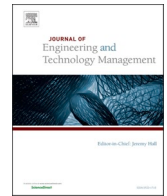


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## The intellectual structure of human resource management and digitalization research: A bibliometric-mapping analysis

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### ABSTRACT

An integrated analysis of the academic literature for comprehending and advancing in the human resource digital transformation is required. In this sense, this study aims to analyze the development, current status, and trends of the literature of human resource management research regarding its digital transformation. A total of 284 academic documents published between 2001 and 2022 in all fields of knowledge were retrieved from the Web of Science (WoS) database. Data was analyzed through VOSViewer software and bibliometrix R-package. According to the bibliometric analyses, from 2015 digital transformation of HRM had a sustained crescent interest being more remarkable since 2020. Foundational papers, the most influential documents, journals and authors were identified. Through a bibliographic coupling analysis, we identify five current mainstreams: 1) Impact, challenges and out-comes of e-HRM, 2) e-HRM and organizational strategy, 3) Conceptualization of strategic human resource management, 4) Effectiveness of e-HRM: productivity and performance, and 5) e-HRM and innovation. Co-word analysis shows clusters oriented to 1) digital platforms, 2) data analytics and 3) organizational strategy. All the conducted analyses show that human factors have received less attention, a finding confirmed by the thematic map. “Management, strategy, information” and “antecedents, quality and economic growth” are acquiring special relevance in structuring the research field of digital HRM according to the thematic map. These findings and their implications are discussed.

### 1. Introduction

Digital transformation is a process by which technology-based companies seek to improve their capacity to create strategic value to face changes within their environment (Vial, 2019) and to gain competitiveness (Olivas-Lujan et al., 2007). Digital transformation makes use of modifications in business, operations, and structure processes to capitalize on technology-driven benefits (Fenech et al., 2019), in particular, those related to information needed for managing organizations. However, it would be limited to assume that mere technology investment and implementation in the organization would represent transformation (Vial, 2019). Digital

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transformation implies deep changes (Matt et al., 2015) in the business model, approaches, processes, organizational structure, organizational behaviors, organizational culture, and value chains, and even, in the relationship with stakeholders (Stone & Dulebohn, 2013).

Human Resource Management (HRM) and organizations' digital transformation are closely linked to the management of people within the organization, not only because of its influence on talent management processes (Stone et al., 2015) but the convenience of such transformation (Guerra et al., 2023). Hence, it is asserted that digital transformation has less to do with technology and more with people, as it depends on their capacity for acceptance, adaptation, and learning (Frankiewicz & Chamorro-Premuzic, 2020). This transformation requires intrinsic human abilities to ensure the usability and efficiency of digital technology applications (Da Silva et al., 2022). In this regard, digital transformation is not only a type of change, but an organizational change driver, which implies developing three central aspects of people management: new abilities and competencies, new leadership forms, and new organizational capacities (Kohnke, 2017).

Hence, digital transformation represents a challenge to traditional HR practices (Hendrickson, 2003; Fenech et al., 2019) because they were thought and designed for a non-digital environment, so it is uncertain that they could apply to the new digital environments (Guerra et al., 2023). Therefore, digital transformation demands new human resources strategies for talent management according to the digital era (Meena & Parimalarani, 2019). Indeed, thriving in a technologically turbulent world not only requires organizations to digitally transform their HR processes (Bansal et al., 2023) but also demands adaptation and acceleration of the entire organizational structure to new ways of working (Kohnke, 2017). However, although the turn of the millennium shown interest in this topic by academic researchers and HR practitioners (Bondarouk & Ruël, 2013), there remains a lack of an integrated approach from scholars for fully comprehending human resource digital transformation (Bansal et al., 2023). This research aims to fill this gap by offering scholars an overview of the intellectual structure of digital HRM literature, emphasizing its strengths and trends, and identifying areas needing attention and contributing building a comprehensive and integrated approach from the academic supported in scientific production. Such an approach is increasingly crucial for companies, particularly in the current post-pandemic times, where the demand for flexible, agile and effective digital HRM strategies is essential. Framed on the above, this study aims to analyze the development, current status, and trends of the literature on human resource management research regarding digital transformation through a bibliometric-mapping research.

## 2. Literature review

Research has evidenced that digital transformation of HRM has and is evolving (Stone & Dulebohn, 2013; Vrontis et al., 2022; Vahdat, 2022), and it is an unfinished process that is still under construction. Electronic human resource management (e-HRM) is the application of information technology for the creation of networks between at least two players (individual or collective) that will enable them to carry out activities related to human resources functions, and/or that of a specific HRIS (HR Information System) module that will allow human resources functions to be performed in any place as needed (Schalk et al., 2013). The literature identifies that the most e-HRM functions are recruitment, selection, training, compensation, performance evaluation, and administrative processes, which are in turn the ones appreciated as of greater technology application in HRM and better impact (Aral et al., 2012; Schalk et al., 2013; Stone et al., 2015; Fenech et al., 2019; Nurshabrina & Adrianti, 2020).

