The International Journal of Human Resource Management, Vol. 28, Issue 1, 2017, pp. 98-131
DOI:10.1080/09585192.2016.1245672

ELECTRONIC HRM: FOUR DECADES OF RESEARCH ON ADOPTION AND CONSEQUENCES

ABSTRACT

Despite the existence of a number of recent reviews of e-HRM research, we still lack a comprehensive understanding of the factors affecting the adoption and consequences of e-HRM. This paper therefore provides a review of four decades of research in this area with the aim to provide a summary and integrative framework as a basis for future research. We found that the factors affecting the adoption of e-HRM can be divided into three areas: technology; organization; and people – we refer to this as the "TOP" framework. In line with Lepak and Snell (1998) we divide consequences into those that are operational, relational and transformational. We also found that there has been a shift both in the goals for e-HRM, from efficiency to improved HR service provision and the strategic reorientation of HR departments; but also that the type of consequences that the literature focuses on has also changed from operational effects, to relational and then transformational outcomes. The paper discussed these shifts in some detail, along with the implications for future research and practice.

INTRODUCTION

For more than four decades organizations have increasingly adopted e-HRM technology in the hope of achieving administrative and strategic benefits (Kovach, Hughes, Fagan, & Maggitti, 2002; Strohmeier, 2009; Marler & Parry, 2015). E-HRM promised to provide cost reduction, service improvements, and reorientation of HR professionals to become more strategic (Ruël, Bondarouk, & Van der Velde, 2007). Following the pace of technological developments, scholars offered different definitions of e-HRM that reflected the state of e-

HRM developments (web-based, on-line, digital, and even "smart"). Thus, in 2009 Bondarouk and Ruël (2009) proposed the definition of e-HRM as an umbrella term "covering all possible integration mechanisms and contents between HRM and Information Technologies, aiming at creating value within and across organizations for targeted employees and management" (p. 507). Lately, e-HRM has been defined as a set of "configurations of computer hardware, software and electronic networking resources that enable intended or actual HRM activities (e.g. policies, practices and services) through coordinating and controlling individual and group-level data capture and information creation and communication within and across organizational boundaries" (Marler & Parry, 2015, p.2). In this overview we do not argue to choose for one specific definition of e-HRM, but we claim that it is important to acknowledge the significance of multiple elements that when integrated provide a direction for future e-HRM research, and help to understand the factors that influence its adoption and consequences. Whatever e-HRM definition is chosen by researchers, they need to view e-HRM as the unique scholarly field of inquiry that focuses on all types of HRM content that is shared through Information Technologies (IT) to make HRM processes distinctive, consistent, and efficient that create long-term opportunities within and across organizations for targeted users.

While the tone of the literature is generally optimistic about the potential of e-HRM (Ball, 2001; Bondarouk & Ruël, 2009; Haines & Lafleur, 2008; Kovach et al., 2002; Ngai & Wat, 2006; Ruta, 2009; Strohmeier, 2009; Bondarouk, Harms, & Lepak, 2015), researchers increasingly call for more empirical studies to inform conceptualization of e-HRM adoption and its consequences. Further, there is substantial accumulated knowledge about which factors to consider when adopting e-HRM. At the same time, personnel departments still experience difficulties with adopting new technologies, and e-HRM results are not always as positive as commonly assumed. To put it differently, e-HRM projects continue to report

failures (Tansley, Newell, & Williams, 2001; Smale & Heikkilä, 2009; Martin & Reddington, 2010), and have been found to achieve less than expected (Chapman & Webster, 2003). For example, Gardner, Lepak and Bartol (2003) discovered that, rather than freeing up time for HR practitioners, the adoption of e-HRM in practice led to the replacement of administrative duties with technology-related ones. In brief, it did not improve HRM services. Other studies show that HR professionals were unsuccessful in using technology to initiate and support strategic decisions (Dery & Wailes, 2005); e-HRM technology was primarily used to simply support routine administrative HR tasks (Ball, 2001; Haines & Lafleur, 2008; Hussain, Wallace, & Cornelius, 2007); and line managers reported contradictory results when using e-HRM (Reddington & Hyde, 2008). In addition, utilizing the potential of e-HRM was constrained by the complexities of people dynamics such as managing user acceptance when adapting new e-HRM systems (Grant, Dery, Hall, Wailes, & Wiblen, 2009).

One provocative explanation for e-HRM drifting from the anticipated benefits is that its consequences depend on how scholars view its context. Although positive outcomes are steadily reported (e.g. Bondarouk & Ruël, 2009), organizations are not entirely conscious of the critical factors that lead either to e-HRM success or failure. Likewise, studies tend to report overlapping, as well as contradictory empirical findings. Some authors claim user involvement during development and implementation is of great importance for success (Kossek, Young, Gash, & Nichol, 1994) while others argue the evidence for this is weak (Haines & Petit, 1997). While some authors claim the size of an organization to be insignificant (Haines & Petit, 1997; Hussain et al., 2007), others describe it as a determining factor (Ball, 2001; Haines & Lafleur, 2008; Strohmeier & Kabst, 2009). Likewise, for the importance of training: evidence in favor of training is recognized (Alleyne, Kakabadse, & Kakabadse, 2007; Panayotopoulou, Vakola, & Galanaki, 2007; Martin & Reddington, 2010), as well as evidence against it (Ruël et al., 2007). Some research advises HRM professionals to

increase technical knowledge and skills to enable effective e-HRM adoption (Hempel, 2004), and other findings show just the opposite (Bell, Lee, & Yeung, 2006).

A vast volume of papers continue to be published from the point of view of HRM, IT and other disciplines, and scholars should find an in-depth synthesis invaluable. It has now been ten years since Strohmeier (2007) suggested that the field lacks a leading paradigm; in 2013 Marler and Fisher also observed a lack of theoretical foundation and a clearly defined paradigm in e-HRM research. We were challenged and inspired by those observations to conduct a structured literature review into e-HRM studies. Since 2007 (Strohmeier, 2007), there has been a minimum of seven published overviews of the academic literature on e-HRM. Here we offer a new review that builds on the lessons from these previous reviews but also offer new insights.

In the first review Strohmeier (2007) analysed 57 studies and developed a configuration-based framework to study the multilevel nature of e-HRM. He suggested mapping the e-HRM context and configuration against the actual consequences of e-HRM. Guided by that framework, Strohmeier (2007) concluded that "the main and most detrimental inadequacy of current research is its primarily non-theoretical character"(p.28). The review by Bondarouk and Ruël (2009) discussed diverse definitions of e-HRM and suggested considering it as an "umbrella term". They proposed integrating four aspects of e-HRM research: e-HRM content, implementation, targeted users, and e-HRM consequences (p. 507). The e-HRM review by Van Geffen, Ruël and Bondarouk (2013) departed from the perspective of the Information Systems literature in multinational corporations. The analysis of 53 articles allowed Van Geffen et al (2013) to conclude that e-HRM research in multinational corporations was mostly focused on the adoption of systems and end-user satisfaction with e-HRM. Marler and Fisher (2013) examined 40 e-HRM studies from 1999 to 2011, with a goal to "apply an integrative evidence-based framework … to ascertain what e-HRM and strategic HRM

relationships were supported in the literature"(p. 18). They concluded that there was very little systematic evidence concerning whether e-HRM was related to strategic outcomes, but there was considerable evidence advocating the moderating role of contextual factors in these relationships. In 2014 Ruël and Bondarouk provided an overview of the challenges ahead of e-HRM research based on the findings of publications between 2009 and 2012, where they observed that, despite all the effort, e-HRM studies still did not address the full complexity of e-HRM projects (Ruël & Bondaouk, 2014). Their explanation was that the field still lacked theoretical in-depth developments. The latest review in this profound list was conducted by Johnson, Lukaszewski and Stone (2016), where the authors included both, academic and professional developments. Their examination of the mainframe, client server, ERP and web-based systems, and cloud-based systems led to the surprising conclusion that much of the research on the use of technology to support HRM has occurred only within the last 15-20 years and has come in response to the use of the web as a medium for the delivery of HR Information Systems.

We continue with what has become an e-HRM research tradition to review the literature. Our observation of the seven literature reviews from 2007 till 2015 convinces us of the need to examine e-HRM related studies over a longer time-span. We also notice the call from scholars to strengthen the theoretical backbone in e-HRM research. Another reflection is that there is a significant need for improving our understanding of the factors affecting the adoption and consequences of e-HRM.

Based on these observations, in this paper we aim to inform the theoretical modelling of e-HRM by systematically analyzing 40 years of empirical research to identify the key factors for adopting e-HRM in organizations, and present an overview of e-HRM consequences. Thus, this overview synthesizes answers to the questions: what are the factors affecting e-

HRM adoption; what are the consequences of e-HRM adoption; and what are the factors affecting these?

The paper is structured as follows. First, we describe how we sampled the literature, how we searched, selected and analyzed it. Then we synthesize salient findings and areas of divergence in the literature, and, finally, we point to the critical implications of this review for new research paths on e-HRM effectiveness.

LITERATURE REVIEW METHODOLOGY

As e-HRM research is fed by various disciplines, we comprehensively searched for relevant journal articles in HRM, Organizational Behaviour, Psychology, Management, Information Technology, and Computer Science research fields. The primary information source was a database search on ISI Web of Science and Scopus. To find the articles, an initial list of search words was reviewed by experienced e-HRM scholars. Lengthy discussion finally led to a reduced list of 20 search terms such as 'e-HRM', 'electronic HRM', 'digital HRM', 'virtual HRM', 'web (based) HRM', 'online HRM', 'HRIS', 'HRIT' and 'Computer Based Human Resource Management' (De Wit, 2011; Table 1). This procedure resulted in 4,960 hits on Scopus and 1,689 hits on Web of Science.

