Two Prominent Technology Innovations in the Human Resource Management Improvement: e-HRM and AI-HRM

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Abstract

Technological innovation is increasingly playing an important role for companies to increase their competitive advantage in the digitalization era. One of the areas targeted for company innovation is human resource management (HRM) with to improve employee performance, effectiveness, and productivity. This study then explains the two most prominent forms of technological innovation that can be implemented by companies, namely electronic human resource management (e-HRM) and artificial intelligence human resource management (AI-HRM). The method used by the authors is a qualitative method with a focus on literature review, so we are more focused on the use of secondary data, mainly the international reputable journals. This study shows the results that the utilization of e-HRM and AI-HRM have a significant role in improving the quality of the company's HR. Instead of replacing the role of employees, these two innovations actually play a role in facilitating and completing their tasks/work. This phenomenon leads to collaboration between technological machines and humans in companies.

Keywords: Technology innovation, digitalization, e-HRM, AI-HRM

INTRODUCTION

Innovation has been recognized as one of the main sources of competitive growth and company growth, thereby it plays an important role in an increasingly competitive business environment. Companies that do not innovate have a big risk of becoming obsolete and fragile (Looise & van Riemsdijk, 2004). In order to achieve innovation success, companies need to implement highly knowledge-intensive activities driven by collaboration, creativity, and individual commitment (Wikhamn et al., 2023). The introduction and development of innovative activities are usually related to changes in HRM practices, such as management style, information flow, and training (Cakar, 2006).

Until the 1980s, HRM began to involve policy-making processes in the work environment which included recruitment, performance appraisal, promotions or assignments, as well as issues of health, administration, and work discipline

(Fındıklı & Bayarçelik, 2015; Samarasinghe & Medis, 2020). The transformation caused by the Industrial Revolution 4.0 has encouraged companies to adopt new systems and practices that are more innovative than before (Jotaba et al., 2022). Most of the studies that focus on corporate innovation showed that HRM systems or practices have a significant influence on innovation outcomes, despite sometimes they have to bypass intermediary variables, such as knowledge and intellectual capital (Bos-nehles & Veenendaal, 2017; Park et al., 2017).

The company's capacity to innovate depends on the motivation and capabilities of its employees. Companies also need to ensure that HRM is involved in the entire innovation process because employee output is needed for the implementation and development of innovation (Seeck & Diehl, 2016). According to Wolfe (2006 cited in Amarakoon et al., 2016), HRM innovation can be defined as new ideas adapted into HR programs, systems, and practices with the purpose to add value to the company. This novelty aspect in the HRM domain is then considered a starting point for companies to achieve success.

Nowadays, with the increasingly effective use of technology, companies are trying to transform and realign HRM from the industrial era to the informational era (Fındıklı & Bayarçelik, 2015; Varallyai & Hmoud, 2023). Companies are then increasingly determined to integrate digital technology and improve their performance in developing company HR (Allal-Cherif et al., 2021). However, it should be underlined that the use of technology in HRM does not necessarily replace the role of HR, but instead complements this role. In 2019, Forbes published an article emphasizing the collaboration between humans and digital technology in the future, thus further assessing the important role of technology in HRM functions (Arslan et al., 2021).

This article agreed with Forbes' argument that technology can complement HR's role, not replace it. By using the assistance of technology, the task of HR is even easier. Their performance will also increase along with increased effectiveness at work. Therefore, this article aims to explain more about technological innovation in corporate HRM. Forms of HRM innovation that become the main focus are electronic human resource management (e-HRM) and artificial intelligence human resource management (AI-HRM). Furthermore, this article also explains how these two innovations can improve the performance and effectiveness of human resources within the company.

METHOD

This article used qualitative methods related to the collection and interpretation of non-numeric data to understand the role of technology in enhancing HRM. The author then more focused on the literature review by studying various published materials, data, or information (Ramdhani et al., 2014). Therefore, this article emphasizes the use of secondary data, particularly books and international journals indexed by SCOPUS, thus the research data are relevant and can be trusted for its validity. During the data search process, the author used several internationally reputable sources, such as Taylor & Francis, JSTOR, Sage Publications, and Science Direct. After the data was collected, the author then

analyzes the contents and take some notes on the important points that can support the author's argument. The final step in the writing process was developing the findings and writing them into this article.

