

# HRM practices and innovation: an empirical systematic review

HRM practices  
and innovation

Nasser Fathi Easa

*Faculty of Business Administration, Beirut Arab University, Beirut, Lebanon and  
Faculty of Commerce, Alexandria University, Alexandria, Egypt, and*

Haitham El Orra

*Faculty of Business Administration, Beirut Arab University, Beirut, Lebanon*

15

Received 25 November 2019  
Revised 7 January 2020  
Accepted 20 January 2020

## Abstract

**Purpose** – The relationship between human resource management practices (HRMP) and innovation has been described as a black box, where a lot still needs to be investigated. Thus, the aim of this paper is to investigate the nature of the link that exists between HRMP and innovation in both public and private organizations. To do so, theoretical underpinnings and existence of a mediating or a moderating mechanism is inspected.

**Design/methodology/approach** – Based on an empirical systematic review of research conducted between 2010 and 2018, content analysis has been conducted for 31 peer-reviewed articles in the English language.

**Findings** – Inspecting the nature of relations existed in the chosen articles, interesting findings are addressed relative to the nature of the human resource management systems (HRMS) used, practices encompassed and their different utility. HRMS has been shown to be associated with product innovation yet more evidence is needed for supporting process innovation.

**Practical implications** – The HRMS/HRMP and innovation relationship is inspected, important practices that would guide managers to induce innovation are highlighted. Usage of multiple HRMS and contingency in constructing such systems is indicated.

**Originality/value** – Contribution to comprehend the black box and areas for future research has been offered.

**Keywords** Innovation, Systematic review, HRM practices, HRM systems

**Paper type** Research paper

## Introduction

Human resource management practices (HRMP) have been gaining an increased attention especially in the fields of economics of the organization, strategic management and human resource management (HRM) (Laursen and Foss, 2003). Moreover, the past two decades were characterized by noticeable progress in researching human resource management systems (HRMS) (Wei and Lau, 2010). HRMS and innovation relationship in firms is growing as many researchers inspected this area (Vogus and Willbourne, 2003; Beugelsdijk, 2008; De Winne and Sels, 2010; Ma Prieto and Pilar Pérez-Santana, 2014; Chen *et al.*, 2018).



© Nasser Fathi Easa and Hitham El Orra. Published in *International Journal of Disruptive Innovation in Government*. Published by Emerald Publishing Limited. This article is published under the Creative Commons Attribution (CC BY 4.0) license. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors. The full terms of this license may be seen at <http://creativecommons.org/licenses/by/4.0/legalcode>

International Journal of Disruptive  
Innovation in Government  
Vol. 1 No. 1, 2021  
pp. 15-35  
Emerald Publishing Limited  
2516-4392  
DOI 10.1108/IJDIG-11-2019-0005

This growing interest is because of the continuous search for having a competitive advantage in a highly turbulent environment (Jimenez-Jimenez and Sanz-Valle, 2008; Shipton *et al.*, 2005).

Innovation can be promoted through proper management of people (Shipton *et al.*, 2005). Moreover, firms intending to innovate consider HRMP as a precious resource (Beugelsdijk, 2008). Furthermore, human capital when leveraged organizational expertizes are developed, thus innovation would emerge as new products and services (Chen and Huang, 2009). Several ways can be adopted to inspect the HRMP and outcomes linkage. However, the current approach is the following: complementarities or bundle of practices or individual practice in isolation (Wright and Boswell, 2002).

This study seeks to contribute for the comprehension of the HRM and innovation relationship. It has been identified as a black box by several researchers including (Beugelsdijk, 2008; Laursen and Foss, 2003; Messersmith and Guthrie, 2011). Thus, this study tries to inspect the way by which HRM and innovation are linked. Moreover, if there is a need for a mediating or moderating mechanism to understand such a relation.

In what follows the paper is arranged accordingly, first the methodology of the papers selection is explained. Next, the papers are summarized according to the way that HRMP or human resources systems affect innovation. Then, the existence of mediators and moderators as an explaining mechanism is examined. Eventually, practical implication, directions for future research and conclusion of the study are presented.

### **Methodology of the review**

The 31 studies analyzed were published from January 2003 to December 2018 in 18 Journals (Table I). The list is mainly based on high ranking journals with a proven history and impact in the HRM research. The database used includes the following: Academy of Management, Sage Journals, Wiley online library, Taylor and Francis online, science direct, Oxford Academic and Emerald insight.

As a start, the research objective is defined and the conceptual boundaries are set. HRMP and innovation are conceptualized according to the following dimensions: HRMP (bundle/single); characteristics of HRMP; definitions of innovation; dimensions of innovation; the existence of a moderator–mediator; outcomes of HRMP in an indication for innovation in all its forms. Moreover, the focus was on the firm level.

#### *Data collection method*

The database on HRMP and innovation in firms was built through specific inclusion criteria. Figure 1 resembles the selection process adopted; as a start, the AJG Academic journal guide for journal ranking was examined to select, which journals to include in the study. Second, the main concentration was on HRM and employment journals. Moreover, the secondary and supportive source of data were, namely, general management, organization studies, innovation, psychology, economics, international business and hospitality. Third, titles, abstracts and keywords are inspected within the selected journals using the following key terms: “HRMP;” innovation and firm.

Studies identified counted 3,118, however, those that were not listed in AJG (2018) academic guide for journal ranking was dropped. Moreover, books, reviews, case studies, introductions, editorials, proceedings and abstracts were also excluded; only empirical articles were taken into consideration. Studies that had zero citations, except those published in 2018 was dropped. Next, all articles published before 2010 and included in the study had at least 60 citations. Also, research papers having the workplace and the organization as their unit of study was dropped, leaving us with 29 articles. However,

Journal title	Article count	(%)	Journal ranking grade (AJG, 2018)
Human Resource Management Journals			
<i>Human Resource Management</i>	6	20	Grade 4
<i>Human Resource Management Journal</i>	2	6	Grade 4
<i>The International Journal of Human Resource Management</i>	6	20	Grade 3
<i>International Journal of Manpower</i>	2	9	Grade 2
<i>Employee Relations</i>	1	3	Grade 2
<i>Personnel Review</i>	1	3	Grade 2
General Management/Organization Studies/Innovation Journals			
<i>Academy of Management Journal</i>	1	3	Grade 4*
<i>Journal of Management</i>	2	6	Grade 4*
<i>Journal of Management Studies</i>	1	3	Grade 4
<i>Journal of Business Research</i>	1	3	Grade 3
<i>Organization Studies</i>	1	3	Grade 4
<i>Human Relations</i>	1	3	Grade 4
<i>Journal of product Innovation Management</i>	1	3	Grade 4
<i>Creativity and Innovation Management</i>	1	3	Grade 2
Psychology/Economics/ International Business/Hospitality			
<i>Journal of Organizational Behavior</i>	1	3	Grade 4
<i>Cambridge Journal of Economics</i>	1	3	Grade 3
<i>International Business Review</i>	1	3	Grade 3
<i>International Journal of Hospitality Management</i>	1	3	Grade 3
Total	31		

**Table I.**  
List of journals and ranking

studies that used companies and firms interchangeably were adopted, which gave us an addition of 2 articles, leaving us with 31 articles.

