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Introduction

One of the main problems facing organizations is not just how to remain locally or regionally competitive but how to remain or become globally competitive. One of the main options available is to continue to focus on improvements in human capital and innovation as sources of competitive advantage (*Bae et al., 2003; Jenkins et al., 2011*). A growing interest among managers and policymakers in the relationship between human capital and improved innovation, as the main sources of maintaining a competitive advantage, leads to the main research question of this study: do skill-enhancing, motivation-enhancing and opportunity-enhancing bundles of human resource practices lead to innovation and subsequent higher levels of organizational performance when strategic activities are in alignment or are these relationships universal across strategies?

Underlying most of the macro-level HRM research is the implicit assumption that the HRM practices themselves do not directly 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, for example (*Delery, 1998*). 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 & Huselid, 1998, 2006; Messersmith & Guthrie, 2010*). Studies are beginning to explore elements of the transmission pathways from HRM practices to organizational performance, including employee outcomes (e.g. attitude, behaviours, human capital and employee motivation) and organizational operational outcomes (e.g. innovation, productivity and customer service) (*Takeuchi et al., 2007; Liao et al., 2009; Messersmith et al., 2011; Jiang et al., 2012b; Kehoe & Wright, 2013*).

Exploring the relationship between HRM practices and organizational performance and the transmission pathways is rooted in the knowledge that human resources can be developed into a source of sustained competitive advantage by understanding the value that more able employees, given opportunity to act and appropriately motivated can contribute to the organization (*Wright et al., 2001*).

HRM research that focuses on high-performance work systems (HPWS) tends to emphasize a systems approach as opposed to isolating the importance of particular practices (e.g. *Huselid, 1995*). Often, the use of indexes of systems of HRM practices implies that ‘more is better’, and by implementing the system, it will universally result in improved performance (*Becker & Huselid, 1998a*). 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 – 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 & Neumark, 2001; Kaufman, 2010*).

This study addresses the universality critique (i.e. more is better) by taking a sub-bundle approach, where skill-enhancing, motivation-enhancing and opportunity-enhancing sub-bundles of practices are of interest.

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Similar in spirit to *Guest et al. (2004)*, which uses a sequential tree analysis to identify a more parsimonious set of practices that are associated with outcomes, the current study uses a parsimonious sub-bundle approach to isolate the effects of bundles on outcomes to produce a better understanding of which bundles are associated with higher (or lower) innovation and organizational performance outcomes. Thus, this study separates out skill-enhancing, motivation-enhancing and opportunity-enhancing bundles of practices to enable an investigation of key factors affecting the innovation and organizational performance relationship. Further, strategic activities are included as a moderator of both the sub-bundles and innovation relationship and the innovation and organizational performance relationship.

The current 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 HRM sub-bundles and innovation and their joint effect on organizational performance through time can be understood. Further, the inverse innovation and HRM sub-bundles relationship is also explored. This framework permits the simultaneity of the links to be explored in addition to causal links. Further, strategic activities are included as a factor that moderates both the HRM sub-bundles 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 skill-enhancing, motivation-enhancing and opportunity-enhancing bundles of practices are predictive of innovation and whether this innovation then leads to organizational performance.

Theory and development of hypotheses

This study uses resource-based theory (RBT) as a foundation to support the identification of human resources as an enduring source of an organization's competitive advantage (*Wright et al., 2001; Barney et al., 2011*). 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*). Specially, HRM practices that are aligned with organizational strategy are seen as critical to offering a potential source of persistent competitive advantage for organizations.

Becker and Huselid (1998a) argue the pathway between HRM practices and organizational performance includes a process of strategy implementation. *Messersmith and Guthrie (2010)* see firm processes as a part of the transmission linkage; they summarize the HPWS literature as generally theorizing that human capital (knowledge, skills and ability), social capital (relationships) and employee behaviours (innovation and strategically congruent behaviour) comprise the causal linkage. Of particular interest to this 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)*, but also illustrates the 'black box' as a mediator of the HRM practices and organizational performance relationship. This study contributes to the literature by identifying a transmission process and explicitly establishing the pathway from HRM bundles skill, motivation and opportunity to innovation to organizational performance.

