How do high performance work systems influence organizational innovation in professional service firms?

Abstract

Purpose - The aim of this paper is examine how a system of human resource management (HRM) practices, labelled high performance work systems (HPWS), influences organizational innovation in professional service firms (PSFs). In this study, innovation in PSFs is seen as an indicator of firm performance and is calculated as the revenue per person generated from new clients and new services respectively.

Design/methodology/approach– Quantitative data was collected from 195 Managing Partners, HR Managers or experienced Partners in 120 Irish accounting firms. Hierarchical regression analysis was used to test the hypotheses.

Findings - The analysis results indicate strong support for the mediating role of employees' innovative work behaviours in the relationship between HPWS and two types of PSFs' innovation performance.

Practical implications - Managers need to effectively adopt and implement innovation-based HRM practices to encourage and support employees' creative thinking and innovation. Through the adoption and utilization of these practices managers can enhance the firm's innovation and its performance.

Originality/value - This study contributes to our understanding of the link between HRM and firm innovation by explicating a pathway between these variables. This study also generalizes consistent findings on the HRM-firm innovation relationship to a different context, i.e. professional service firms.

Keywords: Organizational innovation, Professional Service Firms, High Performance Work Systems, Employees' Innovative Work Behaviours

Article Classification: Research paper

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Introduction

Facing a rapidly changing environment, knowledge intensive firms increasingly depend upon innovation for their survival (Kim and Mauborgne, 1997). Achieving higher innovation performance requires organizations to harness the knowledge, skills, abilities, opportunities and willingness of employees to innovate. Human resources are a key factor in organizational innovation. Much of the existing innovation research focuses on, identifying the antecedents to innovation (McGrath et al., 1996); conditions under which innovation emerges (Lengnick-Hall, 1992); the processes through which innovation happens (Anand et al., 2007; Davenport, 1993) and its consequences for organizational performance (Han et al., 1998). What is less clear is that how human resource management (HRM) practices influence firm innovation, particularly in the professional service context. In this paper we describe systems of HRM as high performance work systems (HPWS, Guthrie, 2001).

Researchers in the HRM field have just recently begun to explore the impact of HRM practices on firm innovation (e.g. Armstrong et al., 2010; Cabello-Medina et al., 2011; Jiménez-Jiménez and Sanz-Valle, 2008; Laursen and Foss, 2003; Shipton et al., 2005). However, the underlying mechanisms through which HRM influences organizational innovation requires further investigation. To advance existing research on the HRM-innovation relationship, we investigate the underlying mechanisms through which HRM practices have an impact on firm innovation. Specifically, we propose and test the mediating role of innovative work behaviours (IWB) of employees in the HPWS and firm innovation link.

Our paper is one of the first empirical examinations of the intervening mechanisms through which HPWS influence firm's innovation performance achieved by examining the

mediating role of employees' IWB. Very limited research is available on this topic, but one exception is the study by Camelo-Ordaz et al. (2011) which examined the mediating role of employee commitment in the link between HRM and knowledge sharing which is a main driver for organizational innovation. Existing studies on the HRM-innovation link have focused on R&D-intensive companies such as high-technology firms (Collins and Smith, 2006). In terms of country range, studies on HRM and innovation have been conducted in the United States (e.g. Collins and Smith, 2006); United Kingdom (e.g. Shipton et al., 2005); Spain (e.g. Cabello-Medina et al., 2011), Belgium (e.g. De Winne and Sels, 2010), and China (Wei et al., 2011). Based on the recent International Innovation Index[1] which measures the level of innovation of a country, Ireland was ranked in 5th place, following Singapore, South Korea, Switzerland, and Iceland. In this study, we focus on a typical type of professional service firms - accounting firms, based in Ireland. As knowledge intensity and high human resource dependency characterise PSFs (e.g. Maister, 1993; von Nordenflycht, 2007; 2010), they are an interesting and appropriate context to examine the HPWS and innovation link. Our study therefore provides an appropriate context to study innovation. This study explores the HPWS and innovation link as well as its underlying mechanisms as employees IWB (innovative work behaviours). By doing so, our study contributes to a deeper understanding of the indirect link between HRM and firm innovation.

Additionally, existing studies on the HRM-firm innovation link mainly have used comparative and subjective innovation performance data, e.g. using a Likert-scale to evaluate their innovation compared to their competitors. Our study used objective data to measure

1The International Innovation Index is produced jointly by The Boston Consulting Group (BCG), the National Association of Manufacturers (NAM), and The Manufacturing Institute (MI), the NAM's nonpartisan research affiliate. http://www.globalinnovationindex.org

innovation as the revenue per person generated from new clients and new services (Armstrong et al., 2010;Fitzgerald et al., 2008).

The structure of this paper is as follows. In the next section, we introduce the context of PSFs and discuss the role of innovation in securing new clients and developing new services. We then review recent work on the HRM-firm innovation link and propose a series of hypotheses. The research method section provides details on sampling, measurement and the analysis strategy, which is then followed by the description of the data analysis and results. The scholarly and practical implications of the findings in this study are then discussed. A short conclusion is provided.

