variables that affect both the employer's decision to offer training and the employee's training decision include the following variables: workplace characteristics (including industry group, workplace size (employment), workplace age, and turnover rate); employee employment characteristics (including education, occupation, tenure, employment type, wage, and collective agreement coverage); and employee demographic characteristics (including age, gender, marital status, dependents, and immigration status).

Dependent Variables. ***Job-related Training: Classroom and On-the-job.*** Employees were asked two main questions regarding employer-provided/sponsored training in the last 12 months. They were asked whether or not they received classroom training related to their job (yes or no), where classroom training was defined as having a pre-defined objective and format, specific content, and where progress was monitored and/or evaluated. Also, they were asked whether or not they had received on-the-job training related to their job (yes or no). The questions specifically made the distinction that these types of training were different in that the former was formal and the latter was informal. Further, for both classroom and on-the-job training, the employees also identify the type of job-related training completed, selecting from the following types of training: (1) orientation for new employees, (2) managerial/supervisory, (3) professional, (4) apprenticeship, (5) sales and marketing, (6) computer hardware, (7) computer software, (8) other office or non-office equipment, (9) group decision-making or problem-solving, (10) team building, leadership, communication, (11) occupational health and safety, environmental protection, (12) literacy or numeracy, and (13) other. Similar to the macro-level analysis, only the types of training that are more likely to be voluntary are included. From the above list, the following "voluntary" types of training are included: (2) managerial/ supervisory, (3) professional, (5) sales and marketing, (6) computer hardware, (7) computer software, (8) other office or non-office equipment, (9) group decision-making or problem-solving, and (10) team building, leadership. The other category is not included because of its ambiguity. Thus, if the employee identifies any of these types of training for either classroom or on-the-job training, then they are identified as having received employer-provided voluntary *job-related training*. This is a binary measure (1=yes, 0=no). This operationalization of training is an effort to maintain conceptual equivalence across the macro and micro studies.

Employer and Employee Decisions to Train. Following the above two main classroom and on-the-job training questions in the survey, employees were asked whether or not they decided not to take job-related training that was offered to them. Combining the above classroom and on-the-job training measures with the employee's decision to train can be used to create a variable indicating whether or not the employer offered training to the employee. In this thesis, receipt of training and whether training was declined are combined to create *offer to train from employer* received, equal to one, if an offer is made and zero otherwise. With regard to the employee's training decision, the *employee decision (decline training)* variable is used as a binary variable in the analysis to indicate whether training was accepted (=0) or declined (=1). Previous, studies have looked at the four possible outcomes that can be created from the combination of these measures: (1) not offered training (could not take or decline), (2) offered training and did not decline, (3) offered training and declined so did not train, and (4) offered training and accepted some and declined some (Cooke, et al. 2011: 276). My study focuses on three main outcomes and the factors that affect them, including the offer to train from the employer, the employee's decision regarding training (accept or decline), and the receipt of job-related training.

Independent Variables. ***Employee-level Other HPWS Practices Index.*** Similar to the composition of the macro-level other HPWS practices index the *employee other HPWS practices index* includes the same set of sub-bundles: empowerment-enhancing, motivation-enhancing, and skill-enhancing. For the empowerment-enhancing sub-bundle a list of work organization measures similar to those asked at the workplace level are also asked at the employee level and were measured using the questions: how frequently (1) are you asked to complete employee surveys; (2) do you participate in an employee suggestion program or regular meetings; (3) do you participate in job rotation (different duties than your regular job); and (4) are you informed about workplace performance, organizational change, or new technology implementation. These measures were collected with a three-point scale: never, occasionally, and frequently. Further the following questions were asked: how frequently (5) do you participate in a task team or labour-management committee; (6) do you participate in a quality or work flow team or circle; and (7) are you a part of a self-directed work group. These items were measured on a four-point scale including: never, occasionally, frequently, or always. To derive an empowerment sub-bundle, each of these measures is standardized (z-score) and then additively combined. The alpha reliability estimate is 0.73 (see Appendix 1, Table A1.8).

The employee-level motivation-enhancing sub-bundle uses several questions related to performance and compensation (Subramony 2009: 746). Employees are asked about whether their performance is appraised ("Is your job performance in your position evaluated by a standard process? By standard process, we mean: through a written report, a private meeting with your supervisor, and/or a standard report") (1=yes or 0=no)

(Statistics Canada 2005a: 19). They are also asked whether the job evaluation directly affected their level of pay or benefits (1=yes or 0=no). Employees also report whether they receive any productivity-related bonuses, profit-sharing, or profit-related bonuses in the last 12-months (1=yes or 0=no). Employees report whether or not they receive incentive pay based on their output (all employees who received tips, commissions or piecework payments in the past twelve months) (1=yes or 0=no) (Statistics Canada 2005a: 42). Two questions on promotion opportunity are also included: (1) whether a promotion has been received (1=yes or 0=no), and (2) how many times they have been promoted (a count measure).

Further, with respect to motivation-enhancing items, employees report whether they participate in the following benefits: employer-sponsored pension plan, group RRSP, stock purchase plan, dental plan, life-disability insurance, supplemental medical insurance plan, and supplements to employment insurance (for maternity/ parental leave or lay-offs)) (1=yes or 0=no). Further, two questions relate to whether the employer makes contributions to RRSP or to stock purchase plans (1=yes or 0=no). Thus, seven variables indicate the number of benefits received and two identify whether the employer has contributed to the benefit. These nine indirect compensation benefit variables are additively combined to form two benefits scales; the first ranging between 0 and 7 for practices that they participate in and the second ranging between 0 and 2 for practices that their employer supports. Two scales are used so that the final index has an equal weight for each domain. Finally, the motivation-enhancing sub-bundle is calculated by additively combining the standardized values of the two performance appraisal items, two incentive based compensation variables, two promotion items, and two benefits scales. The alpha reliability estimate for the benefits items is 0.76 and the alpha for the motivation items is 0.64 (see Appendix 1, Table A1.8).

The employee-level skill-enhancing sub-bundle, similar to the workplace-level bundle, includes recruitment and selection items. The job-related training items that would typically be included in a fully specified Subramony (2009: 746) skill-bundle have been excluded to avoid endogeneity issues (e.g. including training variables in the skill bundle when training is also the dependent variable would lead to a correlation between the skill bundle and the error term violating the orthogonality assumption) (Cameron and Trivedi 2006: 70-71).

For the selection practices experienced by the employee at the time of hiring, the following hiring practices that are conceptually similar to structured practices include: tests for specific skills, aptitude or other personality testing, tests administered by a recruitment agency, other type of testing or screening, personal interview, test on job-related knowledge, and test on general knowledge or literacy skills. Employees indicated whether or not they participated in the practice (1=yes or 0=no) (Statistics Canada 2005a: 7). These binary variables are additively combined to create a selection methods score ranging from 0 to 7. For the recruitment practices, employees indicate whether or not they became aware of their entry position by: help wanted ad, on-campus recruitment, news story, job fair, recruitment agency (head-hunter), personal initiative, directly recruited by employer, and/or internet (1=yes or 0=no). Similar, to the selection methods, employees report whether or not they participated in the practice. In other words, they identify how they learned of the position availability (Statistics Canada 2005a: 7). These dichotomous items are additively combined to create a recruitment methods score ranging from 0 to 7. The selection and recruitment items have an alpha reliability estimate of 0.42 (see Appendix 1, Table A1.8). As discussed above, the CFA are provided as a secondary assessment of the combination of the items, the index approach adopted for my study relies primarily on theoretical basis and the previous empirical literature. Nonetheless, with regard to the low CFA observed, this is likely due to selection practices generally being substitutes rather than complements at an individual employee level--with the same being true for recruitment practices. This implies that these items are not measuring the same underlying common factor. Rather, the number of practices participated in by the employee is being measured.

The aggregate *employee other HPWS practices index* is calculated by summing the standardized (z-score) the empowerment, motivation, and skill enhancing sub-bundles. Again as above, using standardized scores and using a sub-bundle index development approach avoids assigning more importance to one sub-bundle over another. This is particularly important when variables differ in terms of their formats and ranges. Standardizing each sub-bundle score ensures that standard deviation units are the same unit of measurement across all of the bundles (see Appendix 1 Table A1.9 for descriptive statistics of all of the items used to develop the employee-level HPWS index).

Employee Technology Use. Employees were asked two main questions with regard to computer-related technology use: (1) "do you use a computer in your job?" and

(2) "do you use computer-controlled or computer-assisted technology in the course of your normal duties? For example, industrial robots, retail scanning systems, etc" (1=yes or 0=no) (Statistics Canada 2005a: 20, 22). Further, an additional question meant to cover other types of technology, such as cash registers, sales terminals, vehicles, and industrial machinery was asked: "Do you use any other machine or technological device for at least one hour a day in the course of your normal duties?" (Statistics Canada 2005a: 23). These measures are combined into a dichotomous overall *technology use* variable that equals one if technology was used and zero otherwise.

Technology Change. With respect to computer-controlled or computer-assisted technology use, employees were asked whether there had been any upgrade or change in the technology in the last year (1=yes or 0=no). Further, regarding other types of technology employees were also asked: was there any upgrade or change in technology in the last year (1=yes or 0=no). These two variables are combined into an overall *technology change* variable that is equal to one if technology change occurred and zero otherwise.

Hours of Work Preference. Employees were asked a series of questions regard their hours worked per week. Employees who worked the same hours per week reported their usual hours worked per week, whereas employees who had variable hours per week reported their average hours per week. These two variables are used to create an hours worked per week variable. Further, employees were asked about their preference for additional or fewer hours per week (given their same rate of pay) and could report that they preferred: "1) the same hours for the same pay, 2) fewer hours for less pay, or 3) more hours for more pay" (Statistics Canada 2005a: 11). They also indicated how many additional or fewer hours they would prefer. These variables are combined to create a preferred hours of work percentage change variable. Two variables are derived: (1) *Percentage change more hours preferred*, which is the percentage change in hours for those interested in additional hours, and (2) *Percentage change less hours preferred*--the percentage change in hours for those interested in working fewer hours relative to their current hours worked.

Alternate Training. Two measures of alternate training were collected. The first focuses on career-related courses (i.e. not personal interest) that were not employer-sponsored, but that were supported by another source (yes or no). The second alternate training question focuses on training that is not directly job-related, but that is sponsored by the employer (employees answer yes or no on whether or not they have taken any courses outside of paid working hours). This training was not just for personal interest, but could also focus on career development. These variables are included in the analysis as separate binary variables: (1) *career related training (non-sponsored)*, and (2) *not directly job-related training (sponsored).*

Perceived Need for Training. The perceived need for training is measured using the following question: "Would you say that the amount of training that you take is: (1)

about right for the demands of the job? (2) too little for the demands of the job? (3) too much for the demands of the job? or (4) not applicable, no training required" (Statistics Canada 2005a: 33) . These responses are collapsed into a binary outcome *perception of training need*, where one equals the employee has too little training for the demands of the job and zero otherwise.

Control Variables for the Micro-level Analysis: Understanding Training Decisions. A list of the control variables that are included in the analysis are presented in Table 2. Both employee-level and employer-level factors have been identified in the literature as having a significant relationship with employees receiving training. These factors will be included in the analysis as control variables. The variables in Table 2 are a collection of concepts and measures that are commonly used to understand the frequency and intensity of training provision (Frazis, Gittleman, and Joyce 2000: 452, 455, 458; Georgellis and Lange 2007: 975; Green 1993: 111; Lynch and Black 1998: 72-73; Walsworth and Verma 2007: 234). See Appendix 1 Table A1.10 for the descriptive statistics of the control variables used in the micro-level analysis.

Table 2: Control Variables for the Micro-level Analysis

Variable Name	Coding	Explanation / Question
Workplace Characteristics		
Primary sector	1=Yes, 0=Otherwise	Forestry, mining, oil, and gas extraction
Manufacturing (ref.)		All manufacturing (labour intensive tertiary, primary product, secondary product, and capital intensive tertiary manufacturing) (as the reference group)
Construction, transportation and utilities		Construction; transportation, warehousing, wholesale; and communication and other utilities
Education and health services		Education and Health services
Other service sectors		Retail trade and consumer services; finance and insurance; real estate, rental and leasing operations; business services; and information and cultural industries
Workplace size	Binary	How many employees receiving a T4 Slip were employed at this location? Same set of variables as the macro analysis
Workplace age	Continuous	How long the business unit has been in operation? (number of years)
Workplace age-squared	Continuous	workplace age*workplace age
Proportion of employee driven turnover	Continuous	The ratio of the total number resignations and retirements to total employment
Proportion of employer driven turnover	Continuous	The ratio of the total number of lay-offs plus the incentive encouraged retirements or resignations plus dismissal for cause plus other turnover to the total number of employees
Employee Employment Characteristics		
Less than high-school	1=Yes, 0=Otherwise	Highest level of education
High-school graduate (ref.)	1=Yes, 0=Otherwise	
Some post-secondary	1=Yes, 0=Otherwise	
College diploma	1=Yes, 0=Otherwise	
University undergraduate degree	1=Yes, 0=Otherwise	
Post-graduate degree	1=Yes, 0=Otherwise	
Managers	1=Yes, 0=Otherwise	WES occupation groups based on SOC91 4 digit to 2 digit based on skills and education: 1-Managers, 2-Professionals, 3-Technical/Trades, 4-Marketing/Sales, 5-Clerical/Administrative, and 6-Production workers with no trade/certification, operation and maintenance.
Professionals		
Technical/trades		
Marketing/sales		
Clerical/administrative		
Production workers (ref.)		
Job tenure	Number of years	When did you start working at this particular job?
Job tenure squared		job tenure*job tenure

Table 2 Continued

Variable Name	Coding	Explanation / Question
Workplace Characteristics		
Regular full-time (ref.) Temporary full-time Regular part-time Temporary part-time	1=Yes, 0=Otherwise	Employees working 30 hours or more per week are categorized as full-time--part-time work less than 30 hours. Employees that are in continuous employment relationships are considered regular and employees in casual or on-call contracts or term employment
Log(hourly wage)	Continuous	Logarithmic transformation of hourly wage (dollars)
Collective agreement coverage	1=Yes, 0=Otherwise	In current job, are you a member of a union or covered by a collective bargaining agreement?
Employee Demographic Characteristics		
Age	Years	In what year were you born?
Age squared		Age*Age
Gender (female)	1= Female, 0 = Male	
Marital status (married)	1=Yes, 0=Otherwise	Married or common law (=1) and others (=0) including single, separated, divorced, and widowed
Dependent child(ren)	1=Yes, 0=Otherwise	Do you have any dependent children?
Immigrant age-at-arrival 0 to 9	1=Yes, 0=Otherwise	If not born in Canada, year of arrival in Canada minus year of birth and age between 0 to 9
Immigrant age-at-arrival 10 to 18	1=Yes, 0=Otherwise	If not born in Canada, year of arrival in Canada minus year of birth and age between 10 to 18
Immigrant age-at-arrival 19 to 35	1=Yes, 0=Otherwise	If not born in Canada, year of arrival in Canada minus year of birth and age between 19 to 35
Immigrant age-at-arrival 36 plus	1=Yes, 0=Otherwise	If not born in Canada, year of arrival in Canada minus year of birth and age 36 years old and greater

An additional variable that is included as a control variable that is not common in the literature is the *decision-maker regarding training offer*. This is a workplace-level variable. It is based on a question regarding "who normally makes decisions with respect to" training (Statistics Canada 2005b: 21). A series of stakeholders are among the set of possible decision-makers, including: non-managerial employees, employee work groups, work supervisor, senior manager, individual or group outside workplace, or business owner. Respondents can check all decision-makers that apply so it is possible that both non-managerial employees and senior managers make decisions on the activities, for example. The following measures are an indication of the degree to which employees have decision-making autonomy. If the employer responded that non-managerial employees or employee work groups make the decisions regarding training then the variable *employees usually make training decision* is equal to one and zero otherwise. If the work supervisor, senior manager, individual or group outside workplace, or business owner are identified as making the decisions regarding training then the variable *employer usually makes training decision* is equal to one and zero otherwise.

Employer-level factors include industry, workplace size, workplace age, and turnover (Chaykowski and Slotsve 2006: 38; Cooke, et al. 2009; Green 1993: 103-104; Turcotte, et al. 2003; Zeytinoglu and Cooke 2009; Zeytinoglu, et al. 2008). Industry variables have been discussed above in detail, in the macro-level control variable section. Smaller workplace size is typically associated with less training, while service sector industries tend to train more than manufacturing. Interestingly, contrary to economic theory that suggests employers with higher turnover rates will train less, several studies found that higher turnover leads to higher incidence of training (Forrier and Sels 2003: 159; Morissette and Rosa 2003: 34). This ambiguity may be clarified by emphasizing that different types of training will exist in both low cost (high turnover) and higher cost producers; the difference in the training will be the intensity or cost per employee (Porter 1985: 12). For example, low cost (high turnover) producers may need to provide more job and workplace orientation training to new employees, whereas higher cost producers can focus on providing higher tenure employees with knowledge and skills enhancing training. Training intensity and training cost per employee are factors that will be differentially affected by differing levels of risk aversion, time horizons, labour market information, and preferences (i.e. for other types of consumption such as leisure, work, or other activities) across employers and employees (Lynch and Black 1998: 65). Further, if only the incidence of training is being measured, workplaces with high turnover rates may provide a high frequency of lower cost training, such as orientation and task/duty training for new employees.

Employee-level variables include employment characteristics (such as education level, occupation, workplace tenure, employment type, wage level, and collective agreement coverage) and demographic characteristics (such as age, gender, marital status, dependent children, and immigration status) (Cooke, et al. 2009: 23; Renaud, Lakhdari, and Morin 2004: 731; Renaud, et al. 2006; Underhill 2006; Yoshida and Smith 2005; Zeytinoglu and Cooke 2009; Zeytinoglu, et al. 2008). Higher levels of training have been found to be associated with high levels of education, managers/professionals, higher tenure, full-time employment, higher wage levels, being covered by a collective agreement, being younger, female, married, having dependents, and being a non-immigrant.

Quantitative Techniques

Descriptive statistics and correlations are presented for both the macro-level and micro-level key variables of interest (i.e. variables that are included in the hypotheses). In addition to these univariate and bivariate statistics, multivariate analysis is used to investigate the macro- and micro-frameworks discussed above.

Macro-level Estimation Techniques: Understanding the Transmission Mechanism. For the macro-level analysis, the main estimation technique used is ordinary least squares (OLS) and generalized method of moments (GMM) for a system of equations (Cameron and Trivedi 2006: 166). The GMM estimation technique allows for a system of path equations to be estimated, and for potential failures in the assumptions of OLS to be accounted for in the estimation (e.g. failures such as identical and independent errors). GMM allows for the estimation of multiple equations, where each has a dependent variable and a set of independent variables, and when some right-hand-side variables are endogenous, which means they are the dependent variable of another equation. In particular, the theoretical framework presented in Figure 3, 4, and 5 will be tested using both OLS and GMM and the results will be compared.

Having workplace observations over time makes using a system of equations for estimation ideal, because the relationships can be inferred as causal, while controlling for the inter-dependent or joint determination of some of the factors at a point in time. The framework presented in Figure 3 serves to provide a useful illustration of how the model will be operationalized:

$$P_{t+1} = \delta I_t + \beta X_t + \varepsilon_1 \qquad (1)$$

$$I_t = \lambda T_{t-1} + \gamma H_{t-1} + \theta Z_{t-1} + \varepsilon_2 \qquad (2)$$

In this simple system of equations both P_{t+1} and I_t are endogenous variables, where P_{t+1} is organizational performance and I_t is innovation. In equation 1, X_t is the set of other exogenous variables (independent and control variables), in time 2. In equation 2, training (T_{t-1}), other HPWS practices (H_{t-1}), and a set of time 1 exogenous variables (Z_{t-1}) determine innovation in time 2. The symbols δ, β, λ, γ, and θ, are the parameter estimates for innovation in time 2, exogenous variables in time 2, training in time 1, other HPWS practices in time 1, and exogenous variables in time 1 determining innovation, respectively.

The relationships specified in equations 1 and 2 form a fully recursive structural model. The model is fully recursive because there are no feedback loops or reciprocal direct paths (Greene 2003: 411). Equation 2 is identified, where time 1 regressors predict time 2 outcomes and equation 1 in a linear combination of itself with equation 2, where time 2 regressors (including innovation) predict time 3 outcomes. This implies that the data are independent over i workplaces (Cameron and Trivedi 2006: 207; Greene 2003: 395). For the models presented in Figures 3, 4, and 5, the recursive structure of these models and independence of their errors results in GMM reducing to OLS--with consistent estimation and robust estimation of heteroskedasticity using the White estimator (Greene 2003: 2004). This is the case even for Figure 5, where the disturbances may be correlated within workplaces over time. Further, the workplaces' errors may not be identically distributed (i.e. the assumption of homoskedasticity may not hold). GMM is able to adjust for all of these failures in the classical linear regression model to provide consistent and efficient estimation of the model.

Briefly, GMM defines a class of estimators that includes special cases ordinary least squares (OLS), maximum likelihood (ML), and system estimation methods, for example (Cameron and Trivedi 2006: 166; Hall 2005: 109). The following description of GMM uses an OLS example to simplify the notation. The GMM estimator uses the analogy principle to identify the sample estimator from the population moment condition. The population moment condition is the following:

$$E(xu)=E\{x(y-x'\beta)\}=0 \tag{3}$$

where E(xu)=0 using the law of iterated expectations, assuming error term u is expected to have a zero mean conditional on the regressors x (i.e. E(u|x)=0), and where $u=y-x'\beta$ (Cameron and Trivedi 2006: 167). The corresponding sample moment condition is the following:

$$\frac{1}{N}\sum_{i=1}^{N}x_i(y_i-x_i'\beta)=0 \tag{4}$$

Which can be re-written as the familiar formula:

$$\hat{\beta} = \left(\sum_i x_i x_i' \right)^{-1} \sum_i x_i y_i \tag{5}$$

GMM is the preferred estimator for analysing the proposed linear system of equations (as identified by the relationships in Figure 5) because it allows for the joint estimation of several equations, where the equations are linear in the parameters and the error is included additively. The GMM estimator has a number of favourable properties, such as consistency, asymptotic normality, and efficiency. The system above is just identified or exactly identified because the number of moments equals the number of parameters being estimated, which implies a single solution to the equations can be estimated (Greene 2003: 536). GMM does not make distributional assumptions regarding the data generating process. In other words, a model that is "correctly" specified is asymptotically assumed to produce a normal error distribution. GMM is efficient because the variance matrix estimation permits the errors' conditional variances and covariances to be different across workplaces, thereby adjusting for heteroskedasticity. Further, GMM is also appropriate if independence assumptions do not hold for the errors.

For the basic relationships identified by both equation 1 and 2 above and including a full set of control variables, the Breusch-Pagan / Cook-Weisberg tests for heteroskedasticity (Greene 2003: 222) indicate that the null hypothesis of a constant variance can be rejected at the 99% level of confidence ($p<0.01$). In all of the estimation results presented below the variances are assumed to not be constant and the appropriate covariance matrix is used.

For the estimation of GMM, the variance covariance matrix allows for the errors to be both not identically distributed and independent. Heteroskedasticity is corrected for using a robust weight matrix. Further, the weight matrix is calculated to account for arbitrary correlation among the observations within workplaces across time. In other words, any autocorrelation that is due to a workplace cluster of observations being correlated over time is accounted for in the weight matrix (Greene 2003: 546). Finally, the estimation is allowed to iterate until convergence is achieved. The convergence criterion is set to (1e-6). Thus, the standard errors generated by the GMM estimator are robust standard errors that are adjusted for homoskedasticity and independence assumptions not holding. For all three models (Figure 3, 4, and 5), GMM reduces to OLS. This is the case for two reasons, namely, the regressors are not correlated with the errors and the models are sequential (Hall 2005: 109, 112).

In summary, the GMM technique is appropriate for testing the assumptions of the classical linear regression model given the longitudinal nature of the data and the system of equations approach to modelling the relationships. In particular, GMM enables every endogenous variable to be expressed as a linear function of relevant exogenous variables and structural disturbances, and allows for the interdependence (or joint determination) of training, other HPWS practices, innovation, and performance to be modelled with lagged variables to analyze causal effects (i.e. Figure 5) (Tabachnick and Fidell 2007). Finally, after comparing the GMM and OLS estimates, the GMM results reduced to OLS (i.e. the GMM and OLS coefficient estimates were identical) with the OLS estimates tending to have slightly more conservative standard errors (Greene 2003: 412). Only the OLS results are presented below.

Micro-level Estimation Techniques: Understanding Training Decisions. For the micro-level analysis, factors expanding or limiting training are first explored using a bivariate probit model, where the employee is the unit of analysis. This complexity is necessary given that an employer's offer to train and an employee's decision to train (or to decline training) are not independent events. As a result, individual probit models, although consistent, would be inefficient if the disturbances are correlated, because separate probit models would ignore the correlation between the disturbances. In other words, these two decisions are interrelated and assumptions of independence may no longer hold. Thus, with the two binary variable models four possible outcomes can be observed: refuse training and not train; refuse training and train; not refuse training and not train; and not refuse training and train. The employee and workplace-level independent and control variables discussed above will be used in these models. The inter-related decisions can be presented as follows:

$$y_1^* = x'\beta_1 + \varepsilon_1 \tag{3}$$

$$y_1 = 1 \ if \ y_1^* > 0$$

$$y_1 = 0 \ otherwise$$

$$y_2^* = x'\beta_2 + \varepsilon_2 \qquad (4)$$

$$y_2 = 1 \; if \; y_2^* > 0$$

$$y_2 = 0 \; otherwise$$

Where y_1* and y_2* are unobserved latent variables, ε_1 and ε_2 are joint normal with means zero, variance one, and error correlation ρ. It is important to note that this model collapses to two separate probit models when the errors are not correlated (i.e. ρ=0) (Cameron and Trivedi 2006: 522). The model is estimated using maximum likelihood, where the log-likelihood to be maximized is:

$$\ln L = \sum_i \ln P(y_{1i}, y_{2i}) \qquad (5)$$

Some possible concerns with regard to estimation include the selection issue. The framework of strategic jobs implies an employer's decision to train and an employee's decision to receive training are decisions that can be subject to "selection" issues. For example, employees may choose to work for employers that provide training, with the intention of accepting training. Similarly, employers may hire employees whom they intend to offer training. “Selectivity” suggests that individuals with higher education will select jobs that provide more training, however this does not adjust the likelihood that graduates possess greater ability, ambition, health, and more successful parents (Becker, 1980; 5).