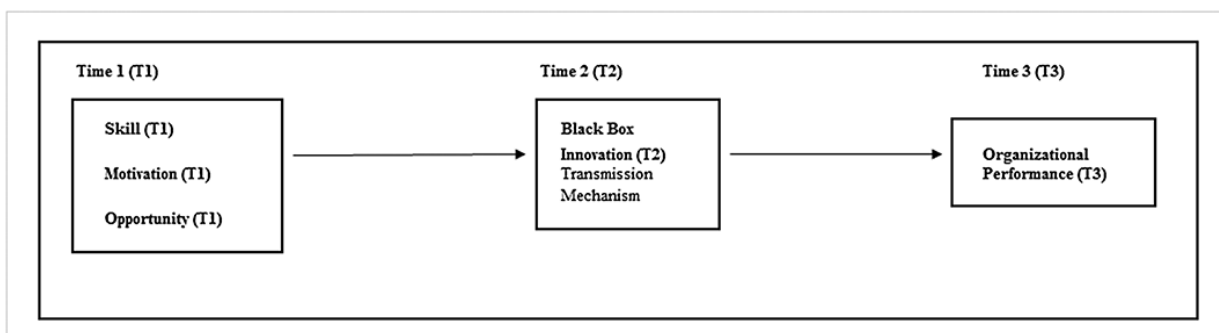


Figure 1. Dynamic transmission mechanism model of skill-enhancing, motivation-enhancing and opportunity-enhancing bundles of practices, innovation and organizational performance at the workplace level

The timing of the implementation of HRM practices and the transmission processes through to organizational performance is not explicitly explored in this study. Rather, it is acknowledged that some HRM practices can be incrementally implemented and evolve in effectiveness, transmission processes may take varying amounts of time to achieve their full impact (*Cohen & Levinthal, 1990*) and the full effect on performance may vary across workplaces, training quality and the nature of the innovation. Thus, this study focuses on the temporal relationships over 1-year period (*e.g.* the gap between time 1 and time 2 is 12 months; *Figure 1*). This is not an assumption that these processes achieve their full effect over this 1-year period, because it is clear that a specific standard time length for HRM implementation and transmission processes across heterogeneous workplaces has not yet been rigorously investigated (*Wright & Haggerty, 2005*). For this theoretical framework, it is assumed that the effect of changes in HRM practices, innovation and organizational performance will at least have an impact within a 1-year period, even if the full cumulative effect has not yet been realized.

The core relationships being investigated are the following: skill-enhancing, motivation-enhancing and opportunity-enhancing HRM bundles of practices in time 1 are determinants of innovation in time 2, and innovation leads to organizational performance in time 3. It is proposed that skill-enhancing practices, including recruitment and selection methods, and training leads to the development of innovation (*Guest et al., 2004; Walsworth & Verma, 2007; Jiang et al., 2012b*). The types of knowledge, skills and abilities (KSAs) that are present within an organization are the result of managers' evidence-based decisions during the hiring process. The hiring process includes recruitment to reach and encourage a sufficient pool of applicants (*e.g.* multimedia advertising and networking on campus and job fairs) and selection of the most appropriate persons (using tests for skills and personality and interviews to aid selection, for example). The hiring of individuals with the requisite KSAs creates a context that enables employees to innovate (*Schuler & Jackson, 1987*). *De Winne and Sels (2010)* find a positive association between measures of selection (such as number of HR practices, number of independent board members and number of experts consulted) and innovation output. Following the hiring process, existing employee knowledge and skill levels can be optimized to fit organizational needs through training (*De Winne & Sels, 2010; Jiang et al., 2012a*). Training provides knowledge, skill improvement and learning, which expands the possible creative domain available to employees, thereby fostering innovation. In addition to the quantity and diversity of knowledge and skills conveyed, quality is also important; effective training can help employees better understand what they do not know, what they and their organization do well and do not do well, and challenge/inspire the employee to strive to improve and invent. Thus, innovation becomes more likely when competencies and capabilities are enhanced through quantity, diversity and quality of training.

In the current 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 from HRM practices (and new organizational or administrative practices), and as a result, the multidimensionality of innovation is not ignored. Thus, 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. Innovation has been linked to organizational performance (*Delery & Doty, 1996; Thornhill, 2006*), where innovations enable more efficient and effective processes and thereby reduce costs or they enable superlative products and increase revenues. These findings lead to the following hypothesis, which follows a structure common in the literature (*Takeuchi et al., 2007; Messersmith et al., 2011; Jiang et al., 2012b; Kehoe & Wright, 2013*):

Hypothesis 1a. Innovation in time 2 mediates the positive relationship between the skill-enhancing bundle of practices in time 1 and organizational performance in time 3.

Despite the frequent reference to the relationship between skills (in particular training) and innovation in the literature, the relationship between other HRM practices, such as motivation-enhancing and opportunity-enhancing practices, and innovation has received less attention (*Chowhan, 2013*). Motivation-enhancing practices, such as direct compensation (individual and group pay for performance schemes), promotion opportunity and benefits, contribute to rewarding and encouraging employee behaviour and eliciting discretionary effort (*Delery & Doty, 1996; Liao et al., 2009*). In the context of innovation, rewarding creative proposals for new or improved products and processes can foster a workplace environment where employees are encouraged to be creative, do not fear failure and are rewarded for initiative.