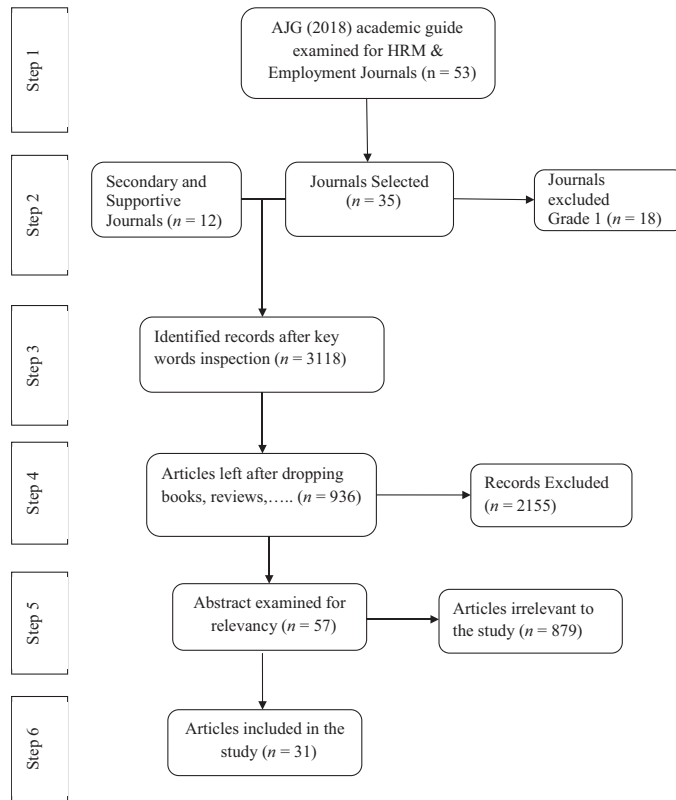
### Human resource management practices and innovation in firm research

The HRMP and innovation relationship in firms is tested in a variety of contexts in this systematic review. This review declares that HRMP and innovation in firms are being empirically explored and has an international appeal as different countries are encompassed.

#### *Distribution of studies*

[Laursen and Foss \(2003\)](#) declared that the attention to HRMP and innovation in firms goes back to the late nineties. Their paper is considered to be essential in inspecting the relationship between HRMP and innovation in firms. Thus, the current study took the year 2003 as a starting point to inspect the previously mentioned relationship. The variance of interest in such a relationship is quite noticed since 2010 ([Figure 1](#)). The years 2010-2018 accounts for the most empirical output in the field of study ( $n = 22$ ). Moreover, the main journals in the study are the following: *Human Resource Management* (6 articles), *The International Journal of Human Resource Management* (6 articles), *International Journal of Manpower* (2 articles), *Human Resource Management Journal* (2 articles) and *Journal of Management* (2 articles). Two third of the articles were published in human resource management journals ( $n = 20$ ).

Furthermore, the quality of the journals used was distributed accordingly. Approximately 10 per cent of the studies used were published in Grade 4\* journals; 41 per



**Figure 1.**  
Chart of articles  
selection method

cent were published in Grade 4 journals; 31 per cent were published in Grade 3 journals and the remaining 18 per cent were published in Grade 2 journals.

In addition, articles revealed a spread over 15 countries, namely, China and Spain dominated the articles count, eight articles for China and seven for Spain, the USA, the UK and Korea counted for two articles each. The rest of the articles were distributed along 10 countries mainly located in Europe. Thus, suggesting an opportunity for a globalized research, if supported with more samples from different countries. Moreover, what has been noticed supports the claim that China is heading to be the world’s innovator (Casey and Koleski, 2011).

*Theoretical perspective*

To identify the theories used, Nolan and Garavan (2016) approach is adopted, thus, relying on “what theory is not by” (Sutton and Staw, 1995). Human resources theories were spotted such as, namely, human capital theory is used to explain the relationship between innovations and organizational culture; social context theory to explain the organizational culture and employee behavior relationship (Lau and Ngo, 2004). Moreover, learning theories is noticed, for example: organizational learning theory used to explain the impact of knowledge enhanced on innovation (Chang et al., 2013; Shipton et al., 2005); Upper echelon

theory was used to stress the importance of managers' knowledge in evoking innovation (De Winne and Sels, 2010) (Figure 2).

Furthermore, the resource-based view (RBV) usage is prominent either in isolation or in complementarities. As for the first, RBV has been deployed to explain, namely, the influence of competitive advantage, the support of the knowledge, skill and abilities and intellectual capital on innovation, respectively (Jimenez-Jimenez and Sanz-Valle, 2008; Lopez-Cabrales *et al.*, 2009; Donate *et al.*, 2016). While for the later, RBV has been combined with creativity theory as an antecedent for creativity, thus leading to innovation (Beugelsdijk, 2008); institutional theory to grab a better understanding of the context as RBV alone fails to do so (Cooke and Saini, 2010); and dynamic capabilities (DC) to enhance innovative performance (Messersmith and Guthrie, 2010).

In addition, the social exchange theory was used in combination with equity theory. Both theories support the claim that employees value the relationship with organization relative to incentives and rewards received (Jiang *et al.*, 2012). Thus, when employees are valued, they reciprocate the organization with an extra effort and novelty in doing things. Also, the job characteristics theory is used in combination with social cognitive theory to the support the impact of change-oriented HRMS (Lee *et al.*, 2016). Job characteristics theory increases self-responsibility toward the change and social cognitive theory enhances self-efficacy. Also, organizational support theory was used to explain how managerial support and HRMP would enhance R&D activities, and thus innovation (Stock *et al.*, 2014). Besides, the presence of knowledge-based view not to be ignored in explaining the importance of knowledge management's impact on innovation (Andreeva *et al.*, 2017; Chen and Huang, 2009).

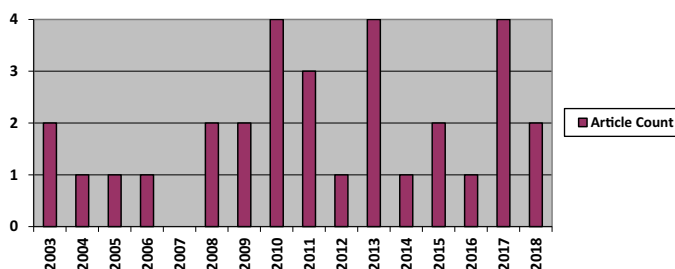
Finally, the usage of the ability, motivation, opportunity (AMO) framework developed by Bailey (1993) is noticed to be prominent after the year 2014. HRMP are declared to be channeled through, the ability enhancement, motivation and opportunity given for employees (Ma Prieto and Pilar Pérez-Santana, 2014; Fu *et al.*, 2015; Lee *et al.*, 2016; Diaz-Fernandez *et al.*, 2017).

## Methodology

To analyze the methodology characteristics three aspects have been examined, namely, the industry, the unit of analysis and methods adopted.

### Industry

The main industry that has been noticed in the chosen articles is the manufacturing sector as it is present in 11 articles. The information and communication technology, is present in 6 papers. The food and beverage, automotive and service industry is present in four research studies. The wholesale trade, computer software industry, electronics, chemical industry, construction and hotel industry was noticed to be covered in 3 articles. The catering,



**Figure 2.**  
Distribution of empirical HRMP and innovation publications

---

transportation, financial service and textile industry is allocated in two papers. The health and personal service, retail trade, internet and added values services, biotechnology and pharmaceuticals and metallurgy industry were inspected in one article each. What is noticed of what been mentioned above that the focus is on the manufacturing industry and there are still some industries to be covered such as oil, education and advertising industries. However, what is interesting that one of the articles excluded the agriculture sector. This may raise some questions and would constitute an opportunity for future research.