INSERT TABLE 1 ABOUT HERE

First, duplicates were removed. Then, we kept only those articles with e-HRM as their main research focus. Researchers independently reviewed the titles and abstracts of all the identified e-HRM publications (1970-2010). They made an initial selection of 299 relevant articles, compressing basic information about each article organized in a spreadsheet, including an abstract, the full article citation and a link to the article itself. We critically

examined the article information for relevance to the literature review by asking the following questions when reading each article: 'does the article *empirically* report on adoption factors or consequences of e-HRM?' and 'what is the likely impact of the article (author's importance in the field, frequently of citation, a journal's impact rating?').

At this stage, we adapted the technique outlined by Wolfswinkel, Furtmueller and Wilderom (2013) to verify inter-coder reliability. In a first comparison among researchers, an article overlap of 0.72 was achieved. A preliminary sample of 109 articles was established which was then reexamined using a forward and backward search for relevant articles. Each of the reviewers carefully read all of the articles and sorted out an exclusive list of only those which presented concrete empirical findings. Purely conceptual and theoretical papers were put aside. After resolving conflicting interpretations for judging the relevance of an article and filtering out non-empirical texts, the final sample in this review comprised 69 articles (see Appendix 1). Of these two are from the 70's, four from the 80's, twelve from the 90's and 51 were published after 2000. Our collective very rough first impression of these 69 articles was that they fell into three basic classes: 37 quantitative, 20 qualitative and 12 mixed methods papers (Figure 1).

INSERT FIGURE 1 ABOUT HERE

To identify key factors when adopting e-HRM in organizations and derive an overview of e-HRM consequences, the analysis began with a variant of 'open coding' (Strauss & Corbin, 1990) of the publications. First, we read and scanned the articles for empirical data on adoption and consequences. Potentially relevant factors were highlighted, noted in a list and

annotated in the article margins. We then re-read the articles to control for having overlooked material and determine whether the factors highlighted during the first reading were still highly relevant. The procedure was exhaustive, continuing until no new factors emerged. Next, we started to categorize e-HRM adoption factors and e-HRM consequences using mind maps software. These mind maps complimented our evolving analysis and significantly helped us to identify, label, categorize and re-label categories reflecting the full range of factors and sub-factors in the universe. The challenge was to be able to freshly observe and learn from the plurality of factors encountered.

Factors Affecting Successful Adoption of e-HRM

Block (1983, p. 24) noted of the adoption of IT in practice: "If I define a successful system as one that is developed *on time and within budget*; it is *reliable* (bug-free and available when needed), and *maintainable* (easy and inexpensive to modify*); meets its goals and specified requirements*; and *satisfies the users*, how many of you would say that your organisation has successful systems? I've asked this question of hundreds of people at all levels of data processing, and the overwhelming response is one of silence".

Block's experience may still sound familiar when we talk about adoption of large e-HRM packages. While there have been periods during the last forty years when e-HRM adoption has been more successful in the industry eye, there is no reason to think that it has become less complicated.

If we integrate knowledge from the computing (e.g., Eason, 1988), Information Systems (e.g., Venkatesh, 2000), and innovation adoption literatures (Rogers, 2010), we would define e-HRM adoption as the strategy and transfer process between an old (or non-existent) and a targeted e-HRM system, and its acceptance by the users.

Our research shows that since the 1970s 168 factors have been found empirically to be responsible for the e-HRM adoption and 95 factors for e-HRM consequences. Our first observation is that the literature is divided into two research streams, which described different types of e-HRM success. The first research stream concerns the adoption of e-HRM and factors affecting successful adoption. The second stream concerns consequences of e-HRM. This distinction is present throughout all decades, although the accents differed.

The second important finding that emerged from our analysis is that the factors affecting adoption can be divided into three categories: technology; organization and people factors. We will refer to this as the "*TOP"* framework: Although some factors do show a relation to multiple categories, and whilst the categories are not mutually exclusive, we think this framework provides a grounded distinction between different influences or adoption or consequences of e-HRM (Appendix 2).

The third observation is that the most important factors affecting adoption, as well as consequences of e-HRM, reside in the category "people factors". Although technology and organizational factors were necessary prerequisites, people factors, and especially the mindsets within certain organizational cultures, were found to make the difference.

Effective technical adoption of e-HRM does not necessarily imply organizational e-HRM effectiveness (Wright, Dunford, & Snell, 2001). For e-HRM to be effective, employees who must use these systems need to accept the new technology, i.e., become convinced about their value and be trained for effective usage. We delineate empirically verified consequences of e-HRM in line with prior definitions, calling them operational, relational and transformational consequences (Lepak & Snell, 1998; Reddick, 2009). The following section describes the identified e-HRM adoption factors (i.e. factors which affect the adoption of e-HRM as opposed to their consequences) and will be followed by a section that discusses the consequences of e-HRM that have emerged.

Technology factors

A number of authors have commented on factors relating to the technology itself or to existing technology within the organisation. Magnus and Grossman (1985) emphasized the importance of customizing HRIS software, Lederer (1984) warned that modification can lead to system errors. Scholars advised managers to analyze organizational needs and clarify required technology characteristics prior to modifying or adopting new systems (Magnus & Grossman, 1985). Current computer capability in an organization was reported to directly influence the extent of computerization of personnel departments (Mayer, 1971). If computerization appeared overly time consuming and the output unreliable, HRIS adoption were typically prevented, paused or even stopped (Tomeski & Lazarus, 1974). In the 90's several key technology factors were identified as influencing HRIS adoption: data integrity, system usefulness, system integration, and in-house development versus using external HRIS software. Comparing mainframe-based and personal computer-based applications shows that the first group is related to a centralized (standardized) HR, and the second to a decentralized HR management tailored to individual users requiring higher integration efforts. Accordingly, current technology used in an organization was reported as affecting the amount of integration efforts (Broderick & Boudreau, 1992). Similarly, Hannon et al. (1996) reported standardization of HR processes as an important factor when adopting HRIS. Whether in-house- or outsourcing development is more beneficial depends on a particular organization's concrete needs, future expectations and risk orientations.

Organizational factors

Organizational factors consists of a wider spectrum with four categories influencing e-HRM adoption: organizational characteristics; planning and project management traditions; data access, security and privacy; and capabilities and resources.

Organizational characteristics: most organizational adoption factors studied in the 70's and 80's relate to organizational size (Mayer, 1971) and sector (Mayer, 1971; Tomeski & Lazarus, 1974). Organizational size was found to be positively related to computerization, since the administrative burden increases with an increase in personnel (Mayer, 1971) and computers were seen as a potential solution. While organization and HR, IS and HRIS departmental age showed insignificant relationships to system usage, Mathieson (1993) also observed that larger organizations were more likely to adopt HRIS. Size was also the most frequently studied of organizational adoption factors in the last decade: larger companies were more likely to implement e-HRM (Ngai & Wat, 2006). However, while adoption is more widespread among large organizations Strohmeier & Kabst (2009) describe larger companies as earlier adopters, *successful* adoption is more widespread among small organizations (Chapman & Webster, 2003). Early system adoption by itself does not automatically positively influence the acceptance or usage of individual users (Haines & Petit, 1997). Not surprisingly, organizations dependent upon high telecommuting adopt e-HRM more frequently (Strohmeier & Kabst, 2009).

Planning and project management: lack of planning from the corporate level to the divisional level was reported to negatively impact the coordination between personnel and IT departments, making HRIS adoption difficult. The growing consensus was that effective adoption requires close alignment of HR, IT and corporate goals (DeSanctis, 1986).

Data access, security and privacy: concerning organizational policies and practices, restricted access and possibilities for employees to edit personal information were found to impact user acceptance of digitalized data (Eddy et al., 1999). Taylor and Davis (1989) observed that violating ethical concerns impacts employees' attitudes and beliefs and can have legal ramifications, leading to the call for efforts to secure privacy when adopting HRIS. Knowledge of which personal information is stored in HRIS and the possibility to verify its

accuracy were required to mitigate dysfunctional attitudes of employees towards HRIS usage (Taylor & Davis, 1989).

Capabilities and resources: delays in computerizing personnel departments (Kossek et al., 1994) resulted from budget limitations due to the economic recession (Martinsons, 1994) and unforeseen costs during adoption. Organizations with only modest budgets (Magnus & Grossman, 1985) or relatively high internal costs (Mayer, 1971) were less likely to adopt a digitalized personnel system. Shortages in technical personnel were seen as a key obstacle to the computerization of the typical personnel department (Magnus & Grossman, 1985).

People factors

Integrating vendor and organizational software continues to be difficult and expensive, yet technology is no longer seen as the most difficult factor (Chapman and Webster, 2003; Teo, Lim, & Fedric, 2007). Instead, managing people factors surfaced as most essential for successful e-HRM adoption. This indicates an amplified awareness of the human aspect in computerizing personnel departments. People factors included: top management support; user acceptance; communication and collaboration between units; HR skills and expertise; and leadership and culture.

Top management support: Mayer (1971) reported lack of top management support as the most limiting factor for successful HRIS adoption. Other research has shown a lack of priority given to HRIS (Tomeski & Lazarus, 1974). In this context, Magnus and Grossman (1985) showed that needs incongruence puts a serious limitation on effective adoption. Mayer (1971) confirmed that advocates of HRIS had to go up to *higher* managerial levels than was the case in other functional areas. Technology usage in personnel departments was often not perceived by top management as important. In retrospect, they clearly had an extraordinary blind spot in seeing computerizing as expensive and the suggested benefits exaggerated (Mayer, 1971). For instance, top management showed high resistance as they did not perceive HRIS systems

having value for their own careers (Kossek et al. 1994). In their view the new systems would only provide benefits for clerical and not strategic tasks. This means that Human Resources managers found it hard to justify the costs for a new technology.

