RESEARCH NOTE

Innovations in Human Resource Management: A Bibliometric Analysis

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ABSTRACT

The present study investigates how research related to innovation is constructed using various intellectual frameworks as well as identifies pertinent references, authors, themes, and journals. To do so, we employed bibliometric methodologies to analyze 1,947 papers published between 2003 and 2023. We identified three publication periods that influenced the development of research in this sector. In addition, we found that technological improvements in human resource management (HRM) have led to a transformation of worldwide operations thus providing numerous advantages to human resources departments. This study emphasizes the influence of technology on HRM, encompassing electronic databases, electronic HRM, and digital platforms. In addition, it shows that a theoretical basis has emerged for the classification of innovative technologies in HRM, which is essential to the development of new conceptual models of HRM in the digital era. In general, the study contributes to the body of literature on HRM and provides guidance for future research.

KEYWORDS

human resource management, E-HRM, innovation, technological system, bibliometric analysis

Introduction

Innovation has become crucial for survival in the business world. A new kind of economy is emerging as a result of recent developments in international trade, particularly the growing importance of services, information, innovation, and

human resource management (HRM). Creative HRM is described as "a designation for reform or innovation of current policies and procedures" (Crossan & Apaydin, 2010).

Employees may experience fear and anxiety about advances in technology, as they believe that these developments could cause them to lose their jobs. While some researchers argue that job opportunities will be eliminated, others suggest that although the advent of robots will lead to the loss of more employees and their replacement by robots, it will also result in the creation of new job opportunities (Lester, 2020). According to Foster and Harris (2005), managers have a significant role to play in this process. The way organizations handle the inherent tensions that managers face has an impact on the adoption and implementation of diversity policies. Management programs may increase chances for innovation, but it is the company's employees who are recognized as the source of new ideas. People are responsible for developing ideas as well as proposing and implementing them. Human creativity is therefore considered the source of innovation (Jiang et al., 2012; Mumford, 2000).

Organizations may better prepare their workers to adapt to new conditions by implementing progressive human resources (HR) policies and practices that promote employee independence and professional growth (Agarwala, 2003). In this regard, the field of HRM contributes substantially in fostering an environment conducive to innovation in the workplace (Seeck & Diehl, 2017). HRM practices are important for determining whether an organization proposes innovations that are in line with its objectives by influencing and shaping the attitudes, conducts, and abilities of its employees (Seeck & Diehl, 2017). Numerous studies have shown that the best way for businesses to boost their innovative performance is to implement a system of coherent HRM practices (see, e.g., Jiménez-Jiménez & Sanz-Valle, 2005). Technology has also diminished the need for physical proximity inside businesses, allowing workers to collaborate across geographic distances and even operate remotely. In addition, technology has enabled businesses to recruit highly skilled workers, such as software engineers, from faraway locations (Agarwala, 2003).

The expertise and ability of employees are important for companies' competitiveness and success. HR technology has progressed from paper and pencil to computers, electronic databases, and integration with company-wide systems. HR departments strive to improve the capabilities and experience of their organizations' employees regarding technology (Wang et al., 2012). Technological inventions are driven by competition between companies and HRM, which has led to the spread of technology around the world (DeCarolis & Deeds 1999; Zhou et al., 2013).

With the invention of smartphones, technology has impacted all sectors of society, changing human lives through services related to financial health, student education, transit amenities, and online jobs, among others. This has significantly influenced HRM in organizations (Stone et al., 2015). However, the acceptance of these technological changes including in the HRM field remains the biggest challenge faced by organizations. Thus, it is the proper management of such aspects as innovations, reporting devices, and employee performance review, that is of utmost importance to organizations (Banerji, 2013).

Technology has changed the business world, and its advancement has dramatically affected all aspects of business operations. Presently, organizations are unable to function smoothly and efficiently unless they use technology, which is also applied to HRM. The integration of technology into the field of HR plays an important role in the performance of employees and the implementation of changes to stay competitive. In other words, a company that manages HR effectively fosters its own ability to compete or stay relevant in the technological environment (Purohit, 2015).

HRM is set to become more widespread, leading to significant progress (Strohmeier, 2007). Technology in management-related fields has developed significantly, thus enabling companies and organizations to manage and handle their work more efficiently. This project is constantly improving (Bagga & Srivastava, 2014).