My study is not able to control for individual ability, and this leads to a concern with regard to selectivity. Selectivity implies that skill levels may be an omitted variable that is associated with training and education, thereby inflating observed relationships between human capital investments and performance outcomes. In other words, the training, innovation, and performance relationship may be due to the hiring of highly skilled employees (i.e. employees who tend to receive training) and the omitted variable ability may be driving the observed relationships rather than the hypothesized relationships.

Ability is an employee characteristic that likely affects the employee's decision to accept training and the employer's decision to offer training. Thus not including a measure for skill in the regression models implies that variables correlated with skill, such as education, will be correlated with the error term, thereby creating the endogeneity concern (i.e. right-hand side variables being correlated with the error term). The problem is that endogeneity can result in potential bias leading to inappropriate interpretation, such as level of education contributing to the decisions to train. Instrumental variables that influence educational attainment but do not directly affect training would enable the modelling to account for the endogeneity issues. However, this assumes "good" instruments exist, which they do not for these data. A good instrument is a variable that is correlated with the right-hand side variable causing the endogeneity issue (education) but not with the left-hand side endogenous variable (training).

An individual's ability is multi-dimensional, and it includes both cognitive and non-cognitive elements. Cognitive ability or intelligence is often measured using IQ tests or other types of intelligence tests. Non-cognitive abilities include time preference, trustworthiness, and behavioural skills (such as motivation and self-discipline) (Heckman and Jacobs 2010: 21). Time preference is the valuation placed on the outcome of decisions, such as leisure versus work, and consumption versus saving, where time preference is an individual's personal preference or demand for the accelerated satisfaction of a desired outcome (e.g. an individual may trade-off lower savings and higher present consumption for lower future consumption). Heckman and Jacobs suggest that successful interventions to improve human capital have an effect on both cognitive and non-cognitive ability. In particular, investments have their greatest return when targeted at early childhood when abilities are the most malleable. Cognitive ability (IQ) is more stable by age ten, but non-cognitive abilities are relatively more malleable into adolescence and adulthood (Heckman and Jacobs 2010: 20).

In summary, if the errors are correlated and the separate binary probit models are nested in the bivariate probit model, then the bivariate probit analysis is the appropriate analysis to estimate the relationships. However, if the errors of the binary probit models are not correlated ($\rho=0$), then it is appropriate to estimate the relationships separately, because the separate binary probit models will fit the data better. A Wald test of rho equal to zero cannot be rejected (($\rho=.163$ and se=.276) ($p<0.56$) (chi2(1) =0.3379) for the full model, which includes all the independent variables of interest and controls, and the dependent variables of job-related training and employee decision (decline training). This indicates that the analysis can be done with two separate probit models to evaluate the decision-making path, since the hypothesis of interrelated decisions fails to hold empirically. To test the hypotheses presented above (in Figure 6), three separate binary probit models will be investigated. The first model looks at the factors associated with the employer decision to offer training, the second model looks at the factors associated with the employee decision to accept or decline training, and the third looks at the factors related to whether or not employer-sponsored job-related training is received by the employee.

Weighting the Data

The Workplace and Employee Survey is a multi-stage stratified sample. Multi-stage sampling refers to a process of two or more successive stages of sampling. It involves a hierarchy of units, where each first stage is divisible into second stage units, and so on (tsu into ssu into psu or employees in workplace(s) in industries/regions, for example). A good sampling frame is required at each stage.

A two-stage sample is different from a simple random sample in that sampled units are not randomly distributed over space, but are grouped based on the stratification. The operational advantages of cluster samples include: cost-effectiveness (distance, time, travel reduced) and facilitation of repeat visits and follow-up. The statistical advantages of using cluster samples include their ability to: focus on important subpopulations while ignoring irrelevant ones; improve the accuracy of estimation; maintain efficiency; and sample equal numbers from strata varying widely in size, which may be used to equate the statistical power of tests of differences between strata. Statistical disadvantages of using cluster samples include: the difficulty in selecting relevant stratification variables; the fact that cluster samples are not useful when there are no homogeneous subgroups; the high cost of the approach; the fact that cluster samples require accurate information about the population, which is not always available; and the potential to introduce bias.

Further, a multi-stage design allows for some groups to be more intensively sampled than others; groups may be targets if their members are relatively rare in the population as a whole. Consequently, a simple random sample is not likely to include enough units (individuals) from a group of interest to permit analysis. In other words, the sample is designed so that units with relevant characteristics have a high probability of being selected. For example, a simple random sample of Canada may not sample enough large workplaces to produce estimates that are nationally representative of large workplaces. Some groups are over-represented deliberately as part of the design (or by accident due to non-response). Departing from simple random samples and using prior information about population can improve precision of the estimate and efficiency of statistical inference. If accurate size measures are available for higher stage units (i.e. workplace size used in stratification) the units may be selected by probability proportional to size.

In summary, to adjust the estimates for potential bias in the selection of the sample, the macro-level analysis uses the 2003 sample survey weight to adjust for the probability of selection. For the estimation of variance, both design- and model-based approaches are used for the macro-level analysis. The design-based approach is used for the results on the relationships identified in Figures 3, 4, and 5, because the estimation of these models reduces to OLS and the bootstrap weights that are available with the WES data can be used (Chowhan and Buckley 2005). A model-based approach implies that all of the variables used in the design of the survey should be included in the model. For the employer-level analysis all of the variables that are available in the data are used in the analysis, including workplace identifier, industry identifier, and workplace size.

For the employee-level analysis, the sample survey weight is used to adjust for the different probabilities of employees being selected into the sample. In particular, two separate employee samples are pooled into one dataset (2003 and 2005). All weights were adjusted to account for the pooling of various years of data for differing employee populations (Thomas and Wannell 2009). The bootstrap weights are used to adjust for the lack of independence between employees surveyed from the same workplace (Chowhan and Buckley 2005; Mann and Chowhan 2011).

There is a clear argument that can be made for the use of the bootstrap weights because of the potential lack of independence among employees clustered within the workplaces being sampled. However, the use of bootstrap weights at the workplace level (i.e. the macro-level analysis) is not as clear given the "clustering" is at the strata level and workplaces are randomly sampled within strata (Statistics Canada 2007: 19). This would mitigate some of the concerns of downward bias standard errors due to clustering, and not being able to adjust for this potential bias by using the bootstrap weights with the GMM command in Stata for the macro analysis if the GMM command was used for the presentation of the results (i.e. OLS results are presented below for the models of Figures 3, 4, and 5).

Common Method Bias

Podsakoff, MacKenzie, Lee, and Podsakoff (2003: 879) address the systematic impact that common methods may have on observed correlations and the implications for validity of inference. Common method bias may be a concern for some survey data; however, for the Workplace and Employee Survey, method bias is not a concern. The workplace level topic sections' questions can be collected from different respondents when different individuals are privy to the information requested (Statistics Canada 2007: 27). Question formats and scale anchors are substantially varied within the survey. Further, Thornhill and White (2007: 557), using a 1999/2000 sample of the WES, performed diagnostic tests and found neither common method bias nor variance inflation factors to be significant.

Descriptive Statistics for the Key Variables of Interest

Macro-level Study Descriptive Statistics Analyses: Understanding the Transmission Mechanism. Table 3 presents the means, standard deviations, and correlations for the macro-level study analyses' key variables of interest, including gross profit per employee, innovation, training, other HPWS practices, and strategic activities. The mean gross profit per employee for the years 2004, 2005, and 2006 is approximately $45,400. This average appears to be at a similar level as estimates presented by Huselid (1995), which appear to be at the higher end of the range of performance per employee measures. For example, as a lower end estimate, Guest et al. (2003: 302) found profit per employee of about $2,700 (2000-01) and annual sales of $120,000 (2000-01) per employee for organizations of an average size of 224 employees using U.K companies. At the higher end of the range, Huselid (1995: 354) reported annual sales of about \$171,100 per employee (1991-92) for organizations with average total employment of 4,413 for U.S. companies. For comparative purposes, my study had an annual revenue per total employment of about \$199,700, in 2006. The above comparisons do not correct for inflation or exchange rate differences over time and across countries, but are presented as benchmarks so that my study's estimates can be understood in the context of the existing literature.

For the gross profit per employee within variable correlations (i.e. over time), all estimates are strongly and significantly related ($r > 0.90$). In addition to the gross profit per employee, the remaining key variables all had strong and significant positive correlations over time. Strategic activities had the second highest correlations overtime ($r = 0.81$), followed by training ($r = 0.70$), and other HPWS practices ($r = 0.63$). The relatively high within variable correlation for strategic activities indicates that strategic orientations are relatively stable over time and are likely adjusted marginally year over year. The relatively lower correlations for training and other HPWS practices imply that there is some variability in the use and number of employees affected by practices over time. The innovation index had a more moderate significant positive relationship over time at $r = 0.45$. Effect sizes are defined as no relationship ($r < 0.10$), weak (small) ($0.10 < r < 0.30$), moderate (medium) ($0.30 < r < 0.50$), and strong (large) ($r >= 0.50$) (Cohen 1988: 79-80; Meyers, et al. 2006: 115). Similar, to training and other HPWS practices, innovation also appears to be quite variable. This implies that workplaces that are successful innovators in one year are not guaranteed success in the following year. In other words, workplaces may not be able to continue the same level of innovation from one year to the next. Training, other HPWS practices, and innovation outcomes appear to not have the same stability as gross profit per employee and strategic activities over time.

The between variable correlations appear to be typical of what is found in the literature. For example, performance per employee measures often have relatively low correlations with HPWS, innovation related measures, and strategy indices. For example, Guest et al. (2003: 303) find a weak (r = 0.12) correlation between profit per employee and high use of human resource management practices. Huselid (1995: 655) finds no relationship (with correlations ranging from r = 0.03 to r = 0.06) for productivity and employee skills and motivation measures practices and no relationship (r = 0.01) between productivity and strategic human resource management index (i.e. HPWS practices aligned with strategy). Both the Guest et al. (2003) and Huselid (1995) studies are often used in this study to make comparisons, because they are among the few studies that have used an objective measure of performance (profit or sales per employee) to investigate the relationship with HPWS (Wood 1999b: 405-407). Finally, when looking at other performance measures, such as ROA and ROE, and individual item HPWS practices, correlations are in the weak range (r = -0.07 to r = 0.22) (Delery and Doty 1996: 819). Further, ROA and ROE performance measures and innovation have no relationship (r = -0.05 and r = 0.09), respectively (Delery and Doty 1996: 819).

For my study, innovation and training correlations are in the weak to moderate range (r = 0.22 to r = 0.31), and these are similar to the weak correlations (r = 0.23) reported by Delery and Doty (1996: 819); further, my innovation and other HPWS practice index correlations (ranging between r = 0.14 and r = 0.22), are similar to Delery and Doty's (1996: 819) correlations for innovation and individual HPWS practices (that ranged from r = 0.01 to r = 0.33). Huselid (1995: 655) finds weak correlations (r = 0.05 and r = 0.18) for employee skills and employee motivation HPWS practices bundles with strategic orientation, respectively. This is similar to the correlation range for other HPWS practices and strategy found in my study (r = 0.09 to r = 0.17).

In summary, all of these variables have positive relationships of a magnitude consistent with previous studies. These significant correlations establish the basic relationships outlined in Figures 3, 4, and 5 above. In particular, the positive relationships with strategic activities indicates product leadership (PL) has a positive relationship with higher levels of innovation, training, and other HPWS practices, while operational excellence (OE) is associated with lower levels of these outcomes.

Table 3: Mean, Standard Deviations, and Correlations Statistics for the Main Variables in the Structural Model, Macro-level

	Variables [a]	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1	2006 gross profit per employee	44,795	187,945										
2	2005 gross profit per employee	45,995	188,779	0.96**									
3	2004 gross profit per employee	45,505	173,810	0.91**	0.91**								
4	2005 innovation index	0	1	0.06**	0.04*	0.04*							
5	2004 innovation index	0	1	0.05**	0.03	0.03	0.45**						
6	2005 training index	0	1	0.03	0.03	0.04*	0.27**	0.28**					
7	2004 training index	0	1	0.07**	0.06**	0.08**	0.22**	0.31**	0.70**				
8	2005 other HPWS practices index	0	1	0.05**	0.05**	0.05**	0.22**	0.18**	0.36**	0.32**			
9	2004 other HPWS practices index	0	1	0.07**	0.07**	0.06**	0.14**	0.18**	0.35**	0.33**	0.63**		
10	2005 strategic activities	35.2	10.5	0.02	0.01	0.01	0.11**	0.08**	0.14**	0.11**	0.14**	0.09**	
11	2004 strategic activities	34.9	8.8	0.01	0.01	0.01	0.15**	0.16**	0.17**	0.12**	0.17**	0.10**	0.81**

[a] n = 3,154. The gross profit per employee variables are in dollars. The innovation, training, and other HPWS indexes are all composite scales (these are z-score standardized values). The strategic activities variable is an angle within the PL and OE space. All variables are continuous.

*p<0.05, **p<0.01, two-tailed tests

Micro-level Study Descriptive Statistics Analyses: Understanding Training Decisions. Table 4 presents the means, standard deviations and correlations for the key variables of interest for the micro-level analyses. The proportion of employees who received employer-provided voluntary job-related training is 36% (SD = 0.48). This estimate is substantially lower than Cooke, Chowhan, and Brown's (2011: 278) estimate of 53% of the employees participating in employer-supported training (including all types of on-the-job training, classroom training and outside the workplace training). The difference between these estimates is due to my study's focus on workplaces with 10 or more employees, and a focus on voluntary on-the-job and classroom training. Nonetheless, the mean of 0.36 is in the range of commonly reported levels of training reported in Canada (Statistics Canada 2010b). Of all employees responding, 9% (SD = 0.29) reported that they declined an offer to train (i.e. they decided not to take training that was offered). This estimate is similar to the proportion reported by Cooke, Chowhan, and Brown (2011: 278). Employers offered training to 40% (SD = 0.49) of employees. These dependent variables are all significantly and positively correlated, with receiving and declining training being weakly correlated (r = 0.22).

With regard to the workplace-level independent variables (i.e. strategic activities, innovation, gross profit per employee, other HPWS practices, and training), these z-score standardized variables' means and standard deviations are not equal to zero and one, respectively, because these estimates are at the employee-level of analysis and not the workplace level (as in Table 3 above). In other words, the employees in workplaces with positive scores have greater representation in the employee-level data relative to their workplaces' representation in the workplace-level sample.

The correlation coefficients for the workplace-level variables at the employee-level of analysis are in the same direction and of the same magnitude as the correlation coefficients observed above in Table 3. However, the workplace-level variables tend to not be substantially correlated with employee-level factors. The notable exceptions are that the employee-level other HPWS practices index and technology use variables both tend to be weakly correlated with workplace-level strategic activity, innovation, gross profit per employee, other HPWS practices, and training variables with correlations ranging between no relationship to moderate (r = 0.03 and r = 0.34). Further, the workplace-level other HPWS practices index and the variable, employees usually make training decisions, are positive correlated (r = 0.17).

Table 4: Mean, Standard Deviations, and Correlations Statistics for the Main Variables in the Micro-level Models

	Variables [a]	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Job-related training	0.36	0.48																	
2	Employee decision (decline training)	0.09	0.29	0.22																
3	Offer to train from employer	0.40	0.49	1.00	1.00															
4	Strategic orientation [b]	36.71	10.41	0.03	0.03	0.04														
5	Innovation index [b]	0.18	1.10	0.06	0.02	0.06	0.18													
6	Gross profit per employee [b]	51,768	251,779	0.04	0.03	0.04	-0.02	0.01												
7	Other HPWS practices index [b]	0.63	1.25	0.13	0.08	0.14	0.10	0.23	0.05											
8	Training index [b]	0.42	1.18	0.13	0.05	0.14	0.13	0.27	0.03	0.42										
9	Employee other HPWS practices index [c]	0.00	1.00	0.29	0.13	0.30	0.13	0.14	0.07	0.34	0.23									
10	Technology use	0.81	0.39	0.39	0.14	0.37	0.05	0.09	0.03	0.15	0.12	0.29								
11	Technology change	0.11	0.32	0.14	0.04	0.14	-0.01	0.04	0.01	0.06	0.06	0.09	1.00							
12	Percentage change more hours preferred [c]	8.76	32.00	-0.03	-0.02	-0.03	-0.07	-0.03	0.00	-0.02	-0.04	-0.10	-0.07	0.00						
13	Percentage change less hours preferred [c]	1.73	7.88	0.02	0.05	0.04	0.04	0.03	0.00	0.04	0.03	0.05	0.03	0.00	-0.06					
14	Career related training (non-sponsored)	0.07	0.25	0.10	0.10	0.13	0.01	0.04	-0.01	0.01	0.01	0.04	0.10	0.09	0.03	0.00				
15	Not directly job-related training (sponsored)	0.04	0.20	0.21	0.09	0.19	0.03	0.02	0.00	0.04	0.02	0.11	0.15	0.00	-0.02	0.01	0.19			
16	Perception of training need	0.24	0.42	0.01	-0.15	-0.03	0.03	0.03	0.00	0.05	0.02	0.04	0.20	0.09	-0.02	0.08	0.12	-0.02		
17	Employees usually make training decision	0.16	0.37	0.06	0.03	0.07	0.05	0.07	0.02	0.17	0.10	0.04	0.07	-0.02	-0.01	-0.01	0.00	0.11	-0.07	
18	Employer usually makes training decision	0.89	0.31	-0.05	-0.02	-0.06	0.02	-0.01	-0.03	-0.03	0.02	-0.07	-0.07	-0.05	-0.01	0.00	0.02	-0.13	-0.01	-0.38

[a] n = 24,977. Correlations whose absolute values are greater than .02 are significant at p<0.01, two-tailed tests

[b] These are workplace-level variables. The gross profit per employee variable is in dollars. The innovation, training, and other HPWS practices indexes are all workplace-level composite scales (workplace-level z-score standardized values are presented--notice the means are not zero, this is because this variables are standardized based on the workplace level sample and this is the employee-level sample). The strategic activities variable is an angle within the PL and OE space.

[c] These are continuous variables with the remainder of the unmarked variables being binary which implies their means are equivalent to proportions. For variable pairing that include a continuous variable Pearson correlation coefficients are reported and for pairings that include two binary variables tetrachoric correlations are reported.

For the remaining employee-level independent variables, very few correlations are in the weak to moderate range and most are in the no relationship range (i.e. r<0.10), but some exceptions can be identified. The employee other HPWS practices index is significantly correlated with job-related training (r = 0.29). Further, job-related training and employee technology use are significantly correlated (r = 0.39). These correlations are of similar magnitude for the dependent variable offer to train from employer. The variable, employees usually make training decisions, has a significant positive weak correlation with workplace-level other HPWS practices index (r = 0.17) and training (r = 0.10). Further, the variable, employees usually make training decisions, is significantly negatively correlated with employer usually makes training decision (r = -0.38). These relationships indicate that as workplaces focus more on the implementation of other HPWS practices and employee autonomy regarding training decisions, the relationship with workplace-level training outcomes tends to be positive.

Finally, most employees (81%) report using technology, and this use of technology is significantly and positively correlated to a perceived need for training (i.e. receiving too little training for the demands of the job) (r = 0.20). This relationship may tend to capture a persistent training-need deficit (i.e. a stock rather than a flow) given the weaker correlation between an employee experiencing a technology change and the perception of training need (r = 0.09)--only 11% of employees report any upgrade or change in the technology in the last year (i.e. computer-controlled or computer-assisted technology use) (see Table 4).

Chapter 6

Results

This section first presents the results for the macro-level analyses, and then the micro-level analyses are presented. For both levels of analyses, the regression results are presented for the relationships identified in Figures 3, 4, 5, and 6, above.

For the presentation of the regression results' inference statistics, three levels of significance are presented, 10%, 5%, and 1% for two-tailed tests. The selection of significance levels depends on the acceptable level of risk of committing a Type I error (i.e. a 1% level accepts less risk than a 10% level) (Statistics Canada 2003: 244) , and the trade-offs that are willing to be made between Type I and Type II errors (Gujarati 1988: 116). A commonly accepted level of risk is 5% (Meyers, et al. 2006: 34; Tabachnick and Fidell 2007: 34). At the 5% significance level, for the conventional two-tail test, a 2.5% critical region is on either side of the distribution (Gujarati 1988: 110; Meyers, et al. 2006: 34). This implies the critical value for inference for a two-tail test at the 10% level of significance is equivalent to a one-tail test at the 5% level of significance. The selection of significance levels also depends on theoretical priors and empirical evidence. If theoretical priors and empirical evidence suggest the observed effect is expected to be in a positive direction, for example, then it is common practice to use a one-tail test (Arthur 1994: 683; Becker and Huselid 1998a: 87, 91; Huselid 1995: 658; Macky and Boxall 2007: 545). Huselid (1995) also presents 10% significance levels for one-tail tests, which implies a 20% critical region. My study uses the three levels to be consistent with both convention and the seminal strategic human resource management literature articles that also use three levels (Cappelli and Neumark 2001: 757; Delery and Doty 1996: 819; Godard 2001: 790, 2010: 475; Huselid 1995: 657; Ichniowski, et al. 1997: 310; MacDuffie 1995: 213; Messersmith and Guthrie 2010; Youndt, et al. 1996: 854), and to enable comparability to previous studies that have used one-tail tests.

Macro-level Study Regression Results: Understanding the Transmission Mechanism

Tables 5 through 7 present the ordinary least squares regression results for the relationships identified in Figures 3 to 5, respectively. Table 5 presents stepwise hierarchical OLS regression results for innovation and organizational performance (i.e. gross profit per employee) dependent variables (see Appendix 2 Table A2.1 for a presentation of the model with all the control variables). These models test the basic mediation model and the hypotheses presented in Figure 3.

Following the causal steps approach conditions for mediation (Baron and Kenny 1986; Mathieu, DeShon, and Bergh 2008: 212; Wood, Goodman, Beckmann, and Cook 2008: 272), my study uses three-step OLS regression analysis to test for mediation. The three steps are as follows: (1) the independent variable (training) must affect the mediator (innovation) when the mediator is regressed on the independent variable; (2) the independent variable (training) also needs to affect the dependent variable (performance); and, finally, (3) the mediator (innovation) must affect the dependent variable (performance) and the training (and other HPWS practices) independent variable's effect must be less or zero (i.e. partial or complete mediation), in a fully specified model. If significant relationships are observed for all of the above steps, then the linkages of the mediation model are taken as confirmed.

In Table 5, model 1 presents the baseline with only the control variables included in the regression models with innovation and gross profit per employee as the dependent variables. For model 1, the control variables explain about 2% of the variance in both the innovation and gross profit per employee regressions. Model 2 adds the other HPWS practices index and the training index into both the innovation and gross profit per employee regressions. The R-squared increases significantly as a result of the inclusion of these variables in both regressions. With regard to the steps of mediation analysis, model 2's innovation regression is step 1, and the gross profit per employee regression is step 2. For the innovation regression, model 2 and model 3 are identical in Table 5 because no new variable is added to the regression; model 3 is not included in Table 5 for the innovation regression. The gross profit per employee regression for model 3 adds the innovation index variable into the analysis (i.e. step 3 for mediation), and this inclusion marginally increases the R-squared from 0.024 to 0.026, which is a significant change ($p<0.10$).

Adjusted R-squared estimates in the range of 0.05 to 0.07 for profit per employee are not uncommon in the literature (Guest, et al. 2003: 305). R-squared values in the range of 0.037 to 0.094 for models with innovation as the dependent variable are typical in the literature (Messersmith and Guthrie 2010: 255). Further, other studies that have looked at labour productivity (sales per employee) as the dependent variable have R-squared values in the range of 0.06 to 0.65 (Chenevert and Tremblay 2009: 754; Huselid

1995: 658; Ichniowski, et al. 1997: 300; MacDuffie 1995: 213-214). Compared to Huselid (1995: 658), for example, one possible explanation for the lower R-squared in my study (Table 5, model 3) is that Huselid includes variables on the right-hand side of the equation that could be considered endogenous, such as sales growth and R&D/sales. Including sales on the right-side implies a change in the total sales for the year, which ends up being reflected in both the dependent variable and the independent variables. For example, an increase in sales increases the dependent variable (sales per employee) but also increases sales growth and decreases R&D/sales, all else held constant. This is likely one reason for the strong negative relationship between sales per employee and R&D/sales (Huselid 1995: 658), and this likely also contributes to the high R-squared. Finally, other outcome measures also have weak to moderate R-squares, Delery and Doty (1996: 822) look at interactions between human resource practices and innovation and the effect on ROA and ROE, and their R-squared estimates, which range between 0.04 and 0.32.