Theory and hypotheses

Key concepts

Firm innovation

Innovation in organizations is a broad concept. It covers a number of areas including different types of innovation, e.g. technological innovation (Betz, 2011; Dosi, 1982; Lee and Kim, 2014; Teece, 1986), product innovation (Dougherty, 1992; Eisenhardt and Tabrizi, 1995; Seidel and O'Mahony, 2014; Utterback and Abernathy, 1975; Zhou and Wu, 2010) and management innovation (Birkinshaw et al, 2008; Helper and Sako, 2010; Peris-Ortiz and Hervás-Oliver, 2014); innovation processes e.g. diffusion, adoption and implementation (Adler and Kwon, 2013; Cooper and Zmud, 1990; Kennedy and Fiss, 2009), innovation involvement, e.g. multiple actor approaches (Ibarra, 1993; Yeniyurt et al., 2014); and innovation as a performance outcome and (possible) indicator for organizational success (e.g. Armstrong et al., 2010; Chen and Huang, 2009). In this study, we use innovation as a performance outcome.

Innovative work behaviours

Employees' innovative work behaviours (IWB) are defined as the "intentional creation, introduction and application of new ideas within a work role, group or organization, in order to benefit role performance, the group, or the organization" (Janssen, 2000: 288). Such behaviours foster knowledge exchange and combination among employees which leads to generating new knowledge. They are therefore critical for firm innovation. Employees' ability to develop such innovation-related behaviours is also critical. This is one reason why most of firms seek to hire graduates from the top institutions who have potentially better learning capability (Hitt et al., 2001). After employees enter a firm, extensive on-the-job and skill-based training programmes are provided. Clients may also prefer to choose the service provider with more talented people since they believe that smarter people will provide better and more innovative solutions.

HPWS

High performance work systems (HPWS) are regularly used as a substitute label for strategic human resource management (SHRM) (Combs et al., 2006; Datta et al., 2005; Evans and Davis, 2005; Guthrie et al., 2009; Jiang et al., 2012; Way, 2002). Although there is no universal agreement on the definition of HPWS (Boxall and Macky, 2009; Boxall and Purcell, 2003), it can be described as "a system of HRM practices designed to enhance employees' skills, commitment, and productivity in such a way that employees become a source of sustainable competitive advantage" (Lawler, 1992, 1996; Levine, 1995; Pfeffer, 1998; cited in Datta et al., 2005: 136). HPWS involve the use of selective staffing, extensive training and development, mentoring, performance management, and incentives (Fu, 2013; Fu et al., 2013; Gittell et al., 2010; Takeuchi et al., 2007).

HPWS and the firm innovation link

HPWS have been found to be positively associated with organizational performance (e.g. Huselid, 1995). In explaining the above link, researchers mostly use the Ability-Motivation and Opportunity (AMO) framework. The AMO framework suggests that effective HRM practices can improve employees' knowledge, skills and abilities (A), motivation (M) and the opportunities (O) to express their talents (Armstrong et al., 2010; Boxall and Macky, 2009; Huselid, 1995). Similarly, it can be used to explain the link between HPWS and organizational innovation. HPWS improve employees' knowledge, skills and abilities to innovate, i.e. by building their expertise and talent (Anand et al., 2007; Becker and Gerhart, 1996; Guest, 1997; Messersmith and Guthrie, 2010; Snell and Dean Jr, 1992). When firms adopt HPWS, employees will also have increased motivation (e.g. through efficient compensation systems or team work) and opportunity (e.g. through employee participation) to develop new ideas which are crucial for organizational innovation. Another explanatory pathway which helps explain the HPWS-innovation link is the organizational learning and knowledge management perspective advanced by Shipton et al. (2005). Organizational learning represents "a capacity to create, transfer and implement knowledge" (Shipton et al., 2005: 119). HRM practices promote and sustain organizational innovation due to its role in managing the organizational learning of knowledge.

Based on the theoretical background, empirical support has been found for the HPWS and organizational innovation link in different contexts. For example, using a longitudinal database from thirty-five UK manufacturing organizations, Shipton et al. (2005) found that HRM systems promote organizational innovation in products and production technology. Jiménez-Jiménez and Sanz-Valle (2008) used a sample from Spain and found that HRM enhances innovation which in turn contributes positively to business performance. Similarly, using a sample of 85 Spanish firms, Cabello-Medina et al. (2011) found that some HRM

practices, e.g. development, selection and empowerment, have an influence on the creation of human and social capital which in turn improves firm innovation. Their study also provides support for the impact of firms' innovation on organizational performance. Still in the Spanish context, Camelo-Ordaz et al. (2011) found that a system of HRM practices influence knowledge sharing which in turn drives organizational innovation. De Saá-Pérez and Díaz-Díaz's (2010) study in an ultra-peripheral region of the European Union – the Canary Islands - provides support for the link between 'high commitment' human resource management and organizational innovation. Based on data collected from Belgian start-ups, De Winne and Sels (2010) highlighted the importance of HRM in promoting organizational innovation. Using a sample of 223 Chinese enterprises, Wei et al. (2011) found that strategic HRM has a positive impact on firms' product innovation and this relationship is stronger for firms with a developmental culture. Besides these quantitative studies, Zanko et al. (2008) conducted an in-depth case study on the failure of implementing new product development (concurrent engineering) by a Eurotech company. They reasoned that this was due to the absence of HRM practices which resulted from the organizational power struggles within the firm. These HRM practices were found to be critically important for organizational innovation in new product development. Therefore, the link between HRM and organizational innovation has been established both theoretically and empirically.