In general, the existent research expresses optimism regarding the digital transformation of HRM effectiveness (Zhou et al., 2022). Likewise, several studies have found that e-HRM has a positive relationship with general organizational performance and value creation (Bondarouk & Ruël, 2013; Zhou et al., 2022). In this regard, the most identified benefits of e-HRM implementation imply cost reduction, process acceleration, improvements in the quality of services for users (Parry & Tyson, 2011; Obeidat, 2016), improvement in communication and information transfer (Gardner et al., 2003; Zhang et al., 2019), innovation and creativity encouragement (Lin, 2011; Huang & Kim, 2013; Ogbeibu et al., 2020), and a more strategic role of HR within the organization (Haines & Lafleur, 2008; Parry, 2011; Bondarouk & Ruël, 2013; Marler & Parry, 2016). Nevertheless, other studies do not identify a correlation between e-HRM and organizational variables, such as an increase in competitiveness (Olivas-Lujan et al., 2007) or a demonstration that e-HRM directly predict strategic results (Marler & Fisher, 2013). The empirical results about the benefits of e-HRM are not conclusive, and in some cases, it is not possible to infer a direct relationship with e-HRM (Schalk et al., 2013; Bondarouk et al., 2017; Heikkilä & Smale, 2011). Therefore, it needs to get more knowledge that allows concluding the advantages and disadvantages of digital transformation (Zhou et al., 2022; Zavyalova et al., 2022). Likewise, more evidence about how digital technologies applied to HRM influences business outcomes is needed. In addition, the development of new technologies, especially, the implementation of intelligent technologies (artificial intelligence/AI, big data, robotization, virtual, and augmented reality, among others) implies new challenges, not only related to its use but to the ethical aspects involved (Da Silva et al., 2022; Vial, 2019; Vrontis et al., 2022).

In sum, more empirical research is needed to analyze the impacts and benefits of the digitalization of HRM (Bondarouk & Ruël, 2009; Bondarouk et al., 2009) and develop specific concepts and models of e-HRM (Voermans & Van Veldhoven, 2007; Strohmeier, 2009; Stone & Lukaszewski, 2009; Zhang et al., 2019). These gaps of knowledge persist and need to be addressed by scholars and HR specialists (Stone & Dulebohn, 2013; Vial, 2019; Da Silva et al., 2022). Currently, this topic is gaining more interest because of the impact of COVID-19 on the acceleration of digital transformation in businesses, organizations, and society in general (Vahdat, 2022; Verma et al., 2023; Zhou et al., 2022). Thus, this study aims to analyze the development, current status, and trends of the literature on human resource management research, regarding its digital transformation. To this purpose, the literature published between 2001 and 2022, and retrieved from the Web of Science database, is analyzed. We selected this period due to the growing academic interest in this topic since the beginning of the 21st century. Such interest is accompanied by the technological advances of this century, pointing out that the transformation of human resources management is an increasingly relevant topic.

### 3. Method

To achieve the research objectives, we conducted bibliometric-mapping research using VOSViewer software and bibliometrix R-package. Once the research purpose was established, we identified the search terms. Following the recommendation by [Dong et al. \(2023\)](#), we conducted a “topic-based” search using “human resource management” joined (AND) to terms that accurately describe the literature that would be examined. The search terms were Technol\* digital\* electronic\* and e-HRM. This search facilitated the retrieval of accurate and reliable documents, as these terms were directly related to the research objective. We utilized the asterisk (\*) to expand the search results of the selected terms. This symbol enhances the likelihood that the retrieved papers represent the relevant literature for our research. Data was retrieved from the Web of Science (WoS) database because, despite not being the biggest one, it is recognized as the most comprehensive citation data source worldwide ([Birkle et al., 2020](#)) and covers a diverse range of high-quality scientific journals. Due to this, bibliometric analysis based on the WoS database has increasingly become a popular method for visualizing the structure of scientific fields ([Zhang et al., 2019](#)) and is considered one of the most commonly used databases for conducting bibliometric studies ([Zupic & Čater, 2015](#)). As a result of the process described before, the search equation was as follows:

human resource and Technol\* (Title) or human resource and digital\* (Title) or human resource and electronic\* (Title) or E-HRM (Title) and 2022 or 2021 or 2020 or 2019 or 2018 or 2017 or 2016 or 2015 or 2014 or 2013 or 2012 or 2011 or 2010 or 2008 or 2009 or 2007 or 2006 or 2005 or 2004 or 2003 or 2002 or 2001 (Publication Years) Web of Science Core Collection Editions =A&HCI, ESCI, SCI-EXPANDED, SSCI

This search returned 284 products; of them 84 % were articles. Once the data was collected, we conducted a performance analysis where the scholar’s production was analyzed. Then, we conducted a science mapping analysis where academic connections between literature components were identified. Data was analyzed from a quantitative and qualitative approach. In this regard, we analyzed the foundational themes through the co-citation network, the trajectory, and current mainstreams by bibliographic coupling analysis, where the resultant clusters were analyzed. In addition, a co-word analysis was conducted. Finally, through a thematic map, we analyze the studied topics related to the digital transformation of HRM.