In Table 5 and model 3, the hypotheses for the basic mediation model are tested. In particular, the basic mediation model is tested to see that there is a positive relationship between training in time 1 and organizational performance in time 3 (i.e. gross profit per employee), and that this relationship is mediated by innovation in time 2 (Hypothesis 1). The basic mediation model is also tested to see that there is a positive relationship between other HPWS practices in time 1 and organizational performance in time 3, and that this relationship is mediated by innovation in time 2 (Hypothesis 2). See Table 9 at the end of this section for a list of all the hypotheses and their results. Training in time 1 has a positive significant relationship with innovation in time 2--an increase of training by one standard deviation increases innovation by about a 0.2 standard deviation. Further, training in time 1 has a positive significant relationship with gross profit per employee in time 3 ($p<0.05$). In addition to statistical significance, the relationship has practical significance. A one standard deviation increase in training increases profit per employee by about $8,517 (in model 3), which represents about 19% of the average profit per employee (i.e. 18.6% = $8517/$45,729). The fall in the effect of training on gross profit per employee from $10,390 to $8,517 indicates partial support for Hypothesis 1--that innovation partially mediates the training-performance relationship. The addition of the time 2 innovation variable in the gross profit per employee (time 3) regression (model 3) results in a decrease in the magnitude of both the effects of training and other HPWS practices in time 1. The relationship between innovation and gross profit per employee is the most substantial and significant relationship among the key variables of interest.

Table 5: Hierarchical Regression Results for Innovation and Organizational Performance, Testing the Basic Structural Model and the Hypotheses Presented in Figure 3

Dependent variable innovation index (standardized) (T2)

Step 1	Model 1 [c]		Model 2 [e]	
Variables	**b**	**s.e.**	**b**	**s.e.**
Constant	0.785***	0.305	0.432	0.314
Other HPWS practices index (T1) [a]	--	--	0.073*	0.042
Training index (T1)	--	--	0.198***	0.045
Control variables (T1) [d]	Yes		Yes	
R-squared	0.022		0.066***	
Change in R-squared			0.044	
F for change in R-squared			10.23***	
N	3154		3154	

Dependent variable gross profit per employee (dollars) (T3)

Step 2	Model 1 [c]		Model 2		Model 3	
Variables	**b**	**s.e.**	**b**	**s.e.**	**b**	**s.e.**
Constant	78175***	30877	51357*	31330	45729	28426
Innovation index (T2) [b]	--	--	--	--	9583**	3733
Other HPWS practices index (T1)	--	--	10081**	3461	9480**	4186
Training index (T1)	--	--	10390**	4744	8517**	4251
Control variables (T2) [d]	Yes		Yes		Yes	
R-squared	0.018***		0.024***		0.026***	
Change in R-squared			0.006***		0.002***	
F for change in R-squared			11.96***		3.78*	
N	3154		3154		3154	

[a] All independent variables in the step 1 regression are from 2004 (time 1 (T1)).

[b] All independent variables in the step 2 regression are from year 2005 (time 2 (T2)) except for the other HPWS practices index and training index are from 2004 (time 1 (T1)), and the dependent variable gross profit per employee is from 2006 (time 3 (T3)).

[c] Ordinary least squares with robust bootstrap standard errors.

[d] Yes indicates that the control variables are included in the estimation of the model. Large workplaces are the reference category for the workplace size dummy variables and capital intensive tertiary manufacturing in the reference category for the industry dummy variables.

[e] For step 1, model 2 results are the same as model 3 results for the innovation regression, because no new variables are added at this step.

*p<0.10, **p<0.05, ***p<0.01, two-tailed tests

The indirect effect of training on performance is \$1,894 (i.e. the product of the effect of training on innovation (0.198) and the effect of innovation on gross profit per employee (\$9,583)), and it is significant at the $p<0.05$ level. The Sobel z-value test (z-value = $a*b/SQRT(b^2*s_a^2 + a^2*s_b^2)$) and the Baron and Kenny (1986) modified Sobel test equation are used to test the indirect effect's significance. The Baron and Kenny (1986: 1177) modified Sobel test equation is equivalent to the Aroian test (z-value = $a*b/SQRT(b^2*s_a^2 + a^2*s_b^2 + s_a^2*s_b^2)$). The z test statistics are 2.22 for the Sobel test and 2.18 for the Aroian test. In the test equations, a and b are path coefficients and s_a and s_b are their standard errors.

With regard to Hypothesis 2, there is no support for innovation in time 2 mediating the other HPWS practices in time 1 and gross profit per employee in time 3 relationship. The other HPWS practices index in time 1 is weakly significant at the $p<0.10$ level with innovation in time 2--a one standard deviation increase in the other HPWS practices index increases the innovation index by 0.073. The other HPWS practices index in time 1 does have a strong significant relationship with gross profit per employee in time 3 at the $p<0.05$ level--a one standard deviation increase in the other HPWS practices index increases gross profit per employee by \$9,480, which is slightly lower than the coefficient in model 2 without innovation. However, the indirect effect of other HPWS practices on gross profit per employee, mediated by innovation, is \$701 and it is not significant (Sobel test z-value = 1.44, p=0.15, two-tail test).

These relationships between training and innovation (Acemoglu 1997; Bartel and Lichtenberg 1987; Beugelsdijk 2008; Walsworth and Verma 2007) and innovation and gross profit per employee (Acemoglu and Cao 2010; Delery and Doty 1996: 822; Thornhill 2006) are consistent with the direction of findings in the literature. Thus, increasing the level of competencies (knowledge and skills) of employees within a workplace through training is associated with higher levels of innovation. Further, more efficient and effective processes or superlative products, which are the result of innovation or technology adoption, are associated with higher levels of organizational performance. In particular, the results above indicate that a one standard deviation increase in training in time 1 leads to a direct effect on time 3 organizational performance (i.e. gross profit per employee) of $8,517 and an indirect effect of $1,894, for a total effect equal to $10,411, which represents a substantial 23% of the average profit per employee ($45,729, from model 3, Table 5, evaluating all other variables at zero). This utility analysis indicates substantial gains can be generated through investments that enhance human capital and its subsequent causal effects on innovation and organizational performance.

The results for the relationship between other HPWS practices in time 1 and innovation in time 2 are consistent with the relationship in the literature between HPWS and innovation, where more practices have been found to be associated with higher levels of innovation (Therrien and Léonard 2003: 34). The use of particular practices (such as training, job autonomy, and performance-based pay) are associated with a greater likelihood of innovation (Beugelsdijk 2008: 835), and higher levels of HPWS index are associated with higher levels of innovation (product, process, and organizational) (Messersmith and Guthrie 2010: 250, 255). Further, the association between HPWS and performance is also well established (Guest, et al. 2003; Huselid 1995; MacDuffie 1995; Wood 1999b; Wright, et al. 2003; Youndt, et al. 1996). Utility analysis for the impact of other HPWS practices in time 1 on gross profit per employee in time 3 indicates a total effect of $10,181 (i.e. a direct effect of $9,480 plus indirect effect of $701). This total effect represents 22% of the average profit per employee, which is similar in magnitude to the effect of training on gross profit per employee. However, the indirect effect of other HPWS practices (through innovation) on organizational performance is not significant.

To summarize the results related to Figure 3 and Table 5, innovation in time 2 is a substantial significant mediator of the relationship between training in time 1 and organizational performance in time 3, whereas the mediation relationship for other HPWS practices, innovation, and organizational performance is not significant. Nonetheless, the other HPWS practices index still had a direct effect on organizational performance. For this basic model, these results indicate that 18.2% (= $1,894/$10,411, indirect effect over the total effect) of the training and organizational performance relationship is due to the transmission effect of higher aggregate employee competencies in time 1, leading to higher innovation in time 2, and subsequent organizational performance in time 3.

Table 6 presents the OLS regression results for innovation in time 2 and time 3 organizational performance (i.e. gross profit per employee) dependent variables with strategic activity included as a moderator (see Appendix 2 Table A2.2 for a presentation of the model with all the control variables). These models test the basic moderation-mediation model and the hypotheses presented in Figure 4.

Edwards and Lambert (2007: 2) identify three current methods used for combining moderation and mediation: (1) the piecemeal approach, where the mediation and moderation analysis are run separately, but the findings are interpreted together; (2) the subgroup approach, where the moderation is explored by splitting the data on the moderator, and mediation is explored within each sub-sample; and (3) the moderated causal steps approach, adapted from Baron and Kenny (1986), where moderation is tested before and after controlling for the mediator. The moderated causal steps approach is used in my study. Edwards and Lambert (2007: 17) integrate both moderated regression and path analysis to develop a general framework for moderation and mediation. The framework overcomes important limitations to current approaches, by being able to: (1) test the moderation relationship, and (2) see how direct, indirect, and total effects vary across levels of the moderator variable (Edwards and Lambert 2007: 17-19).

Hypotheses 3 and 4 identified in Figure 4 and tested in Table 6 consider two main relationships. The first relationship considered is the positive relationship between (a) training in time 1 and innovation in time 2, and (b) other HPWS practices in time 1 and innovation in time 2, and the alignment with strategic activities in time 1. The second relationship considered is the positive relationship between innovation in time 2 and organizational performance (i.e. gross profit per employee) in time 3, and the alignment of this relationship with strategic activities in time 2. The results indicate no support for the moderation effect of strategic activities on either (a) training or (b) other HPWS practices in time 1, or on innovation in time 2 (Table 6, model 4, step 1); thus, Hypotheses 3a and 3b are not supported. Nonetheless, the training and strategy variables in time 1 do have substantial significant effects on innovation in time 2 ($p<0.01$). With the addition of strategy, the training effect on innovation is only slightly reduced, while the effect of strategic activities on innovation is substantial. For every one standard deviation increase in strategic activities in time 1 (i.e. a move from an average strategic orientation to a "pure" product leadership orientation), innovation in time 2 is increased by 0.121 standard deviations. Finally, the addition of the strategic activities variable incrementally improves the R-squared to 0.08 in the innovation regression (and to 0.028 in the gross profit per employee regression).

Looking at step 2 and model 4, with gross profit per employee as the dependent variable (in Table 6), the key variables (innovation in time 2, other HPWS practices in time 1, and training in time 1) all have a positive significant effect on gross profit per employee in time 3. With regard to Hypothesis 4, there is no support--the innovation and strategic activities interaction in time 2 has a negative $4,989 effect on gross profit per employee in time 3 and is significant at the 10% level ($p<0.10$, two tailed test). This result appears to imply, holding all else constant, that organizations that are more focused on product leadership are trading gross profit per employee gains for more proximal innovation gains. In other words, a one standard deviation increase in strategic activities moves organizations toward a “pure” product leadership strategic orientation, and this likely implies short-term profit gains are being forgone to focus on innovation gains and potential longer-term profit growth.

Table 6: Regression Results for Innovation and Organizational Performance with Strategy Interactions, Testing the Moderation Structural Model and the Hypotheses Presented in Figure 4

Dependent variable innovation index (standardized) (T2)

Step 1	**Model 4** [c]	
Variables	**b**	**s.e.**
Constant	0.376	0.313
Other HPWS practices index (T1) [a]	0.069	0.041
Training index (T1)	0.189***	0.046
Strategic activities (T1)	0.121***	0.044
Other HPWS x Strategy (T1)	0.017	0.047
Training x Strategy (T1)	-0.006	0.048
Control variables (T1) [d]	Yes	
R-squared	0.080***	
N	3154	

Dependent variable gross profit per employee (dollars) (T3)

Step 2	**Model 4** [c]	
Variables	**b**	**s.e.**
Constant	50572*	30077
Innovation index (T2) [b]	10311***	4876
Other HPWS practices index (T1)	9296**	3530
Training index (T1)	8287*	4391
Strategic activities (T2)	-461	3203
Innovation x Strategy (T2)	-4989*	3595
Other HPWS x Strategy (T1)	-7344*	4362
Training x Strategy (T1)	2014	5962
Control variables (T1) [d]	Yes	
R-squared	0.028***	
N	3154	

[a] All independent variables in the step 1 regression are from 2004 (time 1 (T1)).

[b] All independent variables in the step 2 regression are from year 2005 (time 2 (T2)) except for the other HPWS practices index, training index and their interaction terms with strategy are from 2004 (time 1 (T1)), and the dependent variable gross profit per employee is from 2006 (time 3 (T3)).

[c] Ordinary least squares with robust bootstrap standard errors.

[d] Yes indicates that the control variables are included in the estimation of the model. Large workplaces are the reference category for the workplace size dummy variables and capital intensive tertiary manufacturing in the reference category for the industry dummy variables.

*p<0.10, **p<0.05, ***p<0.01, two-tailed tests

Further, with respect to the moderation results, the Table 6 results indicate that the alignment and fit of other HPWS practices and innovation with strategy in time 2 have a negative effect on gross profit per employee in time 3 as organizations move toward a product leadership focus (i.e. one standard deviation increase in strategic activities). However, as organizations move toward an operational excellence focus (i.e. a one standard deviation decrease in strategic activities) there is a positive effect on gross profit per employee. These findings are generally consistent with direct effects found in the literature (i.e. positive relationships between: HPWS and performance; innovation and performance; innovation strategy and performance; and prospector/ differentiation strategies and performance) (Delery and Doty 1996: 822; Guest, et al. 2003: 307; Messersmith and Guthrie 2010: 254-255; O'Regan, et al. 2006: 37; Terziovski 2010: 896). However, it is important to identify that the nuanced measurement of strategic activities allows for the identification of variation in the effect of strategy across a continuum (PL to OE) on innovation and other HPWS practices, which is an important contribution of this current research.

The moderation effect of strategic activities on other HPWS practices, training, and innovation have not been explored widely. For the results that do exist, the moderation relationships tend not to be significant when strategies have a product leadership focus (Huselid 1995: 664-665), and tend not to be positive and significant when strategies are framed toward an operational excellence orientation (Youndt, et al. 1996: 854-856). The finding of significant strategy moderation indicates organizations have made strategic choices and implemented supporting HPWS practices, thereby creating an "external fit" (i.e. moderating) effect of strategy on the both the HPWS-performance and innovation-performance relationships.

It is also interesting to note that the indirect effect of training in time 1 on gross profit per employee in time 3, mediated by innovation in time 2, is significant (p=0.03, one-tailed test (Gujarati 1988: 107-111)). A one-tailed test is used based on the prior empirical findings in the literature, which suggest a positive indirect relationship between training and innovation and organizational performance (see literature review above and Table 5), and past practice in the literature for evaluating relationships (Huselid 1995: 658). The indirect effect is $1,949 (=.189*$10,311), which is 19% of the total effect ($10,236=$1,949 + $8,287, indirect effect plus direct effect), see Table 6.

Similar to the utility analysis generated from the model 3 (Table 5) results above, the utility analysis using results from Table 6 indicates that a one standard deviation increase in training leads to a direct effect on gross profit per employee of $8,287, and an indirect effect of $1,949 (notice the direct effect has declined and the indirect effect has increased incrementally from model 3 to model 4), for a total effect equal to $10,236. The total effect represents a substantial 20% of the average profit per employee ($50,572, from model 4, Table 6, evaluating all other variables at zero). As stated above, this utility analysis indicates substantial gains can be generated from investments in enhancing human capital in time 1, which leads to subsequent effects on innovation in time 2 and organizational performance in time 3.

In summary, the above analysis indicates that innovation is a substantial part of the transmission mechanism between the training and organizational performance relationship, and that the effect of innovation on organizational performance can be enhanced by aligning innovation with strategic activities.

Table 7 presents the OLS regression results for the step 1 models with the dependent variables: innovation in time 2, training in time 2, other HPWS practices in time 2, and gross profit per employee in time 2. In these models, strategic activity is included as a moderator. Further, the step 2 regression, with the dependent variable gross profit per employee in time 3, is included in Table 7. This regression has strategic activity included as a moderator in addition to interactions between the key time 2 variables of interest including innovation, other HPWS practices, and training (see Appendix 2 Table A2.3 for a presentation of the model with all the control variables). These models test the basic moderation-mediation model and the hypotheses presented in Figure 5. The regressions in Table 7 all have substantially higher R-square values when compared to Tables 5 and 6, with moderate to high proportions of variance being explained by the independent variables included in the regressions.

This final set of regressions (Table 7, model 5) look at a more complex and inter-related set of relationships. This framework contributes to the literature by further extending the above core theoretical model. In particular, time 1 factors and their relationships with time 2 innovation, training, and other HPWS practices are included in step 1 regressions and as time 2 factors determining time 3 gross profit per employee. This framework "controls" for reverse-causation by acknowledging the temporal precedence of innovation, training, other HPWS practices, and gross profit per employee.

With regard to Hypotheses 5a, b, c, d, there is support for Hypotheses 5a and 5c that training and innovation in time 1 are positively related to innovation in time 2. Not surprisingly, the previous period's innovation coefficient is substantial and positively related to innovation in time 2. Given the magnitude of the effects, the training effect is somewhat substantial, representing 18.8% (= .076/0.405) of the time 2 innovation effect. There is no support for hypotheses 5b and 5d (that other HPWS practices and gross profit per employee in time 1 are positively related to innovation in time 2). The direct effect of time 1 strategic activity on innovation in time 2 is still significant, although the magnitude of the effect is diminished compared to Table 5 and 6 results. A one standard deviation increase in time 1 strategy toward a product leadership focus improves innovation in time 2 by 0.095 standard deviations, which is about half of the model 3 and model 4 effect sizes. None of the hypothesized strategy interactions are significant--there is no support for Hypotheses 8a, 8b, and 8c, that the positive relationship between training, other HPWS practices, and innovation in time 1, and innovation in time 2 is contingent on alignment with strategic activities in time 1. An exception to these contingency hypotheses is that the gross profit per employee with strategy interaction is significant, although the coefficient is not substantial.

Table 7: Regression Results for the Full Structural Model with Training, Other HPWS Practices, Innovation and Gross Profit per Employee--Testing the Hypotheses Presented in Figure 5

Dependent variable innovation index (standardized) (T2)

Step 1	**Model 5** [c]	
Variables	**b**	**s.e.**
Constant	0.167	0.279
Innovation index (T1) [a]	0.405***	0.033
Other HPWS practices index (T1)	0.042	0.040
Training index (T1)	0.076**	0.038
Gross profit per employee (T1)	0.000	0.000
Strategic activities (T1)	0.095**	0.041
Innovation x Strategy (T1)	-0.024	0.033
Other HPWS x Strategy (T1)	-0.001	0.038
Training x Strategy (T1)	0.030	0.037
Gross profit per employee x Strategy (T1)	0.000***	0.000
Control variables (T1) [d]	Yes	
R-squared	0.225***	
N	3154	

Dependent variable training index (standardized) (T2)

Step 1	**Model 5** [c]	
Variables	**b**	**s.e.**
Constant	0.021	0.169
Innovation index (T1) [a]	0.061	0.039
Other HPWS practices index (T1)	0.101***	0.034
Training index (T1)	0.592***	0.042
Gross profit per employee (T1)	0.000	0.000
Strategic activities (T1)	0.069**	0.031
Innovation x Strategy (T1)	0.035	0.033
Other HPWS x Strategy (T1)	-0.055	0.035
Training x Strategy (T1)	0.054	0.033
Gross profit per employee x Strategy (T1)	0.000	0.000
Control variables (T1) [d]	Yes	
R-squared	0.537***	
N	3154	

Table 7 Continued

Dependent variable other HPWS practices index (standardized) (T2)

Step 1	**Model 5** [c]	
Variables	**b**	**s.e.**
Constant	0.254	0.225
Innovation index (T1) [a]	0.034	0.028
Other HPWS practices index (T1)	0.515***	0.042
Training index (T1)	0.097**	0.039
Gross profit per employee (T1)	0.000	0.000
Strategic activities (T1)	0.072*	0.037
Innovation x Strategy (T1)	0.041	0.030
Other HPWS x Strategy (T1)	-0.079*	0.042
Training x Strategy (T1)	0.039	0.027
Gross profit per employee x Strategy (T1)	0.000	0.000
Control variables (T1) [d]	Yes	
R-squared	0.462***	
N	3154	

Dependent variable gross profit per employee (dollars) (T2)

Step 1	**Model 5** [c]	
Variables	**b**	**s.e.**
Constant	-20213	13147
Innovation index (T1) [a]	-962	3216
Other HPWS practices index (T1)	2695	3198
Training index (T1)	-3209	2185
Gross profit per employee (T1)	1.028***	0.102
Strategic activities (T1)	9624**	4703
Innovation x Strategy (T1)	594	2297
Other HPWS x Strategy (T1)	-3947	2495
Training x Strategy (T1)	3952	2804
Gross profit per employee x Strategy (T1)	-0.235**	0.091
Control variables (T1) [d]	Yes	
R-squared	0.868***	
N	3154	

Table 7 Continued

Dependent variable gross profit per employee (dollars) (T3)

Step 2	**Model 5** [c]	
Variables	**b**	**s.e.**
Constant	30321***	8605
Innovation index (T2) [b]	4401***	1485
Other HPWS practices index (T2)	-985	1872
Training index (T2)	97	2103
Gross profit per employee (T2)	0.965***	0.028
Strategic activities (T2)	-2104	1891
Innovation x Strategy (T2)	1704	1404
Other HPWS x Strategy (T2)	1012	1569
Training x Strategy (T2)	-3583**	1524
Gross profit per employee x Strategy (T2)	0.042	0.030
Innovation x Training (T2)	-1177	1564
Innovation x other HPWS (T2)	-2125	1448
Training x other HPWS (T2)	171	1544
Innovation x Training x Strategy (T2)	3520**	1465
Innovation x other HPWS x Strategy (T2)	-890	1100
Training x other HPWS x Strategy (T2)	-1907	1385
Control variables (T2) [d]	Yes	
R-squared	0.925***	
N	3154	

[a] All independent variables in the step 1 regression are from 2004 (time 1 (T1)) and all of the dependent variables are from 2005 (time 2 (T2)).

[b] All independent variables in the step 2 regression are from year 2005 (time 2 (T2) and the dependent variable gross profit per employee is from 2006 (time 3 (T3)).

[c] Ordinary least squares with robust bootstrap standard errors.

[d] Yes indicates that the control variables are included in the estimation of the model. Large workplaces are the reference category for the workplace size dummy variables and capital intensive tertiary manufacturing in the reference category for the industry dummy variables.

*p<0.10, **p<0.05, ***p<0.01, two-tailed tests

For the training regression of model 5, other HPWS practices and training in time 1 are both significant and positively related to training in time 2, indicating support for Hypotheses 6a and 6b, but not for 6c or 6d (i.e. innovation and gross profit per employee in time 1 are not significantly related to training in time 2). The training effect is quite substantial (b = 0.592), and the other HPWS practices effect is also relatively substantial (b = 0.101)--representing 17% of the time 1 training effect (i.e. .171 = .101/.592). Strategic activities in time 1 are significant and positively related to training in time 2, implying that a movement toward product leadership strategic activities is related to higher training. None of the interaction effects are statistically significant. Thus, there is no support for Hypotheses 9a, 9b, and 9c, that the positive relationship between training, other HPWS practices, and innovation in time 1, and training in time 2 will be contingent on alignment with strategic activities in time 1.

With regard to Hypothesis 7, training and other HPWS practices in time 1 are significant and positively related to other HPWS practices in time 2, indicating support for Hypotheses 7a and 7b. However, Hypotheses 7c (innovation in time 1) and 7d (gross profit per employee in time 1) are not significantly related to other HPWS practices in time 2. It is interesting to note that, all else equal, the direct effect on other HPWS practices in time 2 from an increase in strategic activities toward a product leadership orientation (0.072) in time 1 is off-set by the negative interaction of other HPWS practices and strategic activities (-0.079) in time 1. Thus, there is support for Hypothesis 10b that the effect of other HPWS practices are moderated by strategic activities. However, there is no support for strategy moderating the effect of the training and innovation indexes (i.e. Hypotheses 10a and 10c) in time 1. Otherwise, the regressions with training and other HPWS dependent variables in time 2 for model 5 are very similar because both of the independent variables (other HPWS practices and training) in time 1 are important factors explaining time 2 outcomes (except that in each of the respective regressions the magnitude of the effects are reversed).

The following results examine the final step in the transmission process by looking at the effect of training and innovation in time 2 on organizational performance in time 3, while also considering whether strategy, training, and other HPWS practices in time 2 play a moderating role in this relationship. Innovation in time 2 has a significant and positive relationship with gross profit per employee in time 3--a one standard deviation increase in innovation increases gross profit per employee by $4,401. Neither the other HPWS practices nor training indexes in time 2 have a direct significant relationship with organizational performance in time 3. This result is similar to work by Guest, Michie, Conway, and Sheehan (2003: 305, 306) and Wright, Gardner, Moynihan, and Allen (2005: 429) that found the previously positive and significant effect from the high use of human resource management practices on performance became insignificant after controlling for previous performance in the analysis.