User acceptance: on the employee level, DeSanctis (1986) showed that involving users during systems development positively influenced satisfaction in personnel departments. She suggested that the larger the organizational investment in HRIS and the greater the system's influence, the more it was valued by the organization. Further, Haines and Petit (1997) detected a negative relationship between the amount of employee experience in their present position and user satisfaction ($r=-0,16$; $p<0,05$). The more familiar people were with work practices in their current position, the more they resisted using new systems (i.e. a new HRIS). However, while lack of top management support continued to constrain HRIS adoption, HR, financial and IT executives and staff have increasingly supported the automation of personnel affairs (Hannon, Jelf, & Brandes, 1996).

Olivas-Luján et al. (2007) investigated employees' different mindsets towards e-HRM, finding that employees resisted accepting new systems if they thought it would increase their personal workload after adoption. Stakeholder commitment to organizations' long-term goals supported by e-HRM strategizing has become progressively relevant (Olivas-Luján, Ramirez, & Zapata-Cantu, 2007). Thus communication about intended e-HRM use is important (Beulen, 2009); organizations should actively collect feedback from users who are impacted in their jobs by new technology before, during and after adoption (Alleyne et al. 2007). Adoption success is positively impacted (Cronin, Morath, Curtin, & Heil, 2006) by internal marketing such as sending information to stakeholders about the functionality of new systems, positive word of mouth and appointing a system advocate who keeps users enthusiastic about the new systems.

Communication and collaboration between units: incongruence between needs of IT and personnel department (Magnus & Grossman, 1985) and difficulties of personnel departments in communicating with computer technicians (Tomeski & Lazarus, 1974) were also shown to be important. Crucially, e-HRM adoption should be termed an HR rather than an IT project, given that the HR staff holds knowledge of HR processes. In this context, Panayotopoulou et al. (2007) argued that close collaboration between departments (principally HR and IT) is critical. In a study closely related to this emphasis upon developing a shared vision between HR and IT managers (Tansley & Newell, 2007), Tansley and Watson (2000) reported using cross-functional project teams with representatives from HR and IS, mapping of HR processes and identification of HR needs as impacting adoption success. Kossek et al. (1994) reported diagnosing and managing power dynamics, organizational culture and communication between HR and other functions as important determinants of successful adoption. Effective adoption requires exceptional cooperation between diverse business units, which hitherto operated independently. These units frequently had different priorities and different perceptions of new systems.

HR skills and expertise: other people factors studied in the 90's were employee and management skills versus trainings needs and user involvement. Hannon, Jelf, and Brandes (1996) claimed HR professionals are usually able to solve micro-level problems (data entry, editing, and retrieval), but usually lack a more macro viewpoint and the technical skills required for using HRIS for reports or analysis. Training typically plays a crucial role in achieving a more sophisticated use of systems: whereas in-house training was found to enhance satisfaction, self-training was found to diminish it. Accordingly, organizations are well advised to train employees in-house rather than relying on self-training. Therefore, training HR professionals in using new systems reinforces successful adoption (Panayotopoulou et al., 2007; Martin & Reddington, 2010).

Leadership and culture**:** the most studied people factors in the last decade centre around organizational culture, leadership and psychological variables (Panayotopoulou et al., 2007). In general, IT-friendly cultures reported greater adoption success. Visionary, supporting and encouraging leaders (i.e. transformational leader) who advocate e-HRM adoption were found to contribute to the acceptance of new systems (Tansley & Watson, 2000; Hustad & Munkvold, 2005). Psychological factors impacting e-HRM adoption empirically explored include the level of trust among project teams members (Tansley & Watson, 2000), group morale, workplace distress (Wilson-Evered & Härtel, 2009) and security and privacy fears (Reddick, 2009).

Factors Affecting Consequences of e-HRM

Scholars in the 1970's and 1980's rarely studied the consequences of adoption, being concerned rather with exploring the factors causing the rise of computerized personnel departments. It was recognized by scholars that measures of HRIS effectiveness were lacking and they called for the development of instruments to evaluate human resources efforts (Mathys & LaVan, 1982). Mayer had early on (1971) claimed that more research was needed to identify the true cost-benefit tradeoffs of technology. Most research depended on surveys and merely summarized findings and percentages, failing to offer a deeper analysis of tested relationships. The only exception is the study of DeSanctis (1986) who empirically verified operational consequences: cost savings, effectiveness and efficiency gains. Initial warnings of "dehumanizing the personnel department" were counteracted by positive experiences in payroll and record-keeping applications (Mayer, 1971). Tomeski and Lazarus (1974) reported faster reporting capability, improved accuracy of reports, and freeing personnel staff for more important tasks. Researchers alluded to such reports of increased efficiency and effectiveness in stating their positive expectations for the future usage of HR Information Systems.

We consider the conceptual paper of Lepak and Snell (1998) as the key turning point that encouraged e-HRM scholars to systematically examine the consequences of e-HRM. Lepak and Snell divided the consequences of e-HRM into: operational consequences that represent efficiency and effectiveness gains leading to cost savings; relational consequences relating to service improvements for internal and external HR clients; and transformational consequences reflected in strategic re-orientation and change management, including restructuring HR service delivery, increased usage of service centres and outsourcing and business partnering. We will therefore consider these three types of e-HRM consequence in our discussion below. We summarize factors affecting e-HRM consequences in Appendix 3.

Operational consequences

Operational consequences have commonly been explored and empirically validated in the literature in the form of HR effectiveness, efficiency gains, cost and time savings (Kossek et al., 1994, Sturman, Hannon, & Milkovich, 1996). Initially, e-HRM promised to lead to efficiency gains, and most researchers in the past decade advocated e-HRM's strong contribution to the bottom line (Svoboda & Schröder, 2001; Jones, Brasher, & Huff, 2001; Chapman & Webster, 2003; Ruël, Bondarouk, & Looise, 2004; Buckley, Minette, Joy, & Michaels, 2004; Panayotopoulou et al., 2007; Olivas-Lujan et al., 2007; Beulen, 2009; Oiry, 2009). The suggestion from the literature is that more HR work could be accomplished with fewer personnel. Martinsons (1994) showed that HRIS usage freed professionals for superior tasks. Hannon et al. (1996) further documented that uniformity of personnel data enabled divisional and corporate reporting requirements.

However, there was serious disagreement among researchers, e.g. Reddick (2009) did not find support for operational cost savings and only Buckley et al. (2004) provided numerical data for cost savings due to e-HRM.

Relational consequences

Beside operational benefits, increasingly relational consequences were acknowledged in the literature: HR service improvements, HR professionals' status as information brokers, and new communication channels with HR (Kossek et al., 1994). For instance, HR directors evaluated applicants who used the internet for applications more positively than those using a fax, in terms of progressiveness, creativity and innovativeness (Eddy et al., 1999). Hannon et al. (1996) also acknowledged a negative relational consequence of automation: dependence on external vendors. The latter occurred either when systems were bought off-the-shelf or were developed outside; this caused practical dependency on external firms for maintenance, support and system extension.

Relational consequences were detected in the form of improved communication, cooperation, relationships and HR service improvements. Reddick (2009) observed how e-HRM improves employee awareness, appreciation and use of HR programs. Hussain et al. (2007) verified positive attitudes of HR professionals who perceived e-HRM as a crucial and enabling technology. E-HRM was reported as beneficial to employee satisfaction (Panayotopoulou et al., 2007; Voermans & Van Veldhoven, 2007). Recent literature reveals an augmented service satisfaction with the HR department (Lukaszewski, Stone, & Stone-Romero, 2008), and satisfaction related to HR processes (Cronin et al., 2006). Local adaption of e-HRM was even found to affect employee retention. Beulen (2009) documented how employees working in different cultures had different e-HRM preferences, and it was essential to adjust to these needs to retain talented employees.

Employee attraction and retention were found to be indirectly influenced by e-HRM, presumably because using e-HRM was reported to positively shape company image (Feldmann & Klaas, 2002). Organizations using the latest technology were viewed as modern and progressive by employees (Allen, Mahto, & Otondo, 2007; Panayotopoulou et al., 2007). Ruël et al. (2004) illustrated how e-HRM also enhanced visibility of career paths, which

enabled employees to better choose their own, and how this could increase a company's image (Neary, 2002). In large companies, e-HRM provided a transparent and flexible internal labor market (Ruël et al., 2004), facilitating identification of (global) company talent (Neary, 2002).

Transformational consequences

Transformational consequences were noted in the form of HR globalization: integration of decentralized units and consistency of HR practices (Broderick & Boudreau, 1992). The research focus of scholars first shifted from operational (70's and 80's) to relational consequences (80's), and then to transformational consequences of e-HRM in the last decade (Marler, 2009). In our view, this transformation in perspective is attributable to organizations changing from HRIS to e-HRM, whereas applications are targeted to a greater extent to internal customers. Since HR professionals started to budget and spend more time on transformational activities (Gardner et al., 2003) they progressively focus more on their mission (Reddick, 2009; Lievens, De Corte, & Westerveld, 2015). As they become more engaged in organizational change activities they are increasingly seen as business partners (Haines & Lafleur, 2008), and their competence is directed to business issues (Bell et al., 2006), supporting risk management, innovation (Ruël et al., 2004) and horizon scanning (Guechtouli, 2010). E-HRM has enabled professionals to adopt HR strategic decisions (Cronin et al., 2006) and to positively affect HR planning (Beulen, 2009). The literature continues to emphasize the strategic potential of e-HRM to support the long-term strategy evolution of an organization by transforming HR from merely administrative to strategic partners (Reddick, 2009; Bell et al., 2006; Panayotopoulou et al., 2007).