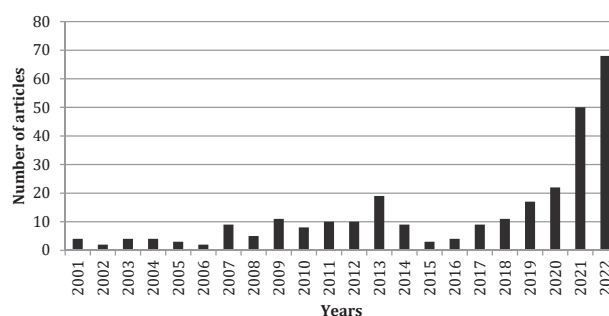
### 4. Results

#### 4.1. Performance analysis

The first analysis was oriented to describe the scholar contributions in digital HRM from 2001 to 2022. [Fig. 2](#) shows how the 284 academic products are distributed by year. It is interesting to notice that, although 2013 was a productive year, the sustained growth of scholarly research started in 2015, showing a significant increasing from 2020 ([Fig. 1](#)).

Of these 284 academic products, more than half (59 %) were published in the Business and Economics area, followed by Computer Science (9,6 %), psychology (8,3 %) and Engineering (8,3 %). Then we categorized the most productive countries of the world. [Fig. 2](#) shows the top ten countries with more publications in digital HRM.

[Table 1](#) shows the top ten most influential documents published on this topic according to the number of citations. [Table 2](#).



**Fig. 1.** Academic publications on electronic HRM (retrieved from WoS database from 2001 to 2022. **Source:** The Authors with data retrieved from the WoS database.

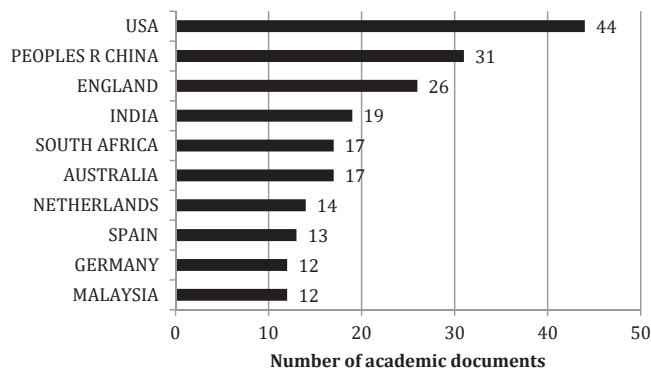


Fig. 2. Distribution of academic publications on digital e-HRM by countries Source: The Authors with data retrieved from the WoS database.

**Table 1**  
Impact of academic production through the number of citations.

Author	Article	Citations	Journal
Stone, D. L., et al. (2015).	The influence of technology on the future of human resource management	151	Human Resource Management Review
Khan, S. Z., Yang, Q., & Waheed, A. (2019).	Investment in intangible resources and capabilities spurs sustainable competitive advantage and firm performance.	129	Corporate Social Responsibility and Environmental Management
Jahanger et al. (2022).	The linkages between natural resources, human capital, globalization, economic growth, financial development, and ecological footprint: The moderating role of technological innovations	129	Resources Policy
Khan et al. (2020).	Natural resource abundance, technological innovation, and human capital nexus with financial development: a case study of China	128	Resources Policy
Chou et al. (2012).	Evaluating the criteria for human resource for science and technology (HRST) based on an integrated fuzzy AHP and fuzzy DEMATEL approach	116	Applied Soft Computing
Marler, J. H., & Fisher, S. L. (2013).	An evidence-based review of e-HRM and strategic human resource management	112	Human Resource Management Review
Aral, S., et al. (2012).	Three-way complementarities: Performance pay, human resource analytics, and information technology	112	Management Science
Parry, E., & Tyson, S. (2011).	Desired goals and actual outcomes of e-HRM	100	Human Resource Management Journal
Alam (2009).	The role of science and technology education at network age population for sustainable development of Bangladesh through human resource advancement	87	Scientific Research and Essays
Hendrickson, A. R. (2003).	Human resource information systems: Backbone technology of contemporary human resources	77	Journal of Labor Research

Then we identified the journals with the most published articles in this topic (Table 2) Source: The Authors with data retrieved from the WoS database.

**Table 2**  
Five journals with most published articles on digital HRM and number of citations.

Journal	Documents	Citations
International Journal of Human Resource Management	18	697
Human Resource Management Review	5	384
Human Resource Management	8	122
International Journal of Manpower	10	107
Employee Relations	7	90

Finally, we identified the top five most productive authors and the number of citations (Table 3).

#### 4.2. Science mapping analysis

Science mapping analyses, allow us to identify the interactions and academic connections between the different research components. Table 3.