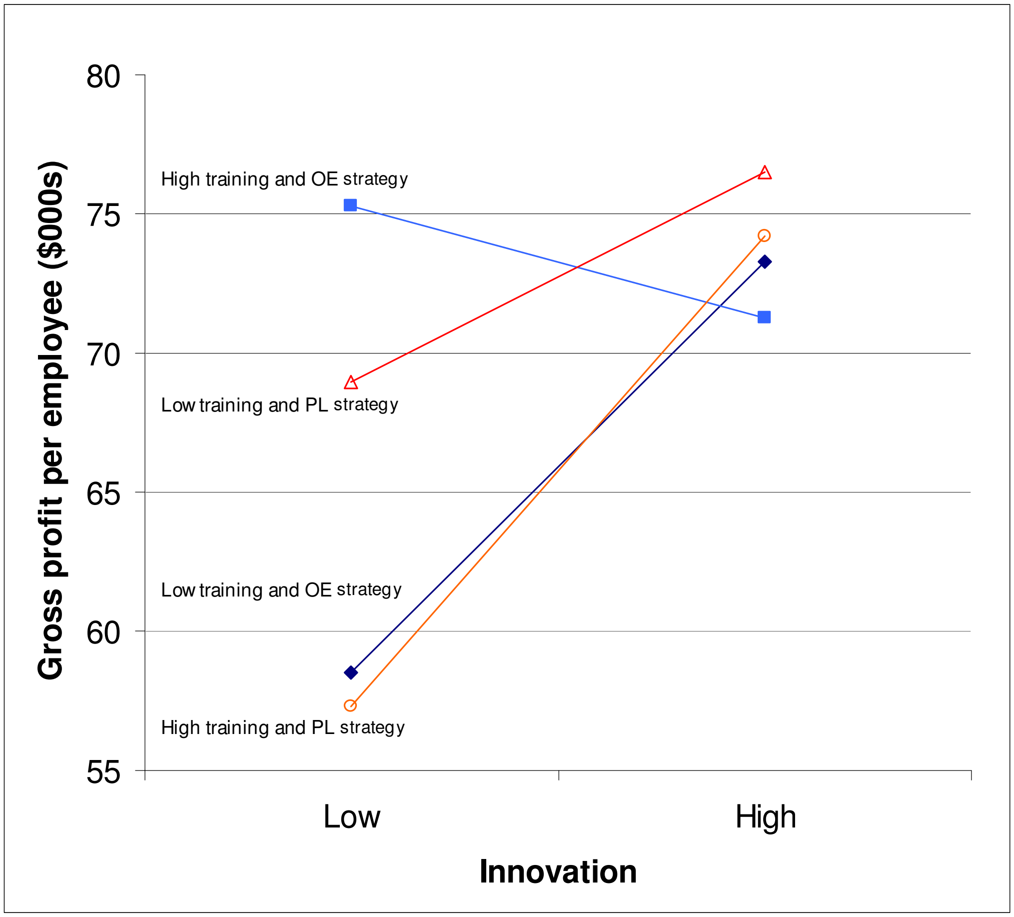
Further, the other HPWS practices and innovation interactions with strategy in time 2 have no significant effect on gross profit per employee in time 3. The training and strategy interaction in time 2 is significant and negative, implying that a move toward operational excellence (i.e. a one standard deviation decrease in strategy) increases organizational performance in time 3 by $3,583. This observed increase is contrasted with a decrease of $3,583 related to a move in the strategic orientation toward product leadership. The significant relationship indicates support for Hypothesis 11, namely, that the positive relationship between training in time 2 and organizational performance in time 3 will be contingent on alignment with strategic activities in time 2. However, the relationship is not in the direction of alignment between training and product leadership, but shows an alignment with operational excellence. These results are qualitatively similar to those found by Youndt et al. (1996: 853-854) that the direct main effects of human resource management systems appear not to be significant in the presence of the contingency relationships of human resource management systems and strategy.

The innovation interactions with training and other HPWS practices in time 2 are not significant. Thus, there is no support for Hypothesis 12, that the positive relationship between innovation in time 2 and organizational performance (i.e. gross profit per employee) in time 3 will be moderated by training in time 2. This result is similar to the limited findings in the literature, which note that the innovation and training interaction is not significant (Delery and Doty 1996: 822). There is no support for Hypothesis 13, that the positive relationship between innovation in time 2 and organizational performance in time 3 will be moderated by other HPWS in time 2. Further, there is no support for Hypothesis 14, that the positive relationship between training in time 2 and organizational performance in time 3 will be moderated by other HPWS practices in time 2. These results are in contrast to Delery and Doty's finding of human resource practices items (i.e. results-oriented appraisals and internal career opportunities) moderated by innovation having a positive and significant effect on performance (Delery and Doty 1996: 822).

One reason for the weakness in these hypothesized bivariate-moderation relationships may be, in part, due to the alignment between innovation, training, and strategy in time 2 being one of the more salient interaction relationships in the model, with a significant and positive relationship with gross profit per employee in time 3. The practical importance of all the interactions between innovation, training, and strategy (and their contribution to differing levels of gross profit per employee outcomes) are evaluated in Figure 7, which shows levels of gross profit per employee for low and high innovation, training and strategic activities outcomes. The low and high outcomes are equivalent to a minus one and plus one standard deviation movement in each of the indices. The predictions regarding gross profit per employee assume a base case of large workplaces in the capital intensive tertiary manufacturing industry group. Further, all other control variables are evaluated at zero, with the exception of workplace age (which is evaluated at its average) and the other HPWS practices (which is evaluated at its average (zero)). For the strategic activities variable a minus one standard deviation movement is equivalent to a pure operational excellence (OE) strategy, and a plus one standard deviation movement is equivalent to a pure product leadership (PL) strategy.

Reviewing the findings in Figure 7, low innovation and high training workplaces with a PL strategy have the lowest organizational performance levels (i.e. gross profit per employee = $57,303), with the second lowest being low innovation and low training with an OE strategy (i.e. $58,505). These two outcomes are substantially below the remaining organizational performance outcomes. Low training workplaces with a product leadership strategy that are low innovators have the third lowest organizational performance ($68,962). All of the high innovation outcomes cluster into a "tight" organizational performance range between $71,262 to $76,485 gross profit per employee (i.e. from bottom to top, $71,262, $73,294, $74,200, and $76,485)--with the low training and product leadership workplaces being at the top of the high innovation range. In contrast to the low innovation and low training workplaces with OE strategy, the OE workplaces with low innovation and high training have the second highest predicted organizational performance. This implies that high training is in alignment with OE strategy. Overall, these relationships illustrate the importance of training across the strategy continuum, but also the critical role of alignment of strategic activities with innovation. Of the high innovation workplaces the top performers are those that have a product leadership strategic activity orientation.

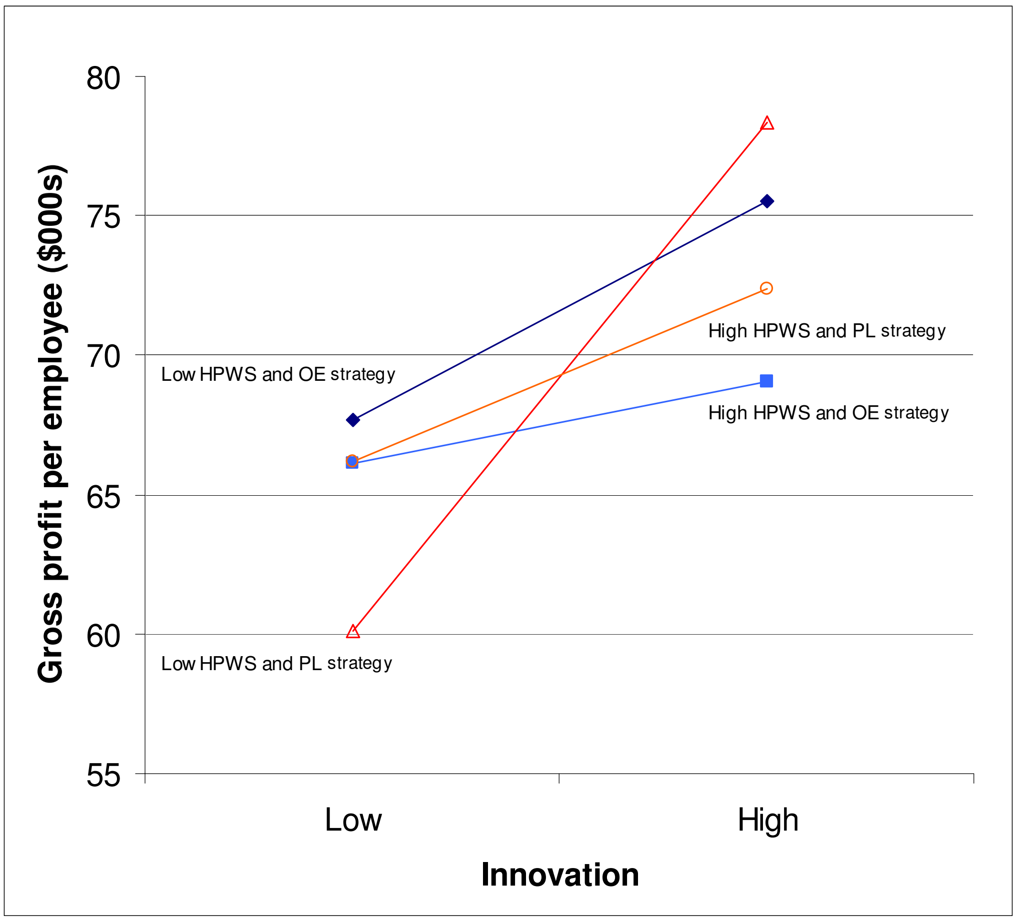
Figure 7: Organizational Performance Outcomes for Innovation, Training, and Strategy Interactions



Notes: The predications are generated using the gross profit per employee regression output from Table 7, model 5, and step 2. The low and high contexts are equivalent to a -1 and +1 standard deviation movement in the respective index variable. Further, the predictions for gross profit per employee assume a base case of large workplaces in the capital intensive tertiary manufacturing industry group. All other control variables are evaluated at zero except workplace age, which is evaluated at its average, and the other HPWS practices, which is evaluated at its average (=0). A -1 standard deviation movement is equivalent to a pure operational excellence strategy (OE) and +1 standard deviation movement is equivalent to a pure product leadership strategy.

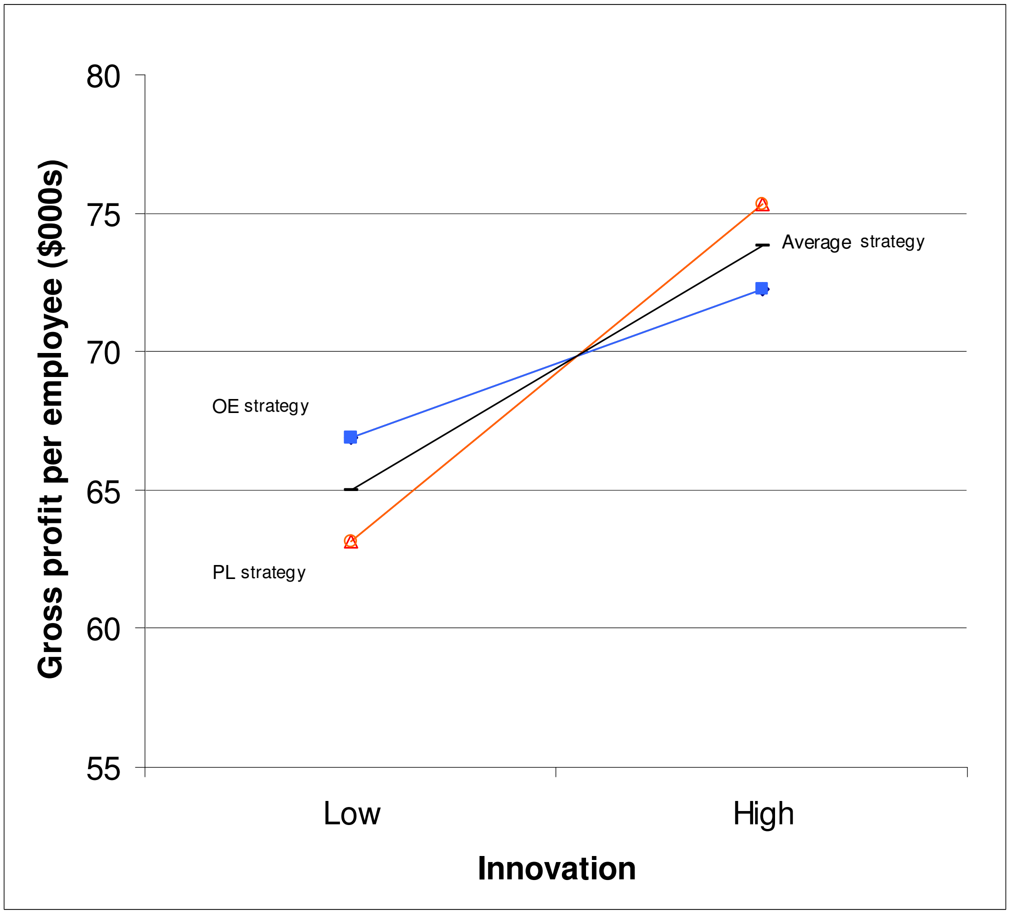
Continuing with the strategic contingency approach and moving beyond just the direct relationships between innovation, strategy, and organizational performance with other HPWS practices as the focus, Figure 8 looks at the interactions between the noted variables. The results indicate substantial differences across the various interactions with low other HPWS practices and PL strategy showing the greatest difference between the low and high innovation outcomes (i.e. an increase from $60,091 to 78,330)--a move from the lowest performance to the highest predicted gross profit per employee performance. The remaining low innovation outcomes cluster around $66,122 to $67,645 gross profit per employee level, resulting in all of the low innovation outcomes having a lower organizational performance than the high innovation outcomes. Clearly, regardless of other HPWS practices or strategies, workplaces benefit from higher innovation. In particular, workplaces with low other HPWS practices and PL strategy ($78,330) benefit the most, followed by workplaces with low other HPWS practices and OE strategy ($75,510). High other HPWS practices workplaces appear to be in the "middle" of the range of outcomes (with workplaces that have PL strategy aligned with high innovation performing better than OE strategy and high innovation workplaces). It is interesting to note that high innovation and low other HPWS practices and OE strategy workplaces have the second highest predicted gross profit per employee, which is in contrast to the average effect where PL strategy and high innovation align to produce higher organizational performance (see Figure 9). Clearly, evaluating organizational performance with the other HPWS practices and training index at their averages generally reduces the range of outcomes while highlighting the important role of the alignment of strategic activities and innovation in enhancing organizational performance outcomes. Overall, these moderation results indicate that alignment between a PL strategy and high innovation consistently enhances organizational performance beyond other alternatives.

Figure 8: Organizational Performance Outcomes for Innovation, Other HPWS Practices, and Strategy Interactions



Notes: In the figure, HPWS is equivalent to other HPWS practices. The low and high contexts are equivalent to a -1 and +1 standard deviation movement in the respective index variable. Further, the predictions for gross profit per employee assume a base case of large workplaces in the capital intensive tertiary manufacturing industry group. All other control variables are evaluated at zero except workplace age, which is evaluated at its average, and the training index, which is evaluated at its average (=0). A -1 standard deviation movement is equivalent to a pure operational excellence strategy (OE) and +1 standard deviation movement is equivalent to a pure product leadership strategy.

Figure 9: Organizational Performance Outcomes for Innovation and Strategy Interactions



Notes: The low and high contexts are equivalent to a -1 and +1 standard deviation movement in the respective index variable. Further, the predictions for gross profit per employee assume a base case of large workplaces in the capital intensive tertiary manufacturing industry group. All other control variables are evaluated at zero except workplace age, which is evaluated at its average, and the other HPWS practices and training indexes, which are evaluated at their average (=0). A -1 standard deviation movement is equivalent to a pure operational excellence strategy (OE) and +1 standard deviation movement is equivalent to a pure product leadership strategy.

Finally, a brief utility analysis is provided for Table 7 for comparability to Table 5 and Table 6's utility analysis discussions above. The utility analysis indicates that a one standard deviation increase in training leads to a direct effect on organizational performance of $97 and an indirect effect of $336 (significant at p=0.048, one-tail test). These direct and indirect effects are smaller in this full model specification than the models presented in Tables 5 and 6 (assuming all other variables are held constant at their average). The total effect is equal to $433, which represents 1% of the average profit per employee ($74,689, from model 5, Table 7, evaluating all other variables at zero and gross profit per employee (T2) at its average $45,995). This utility analysis indicates that gains can be generated from investments in training in time 1 and the subsequent effects on innovation in time 2 and organizational performance in time 3, as stated above.

In summary, these results suggest that the alignment of strategic activities with training, other HPWS practices, and innovation can enhance organizational performance. These models emphasize the causal link between training and innovation, and innovation and organizational performance, while controlling for reverse-causation by acknowledging the temporal precedence of other HPWS practices, training, innovation, and organizational performance. Further, the complementarity between training, other HPWS practices, and innovation are identified through the contingency/moderation interactions. Thus, training aligned with strategic activities and innovation objectives is related to enhanced gains by contributing to a more successful implementation.

Micro-level Study Regression Results: Understanding Training Decisions

Table 8 presents the probit regression results for the relationships identified in Figure 6 (see also Appendix 2, Table A2.4, for a presentation of the models with all of the control variables). In Table 8, three models are used to investigate the workplace and employee characteristics that are related to training decisions (including the dependent variables: offer to train from employer; employee decision (i.e. decline or accept training); and job-related training received (models 6, 7, and 8, respectively)). The regressions have Pseudo R-squared estimates ranging from 0.08 to 0.11. The Pseudo R-square measure is the percentage change (improvement) in likelihoods. The Pseudo R-square (= (1- (LLm/LLo))) is a measure of explanatory improvement of the full model (LLm) over the null model (LLo). The Pseudo R-square is close to zero if the explanatory variables' in the full model have coefficients that are close to zero, which implies the null model of just a constant fits the relationship with the dependent variables just as well as the full model.

Model 6 in Table 8, investigates the employers' decision to offer training to employees. As identified in Figure 6, the employer considers both workplace and employee characteristics in the decision-making process. Focusing first on the workplace-level variables of interest, the results indicate that neither a pure product leadership nor pure operational excellence workplace strategic activity (i.e. +1 or -1 standard deviation, respectively) affect the individual employee's probability of being offered training. Thus, there is no support for Hypothesis 15, which states that workplace-level strategic activities are directly positively related to employees being offered employer-provided training. Further, the coefficient for workplace innovation is not significantly different from zero, suggesting that there is no support for Hypothesis 16 (that workplace innovation will be positively related to employees being offered employer-provided training). This indicates that higher levels of workplace innovation do not generally translate directly into a higher likelihood of individual employees being offered training.

In contrast to these null findings for workplace strategy and innovation, the gross profit per employee is positively related to a higher likelihood of an employee being offered training ($b=0.018$, $p<0.10$), which amounts to support for Hypothesis 17. This result is in contrast to Cooke et al.'s (2011: 283) finding that workplace profitability (revenue-expenses) is not significantly related to any of the employer and employee training decision and training participation outcomes. One explanation for this discrepancy is that my use of a relative (i.e. per employee) workplace-level performance outcome is likely helping to distinguish between organizations that have more or less resources per employee to devote to training, as opposed to an absolute performance outcome that would be affected by organizational size. Similar to Becker (1994) and Wright et al.'s (2005: 419) arguments that more organizational resources can lead to more investments in training, the association between organizational performance and employer training offers suggests that organizations with more resources available per employee are able to make more offers to employees with the goal of making investments in the employees' training and development. The flip-side of this is that less profitable organizations (assessed on a per employee basis) are more likely to make fewer offers of employer-sponsored job-related training to employees.

Although it was not hypothesized, there is a significant positive relationship between workplace-level training, other HPWS practices, and the probability of an employer making a training offer to an employee. Not surprisingly, organizations that have a higher level of workplace-level training tend to offer training to their employees with a greater likelihood. Further, the greater the implementation of other HPWS practices within a workplace the more likely an employee is to receive an offer to train--this indicates an alignment of training with other HPWS practices.

The employee-level independent variables of interest in model 6 are all substantial and significantly related to the employer offer to train. There is support for Hypothesis 18 that employee participation in HPWS practices is positively related to being offered employer-provided training. The association between these two variables is an indication that the employer has identified the employee's job as strategic (Becker and Huselid 2006). This is reflected in the employer offering training to increase knowledge and skill, in addition to the employee already participating in skill, empowerment, and motivation enhancing practices.

Hypothesis 19, which states that employee use of technology is positively related to being offered employer-provided training, is also supported. This relationship is not surprising given the support for the relationship between technology use and training in the literature (Magnani 2011: 44; Turcotte, et al. 2003: 74; Wannell and Ali 2002: 21, 65). However, it is important to note that my study is the first to include both workplace-level innovation and employee-level technology use. The substantial association between employee technology use and the employer's offer to train, combined with the non-significance of the workplace innovation index, indicates that employer's in both lower and higher innovation workplaces are likely targeting their training and development investments at employees who regularly use technology, rather than more broadly offering training to employees. This may be an indication that employers are targeting resources at employees in strategic jobs--that is, employees who use technology are more likely to be in strategic jobs.

The positive and significant relationship between employees experiencing technological change and employees being offered training indicates support for Hypothesis 20. This indicates that, not only does using technology on a day-to-day basis affect an employer's offer to train, but also that technology "shocks" (or changes) substantially increase the likelihood of an employer offering training. These associations may imply that changes in technology and the implementation of new technology can lead to an employee's skills becoming obsolete, which, by extension, requires employers to address capability gaps by investing in training in order to maintain organizational efficiency and effectiveness.

Table 8: Probit Regression Results for the Micro-level Model, Testing the Hypotheses Presented in Figure 6

Dependent variables	Offer to train from employer (1=yes/0=no)		Employee decision (1=decline/ 0=accept)		Job-related training (1=yes/0=no)	
	Model 6 [d]		Model 7 [d]		Model 8 [d]	
Variables [a]	**b**	**s.e.**	**b**	**s.e.**	**b**	**s.e.**
Constant	-0.911**	0.350	-2.215***	0.347	-1.103***	0.355
Strategic activities [b]	0.020	0.023	0.024	0.029	0.010	0.022
Innovation index [b]	-0.006	0.023	-0.018	0.028	-0.005	0.023
Gross profit per employee [b]	0.018*	0.010	0.020**	0.009	0.010	0.009
Other HPWS practices index [b]	0.046***	0.017	0.038	0.027	0.035**	0.016
Training index [b]	0.079***	0.022	0.023	0.026	0.080***	0.021
Employee other HPWS practices index	0.267***	0.029	0.083***	0.027	0.272***	0.029
Technology use	0.297***	0.051	-0.016	0.076	0.356***	0.053
Technology change	0.173***	0.053	0.095	0.068	0.155**	0.068
Percentage change more hours preferred			0.000	0.001	0.000	0.001
Percentage change less hours preferred			0.007**	0.003	-0.001	0.002
Career related training (non-sponsored)			0.135	0.088	0.064	0.096
Not directly job-related training (sponsored)			-0.058	0.106	0.193	0.126
Perception of training need			-0.327***	0.056	-0.044	0.052
Employee decision (decline training)			--	--	0.214***	0.066
Job-related training			0.184***	0.054	--	--
Control variables [c]	Yes		Yes		Yes	
Pseudo R-squared	0.111***		0.082***		0.110***	
N	24977		24977		24977	

[a] The following variables are the reference categories for the sets of binary variables included in the models manufacturing (industry), workplace size large (>500) (workplace size), high school graduate (education levels), production workers (occupation groups), regular full-time (employment type), and Canadian-born (immigration status).

[b] These are workplace-level variables. The gross profit per employee variable is in dollars. The strategic activity, innovation, other HPWS practices, and training indexes are all workplace-level composite scales (z-score standardized values). The strategic activity variable is an angle within the PL and OE space.

[c] Yes indicates that the control variables are included in the estimation of the model.

[d] Probit regressions with robust bootstrap standard errors.

*p<0.10, **p<0.05, ***p<0.01, two-tailed tests

Shifting focus to model 7 in Table 8, employees in workplaces with higher gross profit per employee have a significantly higher likelihood of declining an employer's offer to train. As stated above, this result is in contrast to Cooke et al.'s (2011: 283) finding that workplace performance is not significantly related to any of the declining training outcomes. It may be that employees working in organizations that are resource rich have more options in terms of the distribution of organizational profitability, and are in a better position to negotiate the distribution of profits (this may be a possible explanation for increases in organizational performance being associated with a higher likelihood of employees declining an employer's training offer). Another possibility is that resource-rich organizations may be more likely to offer broad-based training programs, as opposed to programs that are more targeted (i.e. focused on strategic jobs). This may result in a segment of the workforce not needing the offered training or perceiving the training as not relevant.

With regard to Hypothesis 21, there is no support for the proposed relationship that employee participation in HPWS practices is positively associated to the employee’s decision to accept employer-provided training. Model 7 indicates the opposite, that higher employee participation in other HPWS practices is associated with a greater likelihood of declining training. This finding may be related to the link between HPWS and psychological empowerment (Liao, et al. 2009). It appears that the empowerment aspects of HPWS may be having a greater role on the decision to declining training than the positive links between HPWS and human capital (Liao, et al. 2009); the possible positive links from HPWS, commitment, and willingness to train (Macky and Boxall

2007), or the positive links between organizational commitment and motivation to learn (Colquitt, et al. 2000: 683, 687).

Neither the employee use of technology nor the experience of technological change variables by the employee are positively and significantly related to an employee's decision to decline or accept employer-provided training. This result indicates that there is no support for Hypotheses 22 and 23. Further, these findings imply that the use of technology (new or otherwise) is not a distinguishing factor in an employee's decision to train--regardless of the potential alignment with an employer's need to maintain high skill levels and an employee's desire to remain capable of performing their job. However, the positive correlation found in Table 4 (above) between technology use and perception of training need ($r = 0.20$, $p<0.01$) indicates that training need is in part (but not solely) a technology driven outcome.

Turning the focus to only factors that are likely to be known by the employee, there is support for Hypothesis 24, that an employees' preference for less hours of work is positively related to an employee's decision to decline employer-provided training. Thus, if employees have a desire to reduce the number of hours that they usually work in a week then the probability of the employee declining an offer to train is likely to be higher. This finding suggests that employee's have time-use preferences toward fewer work activities and that if employees already have a feeling of being "too busy" then training is likely to be seen as contributing to an already existing time-use pressure (Sussman 2002: 8). The variable, percentage change more hours preferred, is not statistically significant, indicating that being too busy may be more of a factor than not being busy enough in employee decisions regarding time-use (i.e. the presence of a time constraint may make the factor more salient).

With regard to Hypotheses 25a and 25b, neither is supported in model 7. There is no support for employee participation in (a) career related training (non-sponsored) and (b) not directly job-related training (sponsored) being negatively related to an employee's decision to accept employer-provided training.

Finally, there is support for Hypothesis 26, which states that an employee's perceived need for training is significantly and positively related to an employee's decision to accept employer-provided training. When employees find the demands of the job create a situation where they feel they have too little training, and by extension an inadequate skill level to comfortably address the demands of their job and function effectively, then employees attribute a high value to the receipt of training (Colquitt, et al. 2000: 689). The coefficient is quite substantive ($b=-0.327$, $p<0.01$); this high value implies a greater likelihood of a higher net benefit to the employee and a greater likelihood of accepting the employer's offer to train. Further, the receipt of job-related training is a substantive and positive contributor to the likelihood of an employee declining an offer to train from an employer ($b=0.184$, $p<0.01$). This suggests that employees who have the opportunity to train are likely to be given the opportunity more than once, and that these opportunities to participate in training are not always accepted by the employee. Cooke et al. (2011: 282) describe these employees as choosers; choosers tend to be more highly educated and hold positions characterized as managers/professionals.

