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Article

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Zeitschrift für Personalforschung (ZfP)

Provided in Cooperation with:

Rainer Hampp Verlag

Suggested Citation: Ruël, Huub; van der Kaap, Harry (2012) : E-HRM usage and value creation: Does a facilitating context matter?, Zeitschrift für Personalforschung (ZfP), ISSN 1862-0000, Rainer Hampp Verlag, Mering, Vol. 26, Iss. 3, pp. 260-281,
https://doi.org/10.1688/1862-0000_ZfP_2012_03_Ruel

This Version is available at:

<https://hdl.handle.net/10419/93027>

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Huub Ruël, Harry van der Kaap*

E-HRM Usage and Value Creation. Does a Facilitating Context Matter?*

Electronic Human Resource Management (e-HRM) is assumed to be a driving force behind HRM value creation. However, the issue remains of whether empirical evidence supports this assumption. Moreover, is the relationship straightforward and direct or is it conditional, and do contextual factors intervene? This paper presents a study on this issue. Data was collected through a survey conducted in three international firms using e-HRM applications. The findings suggest that e-HRM usage in line with the system's intended purpose and the contextual factors facilitating e-HRM usage are positively related to HRM value creation. Facilitating contextual factors are positively related to HRM value creation as well, but they also moderate the relationship between e-HRM usage and HRM value creation. However, this moderation is the opposite to what was hypothesized: if the facilitating contextual factors are high, then the relationship between e-HRM usage and HRM value creation is weaker. This finding needs further investigation to clarify the intervening role of contextual factors.

Wertschöpfung durch elektronisches Personalmanagement. Was bewirken unterstützende Kontextfaktoren?

Das Elektronische Personalmanagement (e-HRM) ist angeblich eine treibende Kraft der Wertschöpfung durch das Personalmanagement. Fraglich ist allerdings, ob empirische Daten diese Annahme unterstützen. Dabei stellt sich die Frage, ob die Verbindung zwischen e-HRM und Wertschöpfung direkt oder konditionell bedingt ist, d.h. ob Kontextfaktoren eine Rolle spielen. Die vorliegende Arbeit geht dieser Frage nach. Dazu wurden Daten mit Hilfe einer Umfrage in drei internationalen Firmen mit e-HRM-Anwendungen erhoben. Die Resultate deuten darauf hin, dass e-HRM positiv mit der Wertschöpfung im Personalmanagement zusammenhängt. Die unterstützenden Kontextfaktoren haben ebenfalls eine positive Verbindung zur Wertschöpfung im Personalmanagement, aber sie moderieren auch die Verbindung zwischen der e-HRM-Anwendung und der Personalmanagement-Wertschöpfung. Anders als angenommen, bewirkt die Moderation allerdings nicht, dass bei hohen Werten der unterstützenden Kontextfaktoren die Verbindung zwischen e-HRM-Anwendung und Wertschöpfung ebenfalls hoch ist. Dieses Ergebnis sollte weiter untersucht werden, um den Einfluss der Kontextfaktoren zu klären.

Key words: e-HRM, e-HRM usage, HRM, HRM value creation
(JEL: M12, M15, M10)

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** Article received: November 30, 2011
Revised version accepted after double blind review: June 26, 2012.

1. Introduction

Electronic Human Resource Management (e-HRM) is a reality today in many organizations, profit and non-profit, and is expected to create value for them. However, we still do not know whether e-HRM does create value and how it can create value. An obvious line of reasoning would be that if e-HRM applications are used in line with the intended purposes of the applications, the expected outcomes will emerge. Some e-HRM research has dealt with value creation-related questions (Bondarouk et al. 2009; Parry, 2011; Parry & Tyson, 2010; Ruël et al. 2004, 2007; Strohmeier & Kabst, 2009), but the findings have not been conclusive, either due to a narrow focus on the relationship between e-HRM usage and the outcome variable alone, or due to an overly broad and generic perspective. Contextual factors that may play a conditional role have been observed, as for example in a recent study of Parry and Tyson (2010), but have not been taken into account in the study design. Research on e-HRM has so far concentrated more on a specific aspect than on the complete picture (Strohmeier, 2007). This study aims to contribute to clarifying the relationship between e-HRM usage and HR value creation by taking contextual factors into account. The key question for this paper is: *to what extent does usage of e-HRM applications predict HR value creation, and which contextual factors facilitate or inhibit this relationship?*

Literature review

Considering the outcomes and consequences of e-HRM as an object of study is a relatively recent development. Strohmeier (2007) noted a lack of effectiveness studies, and that robust results clearly demonstrating transformations were missing (p. 28). Transformational HRM is associated with the transformation of the HRM function into a strategic partner (organizational change, strategic competence management, strategic knowledge management) (Farndale et al., 2010; Ruël et al., 2004). Marler (2009) tried to show why it is unlikely that examples of e-HRM delivering its strategic expectations will be found: Organizations where the HR function already plays a strategic role are more likely to turn e-HRM into a competitive advantage in her analysis. In this paper we take a broader view of e-HRM and its consequences. We assume that organizations invest in e-HRM in order to create value.

2.1 e-HRM and value creation

Value creation is a central concept in the management and organization literature (Lepak et al., 2007), but relatively new, technology-driven phenomena such as e-HRM raise questions regarding value creation (Currie & Parikh, 2006), most importantly whether e-HRM creates value and how value created by e-HRM can be measured.

Following Haksever et al. (2004, p. 292), we define value as the capacity of a product, service, or activity to satisfy a need or provide a benefit to a person or a legal entity. Value creation takes place when organizations develop new ways of doing things, using new methods (Porter, 1985). Amit and Zott (2001) “observe that in e-business new value can be created by the ways in which transactions are enabled” (p. 493). Organizations that invest in e-HRM aim at renewing their ways of implementing HR policies and practices, hoping for benefits such as improved efficiency and effectiveness. We consider these benefits as value-creating factors.