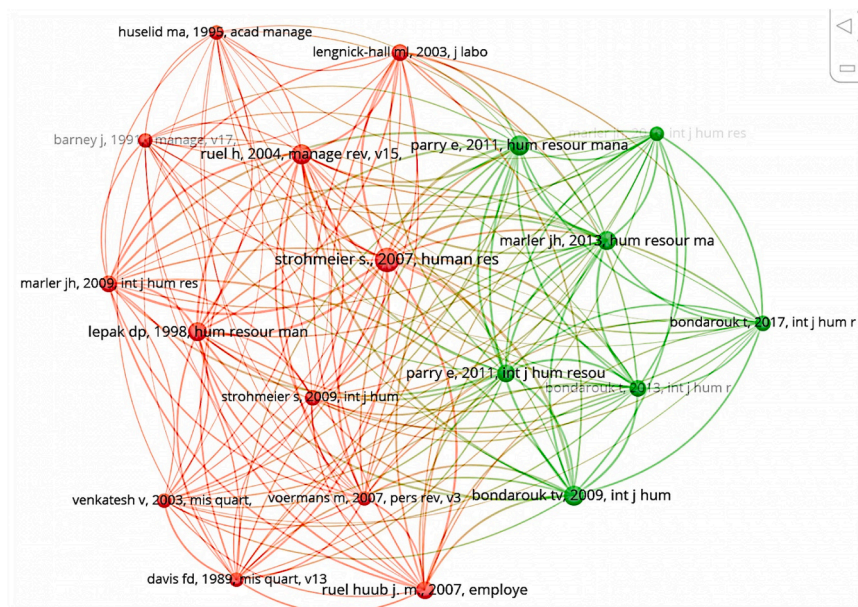
**Table 3**  
Five authors most productive on digital HRM topic, and number of citations.

Author	Documents	Citations
Parry, E.	3	244
Lukaszewski, K.M	3	198
Stone, D.L.	2	198
Marler, J.	2	183
Strohmeier, S.	6	175

4.2.1. Co-citation

Co-citation analysis allowed us to reveal the foundational intellectual structure of digital HRM through the analysis of the relations among cited publications. This analysis assumed that publications that are cited together are similar thematically (Donthu et al., 2021) and belong to a thematic cluster. Thus, in this analysis, clusters are derived from the cited publications. Of the 284 documents examined, 11932 cited references were identified. A minimum threshold of 20 citations of a cited reference was considered, which yielded 19 cited references grouped in two clusters (Fig. 3). Likewise, co-citation analysis helps to identify the foundational and the most influential publications in the field. Table 4 shows the top ten most influential references cited in the field of digital HRM, the number of citations, and the total link strength.

As can be observed in Fig. 3, there are two well-defined major clusters of cited references, the largest one (red) has 12 references, and comprises topics more oriented to the effectiveness, impact, results, competitive advantage, attitudes, and acceptance of digital HRM, while the second one (green) has 7 references and is more oriented to presents an overview of the strategic value of digitalization of HRM, its challenges and implications. It is important to note that of the top 10 references included in Table 4, half of them belong to Cluster 1 and half to Cluster 2. It is interesting to note that cluster 2 comprises the works of only 3 authors.



**Fig. 3.** The co-citation network diagram of cited references.

**Table 4**  
The top 10 cited references.

Authors	Cited reference	Citations	Total link strength
Strohmeier (2007).	Research in e-HRM: Review and implications	60	385
Bondarouk & Ruël (2009).*	Electronic Human Resource Management: challenges in the digital era	40	285
Parry, E., & Tyson, S. (2011).*	Desired goals and actual outcomes of e-HRM	38	272
Ruël et al. (2004).	E-HRM: Innovation or irritation. An explorative empirical study in five large companies on web-based HRM	38	279
Lepak & Snell (1998).	Virtual HR: Strategic human resource management in the 21st century	36	262
Marler, J. H., & Fisher, S. L. (2013).*	An evidence-based review of e-HRM and strategic human resource management	36	245
Ruel et al. (2007).	The contribution of e-HRM to HRM effectiveness: Results from a quantitative study in a Dutch Ministry	30	205
Parry, E. (2011).*	An examination of e-HRM as a means to increase the value of the HR function.	30	248
Lengnick-Hall & Moritz (2003).	The impact of e-HR on the human resource management function.	29	189
Marler (2009).*	Making human resources strategic by going to the Net: reality or myth?	27	223

Notes: The total link strength represents the sum of the strengths of the individual links (number of references cited together) in a network.

\* Cluster 2

#### 4.2.2. Bibliographic coupling

The main studied topics on digital HRM were identified through the bibliographic coupling analysis, which allows for identifying the relationships among cited publications as indicators of the current mainstreams in digital HRM. We selected articles with at least 30 citations. Of the 284 documents, 36 meet the threshold. Of the 36 the largest set of connected documents consisted of 28 were grouped in 5 clusters. The thematic clusters allow us to analyze the more recently studied themes in digital HRM (Table 5). Fig. 4 shows how the clusters are organized.

#### 4.2.3. Co-word analysis

Finally, we conducted a co-word analysis. According to this analysis, words that are frequently together keep a thematic relationship between them. For this procedure, we selected author keywords as units of analysis as they are more comprehensive in representing an article's content (Zhang et al., 2016). Keywords with a minimum occurrence of 5 were selected. Of the 1411 keywords, 73 meet the threshold. Then with the Tesauro database, we eliminate duplicated words or words with similar meanings but written in different ways. As a result of this process, of 1411, 1277 words remained. Then we select those keywords with a minimum occurrence of 5. 19 meets the threshold and 2 were eliminated because were meaningless. Thus, the resultant 17 keywords were grouped into 3 identified clusters (Fig. 5). Table 6 shows the top ten more frequent and linked words in this topic.