Very large organizations have been found to exploit information from e-HRM for sophisticated analysis and advanced reporting. For employee planning, e-HRM plays an instrumental role in storing, aligning and managing employee data, while simultaneously

providing a flexible platform for employees to follow training and development needs. Concerning the role of knowledge in organizations, we found support for increased knowledge creation, capture, transfer and use due to e-HRM (Reddick, 2009). Ruël et al. (2004) reported that a more open culture was the positive consequence of an adoption. Hustad and Munkvold (2005), in a case study at Ericsson on the adoption of a competence management system, showed how staff with similar knowledge became aware of each other.

Surprisingly, rigorous empirical studies in all three areas are still scarce (Florkowski & Olivas-Luján, 2006). Most factors and consequences of e-HRM were identified in case studies and do not yield 'hard' evidence. The identified relationships imply the field of e-HRM requires much more theoretical and methodological grounding before it will become a mature research tradition.

DISCUSSION

Since digital search for articles has been introduced, literature reviews have turned to structured analytical reviews, where different review types contribute to knowledge development: evidence-based, meta-ethnography, meta-narrative, realist synthesis, and meta-analysis (see Jones & Gatrell, 2014). We would classify ours as a narrative review, based on informal mechanisms for organizing and analyzing the literature (Hammersley, 2001). This review synthesized empirical e-HRM studies scattered throughout HRM, organizational behavior, psychology, and management and information systems literature in order to guide e-HRM scholars from these different disciplines. We have examined 40 years of e-HRM research that allowed us to identify TOP factors influencing the adoption and consequences of e-HRM. The number of TOP factors to be taken into account seems to be less important than the call for their *integrative* presence. We have synthesized factors affecting e-HRM consequences in Figure 2.

INSERT FIGURE 2 ABOUT HERE

While researchers in the 70's and 80's in the main focused on understanding factors for successfully adopting e-HRM technology, in the past decade the research on relational and transformational consequences of e-HRM has intensified. A finding evident throughout the 40 years is that all identified adoption factors involve either technological, organizational or people (TOP) requirements. In the 2000-2010 decade we observed a significant increase in the relevance of 'people factors' for successful adoption. In view of that trend Ruël et al. (2004) observed that effectively adopting e-HRM in an organization requires a change in employees' mindsets, since it requires them to do their work differently. Since e-HRM affects an organization as a whole, management and employee support and commitment are essential. The analysis of e-HRM consequences revealed a clear development. Whereas scholars from the 70's and 80's report only operational consequences, subsequent research increasingly explored both relational and transformational consequences.

The development towards relational and transformational consequences appears closely linked to the shift in practices from HRIS (automating the HR department) towards e-HRM (automating services for employees and managers). Florkowski and Olivas-Luján (2006) documented how by 2000 the number of personnel applications developed for employees and managers exceeded those of HR staff. While HRIS partly relieved the administrative burden of HR professionals, allowing them to spend more time on other tasks (e.g. relational tasks), with the arrival of e-HRM they lost even more operational tasks. This study suggested that the jobs of HR professionals therefore underwent an evolution from being mainly administrative (70's and 80's) to being relational (90's), and then to a distinctly strategic transformational role.

Reflecting upon the e-HRM goals discussed at the outset of this paper, namely cost savings, improved HR services and strategic reorientation of the HR department, we found support for most of these goals in the analyzed literature. However, scholars have also found the opposite. For example, an important mixed contribution among researchers emerged in the 2000-2010 decade: e-HRM might on the one hand decrease the administrative burden on HR professionals (Reddick, 2009), while on the other hand increase the burden on employees and line managers (Martin & Reddington, 2010). Chapman and Webster (2003) reported higher time investments by HR staff to filter and respond to applicants due to the growing amount of digital applications, while Buckley et al. (2004) illustrated more efficient screening processes because of e-HRM. Reddick (2009) found no support for an increased volume of HR work, while Ruël et al. (2004) found efficiency gains in the form of a decrease in administrative burden. Reddick (2009) did not find support for reduced levels of bureaucracy, elimination of paperwork or reduced HR labor force. Initially, the promise of e-HRM was to reduce bureaucracy, yet the necessary organizational policies and processes needed to be in place to realize this potential.

It is important to note that, while our literature review covers four decades, going back to 1970s,, it does exclude the past six years. We have observed that the number of academic publications about e-HRM has been increasing since 2000. Some of the recent articles have already earned great recognition among scholars (e.g., Marler, Fisher, & Ke, 2009; Marler, Liang, & Dulebohn, 2006). We observe a better awareness of the complexity of e-HRM in the latest studies, too; where researchers have made an effort to nuance earlier claims about e-HRM effectiveness, strategic positioning, and adoption processes. Thus, Marler and Parry (2015) found that strategic HR involvement and greater e-HRM capability are both directly and reciprocally related supporting both theoretical perspectives but also showing that each is not mutually exclusive. Yusliza and Ramayah (2012) showed that the e-HRM goal clarity

has a significant impact on attitudes towards using e-HRM. Lin (2011) brought empirical evidence that the adoption of e-HRM positively moderated relationship between employees' creativity and organizational innovation. Heikkilä, Brewster and Mattila (2014) have broadened the scope of e-HRM stakeholders by exploring the role of e-HRM vendor consultants in the e-HRM implementation in multinational corporations. The academic field of e-HRM has also been enriched by several dedicated PhD dissertations in different countries. For example, Girard (2014) explored the role of Social Media in recruitment in French companies; Snicker (2013) examined Employee Self-Service Technology acceptance at TAP Portugal; and Njoku (2016) analysed the contribution of e-HRM to sustaining business performance in UK organizations.

A critical reviewer would expect our work to include the very latest published manuscripts. However, we are convinced that conclusions and the organizing *TOP framework* will not be influenced by inclusion of extra articles. To put it even stronger, results of our narrative review encourage scholars to orient their future e-HRM studies along three groups of factors, and explicitly to integrate Technology, Organization, and People factors in every empirical study if they want to address the complexity of the e-HRM phenomenon.

We also note that in some studies several TOP factors were found to be important for both e-HRM adoption and its consequences. Such an overlap is understandable: for example, top management commitment, job relevance of e-HRM applications, or alignment of all HRISs are typical factors that are important to enable adoption of e-HRM, and to secure its designed consequences. More interesting, however, would be to study differences in the explanatory power of such overlapping factors for adoption and consequences. For example, does top management commitment influence adoption or e-HRM consequences to a greater extent?

In order to gain support, e-HRM advocates the need to quantify how automating personnel affairs improves business operations for different stakeholders. It is essential to take

into account the trade-offs for local adoption or standardization and integration of systems, and that organizations need to define the specific goals they aim to achieve in relation to e-HRM before starting an adoption. The underlying complexity of this state of affairs is evident in a study by Bondarouk, Ruël, and Van der Heijden (2009) who document that line managers and employees have different goals for e-HRM use. It is clear that future research must take a multi-stakeholder perspective to accurately explore HRM effectiveness in real life. For HR professionals to accept new technologies they need to know how to effectively work with them and become convinced about the value of new systems (Hempel, 2004). While Hannon et al. (1996) reported HR professionals' lack of technical knowledge and skill as problematic, Kossek et al. (1994) showed that user's higher technical skill level can have a negative impact. Due to the typical long development periods, by the time systems were finally up and running they barely represented the latest technology valued by highly skilled users. Overall, users with more developed computer skills seemed to use systems earlier, but at the same time were generally less positive about doing so.

One would normally expect that developing a system inside an organization would create positive attachment of users, but Haines and Petit (1997) showed that in-house development of e-HRM had no effect on user satisfaction. Earlier, Kossek et al. (1994) had argued that user involvement is important for successful adoption and enhances user satisfaction. The vital issue appears to be an employee's experience in their present position, variations of which were found to negatively influence the level of satisfaction with a new system (Haines & Petit, 1997). It is likely that the longer employees are working in the current position, the more resistant they become towards adapting to new technology. Using an international management lens, a certain degree of resistance can be routinely always expected in global e-HRM projects since subsidies are often used to making own choices regarding HR practices. The transformational potential lies in the integration of distributed HR information across

different units and subsidies, and organizations should thus map all HR processes as a coherent whole to enable strategic global adoption (Tansley et al., 2001).

E-HRM advocates who have followed our deliberation on management practice should now have a solid foundation of insights into the range of factors impacting e-HRM effectiveness. Organizations can use the analyses to anticipate and weigh the relative importance of contingencies for adopting e-HRM. By comparing current practices in organizations with those in the past, one can better evaluate if adoption is feasible, if targeted goals can be achieved and what measures can be taken to enhance the chances for successful e-HRM adoption.

The field of HRM is still criticized for not contributing added value to business operations. However, the e-HRM literature provides some suggestion that e-HRM can add to human resource effectiveness and contribute to organizational goals by means of a strategic reorientation of the HR department. The *resource-based view* of the firm states that organizations with unique internal resources -- that competitors find difficult to imitate -- can have a significant competitive advantage (Barney, 2001). An e-HRM system used to its full potential is, in our view, such a unique organizational resource. When we began our research we expected to find an increase of research rigor, of precision and accuracy, in the empirical literature. It turned out that more theory-driven and evidence-based e-HRM studies are still needed in this still immature research field.