Opportunity-enhancing practices, such as autonomous work, self-directed work groups, flexible job design and information sharing, enhance the opportunity for employees to contribute (*Boxall & Macky, 2009*). When employees feel they can contribute to influencing change, and work practices allow for idea sharing and autonomy, these conditions can enable innovative thinking and activities. Further, empowering employees and creating the opportunity to contribute or participate removes controls, enables self-initiation, opens communications and makes possible the greatest attainable advantage from discoveries.

Thus, based on the well-established relationships between HRM practices and organizational performance (*Huselid, 1995; Delery & Doty, 1996; Youndt et al., 1996*) and innovation and performance (*Delery & Doty, 1996; Thornhill, 2006*), and given these recent results (discussed previously) indicating a positive relationship between motivation-enhancing and opportunity-enhancing practices and innovation, it is expected that innovation is also a part of the transmission mechanism mediating the relationship between motivation-enhancing and opportunity-enhancing practices and organizational performance.

Hypothesis 1b. Innovation in time 2 mediates the positive relationship between the motivation-enhancing bundle of practices in time 1 and organizational performance in time 3.

Hypothesis 1c. Innovation in time 2 mediates the positive relationship between the opportunity-enhancing bundle of practices in time 1 and organizational performance in time 3.

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. The linkage between level of competition and strategy is rooted in a distinction (*suggested by Porter, 1985*) between corporate strategy and business unit strategy, where corporate strategy emphasizes the overall plan in a large diversified enterprise, and business unit strategies that 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. Adapting *Becker and Huselid's (2006)* focus on strategic activities as processes, the current study defines strategic activities as processes that are rooted in pivotal choices that affect all planning and decision-making. For example, a choice to be a product leader would be associated with strategic activities such as

undertaking research and development, developing new products or production process; whereas a choice to focus on operation excellence would be associated with total quality management, reorganizing the work process, labour-management cooperation and improvements in employee skills and involvement (Treacy & Wiersema, 1997; Thornhill & White, 2007). Further, the strategic activities selected by the workplace situate the workplace within a strategic dimensional space where varying mixes of strategic activities can be combined. Thus, organizations can select a mix of strategies that are the most appropriate for their context.

The previous findings (Delery & Doty, 1996; Huselid, 1995; Youndt et al., 1996) taken together indicate that performance improvements are associated with increasing employees' potential to contribute to their organization through either more employees having access to skill-enhancing, motivation-enhancing and opportunity-enhancing practices or more practices and a higher tendency toward a particular strategic categorization. Thus, more focused relatively pure product leadership and operational excellence strategies are more likely to have stronger moderating effects with skill-enhancing, motivation-enhancing and opportunity-enhancing practices on innovation and organizational performance (Figure 2). Thus, a significant positive or negative moderator relationship indicates the importance of relative strategic purity, and non-significance indicates no difference from the 'in-the-middle' approach. This leads to the following hypotheses:

Hypothesis 2a. Strategic activities in time 1 will significantly moderate the relationship between the skill-enhancing bundle of practices in time 1 and innovation in time 2.

Hypothesis 2b. Strategic activities in time 1 will significantly moderate the relationship between the motivation-enhancing bundle of practices in time 1 and innovation in time 2.

Hypothesis 2c. Strategic activities in time 1 will significantly moderate the relationship between the opportunity-enhancing bundle of practices in time 1 and innovation in time 2.

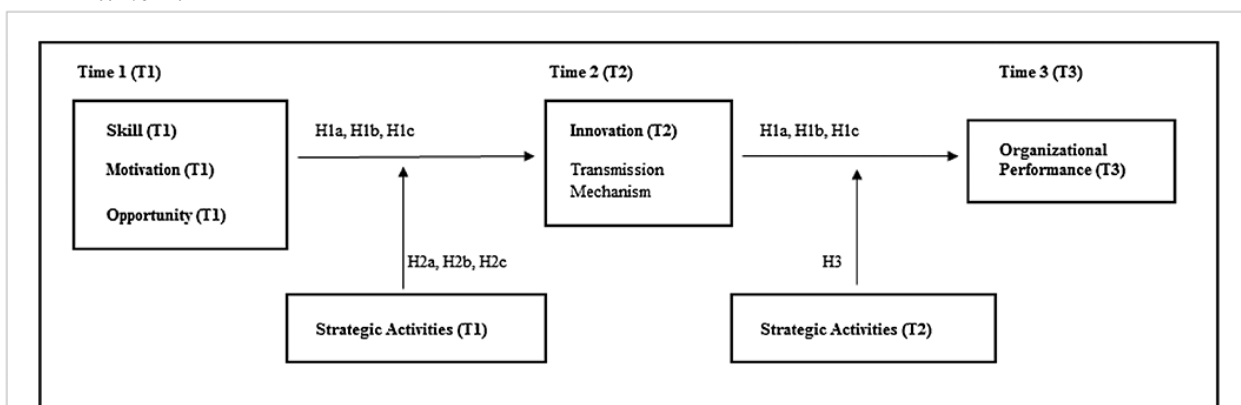


Figure 2. Dynamic transmission mechanism model of skill-enhancing, motivation-enhancing and opportunity-enhancing bundles of practices, innovation and organizational performance at the workplace level with strategic contingencies