Each cluster contains the keywords that frequently co-occurred together among the publications. Thus, each cluster represents specific themes in the research. Table 7 shows the three clusters, their keywords and labels.

Giving a closer look, we inquire about the main networks that are building regarding e-HRM. We select the number of documents with co-authors by country. We select countries with at least five documents (no matter the number of references). Of 73 countries, 22 meet the threshold, but 20 are highly connected (Fig. 6). The relatedness of items is determined based on the number of co-authored documents. Table 8 shows the number of documents, citations and, total link strength of each country in each cluster.

#### 4.2.4. Thematic search development of digital HRM

We conducted a thematic map of the digital transformation of HRM research to analyze the studied theme knowledge tendencies, and potential for future research development. Likewise allows us to analyze the importance and development of some themes in this field of knowledge. In this analysis, we selected the keywords plus. Thematic map presents two properties; centrality (correlation among the different topics) and density (cohesiveness among the nodes). Thus, the topics have to be analyzed according to the quadrant where they are located (Fig. 7).

In the digital transformation of HRM, some themes are enhancing their development and importance (motor themes), they are "antecedents, quality and economic-growth" and "management, strategy and information". There are some themes that although developed and highly specialized and, its contribution is still marginal (Niche themes), such as "education students". This finding suggests that this theme is a potential topic that needs to be more connected to digital HRM. In addition, "antecedents, quality and economic-growth" is in Q2, indicating that its contribution is still marginal to the development of the field, but transverses Q1 which indicates that this theme is increasing their development and importance. On the other hand, framework practices, management practices, and network practices" are weakly developed and marginal themes (emerging or disappearing themes quadrant). Finally,

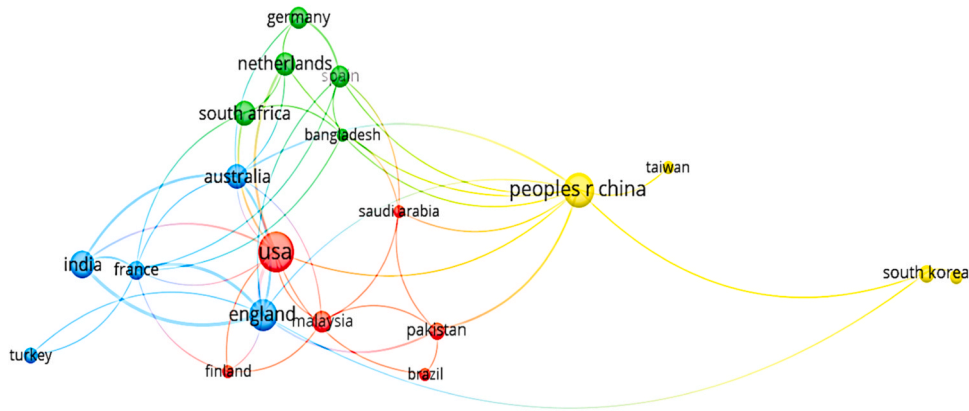
**Table 5**  
The five clusters of bibliographic coupling in digital HRM.