Although no hypotheses were presented for model 8, the following is a brief discussion of the key findings. Many of the key factors that are associated with an employer offering training (model 6) and an employee's decision to decline/accept training (model 7) continue to hold in model 8. Workplace-level factors, other HPWS practices and training are positively and significantly associated with the receipt of job-related training. However, it is the individual employee-level variables, employee other HPWS practices index, technology use, and technology change that are some of the main substantive contributors to the likelihood of receiving employer-sponsored job-related training. Further, the employee decision (decline training) is positively associated with the receipt of training ($b=0.214$, $p<0.01$). This finding re-enforces the finding that "choosers" of training have opportunity and choice, and that for these employees participating in training and declining training offers are inter-related.

With regard to the control variables in models 6, 7, and 8, the results are similar to those seen previously in the literature (Chowhan 2005; Cooke, et al. 2011; Cooke, et al. 2009; Dostie and Montmarquette 2007; Green 1993; Lynch and Black 1998; Magnani 2011; Zeytinoglu and Cooke 2009; Zeytinoglu, et al. 2008) (see Appendix 2, Table A2.4). With regard to making training decisions, employee autonomy is not significantly related to an employer's offer to train, an employee’s decision, or the job-related training received. The coefficients for the variables, employees usually make the training decision and the employer usually makes the training decision, are neither substantial nor significant. There are significant differences across industry groups in the likelihood of employer offers, employee acceptance, and the occurrence of job-related training. In particular, employees in the education and health services industry group are more likely to receive employer offers and are also more likely to decline training. Workplace size and age generally are not significant; however, in model 7, employees in smaller workplaces are substantially and significantly less likely to decline a training offer relative to employees in large workplaces. Further, with regard to declining training, employees in higher turnover workplaces are less likely to decline training, and the magnitude of the coefficient is particularly substantive for employee driven turnover. Education level of the employee does not generally play a significant role in contributing to the outcomes. The employee occupation group variables are positively and significantly related to both employer offers and whether the employee receives job-related training. The results for employment types vary; temporary full-time are the least likely to be offered training, and regular part-time employees are the most likely to decline training relative to regular full-time employees. The higher the hourly wage the greater the likelihood of being offered training and of receiving training. It is interesting that a higher hourly wage is also positively associated with a higher likelihood of declining training. If wage is a proxy for skill and status, then it is not surprising that employees with higher skill levels and greater status within the workplace feel they have the power to decline training offers. Finally, collective agreement coverage is negatively related to both an employer offer to train and the receipt of training, but if an offer is received it is positively associated with accepting the training that has been offered.

Table 9: Summary of Hypotheses and the Results

	Hypothesis Statement	Hypothesis Number	Support (Yes/No)
1	The positive effect of training in time 1 on organizational performance in time 3 will be mediated by innovation in time 2.	1	Yes
2	The positive effect of other HPWS practices in time 1 on organizational performance in time 3 will be mediated by innovation in time 2.	2	No
3	The positive effect of training in time 1 on innovation in time 2 will be contingent on alignment with strategic activities in time 1.	3a	No
3	The positive effect of other HPWS practices in time 1 on innovation in time 2 will be contingent on alignment with strategic activities in time 1.	3b	No
4	The positive effect of innovation in time 2 on organizational performance in time 3 will be contingent on alignment with strategic activities in time 2.	4	No
5	a) Training, b) other HPWS practices, c) innovation, and d) organizational performance in time 1 will positively affect innovation in time 2.	5a 5b 5c 5d	Yes No Yes No
6	a) Training, b) other HPWS practices, c) innovation, and d) organizational performance in time 1 will positively affect training in time 2.	6a 6b 6c 6d	Yes Yes No No
7	a) Training, b) other HPWS practices, c) innovation, and d) organizational performance in time 1 will positively affect other HPWS practices in time 2.	7a 7b 7c 7d	Yes Yes No No
8	The positive effect of a) training, b) other HPWS practices, and c) innovation in time 1 on innovation in time 2 will be contingent on alignment with strategic activities in time 1.	8a 8b 8c	No No No
9	The positive effect of a) training, b) other HPWS practices, and c) innovation in time 1 on training in time 2 will be contingent on alignment with strategic activities in time 1.	9a 9b 9c	No No No

Table 9 Continued

10	The positive effect of a) training, b) other HPWS practices, and c) innovation in time 1 on other HPWS practices in time 2 will be contingent on alignment with strategic activities in time 1.	10a 10b 10c	No Yes No
11	The positive effect of training in time 2 on organizational performance in time 3 will be contingent on alignment with strategic activities in time 2.	11	Yes
12	The positive effect of innovation in time 2 on organizational performance in time 3 will be moderated by training in time 2.	12	No
13	The positive effect of innovation in time 2 on organizational performance in time 3 will be moderated by other HPWS practices in time 2.	13	No
14	The positive effect of training in time 2 on organizational performance in time 3 will be moderated by other HPWS practices in time 2.	14	No
15	Strategic activities that support workplace other HPWS practices will be positively related to employees being offered employer-provided training.	15	No
16	Workplace innovation will be positively related to employees being offered employer-provided training.	16	No
17	Organizational performance will be positively related to employees being offered employer-provided training.	17	Yes
18	Employee participation in other HPWS practices will be positively related to being offered employer-provided training.	18	Yes
19	Employee use of technology will be positively related to being offered employer-provided training.	19	Yes
20	Employees experiencing technological change in their jobs will be positively related to employees being offered employer-provided training.	20	Yes

Table 9 Continued

21	Employee participation in other HPWS practices will be positively related to the employee's decision to accept employer-provided training.	21	No
22	Employee use of technology will be positively related to an employee's decision to accept employer-provided training.	22	No
23	Experiencing technological change in the job will be positively related to an employee's decision to accept employer-provided training.	23	No
24	Employees' preference for more hours of work will be positively related to an employee's decision to accept employer-provided training.	24	Yes
25	Employee participation in a) Career related training (non-sponsored) and b) not directly job-related training (sponsored) will be negatively related to an employee's decision to accept employer-provided training.	25a 25b	No No
26	The employee's perceived need for training will be positively related to an employee's decision to accept employer-provided training.	26	Yes

Chapter 7

Discussion and Conclusion

Discussion

The world is becoming increasingly economically integrated; this fundamental change is leading to unprecedented technological spillovers and proliferation. These flows of physical and organizational capital are difficult to stem. As a result, competitor organizations are able to duplicate and mimic these traditional sources of competitive advantage. In this emerging economic environment, both the academic literature and the popular press have argued that an organization's human capital, enhanced through the use of HPWS practices, can be a source of enduring competitive advantage and improving organizational performance.

The relationship between HPWS practices and organizational performance has been well established in the academic literature across various contexts and contingencies. However, surprisingly little attention has been paid to exploring the pathways between the HPWS and organizational performance relationship, and to understanding the possible transmission mechanisms that mediate this relationship. Further, there is little macro-level theoretical and empirical work that attempts to unpack the "black box" factors that mediate the HPWS and organizational performance relationship. Combined with the "black box" problem, there has been little macro-level analysis that controls for various strategic contingencies.

My macro-level study makes several contributions. First, I identify the transmission process and identify the pathway from training to innovation to organizational performance. Second, this study has elements of both the universal (i.e. more is better) and configurational approaches. In other words, training practices are separated out from HPWS practices. Third, the HPWS practice of training and the dynamic causal pathways that lead to organizational performance within different strategic activity contexts are also investigated. This nuanced approach permits the variability across different contingencies of strategic activities to be better understood. Further, by exploring factors over time causal inferences are appropriate. All of these important contributions have not been explored in a common framework within the existing literature until my study. Further, the use of a unique and valuable longitudinal workplace-level dataset enables nationally representative results that can be generalized across most industries and workplace sizes. Utility analysis is presented to highlight the practical importance of the effect of workplace investments in training on innovation and performance.

The macro-level study results from the basic structural model indicate that innovation mediates the training and organizational performance causal relationship, and that training and other HPWS practices both have a direct causal effect on organizational performance. These results are evidence that the basic assumption of a direct relationship between HPWS practices and organizational performance in the traditional theoretical framework needs to be more fully examined and mediation influences explored. Thus, the contribution of my thesis to academic knowledge is that it identifies training, innovation, and performance as one of the pathways by which specific HPWS practices affect performance. Future research can continue to unpack these pathways to provide a better understanding of how HPWS practices lead to improved performance. Based on my research results, I argue that the focus in the literature should begin to shift toward explorations of effects mediating the HPWS practices and organizational performance relationship. This new focus will lead to an understanding of what human resource management practices to use when and why they should be used to achieve desired outcomes (such as performance, but (more broadly) involvement, commitment, and job satisfaction could be other outcomes of interest).

In my thesis this configurational approach is further investigated by exploring the contingency and moderating effects of strategic activities. Once strategic activities are added as a moderator to the analysis, the mediation effect of innovation in the training and organizational performance relationship becomes more substantial, and the strategic activities have a moderating effect on innovation and other HPWS practices. Not only do the results that I show in my thesis lend support to the direct relationship between training, other HPWS practices, innovation, and organizational performance found in the literature, these results also provide an extension of the transmission mechanism pathway results, and show support for the contention that strategy plays an important role in moderating these causal relationships.

The moderation results in the basic structure indicate that strategic activities at the workplace level provide context for understanding an organization's choices around training, innovation, and other HPWS practices. Given the strategic contingencies of the organization--and its choices around training and other HPWS practices, and innovation and organizational performance outcomes--the evidence suggests that organizations that focus on a product leadership strategy may need to trade-off short-term gross profit per employee improvements for gains in innovation, which have a substantial positive effect on organizational performance. Conversely, the alignment between operational excellence strategic activities and other HPWS practices suggests that organizations focusing on operational excellence get higher organizational performance gains from higher levels of other HPWS practices. This evidence highlights the importance of strategic activity alignment with the implementation of HPWS practices, and that some strategy and HPWS practices configurations are going to have better organizational performance outcomes than others.

The final macro-level full structural regression results indicate that the key causal relationships, between training, innovation, and organizational performance, continue to hold even after accounting for reverse-causality for all of the variables of interest. The transmission mechanism between training, innovation, and organizational performance appears to be a robust relationship over time. The robust relationship between training and innovation over time is similar to findings by Walsworth and Verma (2007: 236-237) who find positive and substantial causal relationships between training and innovation (i.e. for the full model specifications, the total effect of previous year's training had a positive effect on 2000 and 2002 product innovation and 2000 process innovation). Further, in my study, other HPWS practices are no longer a significant contributor to organizational performance. This is a similar finding to Guest et al.'s (2003: 306, 309) that more human resource management practices do not lead to higher profitability. My study's finding of non-significance observed in the other HPWS practices may be due to the "aggregate" nature of the measure. For example, some components of the other HPWS measure may have a positive relationship with organizational performance, while other component bundles may have a negative relationship resulting in a net "zero" relationship. Alternatively, my finding is also consistent with the argument that the higher labour cost associated with other HPWS practices offsets gains in organizational performance, diminishing the net positive effect for the organization (Cappelli and Neumark 2001: 766). Only outcome measures such as gross profit per employee (or productivity) adjust to both revenue and expenditure changes. The strength of these types of measures is that they allow for both effects to be accounted for in the estimation (i.e. performance gains and costs). Further, for example, because gross profit per employee is used as the dependent variable parameter estimates for the independent human resource management practices variables in the analyses can be interpreted in terms of net benefit to employees which is the relevant unit for comparison.

The non-significant finding regarding the interaction of the other HPWS practices with training indicates that, when considering these human resource management practices, configuration concerns regarding internal fit are less critical than external fit and "mediator" fit. In other words, the substantial moderation effect of strategy on training alone, and strategy on training and innovation interacted, indicates that ensuring the alignment of strategic activities with the variables, training and innovation, is critical to organizational performance. Further, if statistical significance is used as a guide, this finding rivals the importance of concluding the adoption of additional other HPWS practices leads to improved organizational performance.

With regard to the moderation effects of the key variables, the reduced variability in the organizational performance observed by workplaces that have adopted pure operational excellence suggests that this strategy is a reliable part of the pathway to more consistent organizational performance outcomes. In contrast, the range of predicted performance outcomes for pure product leadership strategic orientation is greater. In particular, when alignment is achieved between the pure product leadership strategic orientation and (high) innovation, then performance outcomes exceed the outcome under an operational excellence strategy. This evidence (when combined with the results from models with innovation as the dependent variable and training as a consistently positive significant independent variable) suggest a product leadership strategy and higher training leads to higher innovation, and, ultimately, higher organizational performance. The pure strategy outcomes outperform an average strategy choice (i.e. a mix of the product leadership and operational excellence, but without a strong commitment to either) when aligned with innovation outcomes. Thus, these results support a contingency approach to adopting human resource management practices.

In particular, investments in human capital development (such as training to enhance knowledge and skill) lead to higher levels of innovation, including new and improved product and process innovation and to the capacity of the organization to efficiently adopt new technologies into operational processes. The idea that sustainable competitive advantage can be derived from HPWS practices ultimately implies that there cannot be single universal best-practices (Wood 1999b: 377). Organizations need to select and tailor practices to suit their situation and environment. It is the selective implementation and tailoring of HPWS practices that creates differentiation in terms of human resources as an asset that drives sustainable competitive advantage. By identifying the link between training, innovation, and strategy, my study, highlights the importance of effective implementation of strategy and human resource management practices to organizational performance and competitive advantage, similar to Becker and Huselid (2006: 901).

In summary, these results indicate support for a human resource practices bundle perspective when looking at the relationship between human resource practices and organizational performance; my approach is a contrast to a universal system approach. The evidence presented suggests that a sub-bundle approach enables a more nuanced understanding of the transmission mechanism between human resource practices and organizational performance, and, in particular, the transmission mechanism between training, innovation, and organizational performance. Further, the results show evidential support for the contingency perspective while illustrating the important role of strategic alignment in the training, innovation, and organizational performance relationship.

With regard to my micro-level study, the purpose was to explore the factors that affect employer and employee decisions to train, and to better understand the factors that limit or expand training at the employee level (while controlling for workplace-level training, other HPWS practices, innovation, organizational performance, and strategic activities). By extrapolation, factors that limit (expand) training will also limit (expand) innovation at a micro-level and limit (expand) these variables and subsequent organizational performance at the macro-level. Thus, it is not only important to understand the role of training at the macro-level but also to understand the factors that are associated with training at the micro-level.

The over-arching findings of the micro-level study are that workplace-level factors (such as higher training and other HPWS practices indexes) are associated with higher likelihoods of employers offering training and employees receiving job-related training. Further, employee-level other HPWS, technology use, and technological change, all have a substantial positive and significant relationship with the employer's decision to offer training and the employee's receipt of job-related training. With regard to the employee's decision to decline or accept training the most substantial factor is the perception of training need; employees who perceived a higher need for training are less likely to decline training offered by the employer.

These results indicate that workplace adoption of pure strategic activity orientations or higher levels of workplace innovation do not translate into a direct relationship with individual employees being offered training, employee decisions to train, or employee receipt of training. These micro-level findings suggest workplace-level choices around strategy and innovation likely affect employees indirectly. The workplace-level effects (of training, innovation, and strategy) are likely transmitted through the employee's strategic value to the organization (i.e. the nature of the employee's competency within their job and their role in the production process), as discussed by Becker and Huselid (2006: 904). This supposition is hinted at elsewhere in the model. In particular, an indication of the strategic value of the employees is the substantial relationships observed between employee-level factors (namely, other HPWS practices, technology use, and technological change) and the training outcomes. Thus, it appears that if workplace strategy and innovation are playing a role it would have to be through indirect specific and targeted effects on individual employees as opposed to having a general direct effect on training.

The two main workplace-level factors that are related to employers offering training and employees receiving training are the training and other HPWS practices indexes. These relationships suggest an alignment between workplace-level policies and employee-level human resource management practices. However, these workplace-level effects for other HPWS practices are not as substantial as the employee-level factor (i.e. the employee's participation in other HPWS practices). In particular, it appears that employee-level variability across other HPWS practices is a key factor related to employee outcomes and that workplace-level aggregates may be too distal to have a substantial impact. The importance of the employee-level other HPWS practices also suggests that workplace-level policies have their role in contributing to the likelihood of training offers and receipt, but that not all employees get to participate in these practices. More specifically, employees who the employer has identified as being in strategic jobs are the most likely to receive offers and training, as discussed by Becker and Huselid (2006). My study's results suggest that employees who use technology and new technology are more likely to be in strategic jobs--if we assume that strategic jobs are more likely to be filled by employees who are more likely to receive offers to train and to receive training. Support for this supposition can also be found by looking at some relevant control variables. In particular, if strategic jobs tend to be determined by occupation, employment type, and wages and salary, then the positive substantial significant relationship between these variables and training offers from employers and the receipt of training contribute additional support to this supposition.

These substantive findings for the employee-level variables suggest that macro-level results may be mainly driven by the micro-level relationships of employees who are affected by the HPWS practices that they participate in individually. In other words, at the workplace level the proportion of employees covered by HPWS practices can be known, but it is only at the employee level that a sense of the implementation of the practices is revealed. This implies that it is essential to understand the micro-level foundations of the observed macro-level findings--this is critical to understanding the "full-picture" of the HPWS and organizational performance relationship at the workplace level.

With regard to employees declining offers to train, there are several factors that are revealed to be limiters of training (and one factor that expands training). The following are related to a higher likelihood to decline training: gross profit per employee, previously received job-related training, participation in employee-level other HPWS practices, and preference for less hours of work. This implies that when employees work in resource-rich workplaces (where they are able to receive training and where they participate in other skill, motivation, and empowerment practices) they likely feel empowered enough to decline training if they feel it is not the best use of their time. These same employees are likely not worried that additional future training opportunities will not materialize. There is also a burden associated with training (i.e. ex-role, cognitive load, etc.) that employees may be limited in their ability to absorb. This is especially the case if they are already looking to reduce their hours worked. Perceived training need is the main factor that is associated with employees accepting training. Employees are typically in a better position, given their job and duties, to know if their skills are adequate enough to meet current and future performance expectations. Employers and managers need to communicate effectively with their employees to understand and identify whether they are receiving the right amount of training given the demands of their job. Through communication between employees and their managers the gap between job demands and employee skill levels can be revealed to both employee and manager. This could be a mechanism by which limiters and expanders of employer offers, and employee decisions to train, are affected.

My micro-level study contributes to the existing literature by integrating workplace-level factors, including other HPWS practices, innovation, organizational performance, and strategic activities into employee-level decisions. Linking these macro-level and micro-level elements enables a deeper understanding of the factors that affect employee-level training outcomes, which are ultimately an important contributor to addressing growing concerns of sustained competitive advantage. In particular, for organizations focusing on training and innovation as a pathway to organizational performance, being able to enhance "expanders" and reduce the "limiters" of employer offers and employee acceptances of training are critical to achieving workplace-level goals. Any studies looking at the determinants of training need to understand the factors affecting both employers' offers and employees' decisions to participate in human capital development, which are the components that ultimately expand or limit workplace training, innovation, and organizational performance.

Implications for Practice

This research illustrates that human resource practices improve organizational performance; this conclusion is particularly important for managers and human resource practitioners. My research strives to provide value to interested managers and human resource practitioners by providing more prescriptive results than the literature has traditionally provided (such as "more is better"). This nuanced approach enables the variability across contexts to be better understood, which in turn enables prescriptive findings that are relevant to practitioners (such as providing practitioners with a better understanding of what works when and why). Thus, it is important to unpack these pathways to be able to provide practitioners with more nuanced prescriptions regarding the economically significant outcomes of human resource management practices. Without establishing a causal relationship between HPWS practices, mediators, and organizational performance, practitioners will be unable to justify allocating resources to developing or implementing HPWS practices.

The noted importance of aligning strategic activities with training and innovation suggests an important role for human resource managers within an organization. In particular, it is important for human resource managers to be at "the table" to formulate the strategic directions of the organization and to advise on the adoption of human resource systems that are consistent and fit with the organization's strategic activity. For human resource managers exercising this role is one of the first steps to ensuring alignment between strategy and human resource management practices. It is important for all managers to understand that one of the main roles of a human resource system is to deliver appropriately competent employees with the desired behaviours. It is this combination (of competent employees with desired behaviours) that enables organizations to achieve their performance goals. In the context of my study, the choice of human resource practices and the degree of training can have a materially significant effect on levels of organizational innovation and performance. Further, these choices need to be aligned with strategic activity. For example, if an organization has chosen a pure product leadership strategic activity orientation then it is the human resource manager's role to ensure sufficiently knowledgeable, skilled, and able employees are available to work toward achieving product and process goals and technology adoption that lead to improved organizational performance.

Implications for Public Policy

The macro-level framework and results above have identified training as a critical element along the pathway to higher innovation and improved organizational performance. Workplace-level training is a factor that policy makers can directly influence. For example, government programs could be developed to aid workplaces in terms of expertise (i.e. by bringing in new knowledge and skills to the workplace) and costs (i.e. direct and indirect costs of training). Helping to facilitate access to expertise can address potential skill deficits within the workplace and aid the workplace in filling potential knowledge and skill gaps. This will also enable breadth of training within the workplace by not limiting the workplace to the knowledge and skills it may already have in-house. With regard to cost, either through direct grants, subsidies, or tax incentives, government policy can help workplaces by giving them the financial resources (or by freeing up resources) so that they are able to invest in quantity and quality of training. These types of support for training offer an alternative to specific government policy prescriptions that encourage more adequate tax credits for R&D or lower corporate taxes (Acemoglu and Cao 2010: 2, 32).

Government policy and programs may be less able to directly affect the strategic activity of an organization. Organizations that are focused on product leadership and that are high innovators are the top performers, on average. Thus, governments need to consider what role they may have in influencing managers' strategic choices. For example, it may be an issue of managerial capability. In other words, managers may not be fully aware of the importance surrounding the strategic activities they may be selecting consciously or unconsciously. Governments could focus on programs that raise awareness among managers of available strategic activities, and the appropriate decisions that are necessary to achieve innovation goals. Further, programs could focus on encouraging a culture of "product leadership" where, regardless of the industry group, organizations could be encouraged to consistently innovate, even incrementally if not radically. The results above suggest that innovation needs to be a top priority for managers if the benefits from the alignment of strategic activity and innovation are to be realized.

Limitations

For the workplace level of analysis, one limitation of the current study is the tendency for workplaces to segment their workforces and apply human resource practices in varying incidence and intensity across these segmented groups (Boxall 1996: 62). For example, types of segmentation include standard versus non-standard, core versus non-core (contingent), full-time or part-time, permanent (indeterminate) or temporary employees. The current study was not able to distinguish employee participation in HPWS practices in more detail than by occupation and management/non-management categories. Nonetheless, accounting for these types of segments is still consistent with the seminal articles in the literature that focus on the proportion of employees covered by practices (e.g. Guest et al. (2003: 298-300), Huselid (1995: 645), and Messersmith and Guthrie (2010: 264)). The aggregate workplace incidence or intensity levels will differ with the extent to which training varies across these segments. However, the effect of training on organizational performance may be heterogeneous across groups. In other words, training managers or professionals may have a greater impact on performance than the training of other occupations, for example.

Whether there are differences in organizational performance from training managers and professionals or other occupation is an empirical question. Zeytinoglu and Cooke (2009: 106) find that managers and professionals tend to have higher on-the-job training incidence than blue-collar and lower white collar occupations. Thus, a focus on aggregate measures at the workplace level (or at a higher level) may mask more targeted training strategies and differential performance outcomes across employee segments (see

Liao, Toya, Lepak, and Hong (2009: 373) for a review of the literature on variance in exposure to human resource practices and differential outcomes in performance). The existence of employee segments hints at a limited acceptance of human resource management practices and policies as a source of sustained competitive advantage (Boxall 1996: 68). In the WES data, there was no information on the importance of jobs covered by HPWS to the workplace or whether the jobs covered are strategic to the workplace.

An additional critique of the HPWS literature is that its studies typically do not consider the quality of the practices that are implemented, where quality can be defined as the effectiveness of the practice(s). The implicit assumption is that if organizations have implemented practices then the existence of a practice implies a positive benefit, otherwise the organization would discontinue the use of the practice. Further, the effectiveness of practices is generally only considered in the context of internal or external contingencies (i.e. complementarities with other HPWS practices or alignment with strategies). I am aware of only one study that uses measures of HPWS practice effectiveness in the measurement of HPWS indexes (Becker and Huselid 1998b: 6-7). This implies that measurements of practices can be considered a rather crude metric of practices because they only focus on quantity. In other words, measures of practices are often not nuanced enough to provide an indication of the functional proficiency, effectiveness of implementation, and efficacy of the practice itself. This critique applies to all HPWS practices. Workplaces may be implementing a variety of practices, however, it is very likely that some practices are more effective than others, both within and across workplaces. Further, it is likely that these practices will have differing impacts on organizational performance because of the differing rates of effectiveness.

One important caveat for practitioners to consider is that because the current macro-level study is nationally representative of workplaces, the gains identified are essentially averaged across industries and workplace size. The magnitude of the identified relationships between training, innovation, and organizational performance, for example, may vary if the analyses were performed at the industry level or for the different workplace size categories. Thus, specific industry analysis and firm size analysis would be needed to see the variability in the gains to be realized for workplaces in these differing contexts. Clearly, the identified relationships will matter more for workplaces of different sizes in different industries, and, conversely, less for others. This more detailed analysis would provide additional evidence to managers regarding the value of HPWS, particularly training.