CONCLUSION

This review synthesizes and describes the progress of e-HRM effectiveness research from 1970 to 2010. We traced the rough path of a growing archive of reports on empirically studied adoption factors and e-HRM consequences. Over the decades more specific e-HRM goals emerged such as improved HR service provision and the strategic reorientation of HR departments (Marler, 2009). Unquestionably, e-HRM has the potential to simplify and enrich;

steer and support; and shorten and speed up the pursuit of organizational and employee goal accomplishment. How it is introduced in specific firms and other organizational units seems crucial for fulfilling the promise. This is especially true because e-HRM entails a change-management type of paradox, requiring us to continuously ask the question; if HRM is supposed to aid or support employees doing well for the organization, how routinizing part of that process (through e-HRM) might enrich those organizational contexts even more, and why? In other words, we found hardly any generic factor that can be held responsible for all adoption of e-HRM in organizations. Rather, it is people factors (such as innovative and visionary leaders promoting e-HRM, trust, change management, confidence with technology skills, communication about system usefulness) that were reported as most relevant for successful adoption in the last decade. More theorizing is necessary on this complex issue before new empirical research on this generic issue may bear fruit. Let's address some of the limitations of this review and suggest directions for future research.

This literature review solely analyzed empirical studies. There may well be many other relevant adoption factors and consequences which have not yet received research attention. We limited our sample to general e-HRM research and did not specifically search literature in functional human resources areas such as e-recruitment and e-learning. Although some of the analyzed articles investigated these areas, our review focused on e-HRM in general. Given the increasing complexity in e-HRM theory and practice, a 'multi-functional e-HRM approach' is clearly needed. Future research should examine the identified factors and consequences in relation to distinct functional HRM areas. At present it is extremely difficult to say whether the identified factors influence all types of e-HRM applications. This of course is also a limitation of this study since we selected solely articles on e-HRM. It is essential to establish a theoretical framework for the various e-HRM applications. Further, we did not examine the archives for the rich body of literature on a host of other IT adoption. For instance, literature

on ERP (Enterprise Resource Planning) would no doubt be especially useful to understand e-HRM adoption effectiveness. Scholars should continue to investigate IT literatures and assess if the factors presented in this review can be meaningfully extended and validated in practice.

Although we identified relevant factors, these were mostly discussed in the literature as *success factors or enablers* when positive, or *barriers and constraints* when negative; at no point did we strive to explain the procedures used to benefit from the positive factors or remedy the barriers. Based on the theory underlying the set of papers, we could not provide a full explanatory account how the identified factors contribute to e-HRM success. For example, for 'internal marketing' it would be interesting to investigate which contents or format of communication are most effective in achieving successful e-HRM adoption.

Further, none of the studies distinguished between various adoption phases. Considering 'user involvement', one could ask: 'is user involvement necessary in a phase prior to the adoption, during the adoption process or especially at the end?'

Research on environmental factors impinging on e-HRM appeared scant. Although these factors are often hard to influence by an organization, it is crucial to clarify which have implications for organizations planning to adoption e-HRM. Future research should pay attention to potential mediators or moderators affecting adoption and consequences. Organizational size, e-HRM type, sector and employee demographics are basic conditions to explicitly consider. It would be also interesting to study the differential effects of internet applications versus intranet applications, since both may have other consequences. For instance, the use of internet-based applications in personnel systems may threaten the privacy of personnel data.

Since effectiveness is a multidimensional concept, e-HRM effectiveness may depend on various organizational, departmental, professional and individual goals such as cost and time savings, improvement of HR services, strategic re-orientation of HR department (Guest,

2011). While Strohmeier and Kabst (2009) emphasized that e-HRM adoption is a multilevel phenomenon best studied at the individual *and* organizational level, adoption was typically alluded to only in a general sense in the analyzed literature. Future research should pay attention to the various levels of analysis in order to find out which factors are most important for individuals, teams, other groups/stakeholders, subsidiaries or organizations as a whole. We do hope this paper will stimulate more of such research.

ACKNOWLEDGMENT

The authors express their gratitude to Ferry de Wit, who helped do the work at the earlier stage of this manuscript.

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Figure 1. Article selection process

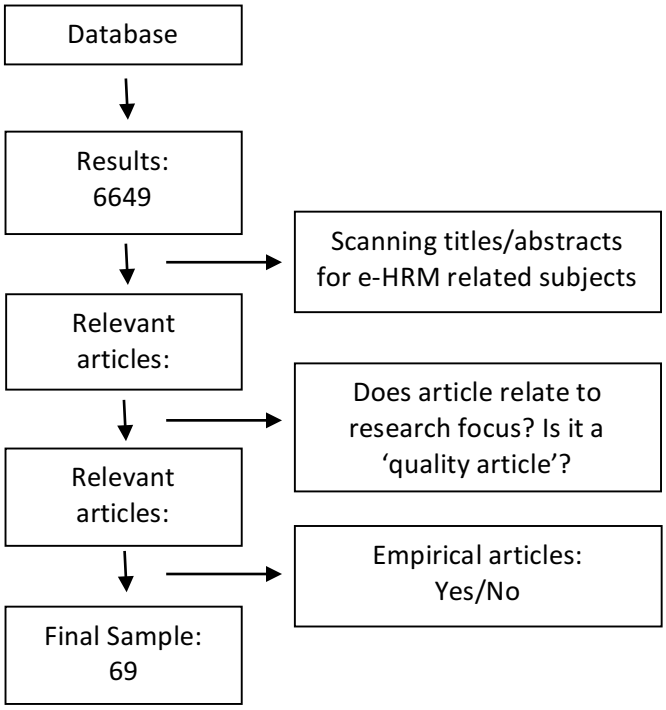

Table 1

Literature Search Terms

	Number of articles	
Search Query	*Web of Science*	*Scopus*
e-HRM	8	30
eHRM	6	10
e-HR	39	71
Electronic HRM	16	39
Electronic Human Resource Management	62	402
Online HRM	6	15
Online Human Resource Management	26	158
Web HRM	9	20
Web Human Resource Management	99	387
Web based HRM	5	12
Web based Human Resource Management	61	132
HRIS	136	39
Human Resource Information Systems	689	1847
HRIT	3	1
Human Resource Information Technology	397	1193
Virtual HRM	8	9
Virtual Human Resource Management	55	84
Digital HRM	5	4
Digital Human Resource Management	31	112
Computer Based Human Resource Information Systems	28	395
Total:	*1689*	*4960*
	Grand total:	*6649*

Appendix 1
Analysed literature supporting antecedents and consequences of e-HRM

Year	Author	Method	Sample
1971	Mayer	Quantitative	375 major US corporations
1974	Tomeski & Lazarus	Quantitative	12 federal departments, 22 states, 15 counties, 24 cities, 17 private organizations
1982	Mathys & LaVan	Quantitative	75 private sector companies (37 manufacturing, 5 Retail & Wholesale, 14 Finance, 9 Utilities, 10 Transportation
1985	Magnus & Grossman	Quantitative	1000 US personnel journal subscribers. The majority work in manufacturing, finance or health services. Their titles include: CEO/ owner/partner/corporate officer/vice president (15%), director (22.9%), manager (39.5%), administration/supervisor/officer (14.3%) and specialist/analyst/ assistant or consultant (8.3%)
1986	DeSanctis	Quantitative	171 members of the Association of Human Resource System Professionals. All major industries are represented in the sample, including manufacturing, banking, insurance, transportation, communications, construction, retailing, education, and services. The typical respondent was a "manager of HRIS," but the survey was completed as well by vice presidents, directors, supervisors within personnel, and managers of compensation and benefits
1989	Taylor & Davis	Quantitative	223 business management undergraduates participated in the study; 100 (45%) female and 123 (55%) male
1992	Broderick & Boudreau	Qualitative	Case studies of 10 Fortune 500 companies considered 'leaders' in HRIS usage (exploratory interviews with top HR Manager, HRIS Manager, Representatives from HRIS staff, Information Systems, Finance or other areas who regularly worked with the HRIS
1993	Mathieson.	Quantitative	Survey of 78 users of a university HRIS
1994	Kossek et al.	Qualitative	Longitudinal case study. Data were collected at two different times spanning several years. Surveys, interviews, and reviews of company documents were used. 26% were from corporate, 74% from field locations. 23% were managers and 77% were HRM professionals or staff. 72% were experienced users
1994	Martinsons	Quantitative	118 Canadian respondents, 361 Hong Kong respondents
1996	Hannon et al.	Mixed method	14 US-based MNCs. 14 telephone interviews and 11 in-depth interviews with executives
1996	Sturman et al.	Quantitative	Experimental design in a field setting. 80 employees of a Fortune 500 company. Random assignment to 3 conditions
1997	Haines & Petit	Quantitative	Survey of 152 members of the Canadian Association of Human Resource Systems Professionals (CHRSP). They were users who interact directly with a computer-based HRIS to do their work
1997	Powell & Dent-	Quantitative	65 surveys of CEOs and senior executives in the retail