Formal innovation strategies, innovation and technological capabilities have been found to be associated with organizational performance (Terziovski, 2010). This suggests that a positive moderating effect of product leadership strategy on innovation implies organizations with strong alignment are more able to identify, adopt and implement change (compared with organizations that have a weaker alignment) leading to higher performance levels (Figure 2):

Hypothesis 3. The positive effect of innovation in time 2 on organizational performance in time 3 will be positively moderated by relatively pure product leadership strategic activities in time 2.

Methodology

Data

The Workplace and Employee Survey (WES) 2003–2006 from Statistics Canada is used to address the hypotheses identified previously. The strengths of the WES are that it is a longitudinal data set that is nationally representative of workplaces in Canada and it includes non-government business sector employers stratified by industry, region and workplace employment size (*Statistics Canada, 2007*). Non-profit and workplaces with less than 10 employees are dropped; only workplaces with longitudinal records entering the sample in 1999, 2001 and 2003 are kept ($n = 3,176$ for the period 2003 to 2006), and missing values are dropped (leaving a sample of $n = 3,154$). This sample is nationally representative of 146,627 workplaces.

Measurement

In this study, the index approach is used for the measurement of key concepts of interest – skill-enhancing, motivation-enhancing, opportunity-enhancing practices and innovation. Items are combined based on a theoretical basis and the previous empirical literature.

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 (*Huselid, 1995; Becker & Huselid, 1998a; Datta et al., 2005*); 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.

Skill-enhancing bundle

The skill-enhancing sub-bundle focuses on selection methods, recruitment methods, unfilled position vacancies and training. The recruitment methods include the following items: help wanted ad, on-campus recruitment, news story, job fair, etc. For the selection methods, the following practices are observed: tests for specific skills, aptitude or other personality testing, test on job-related knowledge etc. Workplaces are identified as either using a practice or not using a practice. The identification for each of the selection items is based on whether or not employees reported being required to participate in these practices when hired by the organization. The measure of vacancy indicates 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.

There are three main training components that measure both the breadth and intensity of training. Training breadth is measured by looking at non-mandatory types of classroom and on-the-job training taken: managerial/supervisory; professional; sales and marketing; etc. Training intensity is measured by including the number of employees who received classroom training and the number who received on-the-job training separately and the total direct costs of classroom training.

Motivation-enhancing bundle

The motivation-enhancing bundle has three component bundles: (a) direct compensation, (b) promotion opportunity and (c) 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: (a) individual incentives (bonuses, piece-rate and commissions), (b) productivity/quality gain-sharing and other group incentive plans, (c) profit-sharing, (d) merit pay or skill-based pay and (e) employee stock plans. The promotion opportunity measure looks at how the vacant positions are usually staffed for each of the occupation groups (*i.e.* (a) from within the workplace, (b) from another workplace within the same legal company or business enterprise or (c) from outside the company). 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.

Opportunity-enhancing bundle

The opportunity to perform sub-bundle additively combines the standardized scores of the following sub-bundles: (a) work practices, (b) autonomy and (c) grievance process. The work practices sub-bundle includes six items that are additively combined weighted by the proportion of non-management employees that participate in the practices: employee's suggestion program, flexible job design, information sharing with employees, problem-solving teams, joint labour-management committees and self-directed work groups. 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 grievance process measure combines types of disputes and final authority to settle the issues.

Innovation

The innovation index is composed of five measures of innovation and three measures of new technology implementation. Innovations include the introduction of (a) new products or services, (b) improved products or services, (c) new processes or (d) improved processes, and whether their most important innovation was (a) a world first, (b) a Canadian first, (c) a local market first, (d) not a first (*i.e.* none of the above) or (e) no innovation (not applicable). These measures assess both the nature and novelty of the innovation. The implementation of new technology includes (a) computer hardware or software, (b) computer-controlled or computer-assisted technology and (c) other technology or machinery.

Organizational performance

This study uses a narrower conceptualization of organizational performance: gross profit per employee. Gross operating revenue and gross operating expenditure measures enable the generation of a gross profit measure, which can then be divided by the total number of full-time workplace employees.