Aligned with previous work, we hypothesise that the use of HPWS is positively related to innovation.

Hypothesis 1. The use of HPWS is positively related to innovation.

Mediating role of employees' IWB in the HPWS-firm innovation link

Although the link between HPWS and firm innovation has been empirically tested, the processes though which HPWS impact firm innovation needs to be clarified. To do this,

we need to develop and test the mediating mechanism through which HPWS utilization leads to improved firm innovation.

Viewed from the organizational learning and knowledge management perspective (Shipton et al., 2005), HPWS also help firms to build a strong and efficient organizational structure and climate which allows employees to create, transfer and implement their knowledge, leading to innovative work related behaviours. In this process, HPWS enhance employees' willingness to generate new ideas (Lepak et al., 2007; Naman and Slevin, 1993; Scott and Bruce, 1994). For example, Wright et al. (2001) suggest that HPWS may play a role in creating organizational cultures and shared organizational knowledge which enables a firm to create and maintain its core competencies. Scott and Bruce (1994) emphasize the role of the climate for innovation in supporting employees' IWB. HRM practices such as training focused on and rewards for generating new ideas lead employees' behaviours in innovating. This indicates that the HPWS can help employees to improve their knowledge, abilities and willingness to conduct innovation related work behaviours. Therefore, we anticipate a positive link between HPWS and the employees' IWB.

Hypothesis 2. The use of HPWS is positively related to employees' IWB.

Employees play an important role in the generation and implementation of innovative ideas through their individual and collective behaviours (Anand et al., 2007; Lepak et al., 2007; Lopez-Cabrales et al., 2009; Scott and Bruce, 1994). When employees have the knowledge, skills and abilities required to be innovative, they will be more likely to generate new ideas. When employees are highly committed and frequently involved in IWB, such as generating new ideas and searching for new solutions, the knowledge exchange and combination will be more likely to occur which leads to generating new knowledge. In other words, employees' commitment and involvement in innovative behaviours enables the firm

to create an innovation capability. The employees' IWB therefore will foster firm innovation. Therefore we propose that employees' IWB is positively related to firm innovation.

Hypothesis 3. Employees' IWB is positively related to firm innovation.

The preceding hypotheses highlight the linkages among HPWS, employees' IWB, and firm innovation. Implicitly, the discussion suggests that HPWS affect firms' innovation performance through their impact on employees' IWB. That is, firms can use a system of HRM practices to promote employees propensity to innovate, which in turn will improve innovation. Thus, this study argues that employees' IWB plays a mediating role in the HPWS and firm's innovation relationship. More formally, we propose the following hypothesis.

Hypothesis 4. Employees' IWB mediates the relationship between the use of HPWS and firm innovation.

Figure 1 presents the theoretical model of this study.

(Insert Figure 1 about here)

Methodology

Research context

The research context in this study is professional service firms (PSFs). These firms typically employ a highly educated and professionalized workforce (Empson, 2007; Greenwood et al., 2005; Maister, 1993). Examples of professional services include accounting, engineering consulting, management consulting, and legal services. PSFs are knowledge-intensive (von Nordenflycht, 2007; 2010). Their inputs are mainly based upon the expert knowledge of the professional workforce (Starbuck, 1992), while their outputs take the form of customised solutions for their clients (e.g. Greenwood et al., 2005; Hitt et al., 2006;

Løwendahl, 2000; Morris and Empson, 1998; von Nordenflycht, 2007; 2010). Effective deployment of human resources is a key factor to PSF success.

PSFs gain competitive advantage mainly by exploiting and exploring their knowledge to provide existing and new services to existing and new clients (Maister, 1993). Therefore, in this study, we focus on two types of innovation in PSFs-the first of which is gaining new clients. The service delivered by PSFs has an "opaque quality" (von Nordenflycht, 2010) which means it is difficult for clients to evaluate service quality ex-ante. As a result, clients will tend to choose the service provider with whom they have an established relationship or through recommendations (Alvesson, 2001; Pennings et al., 1998). The second type of innovation within PSFs is the provision of new services. PSFs' innovation in service is achieved through the application of new ideas, processes and methods expressed in customized solutions rather than technologies, e.g. refining and re-combining their services (Anand et al., 2007; Gardner et al., 2008).

As knowledge intensity and high human resource dependency characterise PSFs, they are an interesting and appropriate context to examine the HPWS and innovation.

Procedures

This is a survey-based study. Irish accounting firms were chosen for this study. Most of the research on HRM is based on general manufacturing firms. Some HRM practices measures may not be suitable for accounting firms. In order to refine and contextualize the measures used in this study, a number of exploratory interviews were conducted with the managing partners and HR senior director in one of the so called Big Four accounting firms, as well as university accounting faculty who had served in accounting practices. The topics in the interview included human resource management and innovation. The outcome of these interviews was the development of measurement instruments with high face validity which took account of nuances in the accounting firm environment.

Following these interviews, an organization level survey of a large number of practices was conducted. During the survey design, we piloted the instrument with many experts in different areas including partners in accounting firms, accountants and a statistician to improve the face validity and content validity of the survey. Then Dillman's (2007) Tailored Design Method was employed to conduct the survey, including invitation letter, thank you postcard, and reminders.

