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Thomas Wirtky

Otto-Friedrich University Bamberg, thomas.wirtky@uni-bamberg.de

Andreas Eckhardt

Goethe-University Frankfurt am Main, eckhardt@wiwi.uni-frankfurt.de

Sven Laumer

Otto-Friedrich University of Bamberg, sven.laumer@uni-bamberg.de

Udo Wild

University of Bamberg, udo.wild@uni-bamberg.de

Tim Weitzel

University of Bamberg, tim.weitzel@uni-bamberg.de

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Going beyond operational efficiency in HR using IT – A Literature Review of Human Resources Information Systems

Thomas Wirtky

Otto Friedrich University Bamberg
thomas.wirtky@uni-bamberg.de

Sven Laumer

Otto Friedrich University Bamberg
sven.laumer@uni-bamberg.de

Andreas Eckhardt

Johann Wolfgang Goethe University Frankfurt
eckhardt@wiwi.uni-frankfurt.de

Udo Wild

Otto Friedrich University Bamberg
Udo.wild@uni-bamberg.de

Tim Weitzel

Otto Friedrich University Bamberg
tim.weitzel@uni-bamberg.de

ABSTRACT

Leading academics claim that the management of human resources will be most critical in gaining competitive advantage. Today, the human resources departments (HR) are transforming themselves from an administrative cost-center to an internal partner delivering additional business value. In this transformation process, information technology (IT) could play a key role. Therefore, this paper aims to unfold both the current state of knowledge concerning the value contribution of information systems (IS) for the HR function and approaches that go even beyond operational efficiency. Reviewing nearly 8,000 articles, published in the proceedings of eight major IS conferences reveals that in total 35 articles exclusively deal with the topic of human resources information systems (HRIS) but only very few research approaches show, how HRIS could help to go beyond operational efficiency. Furthermore, the literature analysis identifies that approaches dealing with the IT support for HR planning processes are completely missing so far.

Keywords

human resource information system, HRIS, literature review, conference proceeding, electronic human resource management, e-HRM

INTRODUCTION

Drucker once noted that the change to a knowledge society requires a company to play as a team, but “Personnel usually came in only if there was a crisis – and often not even then” (Drucker, 1993). It is understood though that human resources (HR) are the most important source for competitive advantage (Porter, 1990), and, nowadays, HR departments are transforming themselves from a non-business-oriented, administrative cost-center to an internal business partner delivering additional value (Ulrich, 1997).

Unfortunately, little is known how IT could enable such business support functions as HR to achieve sustainable business value (Laumer, Eckhardt, and Weitzel, 2010). This might be explained by the fact that the IT penetration of corporate HR departments appears to be behind on that of core business functions. Although, the earliest mechanized employee information systems already appeared back in the 1940s, HR departments took little part in the technological advances that were occurring in the accounting and financial areas over the following decades (DeSanctis, 1986). They appear to have strictly followed Carr’s three non-innovative rules for IT Management – (i) Spend less, (ii) follow, don’t lead and (iii) focus on vulnerabilities, not opportunities (Carr, 2003).

In contrast, with the turn of the millennium, the IT enablement of core business processes reached a new level. Instead of automating existing processes, IT revolutionized business processes and allowed companies to provide their customers with a new value proposition. Examples are Amazon, Zara and Dell. Amazon pioneered online shopping (Wolfenbarger and Gilly, 2001). Zara completely abolished their costly in-store inventories through more accurate forecasting and efficiently integrated design, production and replenishment processes (Echikson, 2000). Dell pioneered the built-to-order principle and produced and delivered a customized notebook in just 3 days after arrival of the order (Magretta, 1998). These and many other

companies distinguished themselves from the competition by using IT to perform processes differently, and therefore, according to Michael Porter, gained a competitive advantage (Porter, 1985).