	Micallef		industry
1997	Hubbard et al.	Quantitative	Survey on the perceptions of job-search methods of 32 HRM professionals in top 100 privately owned companies in Georgia
1999	Eddy et al.	Quantitative	124 employed persons enrolled in an MBA course. Experimental design
1999	Martinsons & Chong	Quantitative	Field study of 67 questionnaires of professionals responsible for HRM on the enterprise-level in East and South-East Asia. A second follow-up questionnaire was conducted with the managers whose department most directly affected by the new computer systems (61 of earlier 67)
1999	Elliott & Tevavichulada	Quantitative	154 questionnaires of HRM professionals in public (n=77) and private (n=77) sector companies
2000	Tansley & Watson	Mixed Method	Two year ethnographic/case study (observations, 10 interviews, document analysis, field notes). Covered HRM and IS managers working on a three year global HRIS project for an American corporation (60 countries, 80,000 employees) active in different industries (food processing, agricultural commodity trading, financial risk management and technical services)
2001	Svoboda & Schröder	Qualitative	Case study at Deutsche Bank. Interviews with HRM professionals on the role of IT in changing organizational processes
2001	Ball	Quantitative	Survey of 115 organizations in the Financial Analysis Made Easy (FAME) database about their usage of HRIS applications for different HRM activities
2001	Tansley et al.	Mixed Method	Case study of large UK engineering company (40,000 employees) implementing the HRIS element of an ERP system (SAP)
2002	Jones et al.	Quantitative	Several quantitative studies in which an employee selection system (API) is validated
2002	Neary	Qualitative	Case study of TRW, a major US-based multinational company (active in automotive, aeronautical systems, space and electronics, and information systems) with 100,000 employees. Focused on developing a uniform performance appraisal system
2002	Hagood & Friedman	Qualitative	Case study of the CIA's development and implementation of a balanced scorecard-based performance measurement system for HRIS. The goal being to justify costs and highlight system effectiveness
2003	Gardner et al.	Quantitative	Survey of 357 HRM professionals and 357 HRM executives on the way IT impacted their jobs
2003	Stanton & Weiss	Qualitative	Two studies on employee monitoring and surveillance techniques. One study from the perspective of managers (responsible for HRM) and another from that of employees
2003	Chapman & Webster	Quantitative	Web-based survey of HR Managers on the use of technologies in the recruiting, screening and selection processes for job candidates. Interviewees are members of

			the Society for Human Resource Management and represent 125 US organizations
2004	Hempel	Qualitative	Analyses of 22 Master's degree programs to investigate the 'technology aspect' of HRM education. Data included course information from both the internet and lecturers
2004	Ruël et al.	Mixed Method	Case study (conversational interviews, documents, observations) in 5 large (more than 15,000 employees) organizations
2004	Potosky & Bobko	Quantitative	Experiment with adult student (91% employed) subjects. Cognitively oriented selection tests administered via paper-and-pencil vs. tests administered via the internet
2004	Buckley et al.	Mixed Method	Case study of 14 US educational publishers and their introduction of a computerized applicant recruitment and screening system
2004	Singh & Point	Mixed Method	Discourse analysis of how 241 leading companies in 8 European countries explain and promote diversity management policies on their websites
2005	Hustad & Munkvold	Mixed Method	700 employees of Ericsson (mainly Norwegian branch). Two third were working in R&D departments. Semi-structured interviews and document analysis over 5 months
2006	Bell et al.	Qualitative	Interviews were conducted with HR representatives from 19 Fortune 500 companies to examine the linkage between electronic human resources (e-HR) and the reshaping of professional competence in HRM
2006	Cronin et al.	Qualitative	Benchmarking study: interviews with 20 HR professionals working in federal agencies
2006	Florkowski & Olivas-Lujan	Quantitative	Survey research with HR managers and executives of 216 large (500+employees) companies in the US, Canada, UK and Ireland on the diffusion of HRIT. Specifically it was questioned whether the diffusion was caused by internal forces or external forces, or was hybrid
2006	Hooi	Quantitative	Surveys, interviews, observations of 60 Malaysian employees in manufacturing SME's (more than 250 employees). 21% were public limited companies
2006	Ngai & Wat	Quantitative	Survey of 147 HRM practitioners in Hong Kong
2007	Alleyne et al.	Mixed Method	Case study of a customer service division in a major telecommunications organization which had developed and implemented a company-wide HRM intranet. The sample consisted of HR managers and HR customers
2007	Hussain et al.	Mixed Method	Survey of 101 HRM professionals and interviews with 11 senior executives (to whom the HRM professionals reported) working in small, medium and large UK organizations
2008	Ngai et al.	Quantitative	Survey of 147 HRM practitioners in Hong Kong on their perceptions of the importance of the internet for effective HRM
2007	Panayotopoulou	Mixed	Research on e-HRM adoption in Greece by means of focus

	et al.	Method	groups and 76 questionnaires. For the focus groups 3 HRM managers from the following sectors were included: manufacturing, banking and telecommunications
2007	Ruël et al.	Quantitative	On-line questionnaire with 100 operational employees, managers and HR professionals in the Dutch ministry of internal affairs
2007	Tansley & Newell	Qualitative	Ethnographic narrative study of an IS and HR manager working in a North-American owned corporation (more than 80,000 employees) during the agenda setting stage of a global HRIS implementation. Over a two-year period the researchers observed 12 global HRIS team meetings. The meetings were about the design, specification and procurement of a $15 million HRIS with a global data warehouse and country-specific integrated employee databases
2007	Olivas-Lujan et al.	Qualitative	Case studies of 4 large Mexican owned firms from 4 different sectors (food and beverages, financial and commercial services, production and distribution of construction materials, information technology and BPO (business process outsourcing)). Semi-structured interviews with Senior HR managers, line managers and employees were conducted
2007	Voermans & van Veldhoven	Quantitative	Online questionnaires of 99 managers and 257 employees of Philips Electronics, Netherlands
2007	Teo et al.	Quantitative	Questionnaire with 110 companies in Singapore
2008	Beulen	Qualitative	Case study with 16 HRM executives at Accenture on the way HRIS supports them in their HRM tasks
2008	Bondarouk & Ruël	Qualitative	3 case studies (structured interviews, field notes and document analysis) of a hospital, an insurance company and a university. 83 interviews were conducted with managerial employees responsible for strategic policymaking in the companies, members of the IT project teams and system end-users
2008	Haines & Lafleur	Quantitative	Survey research of 210 senior HRM executives at leading Canadian corporations
2008	Lukaszewski et al.	Quantitative	2 experimental studies. Using a 2x2 experimental design the researchers examined the effects of (a) ability to choose the type of HRM system to which data would be disclosed (choice vs. no choice), and (b) type of information disclosed (medical vs. non-medical) on invasiveness and service satisfaction. Study 1 used 71 and Study 2 used 68 employed participants
2009	Beulen, E.	Qualitative	Case study of 16 HRM executives and managers at Accenture. The interviewed worked at the company's Argentina, Brazil, China, India, Latvia and Slovakia branches. The purpose was to explore how HRIS supported Accenture's efforts in retention management
2009	Bondarouk et	Qualitative	21 interviews about the adaptation of a career development

	al.		tool were conducted at the Ministry of Interior and Kingdom Relations in the Netherlands: 10 with line managers and 11 with employees.
2009	Ruta	Qualitative	Case study of a leading international consulting firm focused on the implementation of an advanced HRM portal and the way it contributes to intellectual capital creation, maintenance and leverage
2009	Morris et al.	Mixed Method	Case study (semi-structured interviews, internal publications, media reports, and other published sources) of HRM unit managers of 20 multinational companies in the United Kingdom (6), Continental Europe (6), Asia-Pacific (5) and the United States (2). Also a survey with 263 HRM Managers. Hypotheses were tested using Structural Equation Modeling
2009	Parry & Wilson	Quantitative	On the basis of a literature review the authors derived factors affecting the adoption of online recruitment. Then 14 semi-structured interviews were held with UK HRM managers in order to validate the factors. The factors were then used to conduct a survey with 439 HR managers and directors to investigate which were associated with vacancies advertised via the corporate website or commercial job boards
2009	Strohmeier & Kabst	Quantitative	Large scale survey with senior HRM managers in 2,336 organizations in 23 European countries to examine which general and contextual factors influence cross-national organizational adoption of e-HRM
2009	Imperatori & Bissola	Quantitative	Experiment with 1,078 undergraduate students attending Organizational Design, HRM and Organizational Behaviour courses at Catholic University in Milan
2009	Oiry	Qualitative	Four case studies of the French banking sector on role conflicts arising from e-learning. 15 interviews were conducted: 4 with training managers, 4 with e-learning project managers, 1 with union representative, 1 direct manager, 2 employees who had undergone the training, 2 members of training department and 1 expert in the development of e-learning in France
2009	Payne et al.	Quantitative	Quasi-experimental study on employee reaction to the use of an online performance appraisal (PA) system conducted with the traditional paper-and-pencil (P&P) approach. Reactions of a group of 83 employees evaluated with the P&P approach and 152 employees evaluated with the online system were compared
2009	Reddick	Quantitative	Survey of 88 US Human Resource Directors employed in the public sector. Scope and perception of HRIS effectiveness
2009	Smale & Heikkilä	Qualitative	A longitudinal in-depth case study on the integration of a global e-HRM system in Finland. Qualitative data was collected via interviews with key HR personnel and managers, which was complemented by company

			documentation of negotiation between HQ and subsidiaries during the IT-based integration of HRM
2009	Wilson-Evered & Hartel	Quantitative	Survey with HR staff and line managers in five hospital districts directly involved in the implementation of HR/payroll integrated HRIS (34 respondents) and an automated system (26 respondents) Focus on key determinants of successful information systems implementation
2010	Barut & Dogerlioglu	Quantitative	Survey with HR professionals (81% HR managers or directors) in 31 organizations Focus on success factors and consequences of HRIS implementation
2010	Guechtouli	Qualitative	Case study in an organization with more than 5000 employees. Describes the way an IT system supports environmental scanning procedures. Interviews were conducted with 5 managers. , Company documents were also analyzed
2010	Martin & Reddington	Mixed Method	Case study of an e-HRM implementation in two strategic business units of a UK-based global oilfield services provider. There were two stages of data collection: 1) survey with 41 line managers, 2) 9 in-depth interviews with line managers
2010	Olivas-Lujan & Florkowski	Quantitative	Web-based survey of 136 US and Canadian firms on the influence of IT governance arrangements on the intensity of e-HRM usage. 116 interviewees had positions in HRM and 60% worked in higher management
2010	Heikkilä & Smale	Qualitative	18 in depth-interviews with subsidiary HR managers from two European MNCs about the effects of language standardization on the acceptance and use of e-HRM systems