Another potential limitation of the current study is that the data are collected with respect to a one year reference period. Data collected with respect to reference periods of shorter duration may be more appropriate for measuring the dynamic relationship between training and innovation. Annual data may be too high a level of aggregation over time and could potentially mask important dynamic relationships. However, Wright, Gardner, Moynihan, and Allen (2005: 436) suggest that "longer time periods" of between 9 and 15 months (relative to shorter periods of 3 to 9 months) may be a more appropriate length that allows the effects to work their way through the organization after the human resource practices have been implemented.

Given that the data were generally reported by the person(s) most knowledgeable and external independent measures were not used, reliability and validity are difficult to assess; some caution should be exercised by the reader when interpreting these results. For example, Gardner and Wright (2009: 57) argue that reliance on a person most knowledgeable (i.e. one person) can lead to construct measures being unreliable and biased (i.e. due to measurement error that is "excessively random" and "systematic", respectively). This argument is not uncommon in the literature (Arthur 1994: 678). Further, studies have even found limited convergent validity between multiple raters (i.e. human resource managers and line managers) of human resource practices measures and human resource effectiveness measures (Gerhart, Wright, McMahan, and Snell 2000). Thus, the current study is not immune to common issues of measurement error and bias that are a part of quantitative research. However, when possible, the current study does follow Gardner and Wright's (2009: 69) suggestions for future research, which include: first, that workplace level as opposed to a corporate level of analysis should be used; and second, that multiple respondents should be used and not just single person responses. However, multiple respondents were not used on the same question and external independent measures were not directly collected. Thus, the current study is able to take only limited steps toward addressing these issues by focusing on workplaces, and, for the macro-level study, when the respondent did not know the answer another respondent was followed up with to complete the questionnaire.

While acknowledging the risk of measurement error bias that can arise when responses are provided by a single respondent, it is also important to note that arguments have been made in the literature that suggest multi-respondent designs may be feasible for smaller-scale studies, but are intractable for larger-scale surveys (Becker and Huselid 2006: 912; Datta, et al. 2005: 143). In particular, large-scale survey attempts to collect multi-response data have resulted in typically trivial response rates and unusable responses. This infeasibility makes the expectation of multiple informants unrealistic. Further, Becker and Huselid (2006: 913) identify that the multi-respondent studies have tended to support the reliability of a single knowledgeable respondent, such as a CEO or a VP of human resources, given the high inter-rater reliabilities that have been observed.

An additional measurement error issue is construct validity or conceptual equivalence. For example, do self-directed work groups mean the same thing at each workplace responding to the survey, or do some workplaces have semi-autonomous and others have autonomous groups that have responsibility for decision-making? These types of differences could matter. To address the issue of conceptual clarity, the WES provides definitional statements to help anchor responses and increase conceptual equivalence. However, as discussed by Ichniowski et al. (1996: 309), only multiple measures of the same construct can capture the nuances across concepts and alleviate this type of measurement error. However, multiple measures can also increase response burden and impact response rates, creating the challenge of balancing (trading-off) construct validity and measurement error with breadth.

Possibilities for Future Research

Given the macro-level theoretical framework presented above, there are several avenues for future research: (1) a further exploration of the "sub-bundles" within the other HPWS practices index to understand both the role of various combinations of practices used and the role component bundles have in affecting innovation and organizational performance, (2) an investigation focusing on how transitions in training and other HPWS practices lead to transitions in innovation and subsequent transitions in organizational performance, (3) a look at how different workforce segments are differentially covered by HPWS practices, (4) a focus on HPWS practices' effectiveness in addition to looking at the existence and intensity of practice use, and (5) exploring various periods of analysis to understand which reference period is the most appropriate for exploring the dynamic relationships of interest.

The identification and use of bundles of practices is logical from the perspective that some HPWS practices can be complements and others substitutes, as suggested by Ichniowski et al. (1996: 311). For example, problem-solving teams may be more effective with flexible task assignment, job rotation, and group incentive pay, where the complementarities generate greater performance outcomes than any practice in isolation (Ichniowski, et al. 1997: 295). My study could be extended to explore whether different bundles may be more appropriate in different contexts (i.e. occupational composition, industry, or location). Thus, rather than developing a list of HPWS practices and asserting this set of practices comprise an arbitrary uni-dimensional system, future research could identify the multi-dimensional nature of human resource management systems. Further, the critical processes linking the components of other HPWS through dynamic mediating complementarities that lead to organizational performance could be investigated. By going beyond my study and providing a greater description of the pathways that characterize the other HPWS and organizational performance relationship, future research could further help to explain the "black-box" that mediates this linkage. Other key HPWS practices (or sub-bundles) that have other transmission mechanisms that affect organizational operational and financial performance outcomes could be investigated (Jiang, Lepak, Hu, and Baer 2012: 1274). The transmission mechanisms between bundled complementary HPWS practices and organizational performance need to be identified in order to provide practitioners instructive guidance on the pathways that generate organizational performance.

The investigation of transitions within workplaces would add further strength to demonstrating a causal link between training, other HPWS, mediated by innovation, and organizational performance. By looking at discrete changes of these key variables from one period to the next (and by examining how a discrete change in the independent variable is related to a discrete change in the dependent variable) causal statements can be derived from a robust and rich context. Thus, the focus would be on how changes within workplaces cause other changes.

Future research can focus on the types of employee segmentation used at the workplace level, across which human resource practices vary by incidence and intensity of implementation. Possible types of employee segments can include: standard versus non-standard, core versus non-core, full-time or part-time, and permanent or temporary employees. Accounting for these types of segments can help research more appropriately measure the differential effect of training on organizational performance across heterogeneous employee segment groups. The exploration of heterogeneous implementation across employee segments is a direction for future research.

Measuring the effectiveness of practices, in addition to the existence of the practices, is another important direction for future research. Measuring overall effectiveness of practices can provide a more nuanced measurement of the impact of HPWS practices on organizational outcomes. Different practices may tend to have higher effectiveness rates in general, or when combined with other practices. Measuring functional proficiency, effectiveness of implementation, and efficacy of the practice will enable a better understanding of which practices are more valuable than others (both within and across workplaces); practices will likely have differing impacts on organizational performance due to the possible differing rates of overall effectiveness. Further, future research could integrate some of the recently identified theoretical and measurement issues regarding human capital (Ployhart and Moliterno 2011; Ployhart, Van Iddekinge, and Mackenzie 2011). For example, when considering effectiveness of practices, both individual level generic and specific human capital, and unit level (e.g. organizational or workplace level) human capital improvements could also be measured. Measuring these concepts directly will enable the links between HPWS practices (existence and effectiveness), human capital, and organizational operational and financial performance outcomes to be tested.

Quantitative work that focuses on a large number of organizations in an attempt to generalize findings will not be able to fully address the interplay of HPWS practices, their implementation, and the transmission mechanism which generates value. Further, follow up qualitative work would be valuable for confirming the alignment within organizations of HPWS capabilities, competencies, and strategic activity (culture). Revealing these nuances can help clarify causal ambiguity and the path dependence of factors affecting organizational performance through the creation of HPWS "assets" that are rare, inimitable, and non-transferable. Qualitative research would permit a clearer understanding of individual managers' philosophies regarding HPWS practices and strategic-choices, thereby shedding light on how attitudes and intentions affect implementation and alignment.

Qualitative analysis has an important role to play in aiding a better understanding of the dynamic relationship between training, innovation, and organizational performance. For example, qualitative analysis exploring different organizations and workplaces across various industries could reveal more appropriate reference periods--by workplace size and by industry, for example. In particular, are reference periods of shorter duration (i.e. 6 to 9 months) more appropriate than medium (i.e. 12 months), or longer duration periods (i.e. 18 to 24 months) for measuring the dynamic relationship between training and innovation and organizational performance.

With regard to the micro-level study, future work can look at the moderation effect of the workplace-level variables at the micro-level. This is similar to an approach taken by Zatzick and Iverson (2011), which looks at the moderation effect of workplace-level high-involvement work systems on employee involvement, and their affect on individual outcomes. Given the importance of the trivariate moderation relationship (training, innovation, and strategy) in the macro-level study and the importance of workplace level factors in previous empirical work (Zatzick and Iverson 2011), these factors may be required to identify the necessary alignment of practices, implementation, and strategic activity to see an impact at an individual employee level. These interactions and other non-linearities could be more fully explored.

Further, an extension of the micro-level analysis probit model above could be the use of a decomposition analysis to explore whether differences in training incidence are due to endowment or behaviour characteristics of employees (employee-level of analysis). Differences across a series of individual competencies and demographics could be explored (each in turn). For example, differences across age groups 18 to 44 compared to 45plus could be explored. This analysis would parallel and extend work by Zeytinoglu, Cooke, Harry, and Chowhan (2008), which only looked at differences between training incidence across low and high wage workers, by using similar dependent, independent, and control variables, and by using techniques similar to those used by Oaxaca (1973) and Yun (2004).

Conclusion

This study contributes to the established literature that focuses on the relationship between HPWS practices and organizational performance by exploring innovation as a mediating transmission mechanism, and strategic activities as a moderator of these causal relationships at the workplace level. In particular, this study identifies the pathway from training to innovation to organizational performance as a significant causal link. These relationships are of particular importance because of the value creation present through the entire pathway, including increases in human capital, the creation of new or improved products or processes or the adoption of new technology, the improvement of gross profit per employee, and the enhanced value created when these relationships are aligned with strategic activities. This research highlights the potential for future research to unpack the black-box and provide a better understanding of the mediating processes between HPWS and organizational performance.

Several calls for future research identified in the strategic human resource management literature are addressed by the current study: the call to explore the "black box" between human resource management practices and organizational performance (Becker and Gerhart 1996: 793; Becker and Huselid 2006: 900, 915; Messersmith and Guthrie 2010: 258; Tharenou, et al. 2007: 267); the call for longitudinal studies; and the call for an investigation of reverse-causality (Becker and Gerhart 1996: 793; Becker and Huselid 2006: 914; Tharenou, et al. 2007; Wright, et al. 2005: 417, 435). By focusing on a continuum of strategy, the current study addresses: the call for a conceptualization of business strategy that accounts for the value to the organization and "can provide a useful guide to empirical work" (Becker and Huselid 2006: 901); the call for the investigation at different levels of analysis and, in particular, the business unit, establishment, or workplace-level analysis to provide greater understanding into the value creation process (Becker and Gerhart 1996: 786, 792; Gardner and Wright 2009: 69); the call for more careful attention to aggregation issues (Wright and Boswell 2002: 268); and the call for multi-organization and multi-industry studies to address the generalizability of the findings (Wright, et al. 2003: 32-34). These are issues that have been identified relatively recently in the literature. The theoretical framework and the unique data set I used in this study enable conceptual and empirical advances that have previously not been explored. Thus, the strength of the unique nationally representative data set implies that inference can be made about human resource management practices and organizational performance for practically the entire economy. The causal relationship between the HPWS practice of training, innovation, and organizational performance and the moderation effects of strategy, reveal the importance of configuration and contingency approaches.

With regard to the micro-level study, calls have been made for future research to explore how human resource systems of practices impact individual employee outcomes (Wright and Boswell 2002: 262). The current study investigated the direct relationship of other HPWS practices, but also explored the relationship of strategic activities, innovation, organizational performance, and training factors at the workplace level on employer and employee training decisions and individual employee training outcomes. This study is an example of how, at the employee-level, it is employees in strategic jobs who are relevant, as opposed to workplace-level factors, such as strategic activity, which generally dominate decisions at the employee-level. Finally, this study has integrated employee-level (micro) and organizational level (macro) research on employee-level factors associated with employee-level training decision outcomes, and the relationship of organizational level training on innovation and performance contingent on strategy.

Appendices

Appendix 1

Confirmatory Factor Analysis and Descriptive Statistics for the Items Used in Analysis

Table A1.1: Training Items Constituting the Training Index, for 2004 and 2005 Macro-level

Year 2004

Item	Sign	item-test correlation	item-rest correlation	average inter-item correlation	alpha
Classroom training, managerial/supervisory training	+	0.652	0.590	0.239	0.850
Classroom training, professional training	+	0.560	0.487	0.245	0.854
Classroom training, sales and marketing training	+	0.504	0.425	0.249	0.856
Classroom training, computer/hardware	+	0.553	0.479	0.246	0.854
Classroom training, computer/software	+	0.625	0.559	0.241	0.851
Classroom training, other office and non-office equipment	+	0.493	0.413	0.250	0.857
Classroom training, group decision-making or problem-solving	+	0.616	0.549	0.241	0.851
Classroom training, team-building, leadership, communication	+	0.678	0.620	0.237	0.849
On-the-job training, managerial/supervisory training	+	0.605	0.537	0.242	0.852
On-the-job training, professional training	+	0.525	0.448	0.248	0.856
On-the-job training, sales and marketing training	+	0.445	0.361	0.253	0.859
On-the-job training, computer/hardware	+	0.524	0.447	0.248	0.856
On-the-job training, computer/software	+	0.590	0.520	0.243	0.853
On-the-job training, other office and non-office equipment	+	0.456	0.373	0.252	0.859

On-the-job training, group decision-making or problem-solving	+	0.559	0.485	0.245	0.854
On-the-job training, team-building, leadership, communication	+	0.617	0.550	0.241	0.851
Proportion of employees receiving classroom training	+	0.479	0.398	0.251	0.858
Proportion of employees receiving on-the-job training	+	0.319	0.226	0.261	0.864
Classroom training cost over total compensation cost	+	0.372	0.282	0.258	0.862
Test scale				0.247	0.862

Year 2005 **Item**	**Sign**	**item-test correlation**	**item-rest correlation**	**average inter-item correlation**	**alpha**
Classroom training, managerial/supervisory training	+	0.669	0.610	0.249	0.856
Classroom training, professional training	+	0.573	0.503	0.255	0.860
Classroom training, sales and marketing training	+	0.509	0.432	0.260	0.863
Classroom training, computer/hardware	+	0.573	0.503	0.255	0.860
Classroom training, computer/software	+	0.650	0.589	0.250	0.857
Classroom training, other office and non-office equipment	+	0.497	0.419	0.260	0.864
Classroom training, group decision-making or problem-solving	+	0.623	0.558	0.252	0.858
Classroom training, team-building, leadership, communication	+	0.677	0.620	0.248	0.856
On-the-job training, managerial/supervisory training	+	0.635	0.572	0.251	0.858
On-the-job training, professional training	+	0.539	0.465	0.257	0.862
On-the-job training, sales and marketing training	+	0.453	0.371	0.263	0.866
On-the-job training, computer/hardware	+	0.542	0.469	0.257	0.862
On-the-job training, computer/software	+	0.588	0.519	0.254	0.860

On-the-job training, other office and non-office equipment	+	0.461	0.380	0.263	0.865
On-the-job training, group decision-making or problem-solving	+	0.588	0.519	0.254	0.860
On-the-job training, team-building, leadership, communication	+	0.628	0.564	0.251	0.858
Proportion of employees receiving classroom training	+	0.437	0.353	0.264	0.866
Proportion of employees receiving on-the-job training	+	0.327	0.237	0.272	0.870
Classroom training cost over total compensation cost	+	0.370	0.282	0.269	0.869
Test scale				0.257	0.868

*n= 3154

Table A1.2: Empowerment-enhancing, Motivation-enhancing, and Skill-enhancing Sub-bundle Items Constituting the Other HPWS Practices Index, for 2004 and 2005 Macro-level

Year 2004 **Empowerment-enhancing items**	**Sign**	**item-test correlation**	**item-rest correlation**	**average inter-item correlation**	**alpha**
Work practices, employee's suggestion program	+	0.507	0.379	0.188	0.736
Work practices, flexible job design	+	0.460	0.327	0.193	0.742
Work practices, information sharing with employees	+	0.621	0.513	0.177	0.721
Work practices, problem-solving teams	+	0.623	0.515	0.177	0.721
Work practices, joint labour-management committees	+	0.562	0.443	0.183	0.729
Work practices, self-directed work groups	+	0.488	0.358	0.190	0.738
Autonomy, planning	+	0.452	0.318	0.194	0.743
Autonomy, customer relations	+	0.535	0.412	0.186	0.732

Autonomy, input management	+	0.436	0.299	0.195	0.745
Autonomy, staffing	+	0.445	0.309	0.195	0.744
Autonomy, production	+	0.416	0.278	0.197	0.747
Grievance process, formal system	+	0.501	0.373	0.189	0.737
Grievance process, final decision/resolution	+	0.471	0.339	0.192	0.740
Test scale				0.189	0.752

* n= 3154

Year 2004				**average**	
		item-test	**item-rest**	**inter-item**	
Motivation-enhancing items	**Sign**	**correlation**	**correlation**	**correlation**	**alpha**
Direct compensation, individual incentives	+	0.312	0.198	0.154	0.765
Direct compensation, productivity group incentive plans	+	0.374	0.263	0.150	0.761
Direct compensation, profit-sharing	+	0.322	0.209	0.153	0.765
Direct compensation, merit pay or skill-based pay	+	0.405	0.297	0.148	0.758
Direct compensation, employee stock plans	+	0.478	0.377	0.145	0.753
Promotion opportunity, Manager	+	0.504	0.406	0.143	0.750
Promotion opportunity, Professional	+	0.463	0.360	0.145	0.754
Promotion opportunity, Technical	+	0.415	0.308	0.148	0.758
Promotion opportunity, Sale	+	0.386	0.277	0.150	0.760
Promotion opportunity, Administrative	+	0.486	0.386	0.144	0.752
Promotion opportunity, Production	+	0.277	0.161	0.155	0.768
Promotion opportunity, Other	+	0.250	0.133	0.157	0.770
Indirect compensation, pension plan	+	0.535	0.440	0.141	0.748
Indirect compensation, group RRSP	+	0.447	0.343	0.146	0.755
Indirect compensation, stock purchase	+	0.542	0.449	0.141	0.747
Indirect compensation, life insurance	+	0.558	0.466	0.140	0.746
Indirect compensation, dental care	+	0.553	0.460	0.140	0.746
Indirect compensation, supplemental medical	+	0.549	0.456	0.141	0.747
Indirect compensation, supplements to leave benefits	+	0.462	0.360	0.145	0.754

Test scale				0.147	0.766

* n= 3154

Year 2004 **Skill-enhancing items**	**Sign**	**item-test correlation**	**item-rest correlation**	**average inter-item correlation**	**alpha**
Selection, tests for specific skills	+	0.600	0.473	0.064	0.506
Selection, aptitude or other personality testing	+	0.592	0.464	0.064	0.507
Selection, tests administered by a recruitment agency	+	0.430	0.277	0.073	0.543
Selection, other type of testing or screening	+	0.312	0.147	0.080	0.566
Selection, personal interview	+	0.366	0.206	0.077	0.555
Selection, test on job-related knowledge	+	0.517	0.375	0.069	0.524
Selection, test on general knowledge or literacy skills	+	0.541	0.403	0.067	0.519
Recruitment, help wanted ad	+	0.329	0.165	0.079	0.563
Recruitment, on-campus recruitment	+	0.275	0.108	0.082	0.573
Recruitment, news story	+	0.241	0.073	0.084	0.579
Recruitment, job fair	+	0.240	0.072	0.084	0.579
Recruitment, recruitment agency	+	0.372	0.212	0.077	0.554
Recruitment, directly recruited by employer	+	0.187	0.017	0.087	0.588
Recruitment, internet	+	0.300	0.135	0.081	0.568
Vacancy, proportion of unfilled (/newhires and turnover)	+	0.257	0.090	0.083	0.576
Vacancy, reasons positions unfilled	-	0.309	0.144	0.080	0.566
Test scale				0.077	0.571

* n= 3154

Year 2005 **Empowerment-enhancing items**	**Sign**	**item-test correlation**	**item-rest correlation**	**average inter-item correlation**	**alpha**
Work practices, employee's suggestion program	+	0.458	0.318	0.171	0.713

Work practices, flexible job design	+	0.442	0.300	0.173	0.715
Work practices, information sharing with employees	+	0.594	0.476	0.158	0.693
Work practices, problem-solving teams	+	0.583	0.462	0.160	0.695
Work practices, joint labour-management committees	+	0.527	0.397	0.165	0.703
Work practices, self-directed work groups	+	0.468	0.329	0.171	0.712
Autonomy, planning	+	0.468	0.330	0.170	0.711
Autonomy, customer relations	+	0.542	0.414	0.163	0.701
Autonomy, input management	+	0.445	0.304	0.173	0.715
Autonomy, staffing	+	0.452	0.312	0.172	0.714
Autonomy, production	+	0.424	0.281	0.175	0.717
Grievance process, formal system	+	0.450	0.309	0.172	0.714
Grievance process, final decision/resolution	+	0.423	0.279	0.175	0.718
Test scale				0.169	0.726

* n= 3154

Year 2005 **Motivation-enhancing items**	**Sign**	**item-test correlation**	**item-rest correlation**	**average inter-item correlation**	**alpha**
Direct compensation, individual incentives	+	0.319	0.204	0.148	0.758
Direct compensation, productivity group incentive plans	+	0.361	0.249	0.146	0.755
Direct compensation, profit-sharing	+	0.292	0.175	0.150	0.760
Direct compensation, merit pay or skill-based pay	+	0.374	0.262	0.145	0.754
Direct compensation, employee stock plans	+	0.451	0.347	0.141	0.747
Promotion opportunity, Manager	+	0.492	0.391	0.139	0.744
Promotion opportunity, Professional	+	0.477	0.375	0.140	0.745
Promotion opportunity, Technical	+	0.442	0.336	0.142	0.748
Promotion opportunity, Sale	+	0.427	0.320	0.143	0.749
Promotion opportunity, Administrative	+	0.507	0.408	0.138	0.743
Promotion opportunity, Production	+	0.280	0.163	0.150	0.761
Promotion opportunity, Other	+	0.272	0.155	0.151	0.762
Indirect compensation, pension plan	+	0.517	0.419	0.138	0.742

Indirect compensation, group RRSP	+	0.445	0.340	0.142	0.748
Indirect compensation, stock purchase	+	0.493	0.393	0.139	0.744
Indirect compensation, life insurance	+	0.542	0.447	0.136	0.740
Indirect compensation, dental care	+	0.543	0.448	0.136	0.740
Indirect compensation, supplemental medical	+	0.524	0.427	0.137	0.741
Indirect compensation, supplements to leave benefits	+	0.466	0.363	0.140	0.746
Test scale				0.142	0.759

* n= 3154

Year 2005				**average**	
		item-test	**item-rest**	**inter-item**	
Skill-enhancing items	**Sign**	**correlation**	**correlation**	**correlation**	**alpha**
Selection, tests for specific skills	+	0.600	0.478	0.074	0.545
Selection, aptitude or other personality testing	+	0.594	0.471	0.074	0.547
Selection, tests administered by a recruitment agency	+	0.414	0.264	0.085	0.582
Selection, other type of testing or screening	+	0.313	0.155	0.091	0.599
Selection, personal interview	+	0.332	0.174	0.090	0.596
Selection, test on job-related knowledge	+	0.540	0.407	0.078	0.558
Selection, test on general knowledge or literacy skills	+	0.551	0.420	0.077	0.556
Recruitment, help wanted ad	+	0.359	0.204	0.088	0.591
Recruitment, on-campus recruitment	+	0.304	0.145	0.091	0.601
Recruitment, news story	+	0.256	0.094	0.094	0.609
Recruitment, job fair	+	0.303	0.144	0.091	0.601
Recruitment, recruitment agency	+	0.387	0.235	0.086	0.586
Recruitment, directly recruited by employer	+	0.205	0.041	0.097	0.617
Recruitment, internet	+	0.315	0.157	0.091	0.599
Vacancy, proportion of unfilled (/newhires and turnover)	+	0.265	0.103	0.093	0.607
Vacancy, reasons positions unfilled	-	0.331	0.174	0.090	0.596
Test scale				0.087	0.603

* n= 3154

Year 2006 **Empowerment-enhancing items**	**Sign**	**item-test correlation**	**item-rest correlation**	**average inter-item correlation**	**alpha**
Work practices, employee's suggestion program	+	0.458	0.318	0.171	0.713
Work practices, flexible job design	+	0.442	0.300	0.173	0.715
Work practices, information sharing with employees	+	0.594	0.476	0.158	0.693
Work practices, problem-solving teams	+	0.583	0.462	0.160	0.695
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Autonomy, input management	+	0.445	0.304	0.173	0.715
Autonomy, staffing	+	0.452	0.312	0.172	0.714
Autonomy, production	+	0.424	0.281	0.175	0.717
Grievance process, formal system	+	0.450	0.309	0.172	0.714
Grievance process, final decision/resolution	+	0.423	0.279	0.175	0.718
Test scale				0.169	0.726

* n= 3154

Year 2006 **Motivation-enhancing items**	**Sign**	**item-test correlation**	**item-rest correlation**	**average inter-item correlation**	**alpha**
Direct compensation, individual incentives	+	0.325	0.208	0.143	0.751
Direct compensation, productivity group incentive plans	+	0.360	0.246	0.141	0.748
Direct compensation, profit-sharing	+	0.304	0.186	0.144	0.752
Direct compensation, merit pay or skill-based pay	+	0.391	0.280	0.140	0.745
Direct compensation, employee stock plans	+	0.440	0.333	0.137	0.741
Promotion opportunity, Manager	+	0.490	0.387	0.135	0.737
Promotion opportunity, Professional	+	0.450	0.344	0.137	0.740
Promotion opportunity, Technical	+	0.425	0.316	0.138	0.742

Promotion opportunity, Sale	+	0.441	0.334	0.137	0.741
Promotion opportunity, Administrative	+	0.506	0.406	0.134	0.735
Promotion opportunity, Production	+	0.284	0.166	0.145	0.754
Promotion opportunity, Other	+	0.235	0.114	0.148	0.758
Indirect compensation, pension plan	+	0.498	0.397	0.134	0.736
Indirect compensation, group RRSP	+	0.430	0.322	0.138	0.742
Indirect compensation, stock purchase	+	0.487	0.385	0.135	0.737
Indirect compensation, life insurance	+	0.539	0.443	0.132	0.732
Indirect compensation, dental care	+	0.536	0.439	0.132	0.732
Indirect compensation, supplemental medical	+	0.504	0.403	0.134	0.735
Indirect compensation, supplements to leave benefits	+	0.487	0.385	0.135	0.737
Test scale				0.138	0.752