Strategic activities

In the WES, employers were asked how important the following strategic activities were in their general business strategy: (a) undertaking research and development, (b) developing new products/services, (c) developing new production/operating techniques, (d) expanding into new geographic markets, (e) total quality management, (f) improving product/service quality, (g) reducing labour costs, (h) using more part-time, temporary or contract workers, (i) reducing other operating costs, (j) reorganizing the work process, (k) enhancing labour-management cooperation, (l) increasing employees' skills, (m) increasing employees' involvement/participation, (n) improving coordination with customers and suppliers and (o) improving measures of performance.

Exploratory factor analysis is used to identify distinct strategic factors. Two main factors were revealed: the first included the items (from the aforementioned list) a–d, and the second items: e, f and j–o. These factors are similar to the product leadership and operational excellence factors identified by *Thornhill and White (2007)* (with 2004 and 2005 mean $\alpha = 0.80$ and $\alpha = 0.88$, respectively) and have an established use as generic strategies (*Treacy & Wiersema, 1997*). The cost focused strategic items listed previously (items g–i) are not included in the analysis – based on low communality values for item h of <0.20 in both 2004 and 2005.

An angular measure of *strategic activities* is used in the analysis. Product leadership (PL) is derived by additively combining the four identified items into a scale ranging from 0 to 20, and operational excellence (OE) combines eight items (*i.e.* 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 & White, 2007*). From the PL and OE measures, a composite strategic orientation can be calculated as follows: $SP = \arctan(PL/OE)$. SP is the

angular measure of the workplace's coordinate with respect to the horizontal axis. As SP approaches 90 degrees (vertical axis), 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 & White, 2007*). Over the 2004 to 2006 period, the average SP is 35 degrees with a range of 11 to 70 in the PL/OE space. For use in the analysis the angular measure is standardized.

Control variables

In addition to the main variables identified previously, several variables will be used as controls to avoid a misspecification of the model and omitted variable bias in the estimation. These additional variables are: presence of collective agreement at the workplace, proportion of employees at the workplace that are covered by a collective agreement, proportion of non-permanent employees, proportion of part-time employees, proportion of employee-driven turnover, proportion of employer-driven turnover, workplace size, workplace age and industry groups.

Analysis

The main estimation technique used is generalized least squares (GLS) (*Greene, 2003*). The iterated GLS 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). The GLS method enables the estimation of a system of structural equations and can account for the correlation of disturbances across equations by iterating until convergence is achieved in the covariance matrix and parameter estimates. The analysis uses the 2003 sample survey weight to adjust for the probability of selection.

Results

Table 1 presents the correlations for gross profit per employee, innovation index, skill index, motivation index, opportunity index and strategic activities. The mean gross profit per employee for the years 2004, 2005 and 2006 is approximately \$45,400. All of these variables have positive relationships of a magnitude consistent with previous studies (*Huselid, 1995; Delery & Doty, 1996; Guest et al., 2003*). These significant correlations establish the basic relationships outlined in *Figures 1 and 2*.

TABLE 1 Mean, standard deviations and correlations statistics for the main variables in the structural model

Variables*	1	2	3	4	5	6	7	8	9	10	11	12
1 2006 gross profit per employee												
2 2005 gross profit per employee	0.88**											
3 2004 gross profit per employee	0.79**	0.84**										
4 2005 innovation index	0.09**	0.06**	0.04*									
5 2004 innovation index	0.10**	0.06**	0.05**	0.45**								
6 2005 skill index	0.06**	0.06**	0.07**	0.28**	0.28**							
7 2004 skill index	0.11**	0.11**	0.12**	0.22**	0.31**	0.70**						
8 2005 motivation index	0.08**	0.10**	0.06**	0.19**	0.19**	0.30**	0.25**					
9 2004 motivation index	0.12**	0.12**	0.09**	0.15**	0.20**	0.26**	0.30**	0.73**				
10 2005 opportunity index	0.00	0.00	0.01	0.21**	0.15**	0.34**	0.29**	0.31**	0.19**			
11 2004 opportunity index	0.05*	0.06**	0.03	0.17**	0.19**	0.36**	0.34**	0.35**	0.34**	0.73**		
12 2005 strategic activities	0.03	0.03	0.02	0.11**	0.08**	0.14**	0.11**	0.09**	0.07**	0.07**	0.02	
13 2004 strategic activities	0.02	0.01	0.01	0.15**	0.16**	0.17**	0.12**	0.11**	0.08**	0.09**	0.05**	0.81**

*n = 3,154. The gross profit per employee variables is modified Box-Cox transformations of dollars measures. The innovation, skill, motivation and opportunity 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.