Strohmeier (2007) found that research on e-HRM so far has shown that it alleviates the administrative burden and improves the accuracy of results and quality of HR activities. It leads to better information responsiveness and more information autonomy. Also, it provides time and cost savings. Ruël et al. (2004) observed signs of a shift in responsibility from HR staff to line managers and employees.

However, attempts to investigate empirically whether and how e-HRM creates value are relatively scarce, and there is little research on the question of whether the organizational context makes a difference. This means that organizations have started to consider e-HRM as a competitive advantage and a way to create strategic value, even though there is no clear evidence about its value creation capacity or how to measure it (Bondarouk & Ruël, 2009; Marler, 2009).

According to Bondarouk and Ruël (2010), there are three levels on which value can be created: the personal level, the organizational level, and the society level. This study focuses on e-HRM usage and value creation at the organizational level, assuming that this is realized through improved HR service delivery. Bowman and Ambrosini (2000) differentiate between two types of value creation at the organizational level: use value and exchange value. The first type refers to the specific aspect of a new job, product, or service in connection with the users' requirements. It can be seen in the transformational functions of e-HRM usage. The second type, exchange value, is defined as the monetary amount realized after the exchange of a new task, service, or product. This type of value may arise from e-HRM mainly through cost reduction.

We reviewed the literature for 2003-2010, the period in which e-HRM research expanded extensively, to assess the value creation each study focused on, use value or exchange value. The result of the review is summarized and presented in Table 1 in chronological order. It becomes clear that most of the literature focuses on use value rather than on exchange value. This is surprising in a sense, as organizations invest substantial amounts of money in e-HRM. As a consequence, research could be expected to focus on the outcomes of e-HRM in monetary terms. A likely explanation for this relatively skewed research focus is that organizations may not like to provide information on their e-HRM investments and financial or countable results. Furthermore, organizations may not have tried to measure e-HRM outcomes in monetary terms. Ruël et al. (2004) already observed that determining an outcome such as cost reductions or return on investment due to e-HRM is very difficult for organizations.

An additional explanation involves the fact that exchange value actually refers to operational e-HRM gains only, and not to relational and transformational e-HRM gains. The latter, however, have been addressed by researchers as the more important and more useful advantage and consequence of e-HRM (e.g. Ruël et al., 2004).

Author	Value creation outcome	Value	Category
Biesalski (2003)	<ul style="list-style-type: none"> Increasing the quality and the pace Providing direct access to the HR resources to the employees 	Use value Use value	Efficiency E-administration of personal data
Shrivastava and Shaw (2003)	HR engineering for providing better: <ul style="list-style-type: none"> Learning environment Assisting in knowledge management Facilitation organizational transformation 	Use value Use value Use value	
Bondarouk and van Riemsdijk (2004)	<ul style="list-style-type: none"> Improving organizational climate Increasing employees commitment 	Use value Use value	
Ruël et.al. (2004)	<ul style="list-style-type: none"> Elimination of HR transactional functions for cost reduction Increasing of the efficiency Improving HR strategic orientation Improving client focus and satisfaction 	Exchange value Use value Use value Use value	Efficiency Efficiency Service quality
Jones et.al. (2005)	<ul style="list-style-type: none"> Organizational culture change 	Use value	
Lawler (2005)	<ul style="list-style-type: none"> Higher-quality services Optimization of the HR administration staff Cost reduction 	Use value Use value Exchange value	Service quality Time spend Efficiency
Cooke (2006)	<ul style="list-style-type: none"> Business change Improve organizational learning Transformation to more strategic HR Achieving organizational goals 	Use value Use value Use value Use value	
Ramirez and Cantu (2008)	<ul style="list-style-type: none"> Time saving because of e-communication 	Use value	Efficiency
Travica (2008)	<ul style="list-style-type: none"> Improving the work within the human resource department 	Use value	Service quality
Bondarouk and Ruël (2009)	<ul style="list-style-type: none"> Reduction of the process Increasing the speed in the transaction processing Decreasing the information errors Improving tracking and control of HR actions Improving service delivery Assisting for making strategic decisions 	Use value Use value Use value Use value Use value Use value	Service quality Service quality Service quality Service quality Service quality
Foster (2009)	<ul style="list-style-type: none"> Increasing of the profitability, market share and size Reduction in costs Efficiency in operations Management productivity 	Exchange value Exchange value Use value Use value	Efficiency Efficiency Service quality
Marler (2009)	<ul style="list-style-type: none"> Reduction of administration costs Elimination of HR transaction functions for achieving cost reduction 	Exchange value Exchange value	Efficiency Efficiency
Bondarouk and Ruël (2010)	<ul style="list-style-type: none"> Change of HR tasks Strategic decision making Automation of routine HR tasks The branding of organizations Freeing HR staff from administrative burdens Improve talent management Transforming HR professionals More time to the HR staff Online report activities Improving the internal services for driving own career 	Use value Use value Use value Use value Use value Use value Use value Use value Use value Use value	Time spend Time spend Time spend Time spend Time spend Time spend Time spend E-administration

Author	Value creation outcome	Value	Category
Farndale et.al. (2010)	<ul style="list-style-type: none"> Professional logic Delivery logic-cost effectiveness More time to the HR staff 	Use value Exchange value Use value	Efficiency Time spend
Heikkilä (2010)	<ul style="list-style-type: none"> Cost reduction Administrative efficiency Improving HR's strategic orientation Achieving organizational goals 	Exchange value Use value Use value Use value	Efficiency Efficiency
Holm (2010)	E-recruiting brings: <ul style="list-style-type: none"> Faster information exchange Lower costs of advertising Data accessibility and availability Reduced costs of communication Improved organization attraction Improve the organizational performance and quality 	Use value Exchange value Use value Exchange value Use value Use value	Service quality Efficiency Service quality Efficiency
Laumer and Eckhardt (201)	<ul style="list-style-type: none"> Improve the organizational performance and quality 	Use value	
Maatman et.al. (2010)	<ul style="list-style-type: none"> Strategic and organizational motives Technical motives Political motives Economic motives Higher-quality services 	Use value Use value Use value Exchange value Use value	Service quality
Marler and Fischer (2010)	<ul style="list-style-type: none"> Cost reduction Administrative efficiency 	Exchange value Use value	Efficiency Efficiency
Mueller and Strohmeier (2010)	E-learning: <ul style="list-style-type: none"> Increasing learner satisfaction Minimizing resistance Supports the overall education achievement 	Use value Use value Use value	
Rao (2010)	E-learning: <ul style="list-style-type: none"> Cost reduction Creating international learning platform 	Exchange value Use value	Efficiency