Authors	Document title	Cluster
Bondarouk and Ruël (2009). Bondarouk et al. (2009).	Electronic Human Resource Management: challenges in the digital era e-HRM effectiveness in a public sector organization: a multi-stakeholder perspective	Cluster 1. <b>Label:</b> Impact, challenges and outcomes of e-HRM.
Gardner et al. (2003).	Virtual HR: The impact of information technology on the human resource professional	
Heikkilä and Smale (2011).	The effects of 'language standardization' on the acceptance and use of e-HRM systems in foreign subsidiaries	
Hendrickson (2003).	Human resource information systems: Backbone technology of contemporary human resources	
Olivas-Lujan et al. (2007).	e-HRM in Mexico: adapting innovations for global competitiveness	
Parry and Tyson (2011).	Desired goals and actual outcomes of e-HRM	
Strohmeier and Kabst (2009).	Organizational adoption of e-HRM in Europe: An empirical exploration of major adoption factors	
Voermans and Van Veldhoven (2007).	Attitude towards E-HRM: an empirical study at Philips	
<b>Comment:</b> This cluster groups nine papers published mainly in the first decade of the XXI century, and are mainly reviews and qualitative studies.	The strategic value of e-HRM: results from an exploratory study in a governmental organization	
Bondarouk, T., & Ruël, H. (2013).	Does e-HRM lead to better HRM service?	Cluster 2. <b>Label:</b> e-HRM and organizational strategy.
Bondarouk, T., Harms, R., & Lepak, D. (2017).	Human resource management, strategic involvement and e-HRM technology	
Marler, J. H., & Parry, E. (2016).	The link between e-HRM use and HRM effectiveness: An empirical study	
Obeidat, S. M. (2016).	E-HRM usage and value creation. Does a facilitating context matter?	
Ruël & Van der Kaap (2012).	The role of IT-based technologies on the management of human resources in the COVID-19 era	Cluster 3. <b>Label:</b> Conceptualization of strategic human resource management
Vahdat, S. (2022).	An evidence-based review of e-HRM and strategic human resource management	
<b>Comment:</b> This cluster comprises six papers mainly quantitative. The topics revolve around e-HRM and its contribution through organizational strategy.	How strategic considerations influence decision making on e-HRM applications	
Marler, J. H., & Fisher, S. L. (2013).	An expanded model of the factors affecting the acceptance and effectiveness of electronic human resource management systems	
Schalk, R., Timmerman, V., & Van den Heuvel, S. (2013).	The influence of technology on the future of human resource management	
Stone, D. L., & Lukaszewski, K. M. (2009).	Concepts of e-HRM consequences: a categorisation, review and suggestion	
Stone, D. L., Deadrick, D. L., Lukaszewski, K. M., & Johnson, R. (2015).	Artificial intelligence, robotics, advanced technologies and human resource management: a systematic review	Cluster 4. <b>Label:</b> Effectiveness of e-HRM: productivity and performance
Strohmeier (2009).	Three-way complementarities: Performance pay, human resource analytics, and information technology	
Vrontis, D., Christofi, M., Pereira, V., Tarba, S., Makrides, A., & Trichina, E. (2022).	Information technology usage and human resource roles and effectiveness	
<b>Comment:</b> This cluster comprises six papers, mainly reviews that address a conceptualization of strategic human resource management. Like the previous cluster, these papers were mainly published in the second decade of the 2000s	Electronic human resource management and organizational innovation: the roles of information technology and virtual organizational structure	Cluster 5. <b>Label:</b> e-HRM and innovation
Aral, S., Brynjolfsson, E., & Wu, L. (2012).	Human resource information systems (HRIS) and technology trust	
Haines, V. Y., & Lafleur, G. (2008).	This cluster groups four quantitative papers where the main topic is the effectiveness of e-HRM as an outcome of its implementation, mainly on productivity, performance, and innovation.	Cluster 5. <b>Label:</b> e-HRM and innovation
Lin, L. H. (2011).	The diffusion of human-resource information-technology innovations in US and non-US firms	
Lippert & Michael Swiercz (2005).	Conceptualizing structural ambidexterity into the innovation of human resource management architecture: The case of LG Electronics	
<b>Comment:</b> This cluster comprises three papers, two of them developed in specific companies. The main topic is the value creation of e-HRM for innovation.	An examination of e-HRM as a means to increase the value of the HR function	



**Table 7**  
The thematic clusters on digitalization in digital HRM.

	Label	Top keywords
Cluster 1 (Green)	Digital Platforms to transform e-HRM	e-HRM, information technology, systems, model, digital transformation and perceptions
Cluster 2 (Red)	Data analytics to innovate performance	performance, innovation, work practices, firm, big data, industry 4.0
Cluster 3 (Blue)	Organizational strategy for digitalization of HRM	HRM, perspectives, information systems, strategy, organizations



**Fig. 6.** Academic networks of collaboration. **Source:** The authors using VOSviewer.

**Table 8**  
Cluster of countries that have academic collaboration in the studied topic.

Country	documents	citations	total link strength
Brazil	5	23	2
Finland	5	139	4
Malaysia	12	205	5
Pakistan	8	168	7
Saudi arabia	5	138	5
Usa	44	2497	19
Cluster 1 (6 countries)			
Bangladesh	5	138	5
Germany	12	210	4
Netherlands	14	458	7
South africa	17	131	5
Spain	13	185	7
Cluster 2 (5 countries)			
Australia	17	176	13
England	26	572	25
France	10	105	13
India	19	55	12
Turkey	7	36	2
Cluster 3 (5 countries)			
Indonesia	6	26	1
Peoples r china	31	442	12
South korea	8	82	3
Taiwan	5	233	1
Cluster 4 (4 countries)			

Note: The total link strength represents the total strength of the countries collaborative links between a given country and other countries.

transversal and important themes, but not enough developed are “innovation, knowledge, work practices”, “impact, hrm, performance”, and “system, e-hrm, model”. As can be seen in the chart, “management, strategy, information” is in between Q4 and Q1, which mean that these themes are important but not enough developed but is increasing their development and importance.