#### *Unit of analysis*

The individual is the essential unit of investigation of HRMP and innovation in firm research. The human resource director (HRD) was exclusively the unit of analysis in five articles, the Chief Executive Officer (CEO) in one article and the manager. Top executives including (CEO, general manager) were the unit of analysis in three papers, the CEO and the HRD in two papers, the CEO, production manager and HRD in one paper. Moreover, the CEO, middle-level managers and local stake holders was the unit of analysis in one paper, the CEO, HRD and financial controller in one article. Furthermore, The HRD and owner/manager (entrepreneur), was the unit of analysis in two research studies, the HRD and technology manager in one paper, the HRD, operational manager and employee in one article, the HRD, strategic director, production manager and the employee in one paper. Also, the senior, middle and junior managers were the unit of analysis in one paper, the senior executives in one article and the marketing manager and R&D manager in one research. As noticed, almost all of papers have focused on either top or middle management to represent the firm without giving an attention to the lower level of employees. Thus, supporting the claim that employees opinion and reaction to HR practices is usually not addressed in HRM literature (Nolan and Garavan, 2016).

#### *Methods used*

The empirical systematic literature review revealed some aspects about the methodological trends used. In total, 27 studies used questioners or surveys (interchangeably) for data collection, only two of them were longitudinal, while the rest were cross-sectional. Moreover, two studies used a mixed approach of a questioner and an interview. Furthermore, the rest two articles have adopted an interview approach with a longitudinal nature, thus a total of four articles having a longitudinal approach.

#### **Content analysis**

The content analysis of HRMP and innovation in firms focused on the following aspects: HRMP (bundle/single); existence of a moderating or a mediating variable, namely, characteristics of HRMS; definitions of innovation; outcomes of HRMP in an indication for innovation in all its forms.

#### *Human resource management systems or human resource management practices*

Lado and Wilson (1994) defined an HRMS as “a set of distinct but interrelated activities, functions and processes that are directed at attracting, developing and maintaining or disposing of a firm’s human resources.” Thus, indicating for the complementary and interrelated nature of the practices formulating an HRMS that imposes a competitive advantage for the firm. Moreover, high-performance work systems (HPWS) in accordance with what have been mentioned earlier is defined as “a system of HRMP designed to

enhance employees' skills, commitment and productivity in such a way that employees become a source of sustainable competitive advantage" (Pfeffer and Jeffrey, 1998).

Moreover, the majority of researchers have adopted HRM practices in isolation to inspect its impact on performance (Wright and Boswell, 2002). However, there is a call for adopting sophisticated HRMS to induce product and technological innovation (Shipton *et al.*, 2005). HRMP when adopted as a system, is expected to evoke innovation as noticed in many research studies, for example: De Winne and Sels (2010), Lopez-Cabrales *et al.* (2009) and many others.

The notion of complementarities is essential for HRMP to induce innovation (Laursen and Foss, 2003). However, it has been found that isolated HRMP induce innovation to a certain extent. However, their interactive impact will be more significant (Beugelsdijk, 2008; Shipton *et al.*, 2006). Furthermore, the impact of a single practice of HRM on a firm's performance is not beneficial (Lau and Ngo, 2004). Additionally, Jimenez-Jemenez and Sanz-Valle (2005) in their study announced a lack of support for the claim that HRMP in isolation would induce innovation.

Moreover, the aspect of integration and fit is highlighted as; HRM system alone might not induce innovation unless accompanied by an organizational culture that supports innovation. Furthermore, the existence of an innovative strategy accompanied by the HRMP is essential for firm innovation (Jimenez-Jemenez and Sanz-Valle, 2005). On the other hand, the alignment of HRMP toward the same goal may have a negative effect (Andreeva *et al.*, 2017).

In summary, papers that used HRMP as a bundle was ( $n = 26$ ); in isolation ( $n = 4$ ); a mixture of a bundle and isolation ( $n = 1$ ). It is noticed that most researchers agree on the notion of the bundle, however, lack of agreement is noticed relative to the type of practices to integrate in the system (Jimenez-Jemenez and Sanz-Valle, 2005).

#### *Human resource management systems characteristics*

A variety of HRMS is used in literature with different HRMP and purposes. HRMS are categorized according to their purpose, namely, innovation-oriented encompassing practices that help build an innovative culture (Lau and Ngo, 2004); a learning supportive (De Saa-Perez and Diaz-Diaz, 2010; Laursen and Foss, 2003; Shipton *et al.*, 2005; Shipton *et al.*, 2006); an exploration and behavior fit to strategy (Cooke and Saini, 2010); flexibility and adaptive capability-oriented system to face the rapid environmental changes (Chang *et al.*, 2013; Jimenez-Jimenez and Sanz-Valle, 2008; Martínez-Sánchez *et al.*, 2011; Wei and Lau, 2010); a system that allow firms to evoke knowledge and build expertise (Andreeva *et al.*, 2017; Chen and Huang, 2009; De Winne and Sels, 2010; Lopez-Cabaralez *et al.*, 2009; Sung and Choi, 2018); high performance work systems used to motivate and build human and social capital (Fu *et al.*, 2015; Donate *et al.*, 2016; Messersmith and Guthrie, 2010); commitment oriented that establish social relations and evokes employee commitment toward the organization and risk taking (Ceylan, 2013; Chen *et al.*, 2018; Neves and Osorio, 2017; Zhou *et al.*, 2013); a collaboration HRMS that helps in the development of equality relationship (Zhou *et al.*, 2013); high involvement work practices that induce management coworkers support (Ma Prieto and Pérez-Santana, 2014); a change oriented that impact employee psychological status such as self-efficacy and responsibility to change (Lee *et al.*, 2016); and a creativity inducing system (Liu *et al.*, 2017).

In summary, HRMS that builds knowledge capabilities evokes flexibility and learning is highly used in research. Moreover, commitment systems are quite noticed, however, the concepts of fit, culture and collaboration need to be more research as few studies have been encountered. Additionally, the same systems encompassing different HRMP were used for different purposes. Furthermore, different systems have been used for the same purpose.

---

Systems used for different purposes are high performance work system, high commitment human resource system. The first was used to; motivate, build human and social capital (Messersmith and Guthrie, 2010); to enhance adaptive capability (Wei and Lau, 2010); and induce innovative work behavior (Fu *et al.*, 2015). The latter, was used to support learning (De Saa-Perez and Diaz-Diaz, 2010); enhance innovative capability (Zhou *et al.*, 2013) and innovative behavior, evoke organizational commitment and employee risk-taking (Chen *et al.* (2018) and alignment of strategy (Cooke and Saini, 2010). This supports the notion that HRMS are used interchangeably especially HPWS, high involvement work system (HIWS) and high commitment work systems (HCWS) (Chen *et al.*, 2018).

#### *Human resource management practices in isolation*

Utilization of HRMP in isolation is quite noticed and adopted in recent research studies. The practices used can be categorized according to their purpose of usage. Lau and Ngo (2004) used three practices directed toward mindfulness; Jiang *et al.* (2012) adopted eight practices to evoke employee creativity; Stock *et al.* (2014) used four innovation-oriented practices; and Diaz-Fernandez *et al.* (2017) incorporated four practices aiming at enhancing employee abilities, motivation and opportunity to innovate.

#### *Innovation by definition*

Different definitions of innovation have been encountered, thus a trial has been conducted to set a certain trend for the definitions adopted. The definition by West and Far, used by Jiang *et al.* (2012), Shipton *et al.* (2005) and Shipton *et al.* (2006). It captures the deliberate behavior directed toward new (products, ideas and processes), that is new to the adopting unit and beneficial for the organization and society. Moreover, its usage has been noticed to be mainly for the technological products and processes.