* n= 3154

Year 2006				**average**	
		item-test	**item-rest**	**inter-item**	
Skill-enhancing items	**Sign**	**correlation**	**correlation**	**correlation**	**alpha**
Selection, tests for specific skills	+	0.599	0.476	0.074	0.543
Selection, aptitude or other personality testing	+	0.596	0.473	0.074	0.544
Selection, tests administered by a recruitment agency	+	0.427	0.278	0.083	0.577
Selection, other type of testing or screening	+	0.302	0.142	0.091	0.599
Selection, personal interview	+	0.335	0.177	0.089	0.594
Selection, test on job-related knowledge	+	0.532	0.398	0.077	0.557
Selection, test on general knowledge or literacy skills	+	0.540	0.406	0.077	0.556
Recruitment, help wanted ad	+	0.361	0.205	0.087	0.589
Recruitment, on-campus recruitment	+	0.309	0.149	0.090	0.598
Recruitment, news story	+	0.258	0.096	0.093	0.606
Recruitment, job fair	+	0.299	0.139	0.091	0.600
Recruitment, recruitment agency	+	0.389	0.236	0.086	0.584
Recruitment, directly recruited by employer	+	0.201	0.037	0.096	0.616
Recruitment, internet	+	0.321	0.163	0.090	0.596

Vacancy, proportion of unfilled (/newhires and turnover)	+	0.265	0.103	0.093	0.605
Vacancy, reasons positions unfilled	-	0.325	0.167	0.089	0.595
Test scale				0.086	0.601

* n= 3154

Table A1.3: Innovation and New Technology Items Constituting the Innovation Index, for 2004 and 2005 Macro-level

Year 2004 **Item**	**Sign**	**item-test correlation**	**item-rest correlation**	**average inter-item correlation**	**alpha**
Innovation, new products or services	+	0.708	0.579	0.250	0.700
Innovation, improved products or services	+	0.756	0.643	0.239	0.688
Innovation, new processes	+	0.757	0.644	0.239	0.687
Innovation, improved processes	+	0.785	0.683	0.233	0.680
Importance of main innovation	+	0.754	0.639	0.240	0.688
New technology, computer hardware or software	+	0.387	0.192	0.324	0.771
New technology, computer controlled or assisted technology	+	0.329	0.128	0.338	0.781
New technology, other technology or machinery	+	0.357	0.158	0.331	0.776
Test scale				0.274	0.751

n= 3154

Year 2005 **Item**	**Sign**	**item-test correlation**	**item-rest correlation**	**average inter-item correlation**	**alpha**
Innovation, new products or services	+	0.708	0.575	0.224	0.669
Innovation, improved products or services	+	0.760	0.644	0.212	0.654
Innovation, new processes	+	0.745	0.623	0.216	0.658
Innovation, improved processes	+	0.780	0.672	0.208	0.648

Importance of main innovation	+	0.747	0.627	0.215	0.658
New technology, computer hardware or software	+	0.347	0.141	0.305	0.754
New technology, computer controlled or assisted technology	+	0.305	0.096	0.314	0.762
New technology, other technology or machinery	+	0.304	0.095	0.314	0.763
Test scale				0.251	0.728

n= 3154

Table A1.4: Strategy Index Items, Rotated Factor Loadings (Pattern Matrix) and Unique Variances, for 2005 Macro-level

Year 2005

Item	**Factor 1**	**Factor 2**	**Factor 3**	**Uniqueness**
Undertaking R&D		0.730		0.491
Develop new products/services		0.786		0.359
Develop new production/operating techniques		0.722		0.412
Expanding into new geographic markets		0.572		0.687
Total quality management	0.372	0.320		0.605
Improving product/service quality	0.477	0.216		0.489
Reducing labour costs			0.757	0.463
Using more part-time, temporary or contract workers			0.275	0.860
Reducing other operating costs			0.737	0.445
Reorganizing the work process	0.451			0.650
Enhancing labour-management cooperation	0.690			0.554
Increasing employee's skills	0.810			0.380
Increasing employee's involvement/participation	0.897			0.329
Improving coordination with customers/suppliers	0.639			0.500
Improving measures of performance	0.682			0.417

* (blanks represent abs(loading)<.2)
**Principal factors oblique with direct oblimin rotation.

Table A1.5: Product Leadership and Operational Excellence Items Constituting the Strategy Index, for 2004 and 2005 Macro-level

Year 2004 Item	Sign	item-test correlation	item-rest correlation	average inter-item correlation	alpha
Operational excellence					
Total quality management	+	0.670	0.559	0.506	0.878
Improving product/service quality	+	0.763	0.677	0.480	0.866
Reorganizing the work process	+	0.664	0.552	0.508	0.878
Enhancing labour-management cooperation	+	0.711	0.611	0.494	0.873
Increasing employee's skills	+	0.796	0.719	0.471	0.862
Increasing employee's involvement/participation	+	0.813	0.742	0.466	0.859
Improving coordination with customers/suppliers	+	0.733	0.639	0.488	0.870
Improving measures of performance	+	0.783	0.703	0.474	0.863
Test scale				0.486	0.883
Product leadership					
Undertaking R&D	+	0.829	0.679	0.493	0.745
Develop new products/services	+	0.842	0.702	0.479	0.734
Develop new production/operating techniques	+	0.810	0.647	0.514	0.760
Expanding into new geographic markets	+	0.724	0.513	0.606	0.822
Test scale				0.523	0.814

Year 2005 Item	Sign	item-test correlation	item-rest correlation	average inter-item correlation	alpha
Operational excellence					
Total quality management	+	0.662	0.548	0.485	0.868
Improving product/service quality	+	0.745	0.652	0.462	0.858
Reorganizing the work process	+	0.656	0.541	0.487	0.869
Enhancing labour-management cooperation	+	0.709	0.607	0.472	0.862
Increasing employee's skills	+	0.787	0.707	0.450	0.852
Increasing employee's involvement/participation	+	0.796	0.718	0.448	0.850
Improving coordination with customers/suppliers	+	0.719	0.618	0.470	0.861
Improving measures of performance	+	0.766	0.680	0.456	0.855
Test scale				0.466	0.875
Product leadership					
Undertaking R&D	+	0.802	0.629	0.469	0.726
Develop new products/services	+	0.831	0.677	0.439	0.701
Develop new production/operating techniques	+	0.792	0.612	0.480	0.734
Expanding into new geographic markets	+	0.714	0.491	0.561	0.793
Test scale				0.487	0.792

* n= 3154

Table A1.6: Descriptive Statistics for Training, Other HPWS, Innovation and Strategy Items, for 2004, 2005, and 2006 Macro-level

Training items	2004 Mean	2005 Mean	2006 Mean	Minimum	Maximum
Classroom training, managerial/supervisory training	0.23	0.24	0.24	0	1
Classroom training, professional training	0.21	0.21	0.23	0	1
Classroom training, sales and marketing training	0.21	0.18	0.17	0	1
Classroom training, computer/hardware	0.10	0.09	0.09	0	1
Classroom training, computer/software	0.25	0.25	0.23	0	1
Classroom training, other office and non-office equipment	0.08	0.08	0.09	0	1
Classroom training, group decision-making or problem-solving	0.08	0.10	0.09	0	1
Classroom training, team-building, leadership, communication	0.15	0.18	0.18	0	1
On-the-job training, managerial/supervisory training	0.21	0.24	0.24	0	1
On-the-job training, professional training	0.15	0.18	0.18	0	1
On-the-job training, sales and marketing training	0.19	0.21	0.21	0	1
On-the-job training, computer/hardware	0.11	0.12	0.14	0	1
On-the-job training, computer/software	0.31	0.31	0.31	0	1
On-the-job training, other office and non-office equipment	0.11	0.11	0.11	0	1
On-the-job training, group decision-making or problem-solving	0.08	0.11	0.08	0	1
On-the-job training, team-building, leadership, communication	0.16	0.17	0.15	0	1
Proportion of employees receiving classroom training	0.32	0.32	0.30	0	--
Proportion of employees receiving on-the-job training	0.40	0.41	0.41	0	--
Classroom training cost over total compensation cost	0.01	0.01	0.01	0	--

Other HPWS items	2004 Mean	2005 Mean	2006 Mean	Minimum	Maximum
Selection, tests for specific skills	0.19	0.26	0.26	0	1
Selection, aptitude or other personality testing	0.14	0.19	0.19	0	1
Selection, tests administered by a recruitment agency	0.04	0.05	0.05	0	1

Selection, other type of testing or screening	0.05	0.04	0.04	0	1
Selection, personal interview	0.90	0.94	0.94	0	1
Selection, test on job-related knowledge	0.16	0.22	0.22	0	1
Selection, test on general knowledge or literacy skills	0.08	0.14	0.14	0	1
Recruitment, help wanted ad	0.33	0.41	0.41	0	1
Recruitment, on-campus recruitment	0.04	0.06	0.06	0	1
Recruitment, news story	0.03	0.07	0.07	0	1
Recruitment, job fair	0.00	0.01	0.01	0	1
Recruitment, recruitment agency	0.07	0.10	0.10	0	1
Recruitment, directly recruited by employer	0.26	0.40	0.40	0	1
Recruitment, internet	0.05	0.09	0.09	0	1
Vacancy, proportion of unfilled (/newhires and turnover)	0.04	0.05	0.05	--	--
Vacancy, reasons positions unfilled	-0.08	-0.09	-0.12	--	--
Work practices, employee's suggestion program	0.30	0.29	0.29	0	1
Work practices, flexible job design	0.12	0.13	0.13	0	1
Work practices, information sharing with employees	0.36	0.37	0.37	0	1
Work practices, problem-solving teams	0.17	0.18	0.18	0	1
Work practices, joint labour-management committees	0.15	0.16	0.16	0	1
Work practices, self-directed work groups	0.06	0.08	0.08	0	1
Autonomy, planning	0.32	0.30	0.30	0	1
Autonomy, customer relations	0.34	0.37	0.37	0	1
Autonomy, input management	0.40	0.43	0.43	0	1
Autonomy, staffing	0.15	0.17	0.17	0	1
Autonomy, production	0.07	0.12	0.12	0	1
Grievance process, formal system	1.88	1.88	1.88	1	3
Grievance process, final decision/resolution	0.88	0.86	0.86	0	3
Direct compensation, individual incentives	0.20	0.26	0.24	0	1
Direct compensation, productivity group incentive plans	0.09	0.10	0.10	0	1
Direct compensation, profit-sharing	0.12	0.12	0.11	0	1
Direct compensation, merit pay or skill-based pay	0.16	0.18	0.16	0	1
Direct compensation, employee stock plans	0.06	0.06	0.05	0	1

Promotion opportunity, Manager	0.26	0.29	0.27	0	1
Promotion opportunity, Professional	0.04	0.05	0.06	0	1
Promotion opportunity, Technical	0.07	0.11	0.08	0	1
Promotion opportunity, Sale	0.08	0.10	0.12	0	1
Promotion opportunity, Administrative	0.13	0.14	0.14	0	1
Promotion opportunity, Production	0.06	0.07	0.08	0	1
Promotion opportunity, Other	0.03	0.02	0.03	0	1
Indirect compensation, pension plan	0.23	0.24	0.25	0	1
Indirect compensation, group RRSP	0.32	0.31	0.31	0	1
Indirect compensation, stock purchase	0.10	0.09	0.09	0	1
Indirect compensation, life insurance	0.73	0.71	0.74	0	1
Indirect compensation, dental care	0.67	0.66	0.69	0	1
Indirect compensation, supplemental medical	0.71	0.69	0.72	0	1
Indirect compensation, supplements to leave benefits	0.16	0.16	0.15	0	1

Innovation and new technology items	**2004 Mean**	**2005 Mean**	**2006 Mean**	**Minimum**	**Maximum**
Innovation, new products or services	0.31	0.40	0.33	0	1
Innovation, improved products or services	0.39	0.48	0.37	0	1
Innovation, new processes	0.24	0.30	0.26	0	1
Innovation, improved processes	0.31	0.37	0.32	0	1
Importance of main innovation	0.66	0.78	0.63	0	4
New technology, computer hardware or software	0.16	0.15	0.09	0	1
New technology, computer controlled or assisted technology	0.06	0.04	0.03	0	1
New technology, other technology or machinery	0.03	0.03	0.02	0	1

Strategy items	**2004**	**2005**	**2006**		
Operational excellence	**Mean**	**Mean**	**Mean**	**Minimum**	**Maximum**
Total quality management	3.12	3.24	3.24	1	5
Improving product/service quality	3.46	3.50	3.50	1	5
Reorganizing the work process	2.40	2.44	2.44	1	5
Enhancing labour-management cooperation	2.73	2.81	2.81	1	5
Increasing employee's skills	3.17	3.20	3.20	1	5
Increasing employee's involvement/participation	2.93	2.97	2.97	1	5
Improving coordination with customers/suppliers	2.93	2.97	2.97	1	5
Improving measures of performance	3.10	3.14	3.14	1	5
Product leadership					
Undertaking R&D	1.82	1.92	1.92	1	5
Develop new products/services	2.32	2.42	2.42	1	5
Develop new production/operating techniques	2.26	2.30	2.30	1	5
Expanding into new geographic markets	2.16	2.17	2.17	1	5
Cost focus					
Reducing labour costs	2.96	2.98	2.98	1	5
Using more part-time, temporary or contract workers	1.57	1.56	1.56	1	5
Reducing other operating costs	3.12	3.13	3.13	1	5

* n= 3154

Table A1.7: Descriptive Statistics for Control Variables Used in the Macro Analysis, for 2004 and 2005

Variable name	Mean	SD	10th percentile	90th percentile
2004				
Presence of collective agreement at workplace	0.20	0.40	0	1.00
Proportion of employees covered by a collective agreement	0.14	0.30	0	0.78
Proportion of non-permanent employees	0.04	0.14	0	0.08
Proportion of part-time employees	0.22	0.26	0	0.65
Proportion of employee driven turnover	0.14	0.24	0	0.38
Proportion of employer driven turnover	0.10	0.45	0	0.23
Workplace size >=10 & <25	0.53	0.50	0	1.00
Workplace size >=25 & <50	0.28	0.45	0	1.00
Workplace size >=50 & <100	0.10	0.31	0	1.00
Workplace size medium (100 to <500)	0.07	0.26	0	0.00
Workplace size large (>500)	0.01			
Workplace age	18	17	4	38
Workplace age (squared)	617	1302	16	1444
Forestry, mining, oil, and gas extraction	0.01	0.10	0	0.00
Labour intensive tertiary manufacturing	0.05	0.22	0	0.00
Primary product manufacturing	0.02	0.15	0	0.00
Secondary product manufacturing	0.05	0.21	0	0.00
Capital intensive tertiary manufacturing	0.05			
Construction	0.07	0.26	0	0.00
Transportation, warehousing, wholesale	0.17	0.38	0	1.00
Communication and other utilities	0.02	0.15	0	0.00
Retail trade and consumer services	0.28	0.45	0	1.00
Finance and insurance	0.06	0.24	0	0.00
Real estate, rental and leasing operations	0.01	0.11	0	0.00
Business services	0.11	0.32	0	1.00
Education and health services	0.06	0.24	0	0.00
Information and cultural industries	0.02	0.15	0	0.00

2005				
Presence of collective agreement at workplace	0.19	0.40	0	1.00
Proportion of employees covered by a collective agreement	0.14	0.29	0	0.76
Proportion of non-permanent employees	0.04	0.13	0	0.10
Proportion of part-time employees	0.21	0.26	0	0.64
Proportion of employee driven turnover	0.15	0.26	0	0.38
Proportion of employer driven turnover	0.10	0.50	0	0.21
Workplace size >=10 & <25	0.51	0.50	0	1.00
Workplace size >=25 & <50	0.29	0.45	0	1.00
Workplace size >=50 & <100	0.13	0.33	0	1.00
Workplace size medium (100 to <500)	0.07	0.25	0	0.00
Workplace size large (>500)	0.01			
Workplace age	19	16	5	38
Workplace age (squared)	623	1290	20	1444
Forestry, mining, oil, and gas extraction	0.01	0.10	0	0.00
Labour intensive tertiary manufacturing	0.05	0.22	0	0.00
Primary product manufacturing	0.02	0.15	0	0.00
Secondary product manufacturing	0.05	0.21	0	0.00
Capital intensive tertiary manufacturing	0.05			
Construction	0.07	0.26	0	0.00
Transportation, warehousing, wholesale	0.17	0.38	0	1.00
Communication and other utilities	0.02	0.15	0	0.00
Retail trade and consumer services	0.28	0.45	0	1.00
Finance and insurance	0.06	0.24	0	0.00
Real estate, rental and leasing operations	0.01	0.11	0	0.00
Business services	0.12	0.32	0	1.00
Education and health services	0.06	0.23	0	0.00
Information and cultural industries	0.02	0.15	0	0.00

* n= 3154

Table A1.8: Empowerment-enhancing, Motivation-enhancing, and Skill-enhancing Sub-bundle Items Constituting the Employee Other HPWS Practices Index, for Micro-level

Empowerment-enhancing items	Sign	item-test correlation	item-rest correlation	average inter-item correlation	alpha
Employee surveys	+	0.531	0.333	0.298	0.718
Suggestion program	+	0.682	0.523	0.255	0.673
Job rotation	+	0.474	0.265	0.315	0.734
Informed about workplace performance	+	0.638	0.465	0.268	0.687
Task team	+	0.681	0.522	0.255	0.673
Quality circle	+	0.722	0.578	0.243	0.659
Self-directed groups	+	0.575	0.387	0.286	0.706
Test scale				0.274	0.726

Benefit items	Sign	item-test correlation	item-rest correlation	average inter-item correlation	alpha
Employer-sponsored pension plan	+	0.575	0.426	0.261	0.738
Group RRSP	+	0.604	0.461	0.255	0.733
Stock purchase plan	+	0.566	0.414	0.263	0.740
Dental plan	+	0.679	0.554	0.241	0.718
Life-disability insurance	+	0.658	0.528	0.245	0.722
Supplemental medical insurance plan	+	0.609	0.467	0.255	0.732
Supplements to Employment Insurance	+	0.443	0.272	0.286	0.762
Employer contributions to RRSP	+	0.576	0.426	0.261	0.738
Employer contributions to stock purchase plans	+	0.549	0.395	0.266	0.743
Test scale				0.259	0.759

Motivation-enhancing items	Sign	item-test correlation	item-rest correlation	average inter-item correlation	alpha
Performance appraised	+	0.586	0.399	0.173	0.595
Evaluation affects compensation	+	0.605	0.423	0.169	0.588
Productivity bonus	+	0.515	0.312	0.188	0.618
Incentive pay for output	-	0.288	0.057	0.234	0.681
Promotion received	+	0.571	0.379	0.176	0.600
Number of promotions	+	0.541	0.343	0.182	0.610
Benefits participation	+	0.626	0.449	0.165	0.581
Benefit support	+	0.544	0.347	0.182	0.609
Test scale				0.184	0.643

Skill-enhancing items	Sign	item-test correlation	item-rest correlation	average inter-item correlation	alpha
Selection, tests for specific skills	+	0.521	0.344	0.039	0.345
Selection, aptitude or other personality testing	+	0.523	0.347	0.039	0.344
Selection, tests administered by a recruitment agency	+	0.379	0.181	0.048	0.394
Selection, other type of testing or screening	+	0.254	0.047	0.055	0.433
Selection, personal interview	+	0.382	0.185	0.048	0.393
Selection, test on job-related knowledge	+	0.469	0.283	0.042	0.364
Selection, test on general knowledge or literacy skills	+	0.496	0.314	0.041	0.354
Recruitment, help wanted ad	+	0.262	0.055	0.055	0.430
Recruitment, on-campus recruitment	+	0.210	0.002	0.058	0.445
Recruitment, news story	+	0.233	0.026	0.057	0.438
Recruitment, job fair	+	0.242	0.034	0.056	0.436
Recruitment, recruitment agency	+	0.288	0.083	0.053	0.422

Recruitment, directly recruited by employer	-	0.310	0.106	0.052	0.416
Recruitment, internet	+	0.237	0.030	0.056	0.437
Test scale				0.050	0.424

*n = 24977

Table A1.9: Descriptive Statistics for Empowerment-enhancing, Motivation-enhancing, and Skill-enhancing Sub-bundle Items Constituting the Employee Other HPWS Practices Index, for Micro-level

Empowerment	**Mean**	**SD**	**Minimum**	**Maximum**
Employee surveys	0.55	0.59	0	2
Suggestion program	1.06	0.70	0	2
Job rotation	0.45	0.62	0	2
Informed about workplace performance	1.20	0.72	0	2
Task team	0.68	0.85	0	3
Quality circle	1.05	0.98	0	3
Self-directed groups	0.83	1.08	0	3
Benefits				
Employer-sponsored pension plan	0.37	0.48	0	1
Group RRSP	0.24	0.42	0	1
Stock purchase plan	0.09	0.28	0	1
Dental plan	0.63	0.48	0	1
Life-disability insurance	0.64	0.48	0	1
Supplemental medical insurance plan	0.55	0.50	0	1
Supplements to Employment Insurance	0.36	0.48	0	1
Employer contributions to RRSP	0.19	0.39	0	1
Employer contributions to stock purchase plans	0.07	0.26	0	1

Motivation				
Performance appraised	0.65	0.48	0	1
Evaluation affects compensation	0.40	0.49	0	1
Productivity bonus	0.28	0.45	0	1
Incentive pay for output	0.12	0.33	0	1
Promotion received	0.42	0.49	0	1
Number of promotions	0.94	1.65	0	--
Benefits participation	2.88	2.01	0	7
Benefit support	0.26	0.50	0	2
Selection and recruitment bundle				
Selection, tests for specific skills	0.12	0.32	0	1
Selection, aptitude or other personality testing	0.10	0.30	0	1
Selection, tests administered by a recruitment agency	0.02	0.15	0	1
Selection, other type of testing or screening	0.02	0.14	0	1
Selection, personal interview	0.81	0.39	0	1
Selection, test on job-related knowledge	0.09	0.29	0	1
Selection, test on general knowledge or literacy skills	0.06	0.24	0	1
Recruitment, help wanted ad	0.15	0.35	0	1
Recruitment, on-campus recruitment	0.02	0.14	0	1
Recruitment, news story	0.02	0.13	0	1
Recruitment, job fair	0.00	0.07	0	1
Recruitment, recruitment agency	0.04	0.20	0	1
Recruitment, directly recruited by employer	0.11	0.32	0	1
Recruitment, internet	0.03	0.16	0	1

*n = 24977

Table A1.10: Descriptive Statistics for Control Variables Used in the Micro-level Analysis

Variable name	Mean	SD	10th percentile	90th percentile
Primary sector	0.02	0.15	0	0
Manufacturing (ref.)	0.24			
Construction, transportation and utilities	0.20	0.40	0	1
Education and health services	0.49	0.50	0	1
Other service sectors	0.05	0.22	0	0
Workplace size >=10 & <25	0.20	0.40	0	1
Workplace size >=25 & <50	0.22	0.41	0	1
Workplace size >=50 & <100	0.19	0.39	0	1
Workplace size medium (100 to <500)	0.29	0.45	0	1
Workplace size large (>500)	0.11	0.32	0	1
Workplace age	21	20	4	45
Workplace age (squared)	822	1656	16	2025
Proportion of employee driven turnover	0.16	0.24	0	0.41
Proportion of employer driven turnover	0.10	0.45	0	0.22
Less than high school	0.11	0.32	0	1
High school graduate	0.18	0.39	0	1
Some post-secondary	0.28	0.45	0	1
Post-secondary diploma	0.22	0.41	0	1
Undergraduate degree	0.16	0.36	0	1
Post-graduate degree	0.04	0.21	0	0
Managers	0.13	0.34	0	1
Professionals	0.11	0.31	0	1
Technical/trades	0.45	0.50	0	1
Marketing/sales	0.08	0.27	0	0
Clerical/administrative	0.15	0.36	0	1
Production workers	0.08	0.26	0	0
Tenure with employer	8.35	8.35	1	21
Tenure with employer (squared/100)	1.40	2.49	0.01	4.41

Regular full-time (ref.)	0.84	0.37	0	1
Temporary full-time	0.04	0.19	0	0
Regular part-time	0.10	0.30	0	1
Temporary part-time	0.03	0.16	0	0
Log(hourly wage)	2.91	0.52	2.22	3.59
Collective agreement coverage	0.21	0.41	0	1
Age	39.84	11.72	24	55
Age (squared/100)	17.24	9.53	5.76	30.25
Gender (female)	0.46	0.50	0	1
Marital status (married)	0.67	0.47	0	1
Dependent child(ren)	0.45	0.50	0	1
Canadian-born	0.80	0.40	0	1
Immigrant age-at-arrival 0 to 9	0.04	0.20	0	0
Immigrant age-at-arrival 10 to 18	0.03	0.18	0	0
Immigrant age-at-arrival 19 to 35	0.10	0.29	0	0
Immigrant age-at-arrival 36 plus	0.02	0.15	0	0

*n = 24977

Appendix 2

Full Model Output for Macro-level Regressions

Table A2.1: Hierarchical Regression Results for Innovation and Organizational Performance, Testing the Basic Structural Model and the Hypotheses Presented in Figure 3