The present study explores and synthesizes the vast array of research literature about the intersection of technology and HRM. The study seeks to understand the impact of technological advancements on HRM practices as well as to identify the trends and patterns that have emerged in this field through a bibliometric analysis. This comprehensive literature review aims to map out the evolution of HRM in the context of technological integration, pinpointing how such advancements have enhanced organizational operations, employee management, and overall business strategies. The research provides a detailed historical perspective tracing progress from basic manual practices to the sophisticated, technology-driven processes that define modern HRM. It highlights the transformative impact of technology—from the introduction of electronic databases and enterprise systems to the latest innovations in electronic HRM (E-HRM) and digital platforms—which has not only streamlined HR operations but also enriched the strategic roles of HR departments in fostering innovation and driving organizational success. Furthermore, the study outlines the implications of these technological advances for HR practices, emphasizing the critical role of strategic HRM in leveraging technology for competitive advantage. It discusses challenges and opportunities in the realm of HR technology, suggesting that ongoing innovation and adaptation are essential for organizations to thrive in a rapidly changing business landscape. The overarching goal of this research is to deepen the understanding of technology's impact on HRM and guide future scholarly inquiry and practical applications in the field of HRM. The study's objectives are as follows:

- To analyze the role of technological advances in the development of HRM practices;
- To outline the implications of these technological advances for HR practices, underlining the critical role of strategic HRM in leveraging technology for competitive advantage;
- To highlight the transformative impact of technology on HR operations and the strategic roles of HR departments.

Literature Review

Overview of Innovation in HRM

The post-globalization era has brought a period of trial and convergence as people learn to live in the new digital economy and adapt to the demands of the fourth industrial and technological revolution (Sánchez-Bayón & Aznar, 2021). This transformation necessitates decisions on how technology will be used to support and enhance the work of employees in pursuit of an organization's strategic objectives. These decisions are heavily influenced by developments in the field of HRM and technology (Schalk et al., 2013).

Although significant progress has been made in HRM and development, HR teams have yet to understand and implement these changes effectively. According to Busro (2018), new technological methods are one way to achieve this goal. Using computers, the Internet, and other forms of electronic communication, technology systems aim to streamline the process of accomplishing specific tasks.

HRM should prioritize information technology to accomplish the tasks effectively within an organization. HRM is a crucial asset for every firm, and technological advancements have helped boost HRM in many areas (Nazari et al., 2017). HRM relies heavily on knowledge, competence, and managerial decision-making, all of which function more efficiently within a framework of systems and technology (Sołtysik, 2003). The responsibility for managing HR has increased due to technology. Technology should be promoted because it improves performance management and strategic development in HR (Rana & Sharma, 2019). Technology has transformed the management of HR, especially in terms of gathering information on employees and altering the nature of work and working relationships. For example, many applications are used online, and HRM procedures mediated by technology have impacted individual interactions and HRM as a whole (Purohit, 2015).

Wright (1998) defines strategic HRM (SHRM) as "the pattern of planned HR deployments and activities intended to enable an organization to achieve its goals." The profession at large has emphasized the need to examine whether and how "systems" or "technology" in HR practices collectively help firms achieve strategic objectives, as opposed to focusing on individual HR practices. HR procedures that are "internally consistent and reinforcing to achieve some overarching results" constitute HR systems (Lepak et al., 2006).

An organization cannot survive or develop without gaining a competitive advantage over other competitors. The competitiveness of organizations can be attributed to the impact of HR. This has led to the rapid development of SHRM in recent years (Lefter et al., 2007). Manageability is instrumental in obtaining a competitive advantage. According to Lefter et al. (2007), the main objective of SHRM is to generate strategic capability to ensure that the organization has highly qualified, highly motivated employees to achieve a competitive advantage.

Technology has already begun to dominate many formerly human-led tasks in science, engineering, business, and HR. Due to advancements in artificial intelligence, current generations have access to unprecedented technological capabilities. According to North (1992), artificial intelligence has largely supplanted human labor in most fields. This raises the question of the long-term strategic impact of technology on HRM practices in relation to employee well-being and job satisfaction. While this article discusses the technological advancements in HRM and their benefits for organizational performance and capabilities, it does not deeply investigate how these technologies affect the psychological and emotional aspects of the workforce over time. Understanding the correlation between the use of HRM technologies and employee well-being, job satisfaction, and work-life balance could provide insights into how technology can be leveraged to improve not only organizational outcomes but also employee happiness and retention.