This paper claims that today, about 10 years into the millennium and despite the HR departments transforming themselves in order to gain a competitive advantage (Ulrich 1997), the IT support of HR processes is still behind that of core business processes because HRIS do not appear to go beyond operational efficiency yet. In order, to enable a more value-oriented discussion of sustainability towards the IT support in HR, this paper aims to provide on the one hand an overview on the current state of HRIS knowledge in IS research and on the other hand an analysis, how these approaches go beyond operational efficiency. Therefore, this literature review focuses on IT in HR processes with the following research question in mind:

What IT approaches in HR go beyond operational efficiency improvement?

To answer this question, the remainder of the paper is as follows. After outlining the applied research method for the literature review and the data sources used, we describe and structure our findings according a self-developed classification framework based on HRM research. Implications for researchers and practitioners, derived from this research, are discussed afterwards.

RESEARCH METHOD

In scope of this literature review were all accessible articles of proceedings of major AIS conferences established during the last three years and listed in Table 2, which were accessed via the AIS Library (AISEL) on February, 2011. The oldest articles are from 1993. Relevant articles of proceedings were identified in a process of three stages.

Full text searches were conducted in the first stage using very general, case insensitive search terms, as listed in Table 1. More specific terms such as “human resources software” were not used as they did not appear to lead to additional results. With regards to the conference “Wirtschaftsinformatik”, which also contains articles in German, both English and German search terms were used. Due to limitations of the AISEL search engine, all results were exported using the website’s XML function and processed offline using Microsoft Excel, in order to efficiently remove redundant results and withdrawn conference proceedings. In total, 7963 potentially relevant articles were exported for manual screening in the second stage. A complete overview of all conference proceedings observed and the exported results could be seen in Table 2.

In the second stage, the potentially relevant articles were manually screened by our research team, to ensure relevance with regards to IT in HR processes. The exact numbers of results are depicted in Table 2. After the final coding process, 35 relevant articles were included for our literature analysis on HRIS. The entire list of these articles is provided in the Appendix.

Finally, the remaining relevant articles were considered and organized using Mendeley Desktop, a free reference management tool providing the feature to potentially share the findings in our four-person research team.

English search term	German search term
e-hrm	Elektronisches Personalmanagement
e-learning	Elektronische Schulung
e-recruiting	Elektronische Personalbeschaffung
e-recruitment	Elektronische Personalbeschaffung
employee performance	Mitarbeiter Leistung
employee training	Mitarberschulung
employee workplace	Arbeitsplatz
hris	PIS
human resources management	Personalmanagement
human resources information system	Personalinformationssystem
payroll	Lohnabrechnung / Gehaltsabrechnung
personnel development	Personalentwicklung
talent management	Talent Management
workforce planning	Mitarbeiterplanung

Table 1. List of search terms

Conference name	Abbreviation	Screened results	Relevant results
Americas Conference on Information Systems	AMCIS	4249	11
International Conference on Information Systems	ICIS	1369	1
European Conference on Information Systems	ECIS	679	6
International Conference on Information Resources Management	CONF-IRM	57	2
Mediterranean Conference on Information Systems	MCIS	111	1
Pacific Asia Conference on Information Systems	PACIS	896	8
Bled eConference	BLED	345	-
Wirtschaftsinformatik	WI	257	6
TOTAL		7963	35

Table 2. List of conferences

FINDINGS

This literature review about HRIS is structured around the HR functions as illustrated in Figure 1. The framework illustrated in Figure 1 highlighting four different HR functions was developed based on prior HRM literature (e.g., Holtbrügge, 2010). HR Planning, HR Management and HR Development contain iterative processes, which HR performs in cooperation with the business units. HR Planning includes personnel planning processes as well as personnel demand evaluations. The HR Management function deals with issues around recruiting, reporting, and compensation and benefits. Within the HR Development function all practices to evaluate, develop and train the current staff are subsumed. In contrast, HR Administration contains support processes (e.g., Payroll) performed by HR only. Examples for other services as part of HR Administration are personnel data management, internal communication, cooperation with workers' council, relocations, absences, retirements, layoffs and social services.

This distinction has implications on IT support in HR processes that will be more obvious in the following review.