Next, the prominent author relied upon in defining innovation was Damanpour, as there has been three definitions established during the following years 1989, 1991 and 1998. The articles are developed by: Diaz-Fernandez *et al.* (2017), Ceylan (2013), Chang *et al.* (2011), Chen and Huang (2009), Fu *et al.* (2015), Jemenez-Jemenez and Sanz Valle (2008), Wei and Lau (2010) and Zhou *et al.* (2013). Such definitions consider innovation as a performance outcome. Moreover, it captures the innovative strategy, product, project, process and organizational innovation. Furthermore, the measuring scale of patents and the classification of radical and incremental innovation was realized.

Additionally, innovation as newness in products, services, work and practices is addressed relying on (Rogers, 1983). In addition, innovation has been considered to be embedded in knowledge according to kogut and Zander (1992), Nonaka (1994) and Smith *et al.* (2005).

In summary, the definition of innovation adopted is mainly that of Damanpour, which states that, namely, “the adoption of an idea or behavior, whether a system, policy, program, device, process, product or service, that is new to the adopting organization” (Damanpour *et al.*, 1989).

#### *Mediator or moderator*

Almost half the studies ( $n = 17$ ) have used a mediator or a moderator as an explaining tool for the indirect linkage between HRMP and innovation in firms (Lau and Ngo, 2004 also Wei and Lau, 2010). The mediators used are as follows: Organizational culture, knowledge management capacity, unique knowledge, valuable knowledge, adaptive capability, innovation-oriented strategy, employee creativity, cross-functional research and development, absorptive capacity, innovative work behavior, human and social capital, firm ownership and middle managers innovative behavior. On the other hand, the moderators



incorporated are, namely, environmental dynamism, strategic activities, compensation and benefits, employee creativity, work-family conflict and work climate.

In the following section, the outcomes of the articles included in the review are presented accordingly; and the HRMP and innovation relationship (direct/indirect). Moreover, the direct relationship is categorized into bundles, isolation and utilization of both approaches.

#### *Human resource management systems*

First, trying to find the best bundle of practices for product innovation in firms, [Laursen and Foss \(2003\)](#) adopted two systems, namely, the first composed of nine practices and the second composed of two; however, both having a learning objective. Their sample was 913 Danish firms with at least 100 employees. Results indicated that the complementarities effect between practices enhances their impact on innovation, however, only seven of the first system had a positive significant impact. Moreover, [Shipton et al. \(2005\)](#) examined the British context by sampling 32 firms having at least 70 employees. The system adopted is learning-oriented composed of six practices. Results indicated a significant impact on product production and technology innovation, however, no impact on the process. This notion was supported by Jiménez-Jiménez and Sanz-Valle (2008), when exploring the Spanish context, with a sample of 173 firms having more than 50 employees.

Also, [De Winne and Sels \(2010\)](#), with a sample of 294 startup firms in Belgium inspected the impact of HRMP as a bundle on product, process and service innovation. The systems composed of five practices directed toward knowledge creation and retention. Results indicated high positive significance between the bundle of practices and the mentioned types of innovation. In addition, [De Saa-Perez and Díaz-Díaz \(2010\)](#), while investigating the Canary Islands by sampling 157 firms having more than 10 employees. High commitment HRMP was used such as internal promotion, group-based performance appraisal among six practices. It was noticed the existence of a positive influence on product and process innovation, yet this influence varies relative to sectors.

Furthermore, Messermith and Gutherie (2010) handled a sample of 2018 firm in the USA having 20 to 100 employees. HPWS was adopted, it supported the emergence of product, organizational but not process innovation. Besides, [Zhou et al. \(2013\)](#) inspected two systems of HRMP, commitment and collaboration in the Chinese context of 125 firms having 50 employees and above. Both systems indicated a positive impact on organizational innovation, however, when implemented together, a negative interactions emerges this hindering innovation. The commitment-based system was used by [Ceylan \(2013\)](#), which enhanced various forms of innovation This positive impact on innovation is also reflected when studying 109 firms with 50 employees or more in Spain ([Nieves and Osorio, 2017](#)).

In summary, different usage of HRMP systems shown a positive association with product innovation, however, little evidence is provided to support the emergence of process innovation. Moreover, innovation level varies among sectors as some are influenced by specific types of system of practices. Thus, according to the sector, careful selection of practices should be adopted. Furthermore, it was noticed that when implementing two different types of systems, the impact of both systems on innovation is diminished. This is explained according to ambidexterity as there should be a balance if more than one system is adopted.

#### *Human resource management practices in isolation*

Next, [Vogus and Wellborne \(2003\)](#) examined the USA by a sample of 184 firms having an average of 238 employees. HRMP was used in isolation, results indicated that innovation output is strongly increased by these practices. Moreover, [Beugelsdijk \(2008\)](#) examined the Dutch context with a sample of 988 firms having a minimum of 5 employees. Outcomes

---

highlighted the importance of adopting practices that stress training and incentives to induce incremental innovation such as follows: training, performance-based pay. While, for radical innovation the adopted practices should induce autonomy.

### *Combination*

Then, [Shipton et al. \(2006\)](#) inspected the UK context through 22 firms having an average of 236 employees. They adopted a set of practices that evoke exploratory learning; results indicated that induction, appraisal, training and teamwork had a significant impact on product innovation yet; appraisal had no impact on technical system innovation. Moreover, contingent reward had no impact on both types of innovation, however, when combined with other practices as a system its impact becomes obvious. In addition, the combined influence had a stronger impact on technical innovation.

Moreover, [Chang et al. \(2011\)](#) when adopting selection and training practices in isolation both had a positive impact on incremental and radical innovation. However, the joint adoption had a negative impact on incremental innovation. Thus, a proper identification of practices so that, they won't impact each other negatively. Besides, [Andreeva et al. \(2017\)](#) adopted 3 knowledge-oriented practices to inspect jointly and separately in 259 companies with at least 100 employees in Finland. The separate impact of rewards and appraisals was positive on incremental innovation, however, no interaction impact. While, for radical innovation rewards had a positive impact while the interactive impact was negative. This supports the notion of careful selection when combining practices.

In summary, various HRMP have been examined if being used would enhance innovation, surprisingly most studies revealed that single practices would evoke innovation. However, when combined with each other innovation will be hindered. Thus, contradicting what has been mentioned above relative to the impact of bundles of HRMP on innovation.

### *Mediators and moderators*

Finally, the existence of a mediating or moderation mechanism to explain the HRMP and innovation linkage is noticed. [Lau and Ngo \(2004\)](#) used innovation-oriented HRMP as a bundle in 332 firms having more than 50 employees in Hong Kong. The system used to create cross-functional teams that support change. It had a positive impact on innovation through the organizational culture. Moreover, knowledge management capacity as a moderator was adopted by [Chen and Huang \(2009\)](#) while examining Taiwanese firms. Results supported the mediating impact between HRMP as a bundle and innovation (administrative and technical). Furthermore, [Lopez-Cabrales et al. \(2009\)](#) examined the Spanish context with a sample of 86 firms having more than 50 employees. Two types of bundles was adopted; knowledge-based and Collaborative HRMP mediated by valuable knowledge and unique knowledge respectively. Hence, both systems had no direct effect, while only collaborative HRMP has an impact on innovation mediated by unique knowledge.

In addition, partial support has been recognized when examining the HPWS and product innovation relationship mediated by adaptive capability ([Wei and Lau, 2010](#)). Also, [Cooke et al. \(2010\)](#) inspected the impact of high commitment work practices on product, process and customer service innovation through alignment of strategy. Strong influence has been noticed, which was explained by the adoption of practices supporting each other. Also, [Jiang et al. \(2012\)](#) tested the impact of HRMP in isolation on technological and organizational innovation mediated by employee creativity. All practices indicated a positive mediation, however, training and performance appraisal were not.