Sample

548 Managing Partners and HR Partners/Managers/Directors in 274 firms were chosen as the target sample. After the invitation letter was sent out, we learned that 10 firms no longer existed and 3 firms did not qualify either due to their size or because they were not accounting firms. This reduced the population to 522 respondents in 261 firms. After reminder postcards and replacement surveys were sent, 195 surveys in total were returned in the form of hard copy (156) and online (39). Four surveys were returned incomplete and therefore excluded. The response rate was 36.59% representing 120 firms (45.98%). There were 71 matched pair responses representing 71 firms, i.e. two respondents from one firm (one from Managing Partner and the other from HR manager/experienced partner) filled in and returned two surveys, and 49 single responses representing 49 firms, i.e. only one respondent in one firm filled in and returned one survey. After aggregation, firm level data from 120 firms was used as the final sample. The firm size had a mean of 90 employees with a standard deviation of 328, and it ranged from 5 to 2756. The firm age ranged from 1 year to 103 years with a mean of 25 years and SD of 20. The firm revenue ranged from .30 to 332 million euros with a mean of 10 million euros and SD of 40. Table 1 presents details on respondents' profile.

(Insert Table 1 about here)

To explore representativeness, we checked for possible non-response bias using a 'time trend extrapolation test' in which 'late' versus 'early' respondents were compared along key study variables (Armstrong and Overton, 1977). The rationale for this test is that 'late' respondents (those responses received after the first round of mailing) are very similar to non-respondents, given that they would have fallen into that category without the follow-up efforts (Armstrong and Overton, 1977). A one-way analysis of variance(ANOVA) showed no significant difference between the early and late responses in terms of measures such as firm size and firm age and individual information such as age, education, tenure in present organization, tenure in the accounting profession and full time work experience. In addition, we compared the above information between the web responses (who filled in surveys online) and the hard copy responses (who returned hard copy survey), as well as between the matched pair responses and single responses, no significant difference was found, which provided support for our decision to use 120 combined matched pair and single response firms.

Measures

HPWS

Most existing HPWS measures are based on general manufacturing firms. Some of the HRM practices measures may not be suitable for accounting firms. Based on an extensive literature review, exploratory interviews with the managing partners and HR senior director in a sample firm, as well as university accounting faculty who had served in accounting practices, we developed HPWS measures including sixteen items on selection, training and development, performance management, compensation, information sharing and participation, and mentoring. Most of the items were adapted from multiple sources, e.g. Huselid (1995) and Datta et al. (2005). A sample item is, "Please estimate what proportion (0% to 100%) of your professional staff are included in a formal information sharing program (e.g., a

newsletter)". To reflect the PSF context more precisely, we added an item regarding structured mentoring, e.g. via articles which are a qualifying period of three or four years under accounting's apprenticeship system. The HPWS index (Batt, 2002; Huselid, 1995; Guthrie, 2001; Guthrie et al., 2009; Takeuchi et al., 2007) was created by averaging across all items and demonstrated good internal consistency(Cronbach's alpha = .73). We report all items in the Appendix.

Employees' IWB

Nine items were adopted from Janssen (2001). The respondents were asked "How often do employees on average engage in the behaviours listed below, e.g. creating new ideas for difficult issues?". The respondents answers range from 1 = never to 7 = always. A principal axis factor analysis using oblique rotation of the items was conducted. All of the nine items loaded on a single factor with factor loadings of .72 or above. These factor loadings are shown in Appendix. The nine-item scale demonstrated good internal consistency (Cronbach's alpha = .96).

Firm innovation

For innovation measures, annual revenue (€ million) per professional staff data from new services and new clients were calculated. To obtain this data, a four quadrant innovation matrix which includes new/existing clients and new/existing service was used. As shown in Figure 2, participants were asked to indicate the proportion of fee income for their most recent year which came from each of the four activity quadrants. The four quadrants sum to 100%. Two types of innovation in PSFs were examined 1) existing and new services to new clients which we label "innovation 1" (new clients, sum of quadrants 4-2 and 4-4); and 2) new services to existing and new clients, which we label "innovation 2" (new services sum of quadrants 4-1 and 4-2). The following two equations show how the measure of innovation was calculated.

Equation 1: Innovation 1 = (Q4-2+Q4-4)*revenue/number of professional staff

Equation 2: Innovation 2 = (Q4-1+Q4-2)*revenue/number of professional staff

Q indicates the quadrant.

(Insert Figure 2 about here)

The innovation measures are consistent with those used by Armstrong et al. (2010) who collected data on number of employees, total sales revenue, and the percentage of sales revenue generated from the new services/products. They then calculated the innovation measure by 1) multiplying the percentage of sales revenue generated from the new services/products and total sales revenue to yield an estimate of sales revenue generated by selling new products or services and 2) dividing sales revenue generated by selling new products or services by the number of employees. Therefore, building on that work our measures capture employees' ability to impact organizational efficiency and innovation through innovations in generating new services and expanding new clients.

Control variables

Firm size and age were controlled for in the analyses for innovation and firm performance. The actual number of a firm's professional staff was derived from the public databases mentioned above. Firm age was collected from respondents.