2.2 E-HRM and value creation in context

Context can be defined as the surroundings associated with phenomena that help to illustrate the specific phenomena that are the subject of study (Capelli and Sherer, 1991). Organization studies have failed to explicitly include contextual factors according to Marschan-Piekkari et al. (2004). They give possible reasons for not including the organizational context: the perception that 'context-free' research is easier to generalise and therefore considered more scientific, that contextual factors can be taken for granted and as a result their influence is overlooked, and the strong influence of psychology on organisational behaviour, which prefers to focus on the individual rather than factors external to the individual.

IS and HRM research and the concept of context

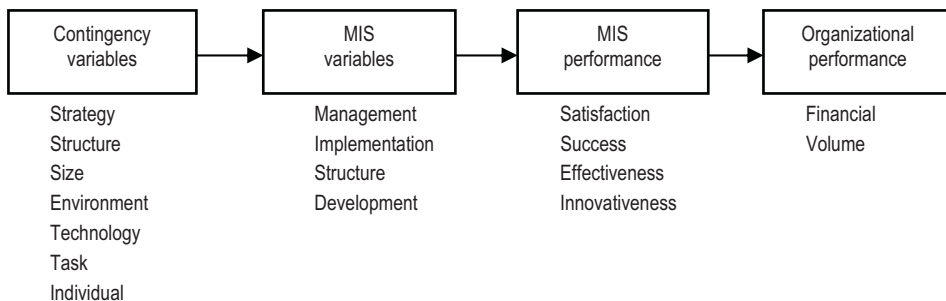
E-HRM research is partly rooted in HRM research, which in turn is rooted in sociology and psychology, organizational behaviour and organization studies, and partly rooted in Information Systems (IS) research. Both research streams commonly take the organizational context into consideration. In IS research, examples of such studies are Ein-Dor and Segev (1978) and Franz and Robey (1986). A subspeciality within IS research, Management Information Systems (MIS), has also included contextual factors

in quite a number of studies, especially by implicitly or explicitly using a contingency theory perspective. Seminal work by Weill and Olson (1987) lists the variables (Figure 1) that are most commonly taken into account as contingency variables: strategy, structure, size, environment, technology, individual, and task. These variables are assumed to influence MIS design, management, use, and implementation. The underlying proposition is that the better the 'fit' between these variables, the better the performance of the IS. The concept of 'fit' refers to a situation where factors or variables are positioned in such a way that the ideal situation or outcome arises.

HRM research has also covered contingency theory, contextual factors, and the notion of 'fit'. Delery and Doty (1996) conclude that the contingency perspective is one of the major modes of theorizing in the HRM literature. Paauwe (2004) applied a contingency-based perspective to HRM in his attempt to construct a contextually based HRM theory. In these works the notion of 'fit' between contextual factors and outcome factors or dependent variables is clearly visible, though not explicitly discussed. Two authors actually address the concept of 'fit' in HRM research, Guest (1997) and Wood (1999). They identify different types of fit: internal, external, and configurational fit (Guest, 1997) and internal, organizational, strategic, and environmental fit (Wood, 1999).

The uncritical application of contingency theory in research has resulted in many problems according to Weill and Olson (1987). The four major criticisms of contingency theory they mention are its deterministic basis, the conflicting empirical results and low correlations from studies measuring similar constructs, its poorly defined concept of fit and performance, and the narrow perspective of researchers. Despite this criticism, contingency theory has not been replaced by a widely accepted alternative and is still an implicit basis of many studies.

Figure 1: Representation of Contingency Theory in MIS Research (Weill & Olson, 1987)



E-HRM research and context

There are also studies using a contingency perspective in the relatively young e-HRM research field (e.g. Ruël et al., 2007). However, contextual aspects have not been a focus of attention (Strohmeier, 2007). A way of classifying contextual factors is to divide them into two groups: micro and macro level (Strohmeier, 2007; Zellmer-Bruhn & Gibson, 2006). However, scholars view the micro and macro levels from different

perspectives. Strohmeier (2007) considers the micro level as the individuals who perform and use e-HRM with their personal characteristics such as computer knowledge and attitudes. The macro level then refers to groups, organizational units and the organization itself. Zellmer-Bruhn and Gibson (2006) define the elements of the micro level as those affecting teams in the organization, such as empowerment, encouragement, coaching, managerial support, feedback availability, training, technical consultation, team rewards and team learning. The macro context is defined by the organizational characteristics and coordination between different activities such as R&D, marketing, manufacturing, etc. and of activities between different subsidiaries.

Contextual factors are occasionally incorporated in e-HRM research but only as variables to help explain or moderate configurations and outcomes, and then generally at the macro level (Strohmeier, 2007). Table 2 presents an overview of contextual factors that have been mentioned or researched in e-HRM studies.

An early example of a human resource information systems (HRIS) study that takes the organizational context into account was conducted by Haines and Petit (1997). They found no significant correlations between the size of the organization, size of departments or units, duration of existence of the HRIS department, and computer experience of the firm as independent variables and HRIS user satisfaction and system usage as dependent variables. In contrast, Ruël et al. (2007) found that especially support from colleagues and managers and information availability and accessibility regarding e-HRM application usage were significant determinants of the perceived e-HRM application structure and content.

According to Hussain et al. (2007), organizational size influences the degree to which HR managers feel required to invest in HRIS to improve their strategic capabilities. However, their findings showed that in most of the cases, its influence was not significant. Usually, larger organizations are more likely to use e-HRM (Marler & Fisher, 2010).