Research Method

Bibliometric techniques use a numerical methodology to quantify the characterization, assessment, and tracking of scholarly output. According to White and McCain (1998), its proponents, it is equipped with an arsenal of statistical and mathematical methods for analyzing and scanning a wide range of written works. The technique consists in using statistics to shed light on a mystery in science and highlight emerging patterns in a field.

Unit of Analysis

The unit of analysis for this bibliometric study was scholarly articles published in journals. These articles were chosen because they represent "certified knowledge" due to their rigorous peer-review process, which ensures the reliability of the results (Callon et al., 1991; Ramo-Rodríguez & Ruíz-Navarro, 2004). Other document types such as proceedings papers, news articles, and other non-peer-reviewed sources were excluded from the analysis.

Database Sourcing and Management

The data for this study were obtained from the Scopus[1] database, which is known for its comprehensive coverage of scholarly literature across various disciplines, including sciences, medicine, economics, humanities, and arts. The search query included terms related to HRM and technology, such as "human resource management," "human resource innovation," "human resource development," "technology development," and "top management team" (Figure 1). The search was limited to titles, abstracts, and keywords to ensure relevance.

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[1] SCOPUS® is a trademark of Elsevier BV, registered in the U.S. and other countries. https://www.scopus.com

Figure 1

The Research Methodology Process Used in the Study
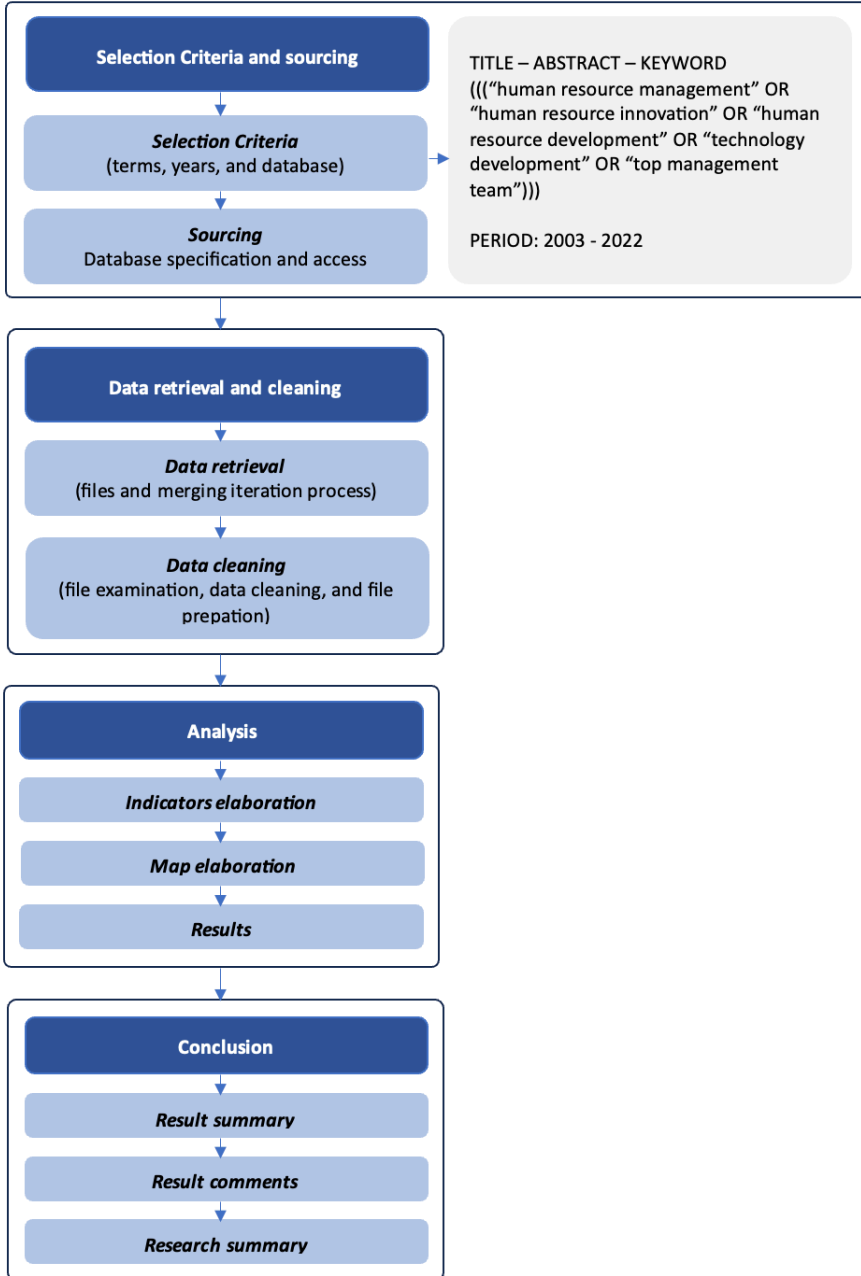
Note. Developed by the authors.