RESULT AND DISCUSSION

Electronic Human Resource Management (e-HRM): The Utilization of Information Technology Innovation in Companies

Since the 1980s, computers have been used in HRM practices. The Internet revolution and various innovations in information technology have further accelerated digitalization in HR (Haidari & Chhibber, 2022). The term e-HRM was first introduced in the 1990s by referring to the implementation of HRM activities through the use of the internet or intranet (Ma & Ye, 2015). The initial definition of e-HRM was then given by Ruël et al. (2004) which stated that e-HRM is a way to implement HR strategies, policies, and practices within the company through direct support from technology-based web channels.

Through the implementation of various intranet-based and self-service features, e-HRM is getting more attention (Patil, 2019). In the early 2000s, the advancement in technology could be used to conduct centralization of all HR and company data, so that users could access it via web browser at any time and place (Stone & Dulebohn, 2013). Companies certainly need to gain an advantage of these technological innovations to develop the potential and performance of employees (Lin, 2011). This is because the use of e-HRM can be seen as a strategic choice to enable companies to achieve their vision, mission, and goals (Marler & Parry, 2015).

The utilization of technology in e-HRM is usually conducted in two ways. First, technology is used to connect spatially separated employees and allow them to carry out virtual meetings or interactions. This means that technology acts as a medium to increase connection and integration. Second, technology can help employees, either fully or partially, to replace them in conducting certain HR tasks. In other words, information technology has an additional role as a tool for doing work tasks (Strohmeier, 2007). MSDM does provide an opportunity to reconstruct how HRM is run in companies through engineering, automation, and dissemination of information in business processes (Marler & Parry, 2015).

Implementation of e-HRM can be the main premise for company success (Poisat & Mey, 2017; Khashman, 2020). In 2006, a CedarCrestone survey showed that companies are increasingly expanding the scope of e-HRM implementation. Although the use of e-HRM in the administrative field still dominates (62% of all surveyed companies), companies also report an increase in the use of e-HRM in talent acquisition services (61%), performance management (52%), or compensation management (49%) (Bondarouk & Ruël, 2009).

E-HRM can then be classified into three types. First, operational HRM is related to basic HR activities in administrative areas, such as setting wages and personnel data. These activities take up most of the employee's time up to 75%. Second, relational HRM by focusing on more advanced activities. This type

emphasizes HR tools that can support fundamental processes in business, namely the recruitment and selection of new personnel, training, performance management, and awards. Third, transformational HRM is related to more complex HRM activities, such as organizational change processes, strategic re-orientation, strategic competency management, and strategic knowledge management (Ruël et al., 2004).

Figure 1. Types of e-HRM
Source: Mahfod et al. (2017)

Technology advancement has enabled companies to develop web-based recruitment systems that can be used to attract candidates across the country or even the world, and enable them to register for jobs online (Stone & Dulebohn, 2013). Not only that, there are also social networks or social media that are often used by companies. Several big companies in the global arena have even used Facebook to recruit their employees, such as Coca-Cola, L'Oreal, Ernst & Young, The Home Depot, BNP Paribas, Walmart, dan GE.

Furthermore, Fındıklı & Bayarçelik (2015) argued that in recent practice, the most widely used e-HRM functions are HR planning, HR recruitment and selection, HR development (training and career management), HR awards (performance evaluation and compensation), and HR protection (security and safety and legal issues or employee relations). While technology performs certain functions, employees can focus on more important activities, such as strategic planning, talent management, and knowledge management to increase the company's competitiveness (Nyathi & Kekwaletswe, 2023). In other words, e-

HRM provides opportunities for employees to be more focused on complex and strategic HR tasks (Yusliza et al., 2010).

The e-HRM system also offers a mechanism that facilitates the collection, recovery, and updating of data relating to the knowledge, skills, and competencies of company employees. By using e-HRM, employees can maintain their respective personnel data. They do not need to consult HR experts first because they can update their own data (Wahyudi & Park, 2014). Moreover, the implementation of self-service for managers (MSS) and employees (ESS) is a key concept of employee independence (Mahfod et al., 2017).

In general, there are six strategic advantages offered by e-HRM, namely (1) development of HR metrics to support company policy making; (2) automate employee routine tasks and replace filling cabinets; (3) improve company branding and image; (4) freeing employees from administrative burdens and encouraging them to take on more strategic management activities; (5) empowering managers through management support and capacity building to carry out HR activities; and (6) improving talent management through e-selection, self-assessment, and e-performance management (Bondarouk & Ruël, 2013).