Next, cross-functional R&D was inspected as a mediator between HRMP in isolation and product program innovativeness. The test conducted in the German context with a sample of 125 firms having 50 employees and above (Stock *et al.*, 2014). Training and rewards had a strong influence on product program innovativeness, however, recruitment had no impact. Besides, the mediating role of absorptive capacity between flexibility-oriented HRMS and incremental innovation was inspected in China. Both systems indicated a significant association with firm innovativeness, however, when implemented together the positive impact fades (Chang *et al.*, 2013).

Then, Ma Prieto and Pilar Pérez-Santana (2014) adopted a supportive work environment as a mediator between high involvement HRMP and innovative work behavior. The study was conducted in Spain handling sample of 198 firms. Outcomes indicated that direct and the mediated relationship between HRMP targeting employee's abilities, skills and opportunities and innovative work behavior is significant. As well, Fu *et al.* (2015) when examining the Irish context adopted HWPS and organizational innovation relationship mediated by innovative work behavior. The sample included 120 firms and results supported the direct and the mediated relationship.

Subsequently, Donate *et al.* (2016) sampled 72 firms in Spain, where two systems are adopted. High profile performance systems composed of five practices and a collaborative system composed of seven practices. The relation with product and process innovation was examined through human and social capital. Results indicated that both systems positively impacted product and process innovation when mediated through human and social capital respectively. In addition, Lee *et al.* (2016) investigated the Korean context sampling 11 firms while adopting a change-oriented HRM system. The suggested relationship between HRM system and group innovation is through employee proactively. Primary results indicated a channeling effect of employee proactive behavior, however, no mediating effect.

As for the moderated relationship between HRMP and innovation, environmental dynamism was used by Martínez-Sánchez *et al.* (2011) in the Spanish context. The study encompassed two flexibility-oriented systems; internal and external numerical. Moreover, the internal system is composed by its turn from functional and numerical. Results indicated that for both direct and moderated relationship the following. The internal system with both its subsystems indicated a positive relationship with innovativeness, however, only consulting contracting firms in the external system is in positive relation.

Furthermore, Diaz-Fernandez *et al.* (2017) conducted a longitudinal study in the Spanish context encompassing a sample of 1,363 firms. He used four HRMP in isolation to be moderated by compensation and benefits. Results indicated that only employment security and investment in new training technologies had a significant impact on innovation as long as this relationship is moderated by high salaries. However, employment security, compensation when implemented in isolation had no impact on innovation. Moreover, the language training and training in new technologies had not impact.

Additionally, what is interesting is the existence of a mediator and a moderator in three studies encompassed in the review. First, Liu *et al.* (2017) investigated the Chinese context by sampling 57 firms. Two systems are adopted, the employee experienced performance HRM and employee experienced maintenance-oriented HRM. The two systems implemented with employee creativity as moderator and firm ownership as a mediator. The multilevel relationship indicated a positive impact on firm innovation. Next, Sung and Choi (2018) examined the Korean contest with a two-set of knowledge stock and flow-oriented practices. The mediators used firm knowledge flow and stock, while the moderator is the strategy. Flow and stock facilitating HRMP indicated a positive impact on firm innovation through firm knowledge flow. Moreover, the moderating effect is partial as innovation is impacted

through knowledge stock. Thus there is a need for a proper implementation of high levels of firm knowledge flow if to make use of firm knowledge stock in inducing innovation.

Finally, [Chen et al. \(2018\)](#) inspected 113 firms in the Chinese context where a high commitment work system is used. The system impact on innovative behavior is studied through middle managers innovative behavior; this relation is moderated by work-family conflict and work climate. The managers' innovative behavior successfully mediates the relationship between HCWS and firm innovative performance. However, the direct relationship was not significant, moreover work-family conflict had a negative impact on innovative behavior. Furthermore, the combined effect of HCWS with both moderating variables indicated a positive impact on innovative behavior.

In summary, the research is rich with trials to explain the relationship between HRMP and innovation through a mechanism. However, the mediating mechanism is more popular among research, thus, what would be beneficial is search for further moderators to explain the above-mentioned relationship. In what follows managerial implications for practice are presented.

### **Practical implications**

Important practical implications are uncovered for managers that need to acquire human resources skills and competencies, which would enhance the firm's survival rate. First, it has been noticed that the existence of training in most of the HRMS is present and plays a vital role in inducing innovation. Lack of training might be reflected in the absence of innovation, however, presence of training would prevent employees from being square minded. Thus, managers are required to focus on human capital development and adopt practices that foster knowledge and enrich employees' skills. Fostering knowledge includes the process of acquiring and sharing information among employees. Sharing information can be motivated through a bonus system that reward combined effort rather than individual ones. Moreover, managers can promote a learning environment by having the proper infrastructure needed and through nurturing social ties. On the other hand, it was noticed that training had no impact on innovation; this case needs to be investigated closely.

Second, managers have to be aware to what practices to use in the HRMS, as some practices when combined together would negatively impact the learning process in the organization. Just as the presence of individual appraisal and pay for performance. Such a case will result in conflict, which can be resolved by careful selection and proper fit among HRMP to be included in the system. Moreover, the fit is not restricted to the practices only, as the fit should take into consideration the company strategy. Third, managers who provide a secure working environment for their employees as replacing contracts with full-time schedules, tolerate and encourage risk-taking, will lead provoke innovation. Forth, cultural aspects should be treated carefully, as when ignored will have negative impact on innovation, as cultural changes require the adjustment of management approach.

Fifth, the importance of selecting and hiring employees with unique knowledge and high education and take the proper measures to retain talents and key persons that are considered vital. This can be done through career development, promotions, flexibility, autonomy, motivation and investment in leadership practices in a dynamic environment. Finally, managers would implement more than one HRM system, however, these systems should be implemented in synergy.

### **Future research**

As noticed in the review the theoretical underpinning of the HRMP, innovation relationship is quite noticed. However, there is still a space to examine more theories to explain this

relationship, for example. Trait theory can be adopted as it explains the individual-level factors, which might impact HRMS positively or negatively (Tett and Burnett, 2003).

Moreover, regarding the methodology, sampling size in most studies was limited, thus, it would be beneficial to in large it. Furthermore, the impact of the context in which the practices were implemented should have been closely inspected (Vogus and Welbourne, 2003). In addition, the sector was controlled for; however, it would of interest to inspect the type of practices that would impact each sector. Also, the longitudinal approach is scarce as noticed only four articles adopted it (Diaz-Fernandez *et al.*, 2017; Shipton *et al.*, 2005; Shipton *et al.*, 2006; Sung and Choi, 2018). Hence, longitudinal studies could grab the impact of the HRMP on innovation in different time intervals. Moreover, the field lacks studies that examined the sample of investigation before and after implementing the HRMP. Finally, face to face interviews when conducted would yield more in-depth information about the field of study.

Furthermore, tow contradicting perspectives have been encountered regarding the parsimony of practices. As for the first, a call is noticed for a limited number of practices, thus inducing flexibility (Jimenez-Jemenez and Sanz-Valle, 2005). While, the latter the inclusion of enormous sets of practices is noticed (Donate *et al.*, 2016; Martínez-Sánchez *et al.*, 2011; Zhou *et al.*, 2013). Moreover, substitution of practices or using alternative practices would be an area of interest to be inspected. Additionally, agreement on the type of practices that are aligned and fit is missing. Finally, the inclusion of more variables to portray the linkage between HRMP and innovation is appealing such as organizational structure, psychological contract and organizational capital.