Data Retrieval and Cleaning

The initial data retrieval involved downloading and merging files from the Scopus database. An iterative process was followed to guarantee the completeness and accuracy of the data. Data cleaning entailed examining the files for inconsistencies, standardizing capitalization, checking authors' initials, and removing duplicate references. This process ensured that the dataset was homogenous and suitable for analysis.

Analysis

The cleaned dataset was analyzed using VOSviewer[2], a powerful network analysis tool widely used in bibliometric studies (van Eck & Waltman 2010). VOSviewer enabled the clustering, mapping, and visualization of bibliometric networks. The analysis included various bibliometric techniques such as citation analysis, bibliographic coupling, co-citations, and co-authorship relationships. These techniques helped build networks comprising journals, researchers, and individual articles.

Indicators and Result Visualization

Descriptive and relational bibliometric indicators were employed to provide sociodemographic context and visualize research trends. Indicators such as countries and years of publication were analyzed to understand the distribution and historical stages of research in the field. Keywords were analyzed to reveal how authors classify and connect their studies, highlighting under-analyzed concepts. Co-occurrence for authors and citations helped map research communities and intellectual frameworks. Lastly, visualization tools such as maps provided a clear picture of research activities and potential future directions.

Results

The results of the analysis were summarized and visualized using various indicators and maps. The findings were discussed in the context of existing literature, and conclusions were drawn based on the results. The study's limitations were acknowledged, and potential lines of future inquiry were suggested. In following this methodology, the study aimed to provide a comprehensive overview of the prevalent topics, keywords, and patterns in the relevant literature on HRM and technology.

Discussion

The articles we examined were published between 2003 and 2023 (Figure 2). We have identified the distinct periods to facilitate thorough examination and debate. During the initial period, from 2003 to 2006, only a limited number of publications were released, which is typical in a foundational period. In the second period, from 2007 to 2013, the average number of papers increased nearly tenfold. From 2014 to 2018, there was a noticeable rise in the number of articles, indicating that the field was in a stage of development. Despite a lower growth rate, a solid baseline of over 121

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[2] https://www.vosviewer.com

papers each year remained. Between 2019 and 2023, 904 articles were published, making it the period with the highest number of publications. The increase in the number of published papers indicates that the subject is progressing into a phase of advancement. Consequently, several avenues of research may be pursued, such as investigating novel interconnected subjects, delving deeper into previously neglected areas, or even seeking to tackle conventional problems.

Figure 2

Annual Number of Publications Related to Technology in HRM
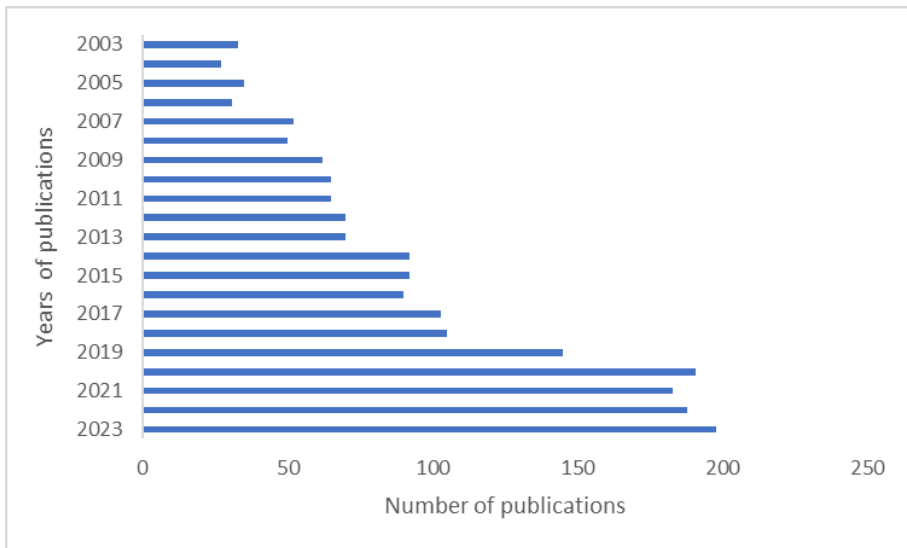
The analysis of the bibliometric data on the management of human resources in technology highlighted significant trends and patterns among the countries active in this research domain. The data indicated that the United Kingdom (381 links), the United States (351 links), and China (229 links) are at the forefront of research activities, emphasizing the critical role and importance of HRM in technology. These countries are leading not only in the number of research links but also in the number of citations their research receives, demonstrating their influence and contribution to the field. The high number of research links for these countries underscores their commitment to advancing knowledge and practices in HRM in technology-intensive environments.