Wright & Snell (1998) observed that an e-HRM implementation goes along with organizational change and that an e-HRM strategy should fit with the overall organizational characteristics. The most relevant characteristics in such a case are HRM practices, employee skills, employee behavior, computer literacy and the personal characteristics of the individuals in the organization (Wright & Snell, 1998). A similar perspective is taken by Oiry et al. (2010). They observed two different lines of reasoning in the literature on which characteristics are crucial in information technology implementation. One line was originally conceived by Orlikowski (2000), who concludes that the characteristics of the employees in a certain organization form the main driver of the adoption of information and communication technologies. The other line was proposed by DeSanctis and Poole (1994), who point out the importance of the characteristics of the technology used. Following the idea about the technology determining the adoption of information technologies, Erdil and Günsel (2006) concluded that the acceptance of HR practices is based on their strategic or technical character. Strategic HRM practices are used to support the employees and business needs of the organization, while technical HR practices improve the quality of those practices. Tansley and Foster (2010) found that e-HRM teams should be cross-functional and

composed of both information technology (IT) personnel and representatives from different departments.

Marler and Fisher (2010) summarized the most important contextual factors for e-HRM acceptance. E-HRM acceptance by stakeholders depends on the degree of involvement in the design and implementation of e-HRM, the perceived usefulness of the e-HRM technology, the degree of managerial compulsion to use e-HRM, and the perception of privacy or data security related to the acceptance of e-HRM. Other contextual factors are the employees' ability to use computers and their Internet literacy. In the analysis, the employees' profiles should be investigated (Ramirez & Cantu, 2008) as well as the organizational size and environmental infrastructure (Marler & Fisher, 2010).

Some research shows that the nationality of the firm adopting the e-HRM technology is also an important issue because of the international differences in HR systems (Marler & Fisher, 2010; Ramirez & Cantu, 2008). The national variations can be recognized in the laws, educational systems, industrial relation systems, legislation addressing storage and the use of electronic data, and level of economic development (Marler and Fisher, 2010). Following the idea of nationality being a factor for analyzing the acceptance of e-HRM, Ramirez and Cantu (2008) also focus on contextual factors such as national-cultural characteristics and organizational culture. National-cultural characteristics are crucial for the implementation of e-HRM (Marler & Fisher, 2010; Ramirez & Cantu, 2008). The authors connect the national-cultural context with economic and industrial development, national-cultural and social-demographic characteristics. In terms of national context, the usage of e-HRM will take time to implement because of the need to improve the employees' computer skills (Ramirez & Cantu, 2008). Culture, along with regulations, determines the factors for the context of the organizational environment (Holm, 2010).

Table 2: Context variables in e-HRM research as independent variables

MICRO	MACRO
Support from colleagues and managers	Organization size
Information availability and accessibility	Department size
HRM practices	Duration of existence of HRIS department
Employee skills	Computer experience of the firm
Employee behaviour	Cross-functional teams
Computer and Internet literacy	Nationality of the firm
Personal characteristics of individuals	Multicultural context
Characteristics of the technology	National culture
Degree of involvement in e-HRM design and implementation	
Managerial compulsion to use e-HRM	
Privacy and data security	

In sum, contingency theory is widely used in IS and HRM research and as a result has been applied in e-HRM studies as well. In most cases, contingency theory researchers suggest that outcome variables such as organizational performance depend on the "best fit" with independent variables such as individual characteristics and organiza-

tional characteristics. These independent variables are referred to as context variables in many of the studies. However, in our view they are not really treated as context variables in the analysis. This study fills this void and assumes that contextual factors may facilitate or inhibit the relationship between e-HRM usage and value creation for HR.

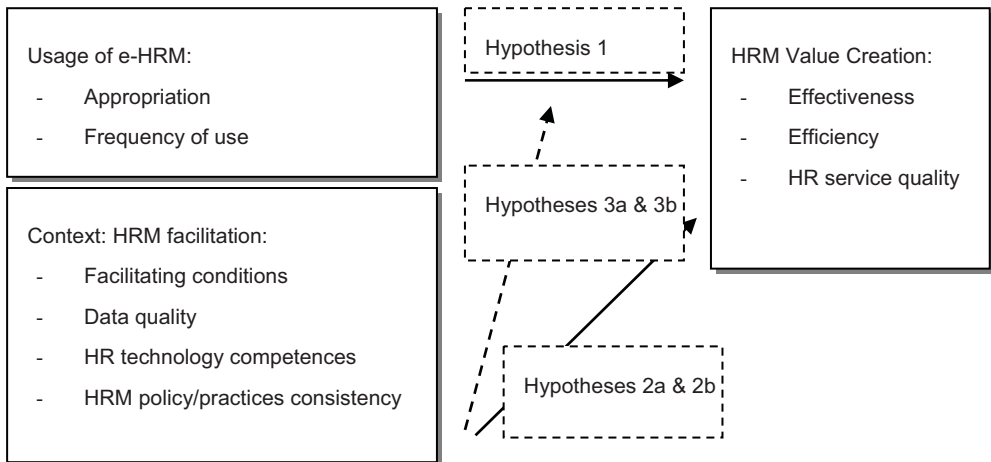
We believe that this approach is needed as it specifically focuses on the contextual factors that impact the relationship between e-HRM usage and value creation. It helps us to understand the complexity of e-HRM in organizations.

Based on the literature we assume that e-HRM can only create value if e-HRM applications are ultimately *used* by end-users. Moreover, we assume that e-HRM applications can only create value if they are used in line with the goals and intentions of their developers (DeSanctis & Poole, 1994).

As explained earlier, we assume that organizations that invest in e-HRM intend to renew their ways of implementing HR policies and practices, resulting in desired benefits such as improved efficiency and effectiveness. We consider these benefits as value-creating factors. Based on a literature review of the benefits of using e-HRM (Table 1), we conclude that most of the outcome variables can be categorized into three groups: efficiency, effectiveness, and HRM service quality.