Aggregation issues

In the final sample, there were 71 matched pair responses representing 71 firms. We chose to average across their responses so that the final score for each firm represents the average unit-level response/perception. To aggregate matched pairs data, the inter-rater agreement and inter-rater reliability were examined. Inter-rater agreement was assessed using R_{wg} (James et al., 1984; 1993) for employees' IWB[2] (see Table 2). The rule of thumb value for R_{wg} is .60 (James, 1982) and the more commonly acceptable value of .70. In this study,

[2]*Rwg* is often used for the Likert scale data. Because of the index based nature of the HPWS measure and the continuity of innovation and productivity, we do not report *Rwg* for these variables.

for employees' IWB, the mean of R_{wg} was .99. Both inter-rater agreement and inter-rater reliability were assessed using the intra-class correlations - ICC(1)s and ICC(2)s were calculated using McGraw and Wong's (1996) formula with a one-way random-effects analysis of variance. In this study, the ICC(1) values were between .56 and .91 which were higher than the required median value of .12 reported by James (1982). This indicated that the two respondents in each unit/firm had high agreement. The ICC(2) values for all of the variables ranged from .62 to .95 which were higher than the .60 cut-off point recommended by Glick (1985). This indicated that the firms could be reliably differentiated in terms of all of the variables in this study. Based on the above results, the matched pair response data were aggregated into firm level data.

In addition, the results from the one-way ANOVA show no difference between matched pair responses and single response on firm information such as firm size and firm age and individual information such as age, education, tenure in present organization or in accounting profession and full time work experience, which supports that we use the firm level data from 120 firms.

Common method bias

To avoid common method bias, this study used third party data relating to firm size as a control variable. In addition, the Harman one-factor test was conducted to examine the common method bias for the remainder of the measures. Significant common method bias would result if one general factor accounts for the majority of covariance in the variables (Podsakoff and Organ, 1986). The measures were in more than one scale e.g. the HPWS' scales were measured on a scale from 0% to 100%, while employees IWB was measured using a seven-point Likert Scale. Therefore, all of the items were first standardized and then a principal axis factoring analysis with oblique rotation method was performed for them. The results showed nine factors with eigenvalues greater than one which accounted for 70 percent

of the total variance, with the first factor accounting for 27 percent of the variance. Since a single factor did not emerge and one general factor did not account for most of the variance, common method bias was unlikely to be a serious problem (Podsakoff and Organ, 1986).

Analytical procedures

The firm-level data from 120 accounting practices was used to test our theoretical model. First, the multiple hierarchical linear regression analysis was used to test for all the hypotheses. The meditating effect of employees' IWB in the HPWS-firm innovation link (hypothesis4) followed the four conditions discussed in Baron and Kenny (1986). In addition, Sobel test for mediation (Preacher and Hayes, 2004; Sobel, 1982) was conducted for each model.

Results

Table 2 presents descriptive statistics, including the means, standard deviations, R_{wg}s, ICC(1)s, ICC(2)s, correlations, and inter-item reliabilities. A number of relationships are noteworthy. For example, HPWS was significantly correlated to employees' IWB and firm innovation. This study used variance inflation factors (VIFs) and the Durbin-Watson test (Durbin and Watson, 1951) to examine the effect of multicollinearity and autocorrelation of residuals. The values of the average VIF associated with the predictors ranged from 1.0 to 1.43, which was less than the accepted threshold of 5 (Haan, 2002), suggesting that there is no need for concern with respect to multicollinearity. The values of the Durbin-Watson test associated with the predictors showed a range from 1.70 to 1.92, which falls within acceptable limits of between 1 and 3 (Field, 2009), again suggesting no need for concern with respect to autocorrelation of residuals.

(Insert Table 2 about here)

In Table 3, the results of testing hypotheses 1 to 4 are presented (see Models 1-3).

(Insert Table 3 about here)

Hypothesis 1 proposed that HPWS would be positively linked to innovation. After controlling for firm age and firm size, the coefficients for HPWS on innovation are both positive and significant (β = .17, p<.10 for innovation 1 – new clients, see Model 2.2 in Table 3; β = .26, p<.05 for innovation 2 – new services, see Model 3.2 in Table 3). Therefore, hypothesis 1 is supported.

Hypothesis 2 stated that HPWS would be positively linked to employees' IWB. The beta coefficient for HPWS on employees' IWB was significant and positive (β = .23, p<.05) (see Model 1 in Table 3). Therefore, hypothesis 2 is supported.

Hypothesis 3 proposed that the employees' IWB would be positively linked to firms' innovation. The beta coefficients for employees' IWB on innovation 1 (new clients) and innovation 2 (new services) were significant and positive (β = .19, p<.10 for innovation 1, see Model 2.3 in Table 3;β = .19, p<.05 for innovation 2, see Model 3.3 in Table 3). Therefore, hypothesis 3 is supported.