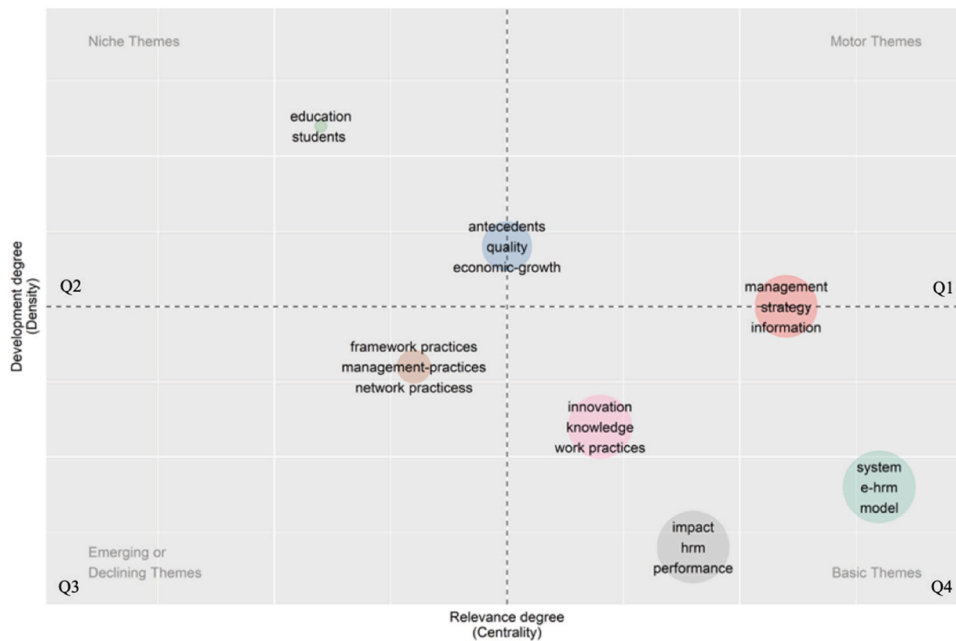


Fig. 7. Thematic map representation. Source: The authors, using Biblioshiny software.

## 5. Discussion and conclusions

This research highlights the internal structure of the digital transformation of HRM, identifying its development, current status, and trends in the literature published between 2001 and 2022. Therefore, the results of this research could shed light on future research guidelines that could contribute to the advancement of the studied field. According to our results, digital transformation has shown a sustained interest from scholars since 2015, being more relevant since 2020 maybe for the pandemic situation (Fig. 1) where companies experienced an acceleration of their digital transformation (Vahdat, 2022; Verma et al., 2023; Zhou et al., 2022).

Based on the findings, digital transformation of HRM research has been mainly oriented to how its implementation helps to reduce cost, and accelerate process time and quality of HR services to employees and managers (Parry & Tyson, 2011; Obeidat, 2016). More recently, e-HRM has been addressed to analyze its impacts on communication transfer and innovation, something that was recognized some years before (e.g. Lin, 2011; Huang & Kim, 2013), putting HR in a more strategic role (Zhang et al., 2019; Ogbeibu et al., 2020). However, we notice that less attention has been paid to human behavioral aspects related to the digital transformation of HRM (see Table 1, and clusters presented in Table 5). These results are coherent with the low participation of psychology as a discipline, on this topic (8,3 %), and the relevant involvement of the Business and Economics area (59 %). This finding is of special interest as digital transformation has less to do with technology and more with people as Frankiewicz and Chamorro-Premuzic (2020) asserted. It involves human abilities and new competencies related to acceptance, adaptation, learning, and new leadership forms, among many others (Da Silva et al., 2022; Kohnke, 2017).

Likewise, it is interesting to highlight that developed countries have made the most important contribution to this topic, as can be seen by the number of academic documents (see Fig. 2), most influential journals (see Table 2), and the most productive authors (of the top five 5 authors, 3 are from USA, 1 from UK and 1 from Germany, see Table 3). Another issue that is worth mentioning is the low academic collaboration to produce high-impact publications, between developed and developing countries, mainly in Latin America, where only Brazil is the exception (see Table 8). Due to the contextual differences, it is important to conduct more studies considering the reality of developing countries to make a more successful implementation of digital transformation of HRM.

According to the co-citation analysis, we could observe that foundational papers in this field of knowledge were organized in two clusters. One is more oriented to the results, impact, and competitive advantages, while the second one is mainly conceptual, and gives an overview of the strategic value of digitalization of HRM, its challenges, and implications, giving context to the topic. Thus, these two clusters draw the foundational intellectual structure of the digital transformation of HRM. On the other hand, it is important to remark that most of these articles were published in the first decade of the twenty-first century (see Table, 4). This finding shows the relatively recent development of this topic and the opportunity that it represents its study to diverse disciplines, mainly in a digital era accelerated by the recent pandemic and the changes that it produced for the entire world. Regarding the current mainstreams in digital HRM (bibliographic coupling analysis), the qualitative cluster analysis revealed five clusters named as follows: 1) impact, challenges, and outcomes of e-HRM, 2) e-HRM and organizational strategy, 3) conceptualization of strategic human resource management, 4) effectiveness of e-HRM: productivity and performance, and 5) e-HRM and innovation. These results support this evolution from mere usage of e-HRM, efficiency, and automatization of HR processes, integrating and assessing organizational variables for HRM's strategy and organizational forecast with organizational variables.