Tables 2 and 3 present the regression results for the hypotheses identified in Figure 2. This study uses a three-step analysis to test for mediation (Baron & Kenny, 1986; Mathieu et al., 2008; Wood et al., 2008). In Table 2, models 1 and 2 present the relationship between the skill, motivation and opportunity indexes and both the innovation and gross profit per employee-dependent variables, respectively. For the three-step analysis, significant relationships are observed for steps 1 and 2 for only the skill index. In particular, the skill index in time 1 has a positive significant relationship with innovation in time 2 ($b = 0.16$, $p < 0.01$), and the skill index in time 1 has a positive significant relationship with gross profit per employee in time 3 ($b = 0.035$, $p < 0.05$) – as was already seen in the correlations. In model 3, the hypotheses for the basic mediation model are tested, the addition of the time 2 innovation variable in the gross profit per employee (time 3) regression results in a decrease in the magnitude of the effects for skill, motivation and opportunity indexes in time 1, but because the coefficients are not zero, the mediation effect is only partial. Thus, there is only partial support for Hypothesis 1a – that innovation partially mediates the skill-performance relationship – the z-test statistic is 2.70 for the Sobel test. This result is similar to findings by Jiang et al. (2012b). With regard to Hypotheses 1b and 1c, there is no support for innovation in time 2 positively mediating either motivation-enhancing or opportunity-enhancing bundles of practices in time 1 and gross profit per employee in time 3 relationship.

TABLE 2 Hierarchical regression results for innovation and organizational performance

Dependent variable	Model 1 ^a		Model 2		Model 3	
	Innovation Index (standardized) (T2)		Gross profit per employee (dollars with modified Box–Cox transformation) (T3)		Gross profit per employee (dollars with modified Box–Cox transformation) (T3)	
Variables	<i>b</i>	s.e.	<i>b</i>	s.e.	<i>b</i>	s.e.
Constant	0.331	0.320	41.459***	0.172	41.429***	0.172
Innovation index (T2) ^b	—	—	—	—	0.064***	0.013
Skill index (T1)	0.160***	0.050	0.046***	0.014	0.035**	0.014
Motivation index (T1)	0.063	0.051	0.069***	0.014	0.066***	0.014
Opportunity index (T1)	0.106**	0.049	–0.007	0.014	–0.014	0.014
Control variables ^c	Yes		Yes		Yes	
R ²	0.090***		0.493***		0.496***	
N	3,154		3,154		3,154	

^aAll independent variables in the robust ordinary least squares model 1 regression are from 2004 (time 1 (T1)).

^bAll independent variables in models 2 and 3 regression are from year 2005 (time 2 (T2)) except for the skill, motivation and opportunity indexes are from 2004 (time 1 (T1)), and the modified Box–Cox-transformed dependent variable gross profit per employee is from 2006 (time 3 (T3)).

^cThe control variables for model 1 are from time 1, and for models 2 and 3, they are from time 2. The following sets of control variables are included in the models: strategy, gross profit per employee, union coverage, employee turnover, workplace, size and industry.

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

Table 3 (model 4) presents a more complex and inter-related set of relationships. This framework contributes to the literature by further extending the above core theoretical model – time 1 factors and their relationships with time 2 innovation, skill, motivation and opportunity indexes 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, skill-enhancing, motivation-enhancing and opportunity-enhancing practices, and gross profit per employee. Further, strategic activity is included as a moderator in addition to interactions between the key time 2 variables of interest including innovation, skill, motivation and opportunity. These models test the basic moderation–mediation model and the hypotheses presented in Figure 2.

TABLE 3 Regression results for the full structural model with skill, motivation, opportunity indexes, innovation and gross profit per employee