## Conclusion

The 31 empirical articles reviewed suggest some improvement toward understanding the HRMP and innovation relationship in firms. The context diversity in which the studies have been conducted reveals that the HRMP and innovation relationship is a rich field yet a lot to be discovered. Practical implication are indicated, which would act as guidance for what of practices would induce innovation if implemented. However, as noticed there no specific system to apply as firms and cultural has to be dealt with according to contingency. Moreover, it suggests some additional theories to be used for inspecting the HRMP and innovation relationship.

In addition, the study encompasses areas of strength and weaknesses, as for the first the types of journals selected are high ranking, which reflects reliability of review. While the latter, the study included only empirical articles, which can be considered a weakness, as many conceptual articles was dropped. Moreover, the studies interpreted the HRMP as a bundle in different ways, with different inclusion of practices for the same system. Furthermore, all unpublished studies, Grade 1 journals, books and abstracts were excluded.

## References

- Andreeva, T., Vanhala, M., Sergeeva, A., Ritala, P. and Kianto, A. (2017), "When the fit between HR practices backfires: exploring the interaction effects between rewards for and appraisal of knowledge behaviours on innovation", *Human Resource Management Journal*, Vol. 27 No. 2, pp. 209-227.
- Bailey, T. (1993), "Organizational innovation in the apparel industry", *Industrial Relations*, Vol. 32 No. 2, pp. 30-48.
- Beugelsdijk, S. (2008), "Strategic human resource practices and product innovation", *Organization Studies*, Vol. 29 No. 6, pp. 821-847.

- Casey, J. and Koleski, K. (2011), *Backgrounder: China's 12th Five-Year Plan*, US-China Economic and Security Review Commission.
- Ceylan, C. (2013), "Commitment-based HR practices, different types of innovation activities and firm innovation performance", *The International Journal of Human Resource Management*, Vol. 24 No. 1, pp. 208-226.
- Chang, S., Gong, Y. and Shum, C. (2011), "Promoting innovation in hospitality companies through human resource management practices", *International Journal of Hospitality Management*, Vol. 30 No. 4, pp. 812-818.
- Chang, S., Gong, Y., Way, S.A. and Jia, L. (2013), "Flexibility-oriented HRM systems, absorptive capacity, and market responsiveness and firm innovativeness", *Journal of Management*, Vol. 39 No. 7, pp. 1924-1951.
- Chen, C.J. and Huang, J.W. (2009), "Strategic human resource practices and innovation performance – the mediating role of knowledge management capacity", *Journal of Business Research*, Vol. 62 No. 1, pp. 104-114.
- Chen, Y., Jiang, Y.J., Tang, G. and Cooke, F.L. (2018), "High-commitment work systems and Middle managers' innovative behavior in the Chinese context: the moderating role of work-life conflicts and work climate", *Human Resource Management*, Vol. 57 No. 5, pp. 1317-1334.
- Cooke, F.L. and Saini, D.S. (2010), "(how) does the HR strategy support an innovation oriented business strategy? an investigation of institutional context and organizational practices in Indian firms", *Human Resource Management: Published in Cooperation with the School of Business Administration, the University of MI and in Alliance with the Society of Human Resources Management*, Vol. 49 No. 3, pp. 377-400.
- Damanpour, F., Szabat, K.A. and Evan, W.M. (1989), "The relationship between types of innovation and organizational performance", *Journal of Management Studies*, Vol. 26 No. 6, pp. 587-602.
- De Winne, S. and Sels, L. (2010), "Interrelationships between human capital, HRM and innovation in Belgian start-ups aiming at an innovation strategy", *The International Journal of Human Resource Management*, Vol. 21 No. 11, pp. 1863-1883.
- Diaz-Fernandez, M., Bornay-Barrachina, M. and Lopez-Cabrales, A. (2017), "HRM practices and innovation performance: a panel-data approach", *International Journal of Manpower*, Vol. 38 No. 3, pp. 354-372.
- De Saa-Perez, P. and Diaz-Diaz, N.L. (2010), "Human resource management and innovation in the canary islands: an ultra-peripheral region of the European Union", *The International Journal of Human Resource Management*, Vol. 21 No. 10, pp. 1649-1666.
- Donate, M.J., Peña, I. and Sanchez de Pablo, J.D. (2016), "HRM practices for human and social capital development: effects on innovation capabilities", *The International Journal of Human Resource Management*, Vol. 27 No. 9, pp. 928-953.
- Fu, N., Flood, P.C., Bosak, J., Morris, T. and O'Regan, P. (2015), "How do high performance work systems influence organizational innovation in professional service firms?", *Employee Relations*, Vol. 37 No. 2, pp. 209-231.
- Jiang, J., Wang, S. and Zhao, S. (2012), "Does HRM facilitate employee creativity and organizational innovation? A study of Chinese firms", *The International Journal of Human Resource Management*, Vol. 23 No. 19, pp. 4025-4047.
- Jimenez-Jimenez, D. and Sanz-Valle, R. (2005), "Innovation and human resource management fit: an empirical study", *International Journal of Manpower*, Vol. 26 No. 4, pp. 364-381.
- Jimenez-Jimenez, D. and Sanz-Valle, R. (2008), "Could HRM support organizational innovation?", *The International Journal of Human Resource Management*, Vol. 19 No. 7, pp. 1208-1221.
- Kogut, B. and Zander, U. (1992), "Knowledge of the firm, combinative capabilities, and the replication of technology", *Organization Science*, Vol. 3 No. 3, pp. 383-397.