The usage of e-HRM applications and the assumed value creation resulting from this usage take place within a context that may facilitate the value creation process (e-HRM usage \times expected benefits). Starting from the usage of e-HRM applications and based on the three value-creation groups identified, we construct the following research model (Figure 2) reflecting the following hypotheses:

Figure 2: The research model



Hypothesis 1: The higher the appropriation of e-HRM applications and frequency of use, the greater the value created for HRM

Hypothesis 2a: The higher the HRM facilitating conditions, the greater the value created for HRM

- Hypothesis 2b: The higher the separate HRM facilitating conditions, the greater the value created for HRM
- Hypothesis 3a: The relationship between the appropriation and frequency of use of e-HRM applications and value created for HRM is moderated by the HRM facilitating conditions: the relationship is stronger if the HRM facilitating conditions are better.
- Hypothesis 3b: The relationship between the appropriation and frequency of use of e-HRM applications and the separate dimensions of value creation for HRM is moderated by the HRM facilitating conditions: the relationships are stronger if the HRM facilitating conditions are better.

HRM Value creation

HRM value creation consists of three factors: efficiency, effectiveness, and HR service quality; efficiency and effectiveness consist of two separate aspects each. The first factor, efficiency, has the following two aspects: efficient HR document handling and efficient personnel data handling.

Efficient HR document handling: E-HRM can result in an improved efficiency of the organization. Efficiency can be increased by eliminating the transactional functions. It can result in cost reduction, improved decision-making, better information quality, more efficient access to information, and productivity improvement. The main advantage of e-HRM is the reduction in process and administration costs. Efficient HR document handling refers to the degree to which HR documents are dealt with in the organization in a smooth, time- and means-saving way.

Efficient personnel data handling: E-HRM supports different HR practices. E-Administration of personnel data refers to the possibility of employees accessing, updating, and monitoring their personnel data whenever they need to. An e-HRM system gives the employees direct access to the HR resources.

The second factor, effectiveness, involves the aspects ease of use and usefulness.

Ease of use: Implementation of e-HRM should be comfortable for the end-users. Ease of use is the degree to which targeted users expect the IS not to involve effort (Davis et al., 1989). They should not spend too much time on the e-HRM tools. For that reason, e-HRM should be clear and understandable. Ease of use refers to the degree to which e-HRM applications are accessible, understandable, and comfortable to work with.

Usefulness: According to Davis (1989), the usefulness of certain systems can be defined as the degree to which a person believes that this system can improve his or her job performance. Usefulness can result in increased productivity of HR-related activities and a faster working process.

The third factor of value creation is *HR service quality*. e-HRM implementation can result in better HR service quality. Parasuraman et al. (1985) defined service quality as the expectations arising of the HRM services an organization offers to its employees when they are used. Value creation factors for improved HR service quality can be: er-

ror reduction, improved tracking control, improvement in HR response time, improvement of data accuracy and improvement of employee satisfaction.

Usage of e-HRM

Our study investigates, first, the usage of an e-HRM system and the value created by this. According to Sedera and Tan (2007), appropriation is one of the best dimensions for measuring the interaction between the user and the system. In many information system studies, the usage of a certain system is measured by the *frequency of its use* and *appropriation*.

According to Orlikowski (1996), appropriation is the ‘continuous, progressive, and mutual adjustments, accommodations, and improvisations between the technology and the users’ (p. 69). The realization of an e-HRM system involves the process of appropriation. When implementing a new system or practice in an organization, the management should be concerned about presenting this system to the employees. The latter have to be taught how to use it. Employees should feel comfortable when using it and should be able to execute the applications in line with its purposes.

Frequency of use is one of the most common metrics of usage exploited in IS research (Straub et al., 1995). It makes no sense to implement a system which is not used by end-users. They should notice the need for e-HRM in their daily activities and use it intensively.

Context: HR facilitation

In this study we focus on the micro-level contextual factors: facilitating conditions, data quality, HR competence as technology expert, and HR policy–practice consistency.

Facilitating conditions: They are defined by Venkatesh et al. (2003) as “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system”. They can be used to stimulate the employees’ readiness to use a certain system (Sykes et al., 2009).

Data quality: Strong et al. (1997) define data quality as the set of accuracy, objectivity, reputation, accessibility, access security, relevance, ease of understanding, timeliness and consistent representation. The data quality provided by the e-HRM system should be accepted by the employees as being reliable, complete and relevant. This can influence their willingness to use the new system.

HR competence as technology expert: Bassellier et al. (2001) define the IT competence of managers as the IT-related explicit and tacit knowledge they have which allows them to exhibit IT leadership in a certain area of business. There is strong evidence for HR competence as technology expertise when HR professionals are able to clearly explain the tools of the e-HRM application. They should be technically skilled in order to do their job properly and assist the other employees by teaching them how to work with the e-HRM tools.

HR policy–practice consistency: The consistency of an HRM system is high when it is consistent over time, people and context. Consistency of HRM messages and the e-HRM system reassures the employees that the HRM practices will work in line with the main goals of the organization as well as with the personal goals of the employees. It helps in achieving the organization’s goals (Bowen & Ostroff, 2004).

3. Method

3.1 Questionnaire development

For our study we developed a questionnaire to collect data. Existing, tested scales were used for most of the variables, though in some cases they were shortened. The original scales were in English, but since data collection was expected to take place in international companies based in the Netherlands and most likely the targeted respondents would be native Dutch speakers, the questionnaire was translated into Dutch and back again into English. This was done to uncover any problems in interpretation and thus to increase its reliability (Brislin, 1980). The translation from English into Dutch was done in parallel by two independent translators, resulting in an accurate wording in the final questionnaire. The questionnaire was checked by three academic researchers from three different universities. This was done to refine the questionnaire so respondents would have no difficulty in answering the questions. This resulted for example in exchanging some words for others that are easier to understand. Furthermore, experts conducted a pilot test, and their suggestions were used to improve the content validity and structure of the questionnaire.

The questionnaire was also beta-tested online by two academic researchers and two experts of an HR consultancy firm. This last check resulted only in minor changes, mostly textual or lay-out changes.