Hypothesis 4 proposed the mediating effect of employees' IWB on the relationship between HPWS and PSF's innovation. To test the mediation, we applied the four-step procedure by Baron and Kenny (1986): (1) the independent variable should be directly related to the dependent variable (X→Y); (2) the independent variable should be related to the mediator (X→M); (3) the mediator should be related to the dependent variable (M→Y); (4) the direct relationship between the independent variable and dependent variable should become non-significant (full mediation) or weaker (partial mediation) when accounting for the effect of the mediator (X+M→Y). The support for hypotheses 1 to 3 on the links between HPWS and firm innovation, between HPWS and employees' IWB, as well as between the employees' IWB and firm innovation meets the first three conditions respectively. The fourth condition requires that the direct relationship between the independent variable and dependent variable becomes non-significant (full mediation) or weaker (partial mediation)

when accounting for the effect of mediator (X+M→Y). The beta coefficient for HPWS on innovation 1 (new clients) became smaller and non-significant when employees' IWB was included (from $\beta = .17$, $p<.10$, to $\beta = .12$, *n.s.*) (see Models 2.2 and 2.3 in Table 3. For HPWS on innovation 2 (new services), the beta coefficient became smaller but remains significant when employees' IWB was included (from $\beta = .26$, $p<.01$, to $\beta = .22$, $p<.05$) (see Models 3.2 and 3.3 in Table 3), satisfying the fourth condition. Finally, the Sobel test was conducted using Preacher and Hayes' (2004) procedure for simple mediation. The results confirm that employees' IWB mediated the relationship between HPWS and innovation 1 (new clients) ($Z_{Sobel} = 1.744$, $p<.05$) and innovation 2 ($Z_{Sobel} = 1.804$, $p<.05$). Hypothesis 4 is therefore supported.

Discussion

This study's primary objectives were to better understand how high performance work systems (HPWS) influence organizational innovation performance in the professional service context. By examining the mediating role of employees' innovative work behaviours (IWB) in the relationship between HPWS and firm innovation, this study has generated several insights with interesting scholarly and managerial implications.

Scholarly Implications

This study examined the indirect relationship between HPWS and firm innovation performance in the professional service context. Particularly, the mediating role of employees' IWB was established. In doing so, our study contributes to the existing literature on HRM and firm innovation in several ways.

First, although human resources are a key factor for organizational innovation, the question of how to manage human resources to improve firm innovation has not received sufficient attention. Existing innovation research focuses on identifying the antecedents to innovation (McGrath et al., 1996), conditions under which innovation emerges (Lengnick-

Hall, 1992), the processes through which innovation happens (Anand et al., 2007) and its consequences for the organizational performance (Han et al., 1998). However, the process through which HRM influences innovation has not been well recognized. We investigated and found the support for the mediating impact of employees' IWB in the HPWS and firm innovation performance link. In the existing research on HRM and firm innovation, most studies only looked at the direct link (e.g. De Winne and Sels, 2010; De Saá-Pérez and Díaz-Díaz, 2010; Jiménez-Jiménez and Sanz-Valle, 2008). To the best of the authors' knowledge, only a few studies examined the indirect link between HRM and firm innovation (e.g. Wei et al., 2011). Camelo-Ordaz et al. (2011) examined the indirect mediating role of employee commitment in the link between HRM and knowledge sharing which is a main driver for organizational innovation. Wei et al. (2011) established the moderating role of organizational developmental culture in the SHRM and firm innovation link. Analysis of intervening variables is important both theoretically and empirically. For example, specifying and testing intervening mechanisms is important in promoting a cumulative science of organizations (Shapira, 2011). Therefore, this study contributes to a better understanding of what, why and how HRM influences firm innovation.

Furthermore, this study extends the research context from the traditional sample of R&D companies to the professional service context. It also enriches our knowledge of cross national findings by testing the model using a sample of Irish firms. Existing research modes of the link between HRM and firm innovation has been tested using data from high-technology firms (Collins and Smith, 2006) and manufacturing firms (Shipton et al., 2005). Countries where these studies have been conducted, include the United States (Collins and Smith, 2006); United Kingdom (Shipton et al., 2005); Spain (e.g. Cabello-Medina et al., 2011; Camelo-Ordaz et al., 2011; Jiménez-Jiménez and Sanz-Valle, 2008), Belgium (De Winne and Sels, 2010), and China (Wei et al., 2011). By examining the HRM and innovation in Irish

professional services firms, this study therefore enriches the research context and provides support for generalization of the findings on the HRM-firm innovation relationship. Moreover, it also provides valuable implications for managing the human resource in a critical type of service firm. In the existing research on PSFs, various researchers have addressed the impact of ownership (von Nordenflycht, 2007) and the function of particular promotion models on performance on PSFs (Gilson and Mnookin, 1989; Malos and Campion, 1995; Morris and Pinnington, 1998), but the role of high performance work systems has been largely ignored. To date, according to our knowledge, our study is the only one which has investigated the possible linking mechanisms underlying such relationships in the PSF context.

Moreover, the existing studies on the HRM-firm innovation link mainly use comparative and subjective data, e.g. using a Likert-scale to evaluate their innovation compared to their competitors. For example, Wei et al. (2011) used a self-report comparative five-point Likert-type scale to access their sample firms' product innovativeness by comparing the firm's level of new products developed with the industry average during the year. Cabello-Medina et al. (2011) and Camelo-Ordaz et al. (2010) also used similar measures. Using objective data, our study employed an innovation matrix to calculate the innovation performance as the revenue per person generated from new clients and new services. It increases the accuracy of the innovation measurement and by using multiple raters allows for the development of stable and convincing findings.