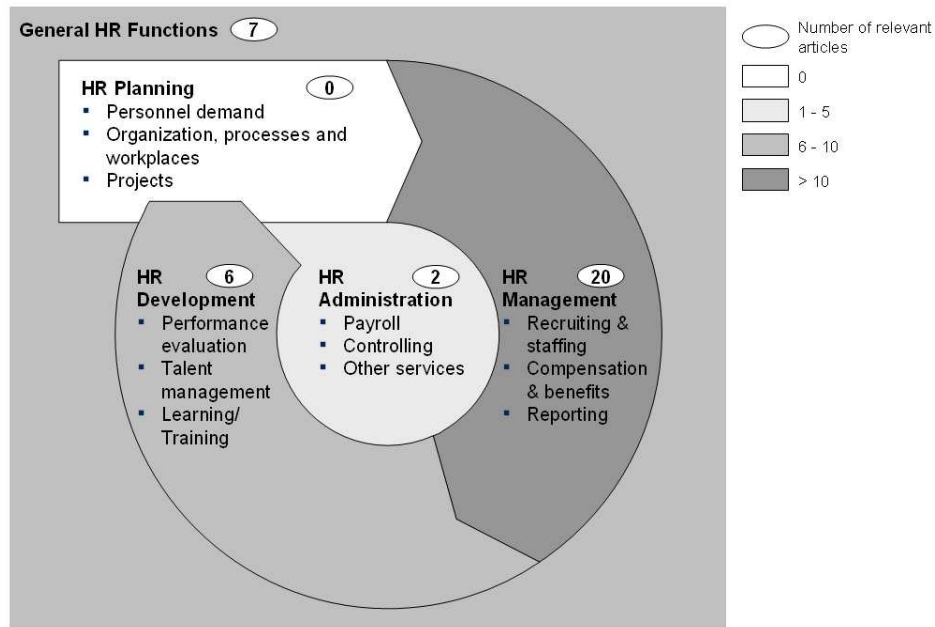


Figure 1. HR functions and allocation of relevant articles

IT support in HR processes: Current state of discussion

As mentioned above, from 7963 screened results (see Table 2. List of conferences) only 35 directly addressed the IT support of HR processes. The allocation of these to HR functions can be seen in Figure 1. There are three remarks regarding this finding in the following before diving into the current state of discussion for HR in general and for the HR functions as structured above.

First, a large number of articles address the IT support of HR indirectly i.e. in the context of establishing Enterprise Systems (ES) (e.g., Bhattacharya, Seddon, & Scheepers, 2010; Ignatiadis and Nandhakumar, 2005). Their general findings are usually applicable to HRIS, too. But since the focus of this paper is solely on IT approaches in HR, only articles in the conference proceedings addressing HR directly are included.

Second, some articles in the conference proceedings on collaboration working technologies impact the employee workplace and implicitly HR Planning. Since these technologies do not explicitly support HRM, they are not considered in this review.

Third, IT-supported training and learning, commonly referred to as e-learning, is highly discussed. The boundaries of e-learning to knowledge management and to collaborative working are often unclear, but there are for sure more than 100 articles in conference proceedings about e-learning. Roughly 95% of these discuss technology (e.g., Langbein, 2009), human learning methodology (e.g., Bronfman, 2000) and the application of e-learning in an academic context (e.g., Kurbel, 2000). Continuing the review of IT approaches in HR, only the remaining 5% of articles discussing the application of e-learning in a corporate context are considered.

HR in general

Exclusively based on case studies, there are 4 articles, in the conference proceedings observed, discussing general concepts of IT support in HR. Two of those argue that the alignment of business and IT is critical (Dery, 2003; Marco and Depaoli, 2008). A third one hypothesizes the focus of IT support in HR, which is either operational efficiency or competitive advantage, to be dependent on the factors organization, technology and people and on the level of implementation – informational, interactional or transformational (Pant and Chatterjee, 2008). The findings of the fourth article were twofold (Ruel and Bondarouk, 2004): First, the strategic goals of HR, i.e. operational efficiency, internal service quality or strategic internal business partner, are seldom clearly defined and prioritized. Second, in theory, the IT support in HR could be more transformational, but in practice the focus is rather on operational efficiency (Ruel and Bondarouk, 2004).