Conversely, countries like Somalia, Kazakhstan, and Palestine exhibited minimal to no research links, indicating a stark disparity in research activity and engagement in this field. The data from VOSviewer further supported these findings by detailing the network connections and clusters of research activities, reinforcing the dominance of developed nations in contributing to and shaping the discourse on HRM in technology (Figure 3). This analysis underscores the need to increase support and collaboration to bridge the research gap between developed and developing nations and thus ensure a more inclusive and comprehensive understanding of HRM in technology.

Figure 3

The Network-Visualized Bibliometric Chart Based on Authorship Countries
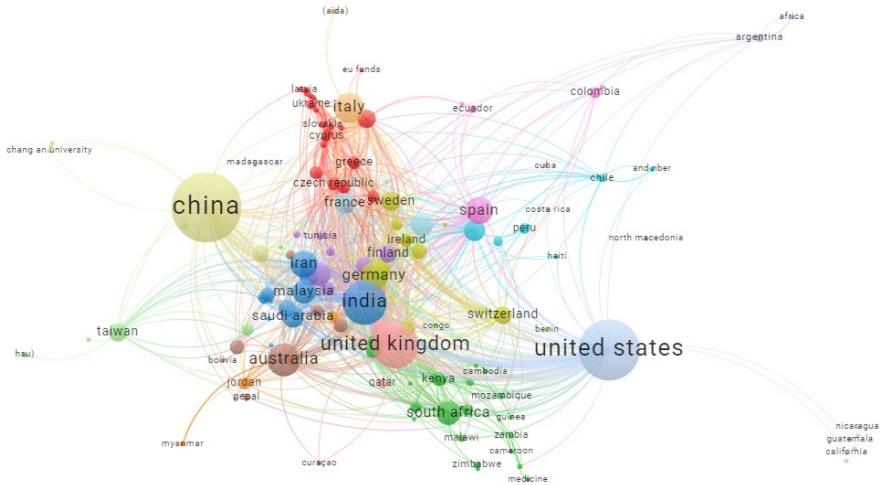
We analyzed 2,659 author keywords, focusing on those that appeared at least five times. "Human resource management" was a central keyword, occurring 56 times with 41 links, which suggested its pivotal role in the research network. This keyword was closely associated with "artificial intelligence" (59 occurrences, 53 links), "digital transformation" (18 occurrences, 11 links), and "sustainability" (42 occurrences, 16 links), reflecting the integration of technology and sustainable practices in HRM. Other significant keywords included "industry 4.0" (39 occurrences, 16 links), which pointed to technological advancements in HRM, and "blockchain" (31 occurrences, 36 links), showcasing its growing relevance in HRM research.

The network analysis revealed clusters of related keywords, such as Cluster 1, which included terms like "machine learning," "internet of things," and "project management," illustrating the integration of advanced technologies in HRM. Cluster 2 featured keywords such as "sustainability," "circular economy," and "waste management," emphasizing sustainable practices in HRM. Geographical keywords such as "Africa," "Bangladesh," "China," and "South Africa" appeared multiple times and evidenced the global scope of HRM research. Keywords with high citation averages, like "nanotechnology" (36.4 average citations) and "systematic review" (21 average citations), indicated a significant impact. Our comprehensive analysis thus provided a holistic view of the current trends and themes in HRM innovation, highlighting the dynamic interplay between technology, sustainability, and HR practices.

We implemented strategies for HRM related to the adoption of new technologies, including providing staff with training on these tools to educate them about their advantages. The proliferation of mobile devices and the rise of information-rich applications in the workplace will help HRM in its mission to train the workforce to utilize technology effectively.

To visually represent the keyword network, we created a VOSviewer map (Figure 4).