Appendix 2. E-HRM Adoption Factors

Part 1 - Technology Adoption factors

	1970-1989	1990-1999	2000-2010
Current IT Architecture	Current applications (Mayer, 1971) Decision on HRIS characteristics e.g. number of applications (DeSanctis, 1986) Computer output reliability, accuracy of personnel data (Tomeski & Lazarus, 1974)	Applications meeting business unit needs (Broderick & Boudreau, 1992) Applications currently running versus those planned (Haines & Petit, 1997) Ease of use and usefulness (Haines & Petit, 1997) Modifying subsystems (Kossek et al., 1994) Digital data reliability (Kossek et al., 1994) Widespread system availability for employees (Broderick & Boudreau, 1992) Type of HRIS technology: mainframe vs. pc-based (Broderick & Boudreau, 1992) Online applications (Haines & Petit, 1997)	Current applications, IT infrastructure (Hooi, 2006; Reddick, 2009), availability of computers in organization (Ruel et al., 2004) Quality of e-HRM application, content and design (Bondarouk et al., 2009; Ruel et al., 2007) Ease of use, usefulness (Ruta, 2009) and usability (Voermans & van Veldhoven, 2007) Manager self-service applications (Beulen, 2009) Option to use keyword searches in personnel information systems (Chapman & Webster, 2003) IT usage in organization (Haines & Lafleur, 2008) Clear and easy structure of information (Ruel et al., 2004) Reliable technology (Chapman & Webster, 2003)
Digitization of HR Data	Centralization of records (Magnus & Grossman, 1985) Integration (Magnus & Grossman, 1985) Customizing HRIS (Magnus & Grossman, 1985) Interfacing with	Integration of subsystems (Kossek et al., 1994) Current systems architecture (Kossek et al., 1994) Incorporating personnel data in HR database (Broderick & Boudreau, 1992) Patched updating (Hannon et al., 1996)	Compatibility across departments (Teo et al., 2007; Parry & Wilson, 2009) Alignment across subsidiaries (Morris, et al., 2009) Local adaption of HRIS (Beulen, 2009; Smale & Heikkila, 2009) Global integration of applications (Beulen, 2009) Language standardization (Heikkila & Smale, 2010) Integrating vendor software with in-house software (Chapman & Webster, 2003) Customizing personnel systems (Cronin et al., 2009) intranet

	corporate headquarter (Magnus & Grossman, 1985)	Amount of data/information to be integrated (Broderick & Boudreau, 1992)	(Alleyne et al., 2007) Organization-wide HR portal configuration (Ruta, 2009)
Technology Project Management	Time management for computerization (Tomeski & Lazarus, 1974) Selecting software (Magnus & Grossman, 1985)	Decision to outsource development (Hannon et al., 1996) Documentation (Haines & Petit, 1997)	Decision for in-house development vs. commercial applications (Chapman & Webster, 2003) Mapping HR processes prior to system implementation (Cronin et al., 2006)
		Part 2 – Organizational adoption factors	
Organizational Characteristics	Organizational size (Mayer, 1971) Sector (Tomeski & Lazarus, 1974)	Organizational size (Haines & Petit, 1997) Departmental size of HR, IS, HRIS (Haines & Petit, 1997) Sector (Martinsons, 1994) Age of HRIS department (Haines & Petit, 1997)	Organizational size (Chapman & Webster, 2003; Ngai & Wat, 2006; Teo et al., 2007; Strohmayer & Kabst, 2009; Ball 2001) Sector (Olivas-Lujan et al., 2007; Panayotopoulou et al., 2007; Strohmayer & Kabst, 2009) Sector characteristics and culture **(**Panayotopoulou et al., 2007) Organizational subsidy/branch (Voermans & van Veldhoven, 2007)
Planning and Project Management Traditions	Integration of HR plan with corporate plan	Cooperation among departments (Broderick & Boudreau, 1992; Kossek et al., 1994) Identification and planning of current and future organizational needs (Hannon et al., 1996) Strategic planning (Hannon et al., 1996; (Kossek et al., 1994)	Cooperation among departments, especially HR and IT (Panayotopoulou et al., 2007) Mapping HR processes (Tansley & Watson, 2000) Cross-functional project team (Tansley & Watson, 2000) Project in hands of HR department (Tansley & Watson, 2000) Clear e-HRM goals and planning (Ruel et al., 2004) Consulting with external advisors on IT vendors (Tansley & Watson, 2000)
Data Access and Privacy	Securing privacy (Tylor & Davis, 1989)	Standardization of HR processes (Hannon et al., 1996) Degree of centralization of HR management (Broderick & Boudreau, 1992) Restricted access (Eddy et al., 1999) Employee authorization before	Global standardization (centralization) of HRM practices vs. local adaption (Hustad & Munkvold, 2005) Confidentiality and security of input data (Ruel et al., 2004) Employment structure: temporary vs, fixed personnel (Strohmayer & Kabst, 2009) HR ICT governance **(**Olivas-Lujan & Florkowski, 2010) Configuration of HRM, degree of formalism (Strohmayer & Kabst, 2009)

		releasing personal information ((Eddy et al., 1999)	Type of information disclosed (Lukaszewski et al., 2008) Organizational policies for career development (Bondarouk et al., 2009)
Capabilities and Resources	Shortages in personnel and time (Magnus & Grossman, 1985) Budget limitations (Mayer, 1971; Magnus & Grossman, 1985) Unforeseen costs (Mayer, 1971) Shortage in technical personnel **(**Magnus & Grossman, 1985)	Shortages in personnel (Martinsons, 1994) Budget limitations during recession (Martinsons, 1994) Concerns about economic and operational feasibility (Kossek et al., 1994) Unforeseen (rising) costs during implementation (Kossek et al., 1994) Shortage in technical expertise (Martinsons, 1994) Knowledge of technological developments (Martinsons, 1994) Organizations' technology level (Hannon et al., 1996) Computer experience of firm (Haines & Petit, 1997)	Financial resources (Hool, 2006) Organizations financial situation (Hustad & Munkvold, 2005) Budget limitations (Reddick, 2009) IT expertise (Hooi, 2006), HRIS (Teo et al., 2007) Capacity to acquire IT skills among HR staff (Olivas-Lujan & Florkowski, 2010) Technical expertise of project team (Bradford Neary, 2002) Language capabilities of employees (Heikkila & Smale, 2010) Change management expertise (Reddick, 2009) Lack of awareness of HR system potential (Tansley & Watson, 2000)
		Part 3 – People factors	
Top Management Support	Lack of top management support (Tomeski & Lazarus, 1974; Magnus & Grossman, 1985) Top management attitude towards HRIS (Mayer, 1974)	Lack of top management support (Hannon et al., 1996) Support from HR executives and staff (Hannon et al., 1996) Support from HR executives and staff (Hannon et al., 1996) Support from financial executives and staff (Hannon et al., 1996)	Lack of CEO or manager support (Reddick, 2009) Lack of middle or top management support (Tansely & Watson, 2000) Commitment from management and employees (Hustad & Munkvold, 2005) Top and line management commitment to e-HRM strategy (Olivas-Lujan & Florkowski, 2010) Top management support and priority for e-HRM systems (Hustad & Munkvold, 2005, Teo et al., 2007) Experienced user support (Voermans & van Veldhoven, 2007) Support from each business unit (Bradford Neary, 2002)
User	User involvement during	HR staff and management	HR and IT staff involvement (Tansely & Watson, 2000)

Acceptance	systems development (DeSanctis, 1986) Age (Haines & Petit, 1997) insignificant for usage	involvement in design (Kossek et al., 1994) Involvement of line management (Kossek et al., 1994) User involvement (Kossek et al., 1994), insignificant for satisfaction Users age, education and HR experience (Haines & Petit, 1997), insignificant for satisfaction Employee experience in present position negatively impacts HRIS satisfaction (Haines & Petit, 1997)	HR and IT staff involvement from other subsidiaries (Tansely & Watson, 2000) Failure in not involving stakeholder impacted by new technology (Tansely & Watson, 2000) Customer involvement (Alleyne et al., 2007) Users age, education, gender, job experience (Voermans & van Veldhoven, 2007), insignificant for usage HR professionals age and gender (Gardner et al., 2003) insignificant for usage
HR Skills and Expertise	Challenge to train users (Magnus & Grossman, 1985)	Providing training and troubleshooting (Broderick & Boudreau, 1992) Face-to-face training (Kossek et al., 1994) Training HRIS skills (Kossek et al., 1994) HR professionals lack of technical knowledge (Hannon et al., 1996) Employee programming experience (Haines & Petit, 1997) In house training enhances satisfaction (Haines & Petit, 1997)	HR professionals lack of IT skills, individual IT competencies (Panayotopoulou et al., 2007) PC skills of management and employees (Ruel et al., 2004) Employee knowledge of languages when using e-HRM (Heikkila & Smale, 2010) HR, manager and employee training (Cronin et al., 2006) Training HR professionals in e-HRM usage (Panayotopoulou et al., 2007) Lack of adequate e-HRM training (Martin & Reddington, 2010) e-Learning (Svoboda & Schröder, 2001)
Communication and Collaboration between Units	Difficulties in communication between HR and IT (Tomeski & Lazarus, 1974) Incongruence between HR and IT needs (Magnus & Grossman, 1985)	Difficulties in communication between HR and IT **(**Kossek et al., 1994) Managing power dynamics (Kossek et al., 1994)	Communication about e-HRM usefulness (Beulen, 2009) Lack of information about implications of new e-HRM (Martin & Reddington, 2010) Feedback and evaluation after systems implementation (Alleyne et al., 2007)
Leadership and		Organizational culture (Kossek et al., 1994)	Organizational culture (Panayotopoulou et al., 2007, Chapman