In their article, Ruël & Kaap (2012) confirmed that empirically, the relationship between the use of e-HRM and value creation is positive. Both of them succeeded in identifying the positive impact of e-HRM on value creation which includes increasing efficiency (efficient handling of documents and personnel data), effectiveness (ease of use and usefulness), and quality of service. In line with this argument, Nivlouei (2014) stated that e-HRM can achieve high commitment, high competence, cost-effectiveness, and higher congruence (Ruël et al., 2004). In its development, e-HRM succeeded in creating an Electronic Performance Management System (e-PMS) which is used to facilitate performance measurement by keeping records of certain data, such as the quantity of work completed, the error rate, and the time spent doing certain tasks. This system also facilitates managers to provide quick feedback to employees (Dede, 2019).

Bondarouk et al. (2015) also found evidence that e-HRM has a positive impact on HRM services through a simplification process and accurate presentation of data. This is because e-HRM is presented through technology applications, so that it can influence employee perceptions of the company's HRM services. Furthermore, Laumer et al. (2011 cited in Yusliza & Ramayah, 2012) conducted a study of e-HRM in the e-business environment among 144 HR managers from the 100 best companies in Germany. This study shows the results that these managers admitted the importance of e-HRM to improve work efficiency and effectiveness. Then in Table 1, we can see the outcome of e-HRM in five global companies.

Table 1. The Outcome of e-HRM

DOW	ABN AMRO	FORD	IBM	Belgacom
Cost effective, growth in employee competences, more 'open' culture, transparant and flexible internal labour market.	Hardly yet, especially not at the level of employees. For line managers first administrative support. For HR departments less administrative work load.	HR-intranet site (HR online) became global internal brand for HR services. 80% considers HR-online as primary source for HR. High client satisfaction with e-HR service. HR site most visited internal website. ROI in the long term, not in short term.	Cost reduction (57%), organisational climate change: more flexiblity, better balance work/private life. Communication improved. Support risk-taking and innovation. Emphasizing flexibility over bureaucracy. Client-satisfaction strongly improved.	67% of all HR data entries go through the employee self service. Improved employee satisfaction with HR service, from 4, 39 to 4,93 (on five point scale) in one year. ROI in 2006

Source: Ruël et al. (2004)

Artificial Intelligence Human Resource Management (AI-HRM): Artificial Intelligence as a Complementary HR Function

The term artificial intelligence is often used to describe machines or computers that can mimic human skills and intelligence, such as learning and problem-solving (Kumar & Nagrani, 2020). Kaplan & Haenlein (2019) then defines AI as the ability of a system to correctly interpret external data, study data, and use this learning to achieve certain goals and tasks through flexible adaptation. The development of AI has changed various aspects of life because of its ability to carry out several tasks that previously required human intelligence. AI then became a field of research in the 1950s because researchers sought to understand the nature of the intelligence of living organisms, especially humans (Jatobá et al., 2019).

In the business world, AI refers to the development of intelligent machines or computerized systems that can learn, react, and work like humans in several activities (Malik et al., 2020). AI is then implemented in companies through various techniques, namely expert systems, fuzzy logic, artificial neural network, data mining, and genetic algorithms (Pereira et al., 2021; Palos-Sanchez et al., 2022). This technology has developed into a very important system for supporting and increasing the effectiveness of human resources or company employees (Berhil et al., 2020; Purwaamijaya & Prasetyo, 2022; Singh et al., 2023).

The implementation of AI technology serves a variety of purposes within the HR area. According to Jatobá et al. (2019), this technology can be used as a support in solving issues related to management, team forecasting, recruitment and selection, job turnover, education or training, talent prediction, HR performance measurement, developing the quality of work life, and competency management. AI can also help HR and companies to automate certain tasks, perform in-depth analysis more quickly and efficiently, help make decisions based on data, and even make predictions (Dwivedi et al., 2019; Nguyen & Malik, 2021).