Step 1	Model 4 ^b			Model 4 ^b			Model 4 ^b		
	Innovation index	Skill index	Motivation index	Skill index	Motivation index	Opportunity index	Innovation index	Skill index	Opportunity index
Variables	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>	<i>b</i>
Constant	0.088	0.041	0.133	0.041	0.133	0.17	0.088	0.041	-0.007
Innovation index (T1) ^a	0.388***	0.048***	0.029**	0.048***	0.029**	0.01	0.388***	0.048***	-0.009
Skill index (T1)	0.056***	0.594***	0.002	0.594***	0.002	0.02	0.056***	0.594***	0.040***
Motivation index (T1)	0.034*	0.006	0.676***	0.006	0.676***	0.01	0.034*	0.006	-0.075***
Opportunity index (T1)	0.093***	0.115***	0.111***	0.115***	0.111***	0.01	0.093***	0.115***	0.703***
Strategic activities (T1)	0.089***	0.075***	0.038***	0.075***	0.038***	0.01	0.089***	0.075***	0.036***
Innovation × Skill (T1)	0.041***	-0.005	-0.001	-0.005	-0.001	0.01	0.041***	-0.005	0.035***
Innovation × Motivation (T1)	0.036**	0.007	-0.013	0.007	-0.013	0.01	0.036**	0.007	0.005
Innovation × Opportunity (T1)	-0.005	0.040***	-0.018	0.040***	-0.018	0.01	-0.005	0.040***	-0.018
Skill × Strategic activities (T1)	0.026	0.051***	0.047***	0.051***	0.047***	0.02	0.026	0.051***	-0.015
Motivation × Strategic activities (T1)	-0.009	-0.041***	-0.023	-0.041***	-0.023	0.01	-0.009	-0.041***	-0.014
Opportunity × Strategic activities (T1)	0.029	0.003	0.020	0.003	0.020	0.01	0.029	0.003	0.019
Innovation × Strategic activities (T1)	-0.033*	0.031**	0.008	0.031**	0.008	0.01	-0.033*	0.031**	0.062***
Innovation × Skill × Strategic activities (T1)	-0.022	-0.019*	-0.012	-0.019*	-0.012	0.01	-0.022	-0.019*	0.021*
Innovation × Motivation × Strategic activities (T1)	-0.003	0.046***	0.013	0.046***	0.013	0.01	-0.003	0.046***	-0.013
Innovation × Opportunity × Strategic activities (T1)	0.016	-0.042***	-0.033***	-0.042***	-0.033***	0.01	0.016	-0.042***	-0.020
Skill × Motivation × Opportunity (T1)	-0.011	0.002	-0.009	0.002	-0.009	0.01	-0.011	0.002	0.000
Innovation × Skill × Motivation × Opportunity × Strategic activities (T1)	-0.021**	-0.008	0.007	-0.008	0.007	0.01	-0.021**	-0.008	0.001
Gross profit per employee (\$10,000) (T1)	0.001	-0.001	0.000	-0.001	0.000	0.00	0.001	-0.001	0.000
Control variables (T1) ^c	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.233***	0.543***	0.557***	0.233***	0.543***	0.557***	0.233***	0.543***	0.561***
N	3,154	3,154	3,154	3,154	3,154	3,154	3,154	3,154	3,154

TABLE 3 (Continued)

Step 2	Model 4 ^b	
Dependent variable modified Box-Cox transformation (T3)	Gross profit per employee (dollars)	
Variables	<i>b</i>	s.e.
Constant	41.523***	0.17
Innovation index (T2) ^d	0.146***	0.03
Skill index (T2)	0.060**	0.03
Motivation index (T2)	0.076***	0.02
Opportunity index (T2)	-0.045**	0.02
Strategic activities (T2)	-0.003	0.01
Innovation × Skill (T2)	-0.041**	0.01
Innovation × Motivation (T2)	-0.012	0.01
Innovation × Opportunity (T2)	0.001	0.01
Skill × Strategic activities (T2)	-0.036**	0.02
Motivation × Strategic activities (T2)	-0.013	0.01
Opportunity × Strategic activities (T2)	0.031**	0.01
Innovation × Strategic activities (T2)	0.000	0.01
Innovation × Skill × Strategic activities (T2)	0.018	0.01
Innovation × Motivation × Strategic activities (T2)	-0.019	0.01
Innovation × Opportunity × Strategic activities (T2)	-0.027*	0.01
Skill × Motivation × Opportunity (T2)	-0.015**	0.01
Innovation × Skill × Motivation × Opportunity × Strategic activities (T2)	0.005	0.01
Gross profit per employee (/ \$10,000) (T2)	0.035***	0.00
Control variables (T2) ^c	Yes	
R ²	0.514***	
N	3154	

^aAll 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)).

^bIterative generalized least squares.

^cYes 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.

^dAll 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)).

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

Table 3 results indicate no support for the bivariate moderation effect of strategic activities in time 1 for the HRM bundles and innovation relationship: (2a) skill index (Skill × Strategic activities (T1), $b = 0.026$, $p > 0.10$) (2b) motivation index (Motivation × Strategic activities (T1), $b = -0.009$, $p > 0.10$), or (2c) opportunity index (Opportunity × Strategic activities (T1), $b = 0.029$, $p > 0.10$); thus, *Hypotheses 2a–2c* are not fully supported. Nonetheless, there is partial support for the more complex multivariate interactions of innovation, skill, motivation, opportunity and strategic activities ($b = -0.021$, $p < 0.05$). Further, the direct effects for the skill index ($b = -0.056$, $p < 0.01$), motivation index ($b = -0.034$, $p < 0.10$), and the opportunity index ($b = -0.093$, $p < 0.01$) are significant; and the direct effect of strategy is significant, a one standard deviation increase in time 1 strategy toward a product leadership focus improves innovation in time 2 by 0.089 standard deviations ($p < 0.01$).