3.2 Factor analyses

Explorative factor analysis (via PAC) was used to identify the three dimensions of dependent variable HRM Value Creation. The original set of variables consisted of 22 items. Due to the combination of low inter-item correlations and low communalities (<0.40), two items were removed. Taking into account the relatively small sample of 151 respondents, factor analysis of the remaining 20 items was deemed to be suitable (the Kaiser-Meyer-Olkin measure of sampling adequacy is 0.855, and the lowest value of the anti-image matrix is 0.772). We decided to use an oblimin rotation because there is no reason to assume that the three value dimensions are independent of each other.

The three factor solution explained 59% of the variance and led to a pattern in which the extracted components represented the dimensions effectiveness, efficiency and HR service quality. It seemed that some items had a cross-loading with more than one dimension, if the presented loading is set at 0.2 or more. One service-quality item ('Willingness of the HR-section to provide services') had a high loading on efficiency. This item connected both dimensions. Given the content of this item in relation to the other items and additional factor and reliability analyses for the separate items of each dimension, we decided to place this item in the so-called service-quality dimension. These three dimensions were strongly related to each other, as expected. From this, it was decided to construct an overall score for value creation based on the average of these three dimensions.

A correlation analysis of the two independent variables, e-HRM appropriation and frequency of use, showed that there was no significant relation between them ($r = 0.09$, $p = 0.251$, $n = 151$).

Explorative factor analysis (via PAC) was also used to identify the four dimensions of the context variable of HRM facilitation. The original set of variables consisted of 20 items. We used an oblimin rotation because there was no reason to assume that the three value dimensions are independent of each other. The three-factor solution led to a pattern in which the extracted components represented the dimensions: facilitating conditions, data quality, HR technical competences, and HR policy consistency. These four dimensions were strongly related to each other, as expected. From this, it was decided to construct an overall score for HR facilitation based on the average of these four dimensions.

Table 3 shows all the variables and their dimensions, a sample item per dimension, the source of the scale, and the number of items used per scale. The descriptive statistics and the reliability of these scales, plus a correlation matrix are given in Table 4. This table also shows the scores for the overall HRM value creation scale (the mean for the three value creation scales) and the overall HRM facilitating scale (the mean for the four facilitating scales).

Table 3: Variables, dimensions, source of the scale, a sample item per scale and the total number of items per scale

Variable/factor	Source Scale	Sample items	Number of items
Value Creation			
Effectiveness Ease of use and Usefulness	Davis, 1989	I find the Employee Self Service clear and understandable / Overall, I find the Employee Self Service useful for the HR instruments that I'm using	8 items
Efficiency Efficient handling of documents and personal data	Self-constructed	Since the introduction of the Employee Self Service the duplication of HR documents has been minimized / I have access to my personal HR information whenever I'd like to	6 items
HR Service quality	Parasuraman et al., 1985, 1991	The HR services guarantee an errorless administration	6 items
Usage of e-HRM			
e-HRM appropriation	Adapted from Ruël (2001)	I use the Employee Self Service in accordance to the manual	4 items
Frequency of use	Self-constructed	I use the Employee Self Service in my day to day work	3 items
HRM facilitation)			
Facilitating conditions	Venkatesh et al., 2003; Marler et al., 2006	An appointed person is available to assist in using the Employee Self Service	5 items
Data quality	Lee et al., 2002	The data in the Employee Self Service are complete	6 items
HR's technology competence	Self-constructed	HR professionals in our organization possess a lot of technical expertise to work with the Employee Self Service	4 items
HRM consistency	Delmotte et al., 2007	In this organization there is a clear relationship between all HR communications	5 items

3.3 Data collection

We collected data from the Netherlands-based branches of three different, large, international organizations. Per organization 150 employees were randomly selected (450 in total). They received an invitation to participate by e-mail. The questionnaire was put online with the tool Netquestionnaire. A reminder was sent two weeks after the initial mailing. In total, 151 valid responses were received (response rate: 33%). The respondents' average age was 40 years, 112 were male: 41 female, 23 of them had been less than a year with their employers, 130 had been more than a year with their employers. Three-quarters of the respondents had a higher education degree; 42 of them held non-managerial/operational positions, 10 held a managerial position, and 63 held positions in a support department.

Table 4: Descriptive statistics and correlations (n =151)

	<i>M</i>	<i>SD</i>	Cronbach's Alpha	1	2	3	4	5	6	7	8	9	10
1. Overall Value Creation	3,416	,574	,750	--									
2. Effectiveness	3,414	,775	,898	,836**	--								
3. Efficiency	3,619	,636	,833	,828**	,559**	--							
4. Service quality	3,216	,692	,834	,793**	,446**	,515**	--						
5. e-HRM Appropriation	2,844	1,122	,729	,241**	,169*	,145	,277**	--					
6. e-HRM Frequency of Use	3,393	,735	,826	,451**	,422**	,394**	,288**	,094	--				
7. Overall HRM Facilities	3,264	,454	,625	,722**	,682**	,525**	,550**	,281**	,392**	--			
8. Facilitating Conditions	3,171	,724	,695	,509**	,541**	,394**	,298**	,248**	,341**	,722**	--		
9. Data Quality	3,671	,699	,879	,576**	,591**	,498**	,315**	,066	,288**	,681**	,385**	--	
10. HR Tech. Competence	3,078	,600	,786	,400**	,313**	,211**	,450**	,228**	,135	,682**	,284**	,220**	--
11. Consistency of HR-policy	3,138	,775	,753	,487**	,399**	,314**	,478**	,240**	,296**	,663**	,239**	,206*	,454**

4. Results

4.1 e-HRM usage and value creation

We tested the hypotheses using hierarchical regression analysis. The results of testing hypothesis 1 ("The greater the appropriation of e-HRM applications and frequency of use, the greater the value for HRM") show the following: appropriation of e-HRM applications and frequency of use of e-HRM applications are both positively related to HRM value creation ($\beta = 0.43$; $p < 0.01$; $n = 151$) ($\beta = 0.20$; $p < 0.01$; $n = 151$) (Model 1 – Table 5). This means that when more e-HRM applications are used as intended and are used more frequently, greater value for HRM is created. The relationship is the strongest for e-HRM appropriation. This model is significant and explains 23% of the variance in HRM value creation. Therefore, hypothesis 1 is supported.