Furthermore, Johnson et al. (2020) explained that AI can support three business functions. First, AI can enhance business process automation by providing cognitive capabilities within the software. In fact, the National Aeronautics and Space Administration (NASA) found that AI is able to complete 86% of employee tasks without human intervention. Second, AI provides cognitive insights that facilitate the policy-making process. This form of AI typically uses algorithms and machine learning to interpret large amounts of data, as well as look for hidden patterns that companies have not identified. Third, use intelligent agents and chatbots to support cognitive engagement. Both of these technologies can be used by employees to interact and share knowledge (Johnson et al., 2020).

The capacity of AI to process a large number of applications quickly and accurately is a distinct advantage for companies. Companies can leverage AI to increase candidate engagement and use high-touch and high-volume recruitment strategies that lead to building long-term relationships with potential company employees (Allal-Cherif et al., 2021). This is because AI can communicate directly with thousands of candidates and focus on those with greater potential (Varallyai & Hmoud, 2023).

The use of AI in the recruitment process is still dominated by multinational companies, such as Axa and its recruiter robot Joby, which guides candidates through thousands of job offers from various countries and accompanies them in the job application process (Allal-Cherif et al., 2021). AI assistants also help HR who serve as recruiters in the screening process, contact management, and setting up meetings and interviews. This can support companies to recruit the best candidates, map their talent accurately, avoid bias and nepotism, and quickly answer candidates' questions virtually (Suen et al., 2019; Sanyaolu & Atsaboghena, 2022). The use of AI in the recruitment process has been proven to save costs of up to 71% per candidate (Jain et al., 2022).

Moreover, by using virtual learning platforms, HRM can create smarter and more successful training programs. AI will place employees in training programs that are specifically designed for them based on individual needs (Budhwar et al., 2022). In this context, Walmart used virtual reality to train its 1 million employees spread across 4,700 stores in the United States. Their training focuses on some aspects related to store operations, from product maintenance to crowd handling during Black Friday (Balu & Sowmya, 2019).

By applying AI to analyze performance in a more targeted way, employee performance reviews become more thorough. Minor activities can be recorded and assessed more easily, thus enabling more focused interventions to improve employee performance and efficiency (Myllymäki, 2021). For instance, Amazon has two patents for an 'intelligent machine' which includes a wristband to monitor the tasks, locations, and activity of workers in a warehouse. This bracelet will vibrate if the worker accesses the wrong rack or detects the wrong locations (Jain et al., 2022).

Similar to e-HRM, the use of AI-HRM also allows employees to concentrate more on creativity, problem-solving, and compassion (Abubakar et al., 2019). Based on a study conducted by IBM, AI can significantly improve HR (Jain et al.,

2022). IBM also has Blue Match software that uses algorithms to enhance employee careers by suggesting steps that need to be taken to advance their careers. As a result, 27% of company employees managed to change jobs in 2018 based on recommendations from Blue Match (Tambe et al., 2019).

Furthermore, AI can also help managers to gain insight into the probability of a talented employee leaving the company. This kind of function has been implemented by IBM with an accuracy rate of 95% in predicting employees who will leave their jobs (Johnson et al., 2020). The direct and indirect economic benefits of adopting AI within companies are well documented. IBM was even able to save US$ 107 million in HR costs by designing and implementing several AI applications in its worldwide network (Pan et al., 2021). This advantage has led many multinational companies—such as Amazon, Infosys, IBM, dan Walmart—to increasingly develop AI-based products and services, as well as invest in developing human capital skills (Jaiswal et al., 2021; Tuffaha et al., 2021).

Therefore, it can be said that instead of replacing, AI actually facilitates and complements the tasks/work of employees. Vrontis et al. (2021) explained that AI creates significant opportunities for collaboration and integration between humans and machines. In their study, Prentice et al. (2020) also found that AI has a significant effect on employee performance—but not on turnover—and indicated that AI can increase employee productivity.

CONCLUSION

The era of digitalization has encouraged companies to implement technological innovation in their business processes, especially in areas related to HRM. Two prominent technologies that can be used by companies are information technology (e-HRM) and artificial intelligence (AI-HRM). Both are often used to assist employees in the process of recruiting and selecting job candidates, training and education, as well as management and performance evaluation. Nonetheless, it needs to be emphasized again that the application of information technology and AI in HRM does not replace the role of employees, but instead complements their work. The application of this technology can also increase employee productivity because while information technology and AI replace their routine or standard jobs, employees can hone their skills in other jobs that are more complex and strategic—works that can only be done using human intelligence.

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