This approach shows an evolution of the topic, however, it is still focused on the implementation of digital transformation, its effectiveness, and its positive impact on performance (see Zhou et al., 2022). As was mentioned before, analyses of these clusters and the most impact articles endorse the assertion that human factors have received lesser attention in this area of knowledge (see Table 5 and Fig. 4). In addition, co-word analyses give also support to this finding, showing that the main scholarly interest has been oriented toward digital platforms to transform e-HRM (Cluster 1), data analytics to innovate performance (Cluster 2), and organizational strategy for digitalization of HRM (Cluster 3), (Table 7, Fig. 5). Besides, the thematic map of our analysis (see Fig. 7) complements this finding and endorse the assertion that human factors have received lesser attention in this area of knowledge. According to the thematic map “management, strategy, information” and “antecedents, quality and economic growth” are topics that are acquiring special relevance and development (Crosses to the motor quadrant (Q1) and both are structuring the research field of digital HRM. This result shows that the digital transformation of HRM is evolving and is still under construction (Stone & Dulebohn, 2013; Vrontis et al., 2022; Vahdat, 2022) broadening its research perspective. On the other hand, “framework practices, management practices, and network practices”, are important topics but weakly developed (emerging and declining quadrant) which support again the assertion that studies about human factors concerning digital transformation are still scarce.

Finally, due to the rapid advance of new technologies and the huge possibilities that those offer to HRM, research from behavioral sciences is quite relevant. Supported by evidence-based models, the behavioral sciences should include more research focusing on topics such as digital workplace and collaboration culture, and analysis of employees’ digital competencies among other human factors. In any case, the digital transformation of HRM requires more behavioral approach research to better understand the complexity of the digitalization of HRM.

Lastly, this research has some policy implications. First, due to the relevance of the digital transformation of HRM and its implications for social and economic growth, developing countries governments should provide incentives to universities that conduct research in this field. To this purpose, alliances between public/ private organizations and universities or other academic establishments could enhance knowledge to successfully implement digital transformations of HRM in the region. Second, as was mentioned before, research on the digital transformation of HRM needs to be addressed with a transdisciplinary approach. Our study shows the necessity to strengthen the behavioral sciences participation to fully understand this phenomenon. Stimulating this kind of research could boost knowledge management in the digital transformation of human resource management.

## 6. Future directions and limitations

This study offers a holistic view on the intellectual structure of knowledge related to the digital transformation of HRM, providing a comprehensive approach supported in the literature related to this subject in the period of time studied. Therefore, the results of this research could shed light on future research guidelines that could contribute to the advancement of the studied field. We highlight the importance of increasing academic research about organizational and behavioral issues related to the technological transformation of HRM. We suggest that future studies address human factors in the digital transformation of HRM. For example, technology acceptance is a topic that has been studied in the past (see Davis, 1986). Recently, Menant et al. (2021) identified three main factors influencing the acceptance: technological characteristics (e.g. system response time, data quality), user satisfaction, and organizational variables (e.g. role of the HR responsible). Those variables might be interesting for future research as our review also found less attention on these organizational and behavioral variables. Our results may indicate that it is important to continue identifying which organizational variables might improve the e-HRM implementation. On one hand, digital transformation deals with the successful e-HRM usage and automatization of the HR process, e.g. e-recruiting for candidate sourcing via business sites and online candidate selection via diagnosis with AI (e.g. Hirevue, 2023). On the other hand, the business impact of digital transformation follows the result of Menant et al. (2021) that the HR department should transform their HR digital services into new or adapted roles and responsibilities and finally, their organizational structure (see Strohmeier’s term of digitalization vs. digitization, 2020). The definition of organizational variables as key performance indicators is needed for designing the strategic role and measures of HRM in a particular organization (Marler & Parry, 2016). Additionally, in the period covered for our bibliometric-mapping research, themes such as AI and sustainability were not found, and both are crucial topics that need to be addressed in the digital transformation of HRM, even more, considering the relevant role that AI is having in the HR digital transformation as is asserted in Gartner’s report (2023).

As an outlook for future research, working on a behavioral approach oriented to develop an organizational culture that enhances collaboration and adaptation to the digitalization of workplaces would be useful. For this purpose, evidence-based cultural assessment is recommended (Cameron & Quinn, 2023). Likewise, models of digital transformation that involve human factors should be tested in companies’ empirical field research (e.g. surveys, experiments) to determine whether they improve the HR processes and achieve the promised organizational outcomes. In addition, analyzing how digital transformation could contribute to sustainability is a promising research area that needs more development. There is some recent evidence in this regard, using analytical evidence, (Zhang et al., 2022; Diaz & Montalvo, 2022). Finally, we suggest analyzing how cultural variables could influence the successful transformation of HRM. In this same line, we highlight the necessity to encourage research on this topic in developing countries, whose publications in highly indexed journals are still scarce.

Our study provided a comprehensive scientific map of the research of digital transformation of HRM while revealing major research avenues and insufficiently developed themes suggesting future research directions. However, this study had limitations that are worth highlighting. First, including only Web of Science publications may exclude relevant literature indexed in other databases. It is recommended in future studies to consider other databases as Scopus to complement our findings. Second, further research should include terms like IA, and other related terms in the search query due to their recent impact and incursion in the studied field.

## CRedit authorship contribution statement

**Francoise Contreras:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis, Data curation, Conceptualization. **Susanne Rank:** Writing – review & editing, Writing – original draft, Validation, Investigation, Conceptualization. **Kety Jauregui:** Writing – original draft, Validation, Investigation, Conceptualization.

## Conflict of interest

The authors declare no conflict of interest.

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