Figure 4

The Network-Visualized Bibliometric Chart Based on Author Keywords
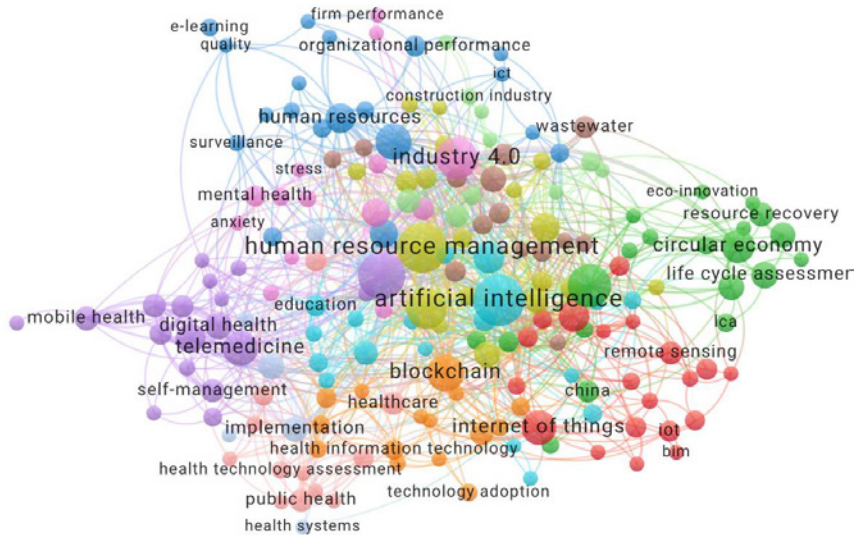
This map illustrates the connections and clusters formed by the keywords used in the literature. The VOSviewer map reveals several key clusters represented by different colors. The HRM cluster (blue), which includes keywords related to HR practices, employee training, and the integration of technology into HRM. The high frequency and numerous links indicate the central role of HRM in the literature, highlighting its importance in organizational innovation and efficiency. The Technology and Innovation cluster (red) is formed by keywords such as "technology," "innovation," and "information technology." This cluster underscores the significant focus on technological advancements and their impact on business models and HR practices. The prominence of these keywords points to the transformative role of technology in modern organizations. Similarly, the Management and Training cluster (green), which encompasses keywords related to management practices and training programs, emphasizes the importance of effective managerial strategies and employee development, especially in the context of new technology adoption. It reflects the ongoing need for organizations to support and develop their workforce to maintain competitiveness and innovation. Lastly, the E-HRM and Information Management cluster (yellow) combines keywords such as "E-HRM" and "information management." This cluster reflects the growing interest in electronic HRM systems and the efficient management of information within organizations. The connections between these keywords suggest a trend towards digital transformation in HR practices, with a view to enhancing strategic, tactical, and operational HR activities.

In conclusion, the cluster structure in the literature revealed the interconnectedness of various themes such as HRM, technology, innovation, management, and information management. These clusters reflect the evolving landscape of organizational practices and the critical role of technology and innovation in driving efficiency and competitiveness.

Technology is an important facilitator of this cooperation. Digital transformation, in particular, has resulted in a significant surge in business model innovation, as evidenced by increased customer engagement and value, backed by new technological routes to market, and a reconfigured operational model of capabilities, resources, and partnerships.

Before 1960s, HR development activities in most countries were rudimentary. However, the potential for activities in HRM expanded and was eventually fully developed in organizations through the use of several HRM techniques (Bondarouk & Brewster, 2016; Jeenanunta et al., 2017). Although numerous case studies have demonstrated the benefits of HRM in a variety of settings, this article focuses on the central aspects of HRM (Strohmeier, 2007). As Adewoye and Obasan (2012) revealed, after the adoption and continuous upgrade of information technology, the efficiency of HR management processes, employee communication and engagement, and the roles and skills of HR managers saw a significant increase (Adewoye & Obasan, 2012). Having analyzed 30 research publications, Adewoye and Obasan (2012) pointed out the favorable connections between HRM systems and organizational innovation.