Dependent variable innovation index (standardized) (T2)									
Step 1	**Model 1 [c]**			**Model 2**			**Model 3**		
Variables	**b**		**s.e.**	**b**		**s.e.**	**b**		**s.e.**
Constant	0.785	***	0.305	0.432		0.314	0.432		0.314
Other HPWS index [a]				0.073	*	0.042	0.073	*	0.042
Training index				0.198	***	0.045	0.198	***	0.045
Presence of collective agreement at workplace	-0.257		0.214	-0.264		0.229	-0.264		0.229
Proportion of employees covered by a collective agreement	0.271		0.281	0.243		0.313	0.243		0.313
Proportion of non-permanent employees	0.001		0.298	-0.139		0.267	-0.139		0.267
Proportion of part-time employees	0.201		0.189	0.214		0.174	0.214		0.174
Proportion of employee driven turnover	-0.037		0.240	-0.107		0.172	-0.107		0.172
Proportion of employer driven turnover	0.123	***	0.048	-0.003		0.045	-0.003		0.045
Workplace size >=10 & <25 [d]	-0.783	***	0.264	-0.347		0.259	-0.347		0.259
Workplace size >=25 & <50	-0.676	***	0.266	-0.297		0.261	-0.297		0.261
Workplace size >=50 & <100	-0.493	**	0.278	-0.174		0.255	-0.174		0.255
Workplace size medium (100 to <500)	-0.453	*	0.262	-0.284		0.235	-0.284		0.235
Workplace age	-0.008		0.006	-0.008		0.006	-0.008		0.006
Workplace age (squared)	0.000		0.000	0.000		0.000	0.000		0.000

Forestry, mining, oil, and gas extraction [d]	-0.076		0.242	0.023		0.225	0.023		0.225
Labour intensive tertiary manufacturing	0.015		0.221	0.025		0.218	0.025		0.218
Primary product manufacturing	-0.003		0.223	0.058		0.216	0.058		0.216
Secondary product manufacturing	0.015		0.270	0.036		0.216	0.036		0.216
Construction	-0.021		0.246	-0.012		0.223	-0.012		0.223
Transportation, warehousing, wholesale	0.019		0.222	0.003		0.198	0.003		0.198
Communication and other utilities	0.009		0.222	0.030		0.183	0.030		0.183
Retail trade and consumer services	-0.060		0.216	-0.050		0.214	-0.050		0.214
Finance and insurance	0.036		0.221	0.011		0.192	0.011		0.192
Real estate, rental and leasing operations	0.014		0.275	0.003		0.262	0.003		0.262
Business services	0.010		0.215	0.004		0.204	0.004		0.204
Education and health services	-0.071		0.254	-0.081		0.261	-0.081		0.261
Information and cultural industries	-0.098		0.248	-0.059		0.238	-0.059		0.238
R-squared	0.022			0.066	***		0.066	***	
Change in R-squared				0.044			--		
F for change in R-squared				10.23	***		--		
N	3154			3154			3154		

Dependent variable gross profit per employee (dollars) (T3)

Step 2	**Model 1 [c]**			**Model 2**			**Model 3**		
Variables	**b**		**s.e.**	**b**		**s.e.**	**b**		**s.e.**
Constant	78175	***	30877	51357	*	31330	45729		28426
Innovation index [b]							9583	**	3733
Other HPWS index (T1)				10081	**	3461	9480	**	4186
Training index (T1)				10390	**	4744	8517	**	4251
Presence of collective agreement at workplace	56739	*	28121	53749	*	28741	58226	*	30935
Proportion of employees covered by a collective agreement	-84428	*	33813	-83555	*	34428	-88077	*	45460
Proportion of non-permanent employees	3214		16221	-2360		15936	934		21046
Proportion of part-time employees	-2262		15478	1272		15092	626		14483
Proportion of employee driven turnover	-7313		8829	-11136		8724	-10704		9774

Proportion of employer driven turnover	-7455	**	3124	-13439	***	3990	-13808	***	3664
Workplace size >=10 & <25 [d]	-12669		17294	21685		18287	26051		18770
Workplace size >=25 & <50	-13554		17596	17205		18831	22520		19337
Workplace size >=50 & <100	-12088		17428	11183		17803	12528		24057
Workplace size medium (100 to <500)	23960		20653	35478	*	20560	39033	**	19674
Workplace age	294.88		581.47	207.93		573.44	272.22		609.90
Workplace age (squared)	-2.58		7.15	-1.92		7.03	-2.29		7.85
Forestry, mining, oil, and gas extraction [d]	138207		144730	145436		144897	145516		126299
Labour intensive tertiary manufacturing	-45117	*	29508	-45181	*	29688	-45009	**	22361
Primary product manufacturing	-31244		29806	-27971		30024	-27762		23431
Secondary product manufacturing	-40793	*	29687	-40348	*	29682	-40141	*	21377
Construction	-26638		30365	-27453		30399	-27695		24100
Transportation, warehousing, wholesale	-19171		31954	-21656		32103	-21447		25728
Communication and other utilities	-7779		31148	-7759		31575	-8111		29833
Retail trade and consumer services	-34892		30674	-35275		30659	-34896		23247
Finance and insurance	-2468		31425	-6049		31466	-5804		27635
Real estate, rental and leasing operations	-1767		33970	-4598		33679	-4352		34575
Business services	-29698		30766	-30875		30678	-30612		24450
Education and health services	-21507		32597	-24801		32978	-24629		26697
Information and cultural industries	-32611		32629	-31110		32415	-30828		25440
R-squared	0.018	***		0.024	***		0.026	***	
Change in R-squared				0.006	***		0.002	***	
F for change in R-squared				11.96	***		3.78	*	
N	3154			3154			3154		

[a] All independent variables in the step 1 regression are from 2004 (time 1 (T1)).
[b] All independent variables in the step 2 regression are from year 2005 (time 2 (T2)) except for the other HPWS practices index and training index are from 2004 (time 1 (T1)), and the dependent variable gross profit per employee is from 2006 (time 3 (T3)).
[c] Ordinary least squares with robust bootstrap standard errors.
[d] Large workplaces are the reference category for the workplace size dummy variables and capital intensive tertiary manufacturing in the reference category for the industry dummy variables.

*p<0.10, **p<0.05, ***p<0.01, two-tailed tests

Table A2.2: Regression Results for Innovation and Organizational Performance with Strategy Interactions, Testing the Moderation Structural Model and the Hypotheses Presented in Figure 4

Dependent variable innovation index (standardized) (T2)			
Step 1	**Model 4** [c]		
Variables	**b**		**s.e.**
Constant	0.376		0.313
Other HPWS index [a]	0.069		0.041
Training index	0.189	***	0.046
Strategic activities	0.121	***	0.044
Other HPWS x Strategy	0.017		0.047
Training x Strategy	-0.006		0.048
Presence of collective agreement at workplace	-0.248		0.235
Proportion of employees covered by a collective agreement	0.262		0.324
Proportion of non-permanent employees	-0.203		0.287
Proportion of part-time employees	0.223		0.177
Proportion of employee driven turnover	-0.067		0.174
Proportion of employer driven turnover	-0.011		0.055
Workplace size >=10 & <25 [d]	-0.289		0.254
Workplace size >=25 & <50	-0.286		0.257
Workplace size >=50 & <100	-0.165		0.254
Workplace size medium (100 to <500)	-0.268		0.232
Workplace age	-0.007		0.005
Workplace age (squared)	0.000		0.000
Forestry, mining, oil, and gas extraction [d]	0.036		0.227
Labour intensive tertiary manufacturing	0.027		0.221
Primary product manufacturing	0.062		0.209
Secondary product manufacturing	0.041		0.218
Construction	-0.017		0.227

Transportation, warehousing, wholesale	0.001		0.198
Communication and other utilities	0.023		0.188
Retail trade and consumer services	-0.056		0.214
Finance and insurance	0.001		0.203
Real estate, rental and leasing operations	0.000		0.291
Business services	0.003		0.205
Education and health services	-0.089		0.266
Information and cultural industries	-0.063		0.246
R-squared	0.080	***	
N	3154		

Dependent variable gross profit per employee (dollars) (T3)

Step 2	**Model 4 [c]**		
Variables	**b**		**s.e.**
Constant	50572	*	30077
Innovation index [b]	10311	***	4876
Other HPWS index (T1)	9296	**	3530
Training index (T1)	8287	*	4391
Strategic activities	-461		3203
Innovation x Strategy	-4989	*	3595
Other HPWS x Strategy (T1)	-7344	*	4362
Training x Strategy (T1)	2014		5962
Presence of collective agreement at workplace	57419	*	28354
Proportion of employees covered by a collective agreement	-87419	**	34559
Proportion of non-permanent employees	651		17110
Proportion of part-time employees	-3508		15952
Proportion of employee driven turnover	-9631		9111
Proportion of employer driven turnover	-13312	**	6467
Workplace size >=10 & <25 [d]	21044		19334
Workplace size >=25 & <50	17487		19592

Workplace size >=50 & <100	7004		18249
Workplace size medium (100 to <500)	35213	*	20704
Workplace age	300		585
Workplace age (squared)	-2		7
Forestry, mining, oil, and gas extraction [d]	147366		145002
Labour intensive tertiary manufacturing	-43828	*	29240
Primary product manufacturing	-26598		29160
Secondary product manufacturing	-41153	*	28762
Construction	-27141		29928
Transportation, warehousing, wholesale	-20521		31050
Communication and other utilities	-8005		30796
Retail trade and consumer services	-32842		30379
Finance and insurance	-4213		31480
Real estate, rental and leasing operations	-1076		33563
Business services	-28621		30233
Education and health services	-23511		32411
Information and cultural industries	-28170		32490
R-squared	0.028	***	
N	3154		

[a] All independent variables in the step 1 regression are from 2004 (time 1 (T1)).
[b] All independent variables in the step 2 regression are from year 2005 (time 2 (T2)) except for the other HPWS practices index, training index and their interaction terms with strategy are from 2004 (time 1 (T1)), and the dependent variable gross profit per employee is from 2006 (time 3 (T3)).
[c] Ordinary least squares with robust bootstrap standard errors. Large workplaces are the reference category for the workplace size dummy variables and capital intensive tertiary manufacturing in the reference category for the industry dummy variables.

*p<0.10, **p<0.05, ***p<0.01, two-tailed tests

Table A2.3: Regression Results for the Full Structural Model with Training, Other HPWS, Innovation, and Gross Profit per Employee--Testing the Hypotheses Presented in Figure 5

Dependent variable innovation index (standardized) (T2)

Step 1	**Model 5 [c]**		
Variables	**b**		**s.e.**
Constant	0.167		0.279
Innovation index [a]	0.405	***	0.033
Other HPWS practices index	0.042		0.040
Training index	0.076	**	0.038
Gross profit per employee	0.000		0.000
Strategic activities	0.095	**	0.041
Innovation x Strategy	-0.024		0.033
Other HPWS x Strategy	-0.001		0.038
Training x Strategy	0.030		0.037
Gross profit per employee x Strategy	0.000	***	0.000
Presence of collective agreement at workplace	-0.129		0.183
Proportion of employees covered by a collective agreement	0.064		0.245
Proportion of non-permanent employees	-0.277		0.275
Proportion of part-time employees	0.159		0.159
Proportion of employee driven turnover	0.049		0.154
Proportion of employer driven turnover	-0.033		0.050
Workplace size >=10 & <25 [d]	-0.169		0.227
Workplace size >=25 & <50	-0.157		0.221
Workplace size >=50 & <100	-0.038		0.225
Workplace size medium (100 to <500)	-0.258		0.205
Workplace age	-0.002		0.005
Workplace age (squared)	0.000		0.000
Forestry, mining, oil, and gas extraction [d]	0.087		0.210
Labour intensive tertiary manufacturing	0.045		0.211
Primary product manufacturing	0.076		0.179
Secondary product manufacturing	0.049		0.199

Construction	-0.001		0.193
Transportation, warehousing, wholesale	0.021		0.182
Communication and other utilities	0.055		0.172
Retail trade and consumer services	-0.031		0.202
Finance and insurance	0.032		0.197
Real estate, rental and leasing operations	-0.003		0.244
Business services	0.037		0.183
Education and health services	-0.053		0.238
Information and cultural industries	-0.031		0.205
R-squared	0.225	***	
N	3154		

Dependent variable training index (standardized) (T2)

Step 1	**Model 5** [c]		
Variables	**b**		**s.e.**
Constant	0.021		0.169
Innovation index [a]	0.061		0.039
Other HPWS practices index	0.101	***	0.034
Training index	0.592	***	0.042
Gross profit per employee	0.000		0.000
Strategic activities	0.069	**	0.031
Innovation x Strategy	0.035		0.033
Other HPWS x Strategy	-0.055		0.035
Training x Strategy	0.054		0.033
Gross profit per employee x Strategy	0.000		0.000
Presence of collective agreement at workplace	0.526	**	0.265
Proportion of employees covered by a collective agreement	-0.589	*	0.338
Proportion of non-permanent employees	-0.051		0.311
Proportion of part-time employees	0.018		0.178
Proportion of employee driven turnover	0.196		0.136
Proportion of employer driven turnover	0.106		0.068

Workplace size >=10 & <25 [d]	-0.192		0.131
Workplace size >=25 & <50	-0.032		0.139
Workplace size >=50 & <100	-0.179		0.108
Workplace size medium (100 to <500)	-0.055		0.092
Workplace age	0.004		0.005
Workplace age (squared)	0.000		0.000
Forestry, mining, oil, and gas extraction [d]	-0.003		0.179
Labour intensive tertiary manufacturing	-0.024		0.129
Primary product manufacturing	-0.064		0.136
Secondary product manufacturing	-0.065		0.122
Construction	-0.043		0.196
Transportation, warehousing, wholesale	-0.020		0.144
Communication and other utilities	-0.067		0.143
Retail trade and consumer services	-0.026		0.154
Finance and insurance	0.032		0.142
Real estate, rental and leasing operations	-0.010		0.241
Business services	0.063		0.152
Education and health services	-0.009		0.181
Information and cultural industries	-0.008		0.156
R-squared	0.537	***	
N	3154		

Dependent variable other HPWS practices index (standardized) (T2)

Step 1	**Model 5 [c]**		
Variables	**b**		**s.e.**
Constant	0.254		0.225
Innovation index [a]	0.034		0.028
Other HPWS practices index	0.515	***	0.042
Training index	0.097	**	0.039
Gross profit per employee	0.000		0.000
Strategic activities	0.072	*	0.037

Innovation x Strategy	0.041		0.030
Other HPWS x Strategy	-0.079	*	0.042
Training x Strategy	0.039		0.027
Gross profit per employee x Strategy	0.000		0.000
Presence of collective agreement at workplace	0.185		0.229
Proportion of employees covered by a collective agreement	-0.026		0.307
Proportion of non-permanent employees	0.015		0.184
Proportion of part-time employees	-0.069		0.140
Proportion of employee driven turnover	0.015		0.132
Proportion of employer driven turnover	-0.095		0.059
Workplace size >=10 & <25 [d]	-0.543	**	0.225
Workplace size >=25 & <50	-0.131		0.205
Workplace size >=50 & <100	-0.284		0.200
Workplace size medium (100 to <500)	-0.164		0.203
Workplace age	0.002		0.006
Workplace age (squared)	0.000		0.000
Forestry, mining, oil, and gas extraction [d]	-0.134		0.131
Labour intensive tertiary manufacturing	0.022		0.123
Primary product manufacturing	-0.058		0.109
Secondary product manufacturing	-0.004		0.188
Construction	0.073		0.153
Transportation, warehousing, wholesale	0.085		0.104
Communication and other utilities	-0.100		0.114
Retail trade and consumer services	0.042		0.131
Finance and insurance	0.092		0.112
Real estate, rental and leasing operations	0.104		0.182
Business services	0.124		0.133
Education and health services	0.169		0.141
Information and cultural industries	0.092		0.153
R-squared	0.462	***	
N	3154		

Dependent variable gross profit per employee (dollars) (T2)

Step 1	**Model 5 [c]**		
Variables	**b**		**s.e.**
Constant	-20213		13147
Innovation index [a]	-962		3216
Other HPWS practices index	2695		3198
Training index	-3209		2185
Gross profit per employee	1.028	***	0.102
Strategic activities	9624	**	4703
Innovation x Strategy	594		2297
Other HPWS x Strategy	-3947		2495
Training x Strategy	3952		2804
Gross profit per employee x Strategy	-0.235	**	0.091
Presence of collective agreement at workplace	-9882		17461
Proportion of employees covered by a collective agreement	18287		25293
Proportion of non-permanent employees	14607		23131
Proportion of part-time employees	-47215		28536
Proportion of employee driven turnover	4050		12201
Proportion of employer driven turnover	-607		3699
Workplace size >=10 & <25 [d]	-6414		8424
Workplace size >=25 & <50	-125		12886
Workplace size >=50 & <100	-6056		11342
Workplace size medium (100 to <500)	-6009		6401
Workplace age	-355		392
Workplace age (squared)	4.900		4.168
Forestry, mining, oil, and gas extraction [d]	51413	**	20096
Labour intensive tertiary manufacturing	25089	*	14265
Primary product manufacturing	29721	**	13652
Secondary product manufacturing	35956	***	12816
Construction	27522	**	14762
Transportation, warehousing, wholesale	31098	**	13442

Communication and other utilities	28297	**	11733
Retail trade and consumer services	49922	***	16641
Finance and insurance	34585	**	13662
Real estate, rental and leasing operations	14817		19848
Business services	35888	**	14699
Education and health services	53645	***	16859
Information and cultural industries	25468		16949
R-squared	0.868	***	
N	3154		

Dependent variable gross profit per employee (dollars) (T3)

Step 2	**Model 5 [c]**		
Variables	**b**		**s.e.**
Constant	30321	***	8605
Innovation index [b]	4401	***	1485
Other HPWS practices index	-985		1872
Training index	97		2103
Gross profit per employee	0.965	***	0.028
Strategic activities	-2104		1891
Innovation x Strategy	1704		1404
Other HPWS x Strategy	1012		1569
Training x Strategy	-3583	**	1524
Gross profit per employee x Strategy	0.042		0.030
Innovation x Training	-1177		1564
Innovation x other HPWS	-2125		1448
Training x other HPWS	171		1544
Innovation x Training x Strategy	3520	**	1465
Innovation x other HPWS x Strategy	-890		1100
Training x other HPWS x Strategy	-1907		1385
Presence of collective agreement at workplace	-912		12411
Proportion of employees covered by a collective agreement	-3428		15431

Proportion of non-permanent employees	25425	**	11027
Proportion of part-time employees	-1286		9151
Proportion of employee driven turnover	-7128		4780
Proportion of employer driven turnover	-1640		2344
Workplace size >=10 & <25 [d]	-16121	**	6806
Workplace size >=25 & <50	-13683	**	6652
Workplace size >=50 & <100	-13471	*	7808
Workplace size medium (100 to <500)	-12399	*	6434
Workplace age	-406	*	232
Workplace age (squared)	3.915		2.652
Forestry, mining, oil, and gas extraction [d]	-1824		7449
Labour intensive tertiary manufacturing	-14811	**	6372
Primary product manufacturing	-10477	*	6128
Secondary product manufacturing	-13490	**	5742
Construction	-1236		7667
Transportation, warehousing, wholesale	-13594	*	7180
Communication and other utilities	-12554	**	6037
Retail trade and consumer services	-7929		4775
Finance and insurance	-928		5753
Real estate, rental and leasing operations	-13401	*	7949
Business services	-6423		4501
Education and health services	-3143		8818
Information and cultural industries	-7712		6103
R-squared	0.925	***	
N	3154		

[a] All independent variables in the step 1 regression are from 2004 (time 1 (T1)) and all of the dependent variables are from 2005 (time 2 (T2)).
[b] All independent variables in the step 2 regression are from year 2005 (time 2 (T2) and the dependent variable gross profit per employee is from 2006 (time 3 (T3)).

[c] Ordinary least squares with robust bootstrap standard errors.
[d] Large workplaces are the reference category for the workplace size dummy variables and capital intensive tertiary manufacturing in the reference category for the industry dummy variables.

*p<0.10, **p<0.05, ***p<0.01, two-tailed tests

Full Model Output for Micro-level Regressions

Table A2.4: Probit Regression Results for the Micro-level Model, Testing the Hypotheses Presented in Figure 6

Dependent variables (1/0)	**Offer to train from employer (yes/no)**			**Employee decision (decline/accept)**			**Job-related training (yes/no)**		
	Model 6 [c]			**Model 7 [c]**			**Model 8 [c]**		
Variables [a]	**b**		**s.e.**	**b**		**s.e.**	**b**		**s.e.**
Constant	-0.911	**	0.350	-2.215	***	0.347	-1.103	***	0.355
Strategic activity [b]	0.020		0.023	0.024		0.029	0.010		0.022
Innovation index [b]	-0.006		0.023	-0.018		0.028	-0.005		0.023
Gross profit per employee [b]	0.018	*	0.010	0.020	**	0.009	0.010		0.009
Other HPWS practices index [b]	0.046	***	0.017	0.038		0.027	0.035	**	0.016
Training index [b]	0.079	***	0.022	0.023		0.026	0.080	***	0.021
Employee other HPWS practices index	0.267	***	0.029	0.083	***	0.027	0.272	***	0.029
Technology use	0.297	***	0.051	-0.016		0.076	0.356	***	0.053
Technology change	0.173	***	0.053	0.095		0.068	0.155	**	0.068
Percentage change more hours preferred				0.000		0.001	0.000		0.001
Percentage change less hours preferred				0.007	**	0.003	-0.001		0.002
Career related training (non-sponsored)				0.135		0.088	0.064		0.096
Not directly job-related training (sponsored)				-0.058		0.106	0.193		0.126
Perception of training need				-0.327	***	0.056	-0.044		0.052
Employee decision (decline training)				--		--	0.214	***	0.066
Job-related training				0.184	***	0.054	--		--

Employees usually make training decision [b]	-0.021		0.055	-0.068		0.082	-0.032		0.055
Employer usually makes training decision [b]	-0.028		0.060	0.051		0.079	-0.016		0.059
Primary sector [b]	0.334	***	0.114	0.083		0.130	0.319	**	0.134
Construction, transportation and utilities [b]	0.129	**	0.058	0.123		0.079	0.122	**	0.058
Other service sectors [b]	0.200	***	0.070	0.184	**	0.078	0.186	***	0.065
Education and health services [b]	0.427	***	0.125	0.494	***	0.149	0.283	**	0.114
Workplace size >=10 & <25 [b]	0.089		0.084	-0.245	**	0.101	0.175	**	0.079
Workplace size >=25 & <50 [b]	0.002		0.098	-0.178		0.108	0.059		0.100
Workplace size >=50 & <100 [b]	-0.082		0.082	-0.232	**	0.105	0.003		0.081
Workplace size medium (100 to <500) [b]	0.020		0.068	-0.135		0.090	0.076		0.066
Workplace age [b]	-0.002		0.003	-0.003		0.004	-0.002		0.003
Workplace age (squared) [b]	0.000		0.000	0.000		0.000	0.000		0.000
Proportion of employee driven turnover [b]	-0.052		0.099	-0.255	**	0.107	0.012		0.099
Proportion of employer driven turnover [b]	-0.022		0.018	-0.141	***	0.048	-0.005		0.018
Less than high school	-0.115		0.072	-0.009		0.099	-0.124		0.075
Some post-secondary	0.114	*	0.064	0.003		0.085	0.101	*	0.061
Post-secondary diploma	0.094		0.068	0.035		0.086	0.074		0.068
Undergraduate degree	0.052		0.069	0.031		0.090	0.049		0.068
Post-graduate degree	0.161		0.122	0.124		0.143	0.085		0.117
Managers	0.299	***	0.113	0.147		0.149	0.247	*	0.125
Professionals	0.283	**	0.119	0.142		0.139	0.263	**	0.122
Technical/trades	0.255	**	0.099	0.094		0.131	0.255	**	0.105
Marketing/sales	0.274	*	0.160	0.030		0.171	0.289	*	0.160
Clerical/administrative	0.353	***	0.116	0.033		0.134	0.377	***	0.118
Tenure with employer	-0.007		0.008	0.000		0.011	-0.008		0.008
Tenure with employer (squared/100)	0.019		0.025	0.003		0.036	0.023		0.024

Temporary full-time	-0.195	**	0.093	-0.150		0.124	-0.185	**	0.090
Regular part-time	0.123		0.095	0.216	**	0.108	0.055		0.105
Temporary part-time	-0.093		0.156	-0.221		0.176	-0.059		0.148
Log(hourly wage)	0.247	***	0.088	0.311	***	0.084	0.216	***	0.078
Collective agreement coverage	-0.247	***	0.054	-0.131	*	0.073	-0.225	***	0.053
Age	-0.036	**	0.014	-0.001		0.016	-0.035	**	0.015
Age (squared/100)	0.036	**	0.016	-0.003		0.019	0.036	**	0.017
Gender (female)	-0.004		0.050	-0.061		0.052	-0.006		0.047
Marital status (married)	0.060		0.049	-0.034		0.061	0.058		0.042
Dependent child(ren)	0.049		0.049	0.024		0.054	0.059		0.050
Immigrant age-at-arrival 0 to 9	-0.135		0.088	-0.115		0.149	-0.094		0.103
Immigrant age-at-arrival 10 to 18	-0.085		0.100	0.109		0.137	-0.152		0.093
Immigrant age-at-arrival 19 to 35	-0.095		0.079	-0.158		0.104	-0.038		0.075
Immigrant age-at-arrival 36 plus	0.045		0.194	0.035		0.199	-0.063		0.217
Pseudo R-squared	0.111	***		0.082	***		0.110	***	
N	24977			24977			24977		

[a] The following variables are the reference categories for the sets of binary variables included in the models manufacturing (industry), workplace size large (>500) (workplace size), high school graduate (education levels), production workers (occupation groups), regular full-time (employment type), and Canadian-born (immigration status).
[b] These are workplace-level variables. The gross profit per employee variables are in dollars. The innovation, training, and HPWS indexes are all workplace-level composite scales (workplace-level z-score standardized values are presented here; note the means are not zero because this is an employee-level sample). The strategic activities variable is an angle within the PL and OE space.

[c] Probit regressions with robust bootstrap standard errors.

*p<0.10, **p<0.05, ***p<0.01, two-tailed tests

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