In addition, there are 3 articles discussing business-to-employee (B2E) portals, which are supposed to provide access to a wide range of employee (self-) services such as online request for vacation or change of employee data (Mootheiril and Singh,

2009; Rahim, 2007; Sugianto, Tojib and Burstein, 2007). Initial research based on three Australian case studies suggests that B2E portals do not go beyond operational efficiency yet (Mootheiril and Singh, 2009) since they do not change the actual HR processes, but merely improve the underlying “infrastructure”.

HR Administration

Only 2 articles in IS conference proceedings so far discuss IT support for HR Administration. They are both arguing that competence management becomes more important as organizations become more innovative (Hustad, Munkvold and Moll, 2004; Lindgren, Stenmark, Bergquist and Ljungberg, 2001). Lindgren et al. (2001) suggest “*a new design rationale promoting systems that are able to detect, visualize and leverage interests of organizational members.*” Similarly, Hustad et al. (2004) expect competence management systems to identify knowledge networks and experts in an organization. As alternative support system innovating the internal staffing process, which is discussed later on under HR Management, this IT approach goes beyond operational efficiency.

HR Planning

No results were found explicitly discussing the use of HRIS for HR Planning.

HR Management

There are no articles in conference proceedings discussing innovative IT approaches in the areas of compensation, benefits and reporting, but interestingly several ones discussing recruiting and staffing. Based on their research objective, they can be divided into two groups. The first group containing ten articles focuses on the process of electronic recruiting illustrating the potential of and provide guidance on IS implementations in recruiting.

The potential of IT in recruiting was empirically and theoretically researched. The findings include that electronic recruiting is important especially in case of recruiting IT professionals (Eckhardt, Laumer and Weitzel, 2008a), and that there is an obvious trend away from paper-based recruiting towards IT-enabled recruiting (Laumer et al. 2009), and that IT does improve time, cost and quality in the recruiting process (von Stetten, Laumer, Eckhardt, & Keim, 2009).

The guidance on implementing electronic recruiting solutions was discussed in 7 instances based on a range of methodologies including case studies (e.g., Malinowski, Weitzel and Keim, 2005), empirical surveys (e.g., Keim and Weitzel, 2006) and theoretical frameworks (e.g., Eckhardt, Laumer and Weitzel, 2008b). The findings include that using a stage model for e-HR implementations could minimize resistance from non-HR employees (Keim, Malinowski and Weitzel, 2005), that IT applicants need to be treated differently compared to non-IT applicants as their behavior in an electronic recruiting scenario differs (Keim and Weitzel, 2006), that the usability of a recruiting website is crucial for its success (Ibrahim, Ithnin, and Muslim, 2006; Musaa, Junainib, and Bujangc, 2006), that an integration of online and offline recruiting processes helps to overcome negative effects of some applicants IT aversion (Eckhardt, Weitzel, Koenig and Buschbacher, 2007), and that employer branding needs to be incorporated in the recruiting processes and their related system architectures (Eckhardt et al., 2008b).

The second group containing further nine articles discusses five innovative technologies in the recruitment process - neural networks, recommender systems, semantic web, e-portfolios and social networks.

In 1998, Kirby, Dufner and Palmer discussed the application of artificial neural networks in the employee selection process. Currently, decision makers in the early stages of the recruitment process rely on different variables such as work experience, test scores, interview results, etc. (Byars and Rue, 1997). The authors’ idea was to train the neural network with performance appraisal data and other skill rating information collected by HR and to then use the network to forecast the success of a new candidate in a selection process. The authors argue that a neural network offers advantages over statistical methods due to variations in the input variables (Kirby et al., 1998).