Implications for Managers

Through the findings on the mediating model of HPWS and firm innovation via employees' IWB, we highlight the value creation chain for managers in PSFs. PSFs that have a high level of HPWS utilization are associated with better innovation performance. HPWS usage needs to focus on promoting employees' IWB which in turn enhances organizational

innovation. Managers who are able to effectively adopt and implement these innovation-based HRM practices encourage and support employees' creative thinking and innovation. Through the adoption and utilization of these practices managers can enhance the firm's innovation and its performance. Developing and implementing HRM practices that aid employees' IWB should allow firms to be more innovative in terms of providing new services/products and thereby achieve higher performance.

Limitations and future research

This study also has its limitations. Firstly, other intervening variables may exist aside from the employees' IWB in the HPWS-firm innovation relationship. We encourage more systematic development to better specify the causal mechanisms through which HPWS impact firm outcomes. This entails more systematic observation and theory building with regard to the mechanisms through which HPWS influence firm innovation. One important aspect of this linkage specification is the AMO framework of SHRM, i.e. employees' ability, motivation and opportunity channels for innovation. In understanding the HPWS-innovation relationship, further research may need to examine the role of the psychological contract (Coyle-Shapiro and Conway, 2005; Rousseau, 1995), and relational resources such as relational coordination (Fu, forthcoming; Gittell et al., 2010).

Other limitations concern the study's small sample size, single industry focus, and cross-sectional design. Although our small sample and the single industry study bias have the advantage of focus, the results may not generalize to other professional service firms, e.g. law practices and architecture firms. It is also important to gather longitudinal data on the application of the HPWS in PSFs to detect causal relationships in more detail. This study is also limited in the examination of employees' IWB in that it only considers the contextual factor of HPWS. Individual-level factors need be taken into consideration as well (Oldham and Cummings, 1996). To supplement firm-level studies such as this one, future research

could undertake multi-level studies to capture a more comprehensive picture of the links between employees' behaviours, work systems, innovation and performance. In addition, while we used third party data on firm size and conducted the Harman one-factor test, there is still potential for common method bias.

Despite these limitations, these results contribute to a better understanding of how HPWS affect firm performance, especially in the accounting firm context. The findings of this study provide empirical evidence for a chain of mechanisms through which HPWS, firm innovation and overall organizational performance are linked.

Conclusion

This research provides insights for a better understanding of innovation within professional service firms. It also provides evidence for the value chain of human resource management practices, employees' innovative work behaviours, and innovation within organizations that contribute to firm performance. It offers a theory-based and more comprehensive approach to explaining why and how high performance work systems influence firm innovation. We believe that this approach will yield dividends for both future academic studies and is of practical relevance to practitioners concerned with boosting organizational innovation.

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Table 1 Feature of Respondents

Title:	
Managing Partner	50%
HR Director/Manager	10%
Partners	34%
Other	6%
Gender:	
Female	20%
Male	80%
Age:	
<30	2%
31-40	21%
41-50	37%
51-60	29%
>60	11%
Education:	
Non university degree	37%
Bachelor's Degree	48%
Master's Degree	10%
Other	5%
Professional qualification:	
Chartered Accountants Ireland (CAI)	60%
Association of Chartered Certified Accountants (ACCA)	13%
Institute of Certified Public Accountants in Ireland (CPA)	10%
Chartered Institute of Management Accountants (CIMA)	1%
Institute of Incorporated Public Accountants (IIPA)	1%
Irish Taxation Institute (ITI)	10%
Chartered Institute of Personnel and Development (CIPD)	4%

Note: N = 191

Table 2 Descriptive Statistics

	Variables	M	SD	*Rwg*	ICC(1)	ICC(2)	α	1	2	3	4	5
1.	Firm age	25.75	19.90		.82	.90						
2.	Firm size	93.40	339.22					.09				
3.	HPWS	45.47	14.75		.56	.72	.73	.06	.38***			
4.	Employees' IWB	4.52	1.05	.99	.43	.62	.96	.10	.21*	.30**		
5.	Innovation 1 (new clients)	0.02	0.01		.84	.92		-.05	.19*	.22*	.24*	
6.	Innovation 2 (new services)	0.02	0.02		.91	.95		-.01	.29**	.22*	.19*	.66***

Note: *** p< .001 ** p< .01, * p< .05 (two-tailed tests).

HPWS = high performance work systems. IWB = innovative work behaviours
Listwise deletion method was employed to deal with missing data in hierarchical multiple regression analysis which reduced sample size from 120 to 116.

Table 3 Impact of HPWS and IWB on Innovation

Variables	IWB Model 1	Innovation 1 (new clients) Model 2			Innovation 2 (new services) Model 3		
		M2.1	M2.2	M2.3	M3.1	M3.2	M3.3
Control							
Firm age	.07	-.07	-.07	-.08	-.01	-.01	.03
Firm size	.12	.20*	.13	.11	.32***	.22*	.20
Predictor							
HPWS	.23*		.17†	.12		.26**	.22*
Innovation1							
Innovation2							
Mediator							
IWB				.19†			.19*
R^2	.10	.04	.07	.10	.10	.16	.20
Adjusted R^2	.07	.02	.04	.06	.09	.14	.17
ΔR^2			.03	.03		.06	.03
ΔF	4.04*	2.31	2.90†	3.71†	6.28**	7.67**	4.22*
Z_{Sobel}			1.744†			1.804†	

Note: Standardized coefficients were reported.