**Table 5: Results of the hierarchical regression analyses
(via centred independent variables, N=151)**

	Model 1 (Usage)			Model 2 (+ Facilitation)			Model 3 (+ Interaction)		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
e-HRM Appropriation	.337	(.06)	.43**	.156	(.05)	.20**	.189	(.05)	.24**
e-HRM Frequency of Use	.102	(.04)	.20**	.023	(.03)	.05	.042	(.03)	.08
Overall HRM Facilitation				.798	(.08)	.63**	.782	(.08)	.62**
Fac. x Appropriation							-.237	(.08)	-.16**
Fac. x Freq. of use							-.119	(.06)	-.12*
Constant	3.416	(.04)		3.416	(.03)		3.464	(.03)	
Adjusted R2	23%**			55%**			60%**		
R Change				31%**			5%**		

* $p < 0.05$ ** $p < 0.01$ (2-tailed)

4.2 HRM facilitation and value creation

Then we included the concept of HRM facilitation in our analysis (hypothesis 2a – “The better the HRM facilitating conditions, the greater the value created for HRM”). The results (Model 2 – Table 5) showed that HRM facilitation is positively related to HRM value creation ($\beta = 0.63$; $p < 0.01$; $n = 151$). In this model appropriation of e-HRM applications is also positively related to HRM value creation, though the strength of the relationship diminished ($\beta = 0.20$; $p < 0.01$; $n = 151$). Frequency of use does not appear to be related to HRM value creation any longer. The better the HRM facilitation for e-HRM usage, the greater the value created for HRM. This model is significant and explains 55% of the variance in the dependent variable. Therefore, hypothesis 2a is supported.

HRM facilitation is a concept consisting of four dimensions: facilitating conditions, data quality, HR technology competences, and HR policy consistency. In order to test hypothesis 2b (“The better the separate HRM facilitating conditions, the greater the value created for HRM”), we added these separate dimensions to model 1. The results (Table 6) show that all dimensions of HRM facilitation are positively related to HRM value creation: facilitating conditions ($\beta = 0.20$; $p < 0.01$; $n = 151$), data quality ($\beta = 0.37$; $p < 0.01$; $n = 151$), HR technology competences ($\beta = 0.11$; $p < 0.05$; $n = 151$), and HR consistency ($\beta = 0.24$; $p < 0.01$; $n = 151$). That means that the better these HRM facilitating dimensions, the greater the HRM value creation. The positive relationship between appropriation of e-HRM applications and HRM value still holds, though it has decreased ($\beta = 0.18$; $p < 0.01$; $n = 151$). This model is significant ($p < 0.01$) and explains 56% of the variance in the dependent variable. Therefore, hypothesis 2b is supported.

Table 6: Results for a multiple regression of the two independent e-HRM usage variables, the four HRM Facilitating variables on the Overall HRM Value Creation-score (via centred independent variables, N=151)

	<i>B</i>	<i>SE</i>	β
e-HRM Appropriation	.144	(.05)	.18**
e-HRM Frequency of Use	.034	(.03)	.07
Facilitating Conditions	.157	(.05)	.20**
Data Quality	.302	(.05)	.37**
HR Technology Competence	.107	(.06)	.11*
Consistency of HR-policy	.227	(.06)	.24**
Constant	3.416	(.03)	
Adjusted R2	56%		

* $p < 0.05$ ** $p < 0.01$

4.3 HRM facilitation as a moderator

Hypothesis 3a indicates that the relationship between the appropriation and frequency of use of e-HRM applications and value created for HRM is moderated by the HRM facilitating conditions: the relationship is stronger if the HRM facilitating conditions are better. The results of the hierarchical regression analysis (Model 3 – Table 5) showed that HRM facilitation only moderates the relationship between e-HRM appropriation and HRM value creation and between frequency of use and HRM value creation, but the trend is opposite to what was hypothesized (resp. $\beta = -0.16$, $p < 0.01$, $n = 151$ and $\beta = -0.12$, $p < 0.05$, $n = 151$). This means that if HRM facilitation is relatively high, the relationship between e-HRM appropriation and frequency of use on HRM value creation is weaker. This model is significant and explains 60% of the variance in HRM value creation. Model 3 adds another 5% of explanatory power. Therefore, hypothesis 3a is rejected.

For these regression analyses, the residuals are normally distributed, and the different plots and partial plots gave no violations on linearity. The mean VIF (variance inflation factor) for the complete model is 1.26 with a maximum of 1.34, and therefore we can conclude that there is no indication of multicollinearity (even the maximum score of the condition index is 2.09).

4.4 HRM facilitation as a moderator for the separate HRM value creation dimensions

Finally, we tested hypothesis 3b, which indicated that the relationship between the appropriation and frequency of use of e-HRM applications and the separate dimensions of value creation for HRM is moderated by the HRM facilitating conditions: the relationships are stronger if the HRM facilitating conditions are better.

The results show a mixed picture per HRM value creation dimension (model 1 – Table 7). For e-HRM effectiveness, only the relationship between frequency of use and effectiveness is moderated by HRM facilitation, but negatively ($\beta = -0.18$, $p < 0.01$, $n = 151$). This means that if the HRM facilitation is relatively high, the relation-

ship between e-HRM frequency of use and effectiveness is weaker. The model is significant and explains 52% of the variance in e-HRM effectiveness. HRM facilitation as a moderator adds 4% of explanatory power, which is significant.

For e-HRM efficiency, only its relationship with appropriation is moderated by HRM facilitation ($\beta = -0.31$, $p < 0.01$, $n = 151$), and again negatively. This means that if HRM facilitation is high, the relationship between e-HRM appropriation and e-HRM efficiency is weaker. This model (Model 2 – Table 7) is significant and explains 38% of the variance in e-HRM efficiency.