Culture	Staff resistance to change (Kossek et al., 1994)	& Webster, 2003) Organizational image (Chapman & Webster, 2003) HR innovation climate (Olivas-Lujan & Florkowski, 2010) Subjective norms (Parry & Wilson,2009) Openness to new ideas, receptiveness (Martin & Reddington, 2010) Change management leadership (Wilson-Evered & Härtel, 2009) Visionary leader promoting e-HRM (Tansley & Watson, 2000) Presence of system champion (Hustad & Munkvold, 2005) Presence of HR technology champion (Olivas-Lujan & Florkowski, 2010) Aligning e-HRM, HR and corporate strategy (Tansely & Watson, 2000) Trust between members of e-HRM project team (Tansely & Watson, 2000) Staff resistance to change (Reddick, 2009) Security/privacy fears (Reddick, 2009) Negative perception of HR staff (Martin & Reddington, 2010) Changing mindset of employees and line managers (Ruel et al., 2004) Employee champion preferences (Voermans & Van Veldhoven, 2007) Strategic preferences and differences among involved parties (Voermans & van Veldhoven, 2007) Group morale (Wilson-Evered & Härtel, 2009) Workplace distress (Wilson-Evered & Härtel, 2009) Jos satisfaction (Wilson-Evered & Härtel, 2009) Confidence with technology skills (Wilson-Evered & Härtel, 2009) Positive or negative beliefs about advantages of new systems (Parry & Wilson, 2009)

Appendix 3. Consequences of e-HRM

	Operational e-HRM consequences		
	1970-1989	**1990-1999**	**2000-2010**
HR Efficiency	Faster reporting (Tomeski & Lazarus, 1974) Freeing HR staff for important tasks (Tomeski & Lazarus, 1974) Productivity, more HR work with less HR personnel (Tomeski & Lazarus, 1974)	Faster diagnosis of HR problems (Broderick & Boudreau, 1992) Freeing HR staff for important tasks (Martinsons, 1994) Time savings (Kossek et al., Sturman et al., 1996) Increased automation of HR duties (Kossek et al., 1994) Productivity, more HR work with less HR personnel (Broderick & Boudreau, 1992)	Time savings (Cronin et al., 2006; Panayotopoulou et al., 2007) Efficient screening systems (Chapman & Webster, 2003), Buckley et al., 2004) Increased automation of HR duties (Ruel et al, 2004; Reddick, 2009) HR operating efficiency (Ruel et al., 2004; Reddick, 2009, Beulen, 2008) Productivity of HR staff (Reddick, 2009) HR professionals administrative competency becomes less important (Bell el al., 2006) Decrease in administrative burden (Ruel et al, 2004; Reddick, 2009) Increased workload for line managers (Martin & Reddington, 2010)
HR Effectiveness	Information processing (Tomeski & Lazarus, 1974) Accuracy of data/reports (Tomeski & Lazarus, 1974)	Accuracy of administration activities (Broderick & Boudreau, 1992) Uniformity of data (Hannon et al., 1996)	Accuracy of data/reports (Reddick, 2009) Technical HRM effectiveness (Ruel et al., 2007, Haines & Lafleur, 2008; Ruta, 2009) Increased number in under-qualified applicants (Chapman & Webster, 2003 Increased information responsiveness by HR (Gardner et al., 2003) Greater information autonomy for HR (Gardner et al., 2003) Flexibility of HR professionals (Reddick, 2009) Standardization of HR processes (Cronin et al., 2006) Cheating issues (Chapman & Webster, 2003) Training flexibility (Oiry, 2009) Increased number of applications from minorities (Chapman & Webster, 2003)
HR Cost Savings	Cost savings (Tomeski & Lazarus, 1974)	Cost savings due to effective administration, record keeping, outsourcing (Broderick &	Cost savings (Svoboda & Schröder, 2001; Jones et al, 2001; Chapman & Webster, 2003; Ruel et al, 2004; Buckley et al, 2004; Panayotopoulou et al., 2007; Olivas-Lujan et al, 2007; Oiry, 2009) Eliminated paperwork (Reddick, 2009) – no empirical support

		Boudreau, 1992; Hannon et al., 1996)	
Relational e-HRM consequences			
HR Service Improvements		Improved benefits administration for employees (Sturman et al., 1996) HR provides centralized services (Kossek et al., 1994)	Improved quality of HR services (Reddick, 2009) Improved services to employees (Panayotopoulou et al., 2007) Faster responses from HR department (Olivas-Lujan et al, 2007; Reddick, 2009) Improved training and development services (Beulen, 2009; Oiry, 2009) Empowered employees and managers (Reddick, 2009, Beulen, 2009) HR professionals spend more time on IT support activities (Gardner et al., 2003)
HR Relationship Management		Dependence on software vendors, outsourcing partners (Hannon et al., 1996)	Improved collaboration (Panayotopoulou et al., 2007) Improved relationships with HR (Alleyne et al., 2007), upper management (Reddick, 2009) Enhanced team spirit (Svoboda & Schröder, 2001) Dehumanized selection processes (Chapman & Weber, 2003;
HR Attitude Management	Impersonality of computerization (Mayer, 1971) Upper management and HR management satisfaction with HRIS (De Sanctis, 1986)	Employee perceptions of privacy invasiveness (Eddy et al., 1999) Employee perceptions of fairness (Eddy et al., 1999) HR directors positive perception of applicants doing online applications (Hubbard et al., 1997) User satisfaction with HRIS (Sturman et al., 1996; Elliot & Tevavichulda, 1999; Haines & Petit, 1997)	Lack of human contact (Oiry, 2009) HR seen as crucial and enabling technology by HR professionals (Hussein et al., 2007) Improved employee awareness, appreciation and use of systems (Reddick, 2009) Employee commitment (Olovas-Lujan et al., 2009) Employee perceptions of privacy invasiveness (Lukaszewski et al., 2008) Role conflicts (Oiry, 2009) Levels of supervisor accountability (Payne et al., 2009) Levels of personnel data security (Payne et al., 2009) Employee and manger satisfaction with HR intranet (Alleyne et al., 2007; (Panayotopoulou et al., 2007), e-HR service (Ruel et al., 2004) Satisfaction with HR processes (Cronin et al., 2006) Satisfaction with HR department services (Lukaszewski et al., 2008) Satisfaction with performance appraisals (Payne et al., 2009)
HR Communications		Consistent communication of	Improved communication between HR and employees (Ruel et al, 2004; Panayotopoulou et al., 2007)

	HRM policies (Broderick & Boudreau, 1992)	Employees participating in online discussions (Ruel et al., 2004) Improved employee access to HR information (Panayotopoulou et al., 2007)
HR Status	HR status, role as information brokers and decision enablers (Kossek et al., 1994)	Enhanced professional standing of HR (Hussein et al., 2007) HR professionals using external professional links, outsourcing, networking (Gardner et al., 2009) HR professionals shift from administrative to strategic role (Bell et al., 2006) Company image, employer of choice (Panayotopoulou et al., 2007)
Transformational e-HRM consequences		
HRM Globalization	Consistent HRM practices throughout the firm (Broderick & Boudreau, 1992) Integration of decentralized units (Kossek et al., 1994)	Alignment HRM and corporate strategy (Ruel et al., 2004) Alignment HR functions with organizational objectives (Panayotopoulou et al., 2007) Alignment of corporate and employee goals (Panayotopoulou et al., 2007) HRM replication capability across subsidiaries (Morris et al., 2009) Identification of (global) talent company (Neary, 2002)
HRM Strategic Change Management		Made HR a strategic partner (Reddick, 2009) Scope of HR towards strategic management (Reddick, 2009) Strategic HRM effectiveness (Ruel et al., 2004; Haines & Lafleur, 2008) Supports risk taking and innovation (Ruel et al., 2004) HR professionals spend more time on transformational activities (Gardner et al., 2003) HR professionals role as strategic business partner (Haines & Lafleur, 2008; (Panayotopoulou et al., 2007) HR professionals role as change agent (Haines & Lafleur, 2008) Improved strategic information analyses (Ball, 2001)
HRM Knowledge Management		Knowledge sharing culture (Ruel et al., 2004; Ruta, 2009) Increased knowledge management: creation, capture, transfer and use (Reddick, 2009) Development and maintenance of intellectual capital (Ruta, 209) Globally available resources for learning (Svoboda & Schröder, 2001) Quality of information base for performance appraisals and ratings (Payne et al., 2009) Emergence of competency management systems (Hustad & Munkvold, 2001)

Succession Planning	Improved HR planning (Beulen, 2009) Improved recruiting and retention systems (Reddick, 2009) Reduced turnover (Buckley et al., 2004, Beulen 2009) Transparent and flexible internal labour market (Ruel et al., 2004) Uniformity and completeness in managing and evaluating employees (Neary, 2002) Digitalized employee development planning (Panayotopoulou et al., 2007)