In 2003, Färber, Weitzel, Keim and Wendt developed and discussed a probabilistic automated recommender approach for the employee selection process. It is further argued that this approach not only improves the quality of matching individual job positions with candidate profiles, but also improves the staffing of teams based on individual preferences and team work research (Färber, Weitzel and Keim, 2003; Keim, Faeber and Weitzel, 2003). In 2005, Malinowski, Keim, Weitzel and Wendt presented and evaluated the first implementation prototype of the recommender approach in the team staffing process.

In 2005, Bizer, Heese, Mochol, Oldakowski, Tolksdorf and Eckstein argued that “*Semantic Web technologies in the domain of online recruitment could substantially increase market transparency, lower the transaction costs for employers, and*

change the business models of the intermediaries involved.” Describing both the job posting and the applicant’s profile using meta information, the search for candidates as well as the pre-selection process would be facilitated (Bizer et al. 2005).

In 2008, Gheris and Fundaburk examined the employers’ support of e-portfolios of job applicants. The focus was on showcase e-portfolios (Greenberg, 2004) containing resumes, descriptions of employment experiences, descriptions of internship experiences, and references in an online database. In summary, they found that less than half of the 35 surveyed institutions support e-portfolios (Gheris and Fundaburk 2008).

In 2009, Plummer and Hiltz developed and discussed a theoretical model, which predicts the intention of jobseekers to use social networks. As a result, the authors outline that outcome expectancy, perceived usefulness and perceived risks are the major factors determining the jobseekers intention to use social networks (Plummer, 2009; Plummer and Hiltz, 2009).

In addition to discussing each technology individually, Spiekermann, Meyer, Hertlein and Latke (2009) describe an innovative IT approach combining social network, semantic web and knowledge management. Initially developed at the Institute of Information Systems at Humboldt University in Berlin, Germany, skillMap is based on a trustworthy social network whose profiles contain meta information about skills, experiences and knowledge used in a semantic web (Spiekermann et al., 2009). Although not mentioned by the authors, such a profile would follow the definition of an e-portfolio discussed earlier. As a result, skillMap is a knowledge management system, where the knowledge objects are no longer anonymous (Spiekermann et al., 2009). The authors further argue that on one hand participants have an incentive to contribute their knowledge to the system as it remains to be personally associated with them, and that on the other hand the organization is equipped with a searchable knowledge management tool facilitating the staffing process (Spiekermann et al., 2009).

HR Development

There are no discussions around IT supported HR performance evaluation or talent management, but IT supported training and learning, commonly referred to as e-learning, is highly discussed. As mentioned before, only those e-learning articles discussing the application of e-learning in a corporate context are investigated in the following– starting with identified challenges and finishing with discussed potential solutions.

Conducting an empirical study, Habermann (2005) found that corporate managers are not IT averse, but that they are very critical with regards to e-learning modules especially because these modules do not yet adapt to the learners’ needs. This challenge is already well recognized and discussed in the academic context (e.g., Sun, Chou, and Doong 2001; Lai, H Wang, and M Wang 2007).

Assuming that e-learning is more tailored towards the learners’ needs, the next challenge is the integration of e-learning in the corporate context. For that purpose, Haas, Ahlemann, and Hoppe (2003) derived a model from a set of case studies helping to integrate e-learning into organization and processes of a corporation.

An e-learning approach in HR that is aiming beyond operational efficiency is the combination of knowledge management and e-learning. This combination is already discussed from a technology and from an academic point of view (e.g., Bick, Ehlers, Pawlowski and Adelsberger, 2005; Comas and Sieber, 2001). In contrast, it is rarely discussed from a corporate point of view. In 2000, Seufert describes in a case study how Swiss Re explicitly aims beyond operational efficiency improvements through combining knowledge management and e-learning. At the time, final results were still to be seen, but the author claimed the interdisciplinary links of HR, corporate education and technology to be the greatest issues of the endeavor (Seufert 2000). In 2004, combining knowledge management and e-learning, Dunne and Butler discussed a framework they derived from theory and another case study. The authors highlight *“the roles that a learning management system (LMS) can play in the support and management of learning within knowledge-intensive business enterprises”* (Dunne and Butler, 2004).