- Lau, C.M. and Ngo, H.Y. (2004), "The HR system, organizational culture, and product innovation", *International Business Review*, Vol. 13 No. 6, pp. 685-703.
- Lado, A.A. and Wilson, M.C. (1994), "Human resource systems and sustained competitive advantage: a competency-based perspective", *The Academy of Management Review*, Vol. 19 No. 4, pp. 699-727.
- Laursen, K. and Foss, N.J. (2003), "New human resource management practices, complementarities and the impact on innovation performance", *Cambridge Journal of Economics*, Vol. 27 No. 2, pp. 243-263.
- Lee, H.W., Pak, J., Kim, S. and Li, L.Z. (2016), "Effects of human resource management systems on employee proactivity and group innovation", *Journal of Management*, p. 149206316680029.
- Liu, D., Gong, Y., Zhou, J. and Huang, J.C. (2017), "Human resource systems, employee creativity, and firm innovation: the moderating role of firm ownership", *Academy of Management Journal*, Vol. 60 No. 3, pp. 1164-1188.
- Lopez-Cabrales, A., Pérez-Luño, A. and Cabrera, R.V. (2009), "Knowledge as a mediator between HRM practices and innovative activity", *Human Resource Management*, Vol. 48 No. 4, pp. 485-503.
- Ma Prieto, I. and Pérez-Santana, M.P. (2014), "Managing innovative work behavior: the role of human resource practices", *Personnel Review*, Vol. 43 No. 2, pp. 184-208.
- Martínez-Sánchez, A., Vela-Jiménez, M.J., Pérez-Pérez, M. and de-Luis-Carnicer, P. (2011), "The dynamics of labour flexibility: relationships between employment type and innovativeness", *Journal of Management Studies*, Vol. 48 No. 4, pp. 715-736.
- Messersmith, J.G. and Guthrie, J.P. (2010), "High performance work systems in emergent organizations: implications for firm performance", *Human Resource Management*, Vol. 49 No. 2, pp. 241-264.
- Nieves, J. and Osorio, J. (2017), "Commitment-based HR systems and organizational outcomes in services", *International Journal of Manpower*, Vol. 38 No. 3, pp. 432-448.
- Nolan, C.T. and Garavan, T.N. (2016), "Human resource development in SMEs: a systematic review of the literature", *International Journal of Management Reviews*, Vol. 18 No. 1, pp. 85-107.
- Nonaka, I. (1994), "A dynamic theory of organizational knowledge creation", *Organization Science*, Vol. 5 No. 1, pp. 14-37.
- OECD/Eurostat (2005), "Guidelines for collecting and interpreting innovation data", available at: [www.keepeek.com/Digital-Asset-Management/oecd/science-and-technology/oslomanual\\_9789264013100-en](http://www.keepeek.com/Digital-Asset-Management/oecd/science-and-technology/oslomanual_9789264013100-en) (accessed 8 August 2015).
- Pfeffer, J. and Jeffrey, P. (1998), *The Human Equation: Building Profits by Putting People First*, Harvard Business Press.
- Rogers, M.E. (1983), *Diffusion of Innovations*, The Free Press.
- Shipton, H., Fay, D., West, M., Patterson, M. and Birdi, K. (2005), "Managing people to promote innovation", *Creativity and Innovation Management*, Vol. 14 No. 2, pp. 118-128.
- Shipton, H., West, M.A., Dawson, J., Birdi, K. and Patterson, M. (2006), "HRM as a predictor of innovation", *Human Resource Management Journal*, Vol. 16 No. 1, pp. 3-27.
- Smith, K.G., Collins, C.J. and Clark, K.D. (2005), "Existing knowledge, knowledge creation capability, and the rate of new product introduction in high-technology firms", *Academy of Management Journal*, Vol. 48 No. 2, pp. 346-357.
- Stock, R.M., Totzauer, F. and Zacharias, N.A. (2014), "A closer look at cross-functional R&D cooperation for innovativeness: innovation-oriented leadership and human resource practices as driving forces", *Journal of Product Innovation Management*, Vol. 31 No. 5, pp. 924-938.
- Sutton, R.I. and Staw, B.M. (1995), "What theory is not", *Administrative Science Quarterly*, Vol. 40 No. 3, pp. 371-384.

- 
- Sung, S.Y. and Choi, J.N. (2018), "Building knowledge stock and facilitating knowledge flow through human resource management practices toward firm innovation", *Human Resource Management*, Vol. 57 No. 6, pp. 1429-1442.
- Tett, R.P. and Burnett, D.D. (2003), "A personality trait-based interactionist model of job performance", *Journal of Applied Psychology*, Vol. 88 No. 3, p. 500.
- Vogus, T.J. and Welbourne, T.M. (2003), "Structuring for high reliability: HR practices and mindful processes in reliability-seeking organizations", *Journal of Organizational Behavior*, Vol. 24 No. 7, pp. 877-903.
- Wright, P.M. and Boswell, W.R. (2002), "Desegregating HRM: a review and synthesis of micro and macro human resource management research", *Journal of Management*, Vol. 28 No. 3, pp. 247-276.
- Zhou, Y., Hong, Y. and Liu, J. (2013), "Internal commitment or external collaboration? The impact of human resource management systems on firm innovation and performance", *Human Resource Management*, Vol. 52 No. 2, pp. 263-288.

### Further reading

- Cano, C.P. and Cano, P.Q. (2006), "Human resources management and its impact on innovation performance in companies", *International Journal of Technology Management*, Vol. 35 Nos 1-4, pp. 11-28.
- Chowhan, J. (2016), "Unpacking the black box: understanding the relationship between strategy, HRM practices, innovation and organizational performance", *Human Resource Management Journal*, Vol. 26 No. 2, pp. 112-133.
- Curado, C. (2018), "Human resource management contribution to innovation in small and medium-sized enterprises: a mixed methods approach", *Creativity and Innovation Management*, Vol. 27 No. 1, pp. 79-90.
- Gong, Y., Law, K.S., Chang, S. and Xin, K.R. (2009), "Human resources management and firm performance: the differential role of managerial affective and continuance commitment", *Journal of Applied Psychology*, Vol. 94 No. 1, p. 263.
- Li, Y., Wang, M., Van Jaarsveld, D.D., Lee, G.K. and Ma, D.G. (2018), "From employee-experienced high-involvement work system to innovation: an emergence-based human resource management framework", *Academy of Management Journal*, Vol. 61 No. 5, pp. 2000-2019.
- Lin, C.H. and Sanders, K. (2017), "HRM and innovation: a multi-level organizational learning perspective", *Human Resource Management Journal*, Vol. 27 No. 2, pp. 300-317.
- Wei, L.Q. and Lau, C.M. (2010), "High performance work systems and performance: the role of adaptive capability", *Human Relations*, Vol. 63 No. 10, pp. 1487-1511.
- Xiao, Z. and Björkman, I. (2006), "High commitment work systems in Chinese organizations: a preliminary measure", *Management and Organization Review*, Vol. 2 No. 3, pp. 403-422.

### Corresponding author

Nasser Fathi Easa can be contacted at: [n.easa@bau.edu.lb](mailto:n.easa@bau.edu.lb)



Author/year	Method	Country	Unit of analysis	Theory/traditions	HRMP/HRMS	Innovation	*Mo/**Me	Outcomes
Laursen and Foss (2003)	Questioner	Denmark	Private Firm 913 mini 100 emp	HRM	HRMS/ interdisciplinary work groups quality circles systems for collection of employee proposals-planned job rotation-delegation of responsibility-integration of function-performance-related pay HRMS/internal training-external training	Performance (product and service)	+ Complementarities effect stronger	
Vogus and Welbourne (2003)	Prospectus	The USA	Firm 184 Av emp 238	SHRM	Use of skilled temporary employees Positive employee relation Emphasis on training	Intensity of innovation (patent)	+	
Lau and Ngo (2004)	Survey	Hong Kong	Firm 332	Human capital theory	Innovation-oriented HRMS	Product	**Organizational culture	+ Mediation
Shipton <i>et al.</i> (2005)	HR directors Longitudinal Managerial Review Survey	The UK	Firm 35	Organizational learning theory	HRMS	Product production technology Production processes		+ Innovative (products and production technology) - (appraisal to pay practices and production process)
Shipton <i>et al.</i> (2006)	Longitudinal Managerial interviews: CEO directors and HR specialist	The UK	Firm 22 Av emp 226		HRMP/induction-appraisal-training-contingent reward-team working	Product Technical systems	+	Reward Interaction for team working Stronger influence in tech-innovation
Author/year	Research design	Country	Unit of analysis	Theory/traditions	HRMP/HRMS	INN	*Mod/**Med	Outcomes
Beugelsdijk (2008)	Survey Face to face interviews HR directors	The Netherlands	Firm 988 5 emp and above	Creativity and theory	SHRP/training and task rotation/job autonomy and flexible working hours-performance-based pay-short term employment contracts	Product (radical and incremental)		Incremental innovation is associated with training and schooling, job autonomy, performance-based pay and limited used of stand by contracts Radical innovation is associated with stand by contracts (negative), job autonomy and flexible working hours
Jiménez-Jiménez and Sanz-Válle (2008)	Personal interview Structured questionnaire Top executives	Spain	Firm 173	RBV	HRM system	Product Process administrative systems		+ Radical innovation is associated with stand by contracts (negative), job autonomy and flexible working hours