Looking at step 2 and model 4, with gross profit per employee as the dependent variable, the key variable innovation in time 2 has a substantial positive significant effect on gross profit per employee in time 3. With regard to *Hypothesis 3*, the bivariate innovation and strategy interaction is not significant; however, the innovation, opportunity and strategic activities interaction has a negative effect on gross profit per employee in time 3 and is significant

($p < 0.10$, two-tailed test). This result appears to imply, holding all else constant, that organizations that are able to combine an operational excellence strategy with opportunity-enhancing practices and innovation are achieving higher gains.

One reason for the weakness in the innovation and PL strategy moderation relationship may be, in part, due to a more complex set of combinations that contribute to the synergies and alignment between innovation, HRM sub-bundles and strategy in time 2, for example, interactions with the skill and opportunity indexes tend to have more significant relationships.

Discussion

This study presents a theoretical framework and empirical analysis that contributes to unpacking the 'black box' factors that mediate the HRM practices and organizational performance relationship. The results from this study indicate that innovation positively mediates the skills-enhancing index and organizational performance relationship. Further, the mediation effect of innovation in the skills-enhancing index and organizational performance relationship remains substantial once strategic activities have been accounted for as a moderator. The full structural regression results indicate that the key causal relationships, between skills-enhancing bundle of practices, innovation and organizational performance, continue to hold even after accounting for reverse causality for all of the key variables of interest. The unmoderated skill-enhancing, motivation-enhancing and opportunity-enhancing bundles of practices not only remain significant contributors to organizational gross profit per employee performance but also predict skill, motivation, and opportunity index and innovation outcomes in time 2. These findings of positive significant relationships between HRM bundles and organization performance are in contrast to work by *Guest et al. (2003)* and *Wright et al. (2005)* that found the previously positive and significant effect from the high use of HRM practices on performance became insignificant after controlling for previous performance in the analysis.

Considering the theoretical framework proposed, these findings support an important causal role for skill, motivation, and opportunity practices for enhancing organizational, operational (*i.e.* innovation) and financial performance outcomes. These results suggest organizations can enhance outcomes by optimizing skill levels through extensive search, intensive selection and through quantity, diversity and quality of training; and that the unique knowledge and social relationships that employees develop can be optimized by providing conditions that elicit desired behaviour and opportunity for those behaviours to fully contribute and influence change.

HRM practice and strategy alignment needs to occur over time to achieve future improvements; for example, in time 1, the skill index is a positive and significant predictor of innovation (and skill in time 2), workplaces that focus on a PL strategy have higher innovation outcomes and the time 1 interaction of innovation and skill is associated with positive innovation outcomes in time 2 (*Table 3*). Thus, it is within this temporal context that the high skill and pure strategy combination leads to the performance outcomes that outperform an in-the-middle strategy choice when aligned with innovation outcomes. Contrary to the bivariate strategy moderation hypothesized, the moderating relationships of strategy and HRM sub-bundles are complex as indicated by *Table 3* (step 1 and step 2) results. This implies that understanding the interaction effects of bundles of practices on organizational outcomes is a key element to guiding HRM practice selection given an organization's contexts. Thus, it is important to unpack contexts and pathways to be able to provide practitioners with more nuanced prescriptions regarding the economically significant outcomes of HRM practices that are relevant to practitioners (*i.e.* practitioners need a better understanding of what works when and why). Without establishing a causal relationship between HRM practices, mediators and organizational performance, practitioners will be unable to justify allocating resources to developing or implementing HRM practices.

Conclusion

This study extends the theoretical framework identifying operational outcomes as an element of the transmission pathway between HRM skill-enhancing, motivation-enhancing and opportunity-enhancing bundles of practices and organizational financial performance (*Messersmith & Guthrie, 2010; Jiang et al., 2012b*) by focusing on the moderating effect of strategy. One of the main findings is that investments in skill-enhancing practices lead to higher levels of innovation, and subsequently higher organizational performance, and that these positive and significant relationships show the importance of the temporal pathway even after controlling for reverse causality. Further, this study highlights the importance of aligning strategy with HRM practices to achieve higher levels of organizational performance. The implementation of relatively pure strategies can have performance improvements over ‘in-the-middle’ strategies if strategy is aligned with HRM practices. Thus, organizations need to select and tailor practices to suit their strategic choices within a given environment. It is the selective implementation and tailoring of HRM practices in alignment with strategic activities that creates differentiation in terms of human resources as an asset that drives sustainable competitive advantage.

Вопросы для размышления

1. Каковы основные проблемы, рассматриваемые в статье?
2. Какие из приведённых в статье исследовательских методов и выводов по результатам исследования представляются Вам спорными, недостаточно обоснованными? Почему?
3. Каковы ограничения проведённого исследования?
4. Каковы направления использования результатов этого исследования в сфере управления человеческими ресурсами?
5. Являются ли рассмотренные в статье проблемы актуальными для российских организаций?