For the dimension of HRM service quality, HRM facilitation does not significantly moderate the relationship between e-HRM appropriation, frequency of use and HRM service quality. Thus, hypothesis 3b is rejected.

Table 7: Results of the hierarchical regression analysis. Reported is step 3 plus R change (via centred independent variables, N=151)

	Effectiveness			Efficiency			Service quality		
	B	SE	β	B	SE	β	B	SE	β
e-HRM Appropriation	.208	(.05)	.20**	.270	(.06)	.31**	.089	(.07)	.10
e-HRM Frequency of Use	.017	(.07)	.03	.009	(.04)	.02	.100	(.05)	.16*
Overall HRM Facilitation	1.067	(.04)	.63**	.540	(.10)	.39**	.738	(.12)	.48**
Fac. x Appropriation	-.149	(.11)	-.08	-.491	(.11)	-.31**	-.070	(.13)	-.04
Fac. x Freq. of use	-.235	(.12)	-.18**	-.000	(.08)	.00	-.123	(.09)	-.11
Constant	3.467	(.05)		3.683	(.04)		3.243	(.05)	
Adjusted R2	52%**			38%**			32%**		
R Change (interaction)	4%**			9%**			1%		

* $p < 0.05$ ** $p < 0.01$ (2-tailed)

For these regression analyses the residuals are normally distributed, and the different plots and partial plots gave no violations on linearity (multicollinearity of the independent variables was already checked in relation to the first overall model in Table 5).

5. Discussion

The core question of the study presented in this paper is: *to what extent does usage of e-HRM applications explain HR value creation, and which contextual factors facilitate or inhibit this relationship?* The data collected in three branches of international firms based in the Netherlands that use e-HRM indicates that, if there is no contextual facilitation, e-HRM usage is positively related to HRM value creation. This means that hypothesis 1 was supported. Furthermore, the contextual factors, facilitating conditions, data quality, HRM technology competences, and HR policy consistency are also positively related to HRM value creation. If HRM facilitation is added to the model, the relationship between e-HRM appropriation and HRM value creation remains, but the relationship between frequency of use and HRM value creation is no longer significant. Altogether, e-HRM appropriation, frequency of use, and HRM facilitation explains 55% of the

variance in HRM value creation. Therefore, hypotheses 2a and 2b were both supported. Finally, HR facilitation, the contextual variable as a whole, seems to moderate the relationship between e-HRM usage and HRM value creation significantly, but in the opposite sense to what was expected: the higher the level of HRM facilitation, the weaker the relationship between e-HRM usage and HR value creation. This outcome also exists for two of the three separate HRM value creation dimensions: effectiveness and efficiency. Hypotheses 3a and 3b, therefore, were rejected.

What are the implications of the findings? This study added evidence to the debate on the relationship between e-HRM usage and value creation. It empirically confirmed that the relationship exists. Of particular interest is the use of the concept of appropriation (DeSanctis & Poole, 1994), which goes beyond just usage in terms of frequency of system usage. It aims to measure usage in line with the intentions of an application or system. Appropriation of e-HRM is confirmed to be positively related to value creation factors. But in our study we were also curious about the role of contextual facilitating factors in value creation. HRM facilitation such as facilitating conditions, the data quality, HR's technology competences, and HR policy consistency have a significant and strong, direct relationship with HRM value creation. Furthermore, HRM facilitation also moderates the relationship between e-HRM usage and HRM value creation. Combining these findings, we conclude that e-HRM usage is only one aspect generating HR value; contextual facilitating factors are of great importance as well. This conclusion suggests more support for the study of Ruël et al. (2007), which found that e-HRM usage is only one of the variables positively related to e-HRM effectiveness. Recent work on the goals and outcomes of e-HRM by Parry (2011) and Parry and Tyson (2010) also suggest that e-HRM brings a certain value to organizations (efficiency, service delivery, standardisation of goals, and some evidence of transformational impact), but their unit of analysis was the organization, not the individual user. And these studies, however interesting, lack a precise and in-depth analysis of the causes of HR value creation because of e-HRM. The benefit of the study presented here therefore lies in its contribution to our understanding of user-level determinants of value creation of e-HRM.

As stated earlier, the finding in our study indicates that contextual factors matter. In this paper we briefly discussed the concept of organizational context and contingency theory as a perspective that aims to include factors such as organization size, strategy, industry, technology, individuals and tasks. These factors have hardly been included in e-HRM research published so far. We even suggest that other factors going beyond the most commonly included contextual factors in other research fields within organization and management studies may help to explain value creation because of e-HRM. Suggestions for such variables are: implementation approach, change management, leadership, group dynamics, communication, user involvement and commitment, structure (unit, department, group), culture (organization and group), and project management.

Our findings indicate that contextual factors, summarized in this study as HR facilitation, are directly positively related to HRM value creation. This forms an addition to earlier e-HRM studies that aimed to include contextual factors (e.g. Hussain et al., 2007; Marler & Fisher, 2010; Oiry et al., 2010; Ramirez & Cantu, 2008; Wright &

Snell, 1998). Interestingly, the findings presented in this paper clearly indicate that contextual factors moderate the relationship between e-HRM usage and HR value creation. If the HRM facilitation is high, the relationship between e-HRM usage and HRM value creation is weaker. This finding needs further investigation to clarify the intervening role of contextual factors.

In conclusion, contextual facilitating factors do play a role in HRM value creation among e-HRM users, as our findings indicate. Future research may continue to include a larger set of factors and clarify how and why the impact of contextual factors differs per user group.

Limitations

The results of our study need to be treated with caution for a number of reasons. First, the sample size in our study was relatively small. Secondly, the sample only included three organizations of a specific type (service industry) and therefore may not be representative for organizations in other types of industries. Furthermore, the cross-sectional nature of our study also reduces a full and in-depth understanding of the relationship between e-HRM usage and HRM value creation and the moderating role of contextual facilitating factors. Finally, the data collected regarding the independent and dependent variables all come from the respondents who participated in our study (single source bias) using the same questionnaire (common method bias). Mixed method research would be a way to overcome these biases.

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