LIMITATIONS

The primary limitation of this review is its focus on IS conference proceedings only. Whereas, it does capture current academic discussions it does not capture all published IT approaches in HR for example in academic journals. The current research is also limited in that identified IT approaches that go beyond operational efficiency are not yet further evaluated e.g., in terms of potential business value be it proprietary to an individual company or infrastructural on a macroeconomic level (Carr, 2003).

DISCUSSION

Despite the importance of HR to gain competitive advantage as mentioned in the introduction and despite the large set of IS conference proceedings reviewed in this paper, only a few articles are concerned with the IT support of HR processes so far. In the following, the findings are discussed in more detail and their implications are outlined in the end.

Generally, it appears that there is hardly a continuous academic discourse on IT in HR on the major IS conferences yet, since the few articles seldom reference each other. As a general rule, it seems that there are more discussions in areas with more HR-business interaction such as HR Management and HR Development. These are also the areas with more IT approaches that go beyond operational efficiency improvement. Thus, with hardly any business interaction, it is not surprising that HR Administration is seldom discussed. HR Planning, requiring more HR-business interaction, is a curious exception to this general rule, for which there is no explanation yet.

Focusing on IT approaches in HR that go beyond operational efficiency improvement, e-recruitment and e-learning appear to be the most promising areas. Regarding e-recruitment, research around an array of suitable technologies, empirical research substantiating the potential for improvement as well as practical case studies and frameworks supporting the implementation do exist. With more than 100 conference proceedings, e-learning appears to become a maturing area of research, which just needs to find its way into the HR departments in order to be successful.

The outlined technologies in e-recruitment, except for e-portfolios, go beyond operational efficiency for two reasons. Either they have the potential to infer implicit information from applications such as leadership or social skills based on analyzing historical recruitment data, or they have the potential to change the recruiting business e.g., by systematically tapping new sources of candidates. Furthermore, the technologies appear to be more effective, if used complementary. Initially each technology was developed and discussed individually. But the case of skillMap, which was later acquired by SUN Technologies, illustrated that it is a combination of new technologies that gains the attention of the industry (Spiekermann et al., 2009). Maybe neural networks or recommender systems in recruiting can get to the next level, when combined with new web 2.0 technologies.

The development of e-learning appears to face two issues, which probably need to be approached consecutively in order to get to the next level. Initially, e-learning was more technology-focused than learner-focused, which led to learner resistance and low usability of e-learning (Habermann 2005). Today, this initial issue appears to be well addressed and understood, but the findings strongly indicate that there is a second issue with e-learning research primarily focusing on its application in an academic context rather than in a corporate context. The difference is that e-learning in an academic context needs to primarily benefit the learner, whereas in a corporate context, it needs to primarily benefit the corporation. Thus, e-learning applications might have to be adjusted to the respective context in order to be effective.

Implications

HRM practitioners have currently little to expect from IT to provide approaches enabling them to transform HRM and to go beyond operational efficiency improvements, e-recruiting and e-learning being the only exceptions on the horizon.

HRIS researchers need to become more active in order to generate new IT approaches in HR e.g., in the area of HR Planning and in order to substantiate existing IT approaches e.g., in the areas of e-recruitment and e-learning. This impression is also supported by the recent call for papers of The Journal of Strategic Information Systems for a special issue on "Realizing the Strategic Potential of e-HRM" (Grant and Newell, 2011) and a current special section on E-HRM in an e-business environment in the Journal of Electronic Commerce Research (Laumer et al. 2010).

CONCLUSION

The human resource departments are transforming themselves from a non-business-oriented, administrative cost-center to an internal business partner delivering additional value (Ulrich, 1997). This literature review reveals that IT does not play a major role in this transformation as IT in HR processes is rarely discussed and most of the IT support in HR is still focusing on improving operational efficiency. The identified, most promising IT approaches in HR that go beyond operational efficiency are e-recruiting and e-learning.

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