*(continued)*
**Table A1.**  
 Summary of HRMP  
 and innovation  
 publications

Author/ year	Method	Country	Unit of analysis	Theory/ traditions	HRMP/HRMS	Innovation	*Mo/**Me	Outcomes
Chen and Huang (2009)	Questioner Top executives	Taiwan	Firm 146	KBV	SHRP/ staffing-training-participation-appraisal-compensation Knowledge-based HRM Collaborative HRM Jwdh	Administrative Technical Product	**Knowledge management capacity **Unique Knowledge	+ Job design (job security and rewards) Both systems had no significant direct effect on innovation Confirms RBV + Mediator Performance linkage was partially supported. (alignment no sig relation)
Lopez-Cabralles et al. (2009)	Questioner Mail R&D departments	Spain	Firm 86 More than 50 emp	RBV	HPWS	Innovation measured by new (products, patents, technologies) and innovative projects Process Product/service	**Adaptive capability	+ Product Process Organizational Incremental Radical
Wei and Lau (2010)	Questioner CEO HR managers Financial officers	China	Firm 600 Avg emp 814	DC	HRP/ valid selection techniques/ Training/ group-based appraisal performance/ engagement in competence management with the explicit purpose of knowledge retention HCHRM	Product process	Alignment of strategy Customer service	+ Product Process Customer service
De Winne and Sels et al. (2010)	Survey Owners Managers	Belgium	Firm 294	RBV	HPWS	Product Process Organizational Incremental Radical		+ Product Process Organizational Incremental Radical
De Saá-Pérez and Diaz (2010)	Self admin questioner	Canary Islands	Firm 157 More than 10 emp	RBV Institutional theory	High commitment- performance HRM	Product Process Customer service		+ Product Process Customer service
Cooke and Saini (2010)	Exploratory Qualitative survey Senior-Middle-Junior	India	Firms 54	RBV Institutional theory	HPWS	Product Process Organizational Incremental Radical		+ Product Process Organizational Incremental Radical
Messersmith and Guthrie (2010)	Top management CEO, founder and vice president	The USA	2018 Firm 20-100 emp	RBV DC	Selection and training	Product Process Organizational Incremental Radical		+ Product + Organizational Not supported process innovation
Chang et al. (2011)	Survey Senior HR managers	China	Firm 196					+ In isolation -In combination
		Spain		DC				

(continued)

Author/ year	Method	Country	Unit of analysis	Theory/ traditions	HRMP/HRMS	Innovation	*M <sub>0</sub> **Me	Outcomes
Martinez-Sanchez <i>et al.</i> (2011)	Questioner HR managers Tech managers		Firm 132		Functional flexibility	Product Process	*Environment dynamism	Internal flexibility + External flexibility only R&D/ consulting contracting firms are. Same for moderator
Jiang <i>et al.</i> (2012)	Survey HR managers, operation managers and employees	China	Firm 106	Social exchange theory Equity theory	External HR flexibility Hiring and selection-training-performance appraisal-reward-job design- team work	Technological (product and process) Organizational (administrative) Product program innovativeness	**Employee creativity	+ Mediator Training and performance appraisal, no impact
Stock <i>et al.</i> (2013)	Survey Marketing managers R&D managers	Germany	Firm 125 Above 50 emp	RBV Organizational support theory	HRM practices (innovation-oriented)/ rewards-training and development-recruitment	Product program innovativeness	**Cross functional R&D	+ Mediator Recruitment no impact
Zhou <i>et al.</i> (2013)	Survey Senior HR managers	China	Firm 179	Ambidexterity theory	Commitment HRS Collaboration HRS	Organizational		+ + - Interaction
Ceylan (2013)	Questioner Owners or Senior managers, HR manager or HR specialist	Turkey	Firm 103 (3-7,500) emp	INNO	Commitment-based HRS	Process Organizational Marketing Product Firm Incremental Radical		+ + - Interaction
Chang <i>et al.</i> (2013)	Survey CEO HRM executive	China	Firm 139	Organizational learning theory The AC concept	RFHRM CFHRM	Incremental Radical	**Absorptive capacity	+ Joint existence, the positive association disappears
Ma Prieto and Pilar Perez-Santana (2014)	Survey CEO HR managers	Spain	Firm 198	AMO	Staffing/training/compensation/ performance appraisal/job design/ participation/	Innovative work behavior	**Supportive work environment (management and coworkers)	+ +
Fu <i>et al.</i> (2015)	Survey Managing partners HR managers/ directors	Ireland	Firm 120		HPWS	Organizational innovation (new clients and new services)	**Innovative work behavior	+ +
Donate <i>et al.</i> (2016)	Survey Senior executives	Spain	Firm 72	RBV	Collaborative HRM system	Product Process Group innovation (process)	**Human capital **Social capital	+ +
Lee <i>et al.</i> (2016)	Survey Leaders Member	Korea	Firm 11	Job characteristics theory	Change-oriented HRM system	Group innovation (process)		+ Impact is channelled through

(continued)

Table AI.

Author/ year	Method	Country	Unit of analysis	Theory/ traditions	HRM/HRMS	Innovation	*M <sub>0</sub> /*Me	Outcomes
Díaz-Fernández <i>et al.</i> (2017)	Longitudinal survey	Spain	Firm 1363	Social exchange theory AMO	HRP/employment security-training in new technologies – language training-compensation and benefits	Innovation (measured by number of patents)	*Compensation and benefits	proactive behavior. No mediating effect Employment security and compensation no impact. No sig relation (training) Employment security and investment in training in new technologies produce more patents when such practices are moderated by high salaries
Andreaeva <i>et al.</i> (2017)	Survey HR directors or managers/other directors	Finland	Company 259 At least 100 employees	Knowledge governance	Rewards and performance appraisal	Radical Incremental		(Incremental) the direct effect of rewards for knowledge behaviors and appraisals of knowledge behaviors are significant and had a positive impact. Interaction effects were not significant (Radical) significant positive impact of rewards for knowledge behaviors.
Liu <i>et al.</i> (2017)	Online survey Core knowledge employees and supervisors (firm and individual level)	China	Firm 57	Componential theory of creativity P-O fit theory	Employee experienced performance-oriented HR system Employee experienced maintenance-oriented HR system	Firm innovation (new products introduced)	*Employee creativity **Firm ownership	Interaction (-) Interactive effect between both systems and firm ownership is significantly related to employee creativity. Interaction between employee creativity and firm ownership was significantly associated with firm innovation +
Nieves and Osorio (2017)	Questioner	Spain	Firm 109/ 50 or more emp		Commitment-based HRP/training and development, remuneration and involvement	(OECD/Eurostat, 2005)		
Sung and Choi (2018)	Survey HRM and strategy directors-production managers and	Korea	Firm 203	KBV	Stock building HRM practices Flow facilitating HRM practices	Firm innovation measured by new product and service	** knowledge stock ** knowledge flow *Strategy	HRM practices explain the emergence of firm-level stock and flow of knowledge that contribute to firm innovation through their interactive effect

(continued)

Author/ year	Method	Country	Unit of analysis	Theory/ traditions	HRMP/HRMS	Innovation	*Mo/**Me	Outcomes
Chen <i>et al.</i> (2018)	employees-department managers Longitudinal Survey CEO-middle managers-local stakeholder	China	Firm 113	Social exchange theory AMO	HCWS	Innovative behavior new technologies, processes, techniques and product ideas. Innovative performance Product and service development	*Work-family conflict *Work climate **Middle managers innovative behavior	+ relation between HCWS innovative behavior HCWS correlated with innovative performance The interaction between HCWS and work-family conflict (-) related to the middle manager innovative behavior The three way interaction among HCWS, work family conflict and work climate is positively related to middle manager

**Note:** \*The presence of a Moderator; \*\*the presence of Mediator

Table AI.