Process innovation, organizational structure innovation, and people innovation are all overlapping facets of innovation (Knight, 1967). HRM refers to the administration of a company's human capital resources, which comprise its workers' knowledge, skills, and capacities (Crook et al., 2011). Some scholars detail the shifts that have occurred, stressing the need for innovation not only in isolated projects but also in the design of the whole business operation (White & McCain, 1998). The European Union's economy relies on the expansion and creation of small and medium-sized businesses. Consequently, new ideas are crucial to a successful business. In addition, some evidence links the spread of innovation to the sustained growth of businesses (del Brío & Junquera, 2003; Laforet, 2011). Implementing and supporting new solutions in the organization is the next stage in the growth of innovation in an enterprise. Training, advancement in one's profession, the capacity to initiate projects, and innovation-related expertise are all crucial areas for improvement (Salavou et al., 2004; van de Vrande et al., 2009). Accordingly, important avenues for development include education, career promotion, initiative, and knowledge of innovation (Xerri et al., 2009).

It should be noted that innovation in the workplace requires not only a proactive mindset but also the ability to adapt quickly to new situations. Further, innovation management must be discussed at the institutional, team, and personal levels (De Jong & Den Hartog, 2010). Workplace innovation may be defined as both proactive management and the introduction of novel ideas, processes, products, and procedures from the ground up (De Jong & Den Hartog, 2010). A profitable company model and

revenue may be generated and established via the innovative process of coming up with new ideas and altering existing concepts.

HRM in today's inventive industry necessitates an examination of emerging technology. Several writers have speculated and forecasted that by the year 2020, the most fundamental workforce skills and knowledge would be ones that we are not even aware of now. E-HRM can be defined as an approach to HRM that makes use of information technology to facilitate HR management tasks (Lengnick-Hall & Moritz, 2003). E-HRM was developed to promote strategic, tactical, and operational HR practices (Strohmeier, 2007). The use of E-HRM has a positive impact on the efficiency and efficacy of HRM procedures, which, in turn, benefits the organization's bottom line. Notably, the elimination of certain paper tasks helps improve the efficiency and effectiveness of HRM processes (Kaur, 2013).

Conclusion

This study demonstrated that innovation in HRM is a well-established but still complex subject. An examination of the publications on innovation in HRM from 2003 to 2023 revealed that research on this topic can be divided into three stages: an initial phase from 2003 to 2006 characterized by the establishment of foundational work, a period of rapid expansion from 2007 to 2018, and a subsequent phase of ongoing development starting in 2019. This pattern corresponds to the typical developmental phases of study in a specific topic or field. It offers a solid foundation for developing new research and allows academics to investigate new subjects or connections and experiment with different frameworks. Once a particular subject reaches a point where it is considered resolved, intellectual principles serve as a foundation for conducting thorough investigations into undiscovered, interconnected subjects.

Technology plays a significant role in HRM. Technological advancements have revolutionized HRM practices, enhancing organizational operations, employee management, and overall business strategies. Our study used bibliometric analysis to map out the evolution of HRM in the context of technological integration. It revealed that the existing research underscores the transformative impact of technology, from the introduction of electronic databases and enterprise systems to the latest innovations in E-HRM and digital platforms. These advancements have not only streamlined HR operations but also enriched the strategic roles of HR departments in fostering innovation and driving organizational success. This study also outlined the implications of these technological advances for HR practices, notably the critical role of strategic HRM in leveraging technology for competitive advantage. It discussed the challenges and opportunities that lie ahead in the realm of HR technology, suggesting that ongoing innovation and adaptation are essential for organizations to thrive in a rapidly changing business landscape. The study concludes by suggesting avenues for future scholarly inquiry and practical applications in the field of HRM, focusing on understanding the correlation between the use of HRM technologies and employee well-being, job satisfaction, and work-life balance. This will provide insights into how technology can be leveraged

to improve not only organizational outcomes but also employee happiness and retention. Our study explored how technology and innovation are shaping the field of HRM, their implications for organizational performance, and the strategic approaches that HR departments can adopt to leverage technology effectively. It addressed the impact of technology on HRM practices, the role of innovation in HR operations, and the strategic implications of using technology in HRM to improve organizational performance.

There are specific limitations in our investigation. While we analyzed contributions for the entire duration of the field's history, it would be beneficial to conduct a similar analysis for each of the indicated stages. This could offer an alternative viewpoint on the development of indicators and offer a distinct approach to comprehending potential patterns. Regarding the positioning of referenced publications, it would be valuable to utilize precise natural language programming, whenever it becomes accessible, to enhance the effectiveness of these strategies. Exploring a wider scope of innovation in HRM and conducting more assessments from a global perspective would be useful for the advancement of emerging technologies in this field.

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