Listwise deletion method was employed to deal with missing data in hierarchical multiple regression analysis which reduced sample size from 120 to sizes ranging from 111 to 112.
** $p<.01$, * $p<.05$, † $p<.10$. All tests were two-tailed.

Figure 1. Theoretical Model Linking High Performance Work Systems to Firm Innovation

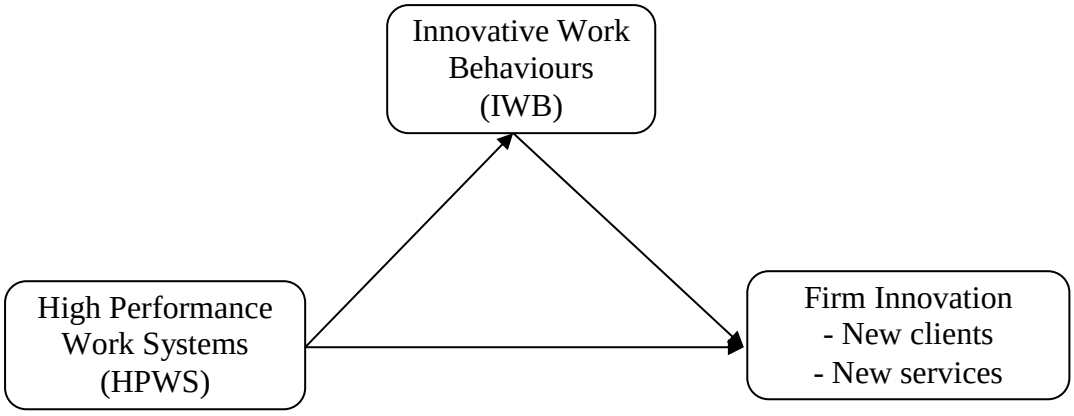
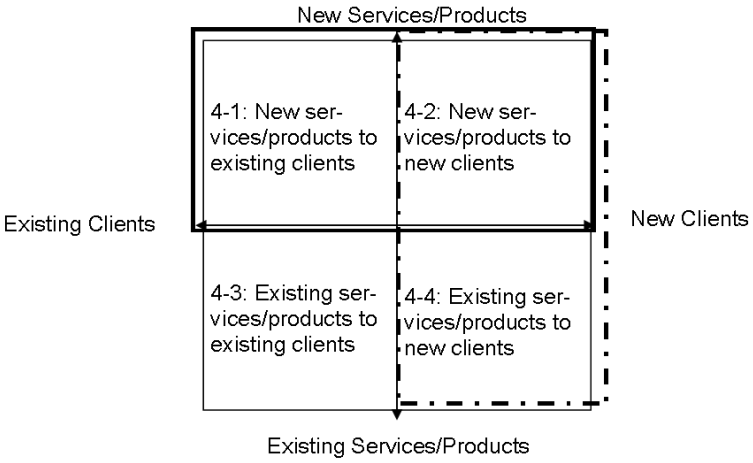


Figure 2. Innovation Matrix



The four quadrants present the proportion of fee income from each corresponding activity, e.g. 4-1 is new services / products to existing clients. The four quadrants should total 100%. The dash line square indicates the innovation 1 (new clients) and the real line square indicates the innovation 2 (new services)

Appendix

The Applications of HPWS in Irish Accounting Firms

What proportion of your professional staff…
Are administered an employment test (e.g. skills tests) prior to hiring?
Hold jobs which have been subjected to a formal job analysis to identify position requirements (such as required knowledge, skills or abilities)?
Hold non-entry level jobs which have been filled as a result of internal promotions (as opposed to hired from outside of the organization)?
Receive formal individual performance appraisals?
Receive formal performance appraisals from more than one source (i.e., from several individuals such as supervisors, peers etc.)?
Have access to company incentive plans, profit-sharing plans, and/or gain-sharing plans?
Receive their performance appraisals which are used to determine their compensation?
Receive their performance appraisals which are used to set goals and plan skill development?
Receive above market wage levels to attract and retain them?
Are included in a formal information sharing programme (e.g., a newsletter)?
Are asked to complete attitude surveys on a regular basis?
Participate in Quality of Work Life (QWL) programs, Quality Circles (QC), and/or labour-management participation teams?
Have access to a formal grievance procedure and/or complaint resolution system?
Receive continuous training, e.g. continuous professional development?
Receive structured mentoring, e.g. via articles?
Are organized in self-directed work teams in performing a major part of their work roles?

The Results of Exploratory Factor Analysis for Employees' IWB[b]

Please indicate how often do employees in your organization engage in the follow behaviours?	Factor Loadings
Transforming innovative ideas into useful applications.	.894
Evaluating the utility of innovative ideas.	.891
Mobilizing support for innovative ideas.	.883
Making team members enthusiastic for innovative ideas.	.878
Introducing innovative ideas into the work environment in a systematic way.	.876
Generating original solutions for problems	.858
Acquiring approval for innovative ideas.	.844
Searching for new work methods, techniques or instruments.	.833
Creating new ideas for difficult issues.	.723

[b] Missing data and listwise deletion reduced the sample from n = 190 to n = 189.