

Structural Topic Modeling of Artificial Intelligence Research in Human Resource Management

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Abstract

The widespread adoption of artificial intelligence technologies has led to comprehensive transformations within organizations. One of the most critical areas affected by this transformation is human resources. In this regard, the study examines the publication performance, research topics, and temporal evolution of the literature on artificial intelligence in human resources management. In the study, 1.999 peer-reviewed publications obtained from the Scopus database over the past ten years were analyzed using the structural topic modeling method, which is a topic modeling approach. As a finding of the analysis, 19 topics were identified. Furthermore, the findings reveal that research on artificial intelligence in human resources management has demonstrated an exponential growth trend during the period of 2016–2025. In terms of topic proportions, the most frequently studied themes were identified as “Digital Transformation in Human Resources Management,” “Ethical Recruitment,” and “Chatbot Applications,” while “Knowledge Management,” “GenAI in Assessment” and “Talent Acquisition” were represented at comparatively lower levels. The trend analysis further shows that “Ethical Recruitment,” “Green Human Resources Management,” “Adoption of Innovation,” “Digital Transformation in HRM” and “GenAI in Evaluation” have exhibited consistent growth, whereas “Internet of Things,” “Agile Team Management,” “Decision Support,” “Artificial Neural Networks,” “Project Management,” and “Robotics” have followed a declining trajectory. On the other hand, it was also identified that “Machine Learning,” as a fundamental technology, and “Chatbot Applications,” as one of the most frequently studied themes, did not display statistically significant trends. Overall, the findings indicate that research on artificial intelligence in human

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resources management has been shifting its focus from purely technical aspects toward dimensions such as ethics, sustainability, and social impacts; however, this transformation has so far taken place only at a limited level.

1. INTRODUCTION

The adoption of artificial intelligence (AI) within organizations has reshaped how firms generate and deliver value. In particular, the rapid advancement of machine learning and natural language processing two key branches of AI has strengthened the capacity of enterprises to base their decisions on data, thereby improving efficiency in operations. These developments have accelerated the integration of AI into not only management practices but also diverse organizational units. Among these, human resources management (HRM) stands out as one of the areas most notably influenced by AI-driven solutions.

In recent years, the acceleration of digital transformation has driven the digitalization of HRM processes, reshaping HRM practices by fostering a shift toward innovative, data-driven approaches (Vrontis et al., 2022). Today, AI in HRM plays a crucial role in a wide range of processes, including the use of chatbots in recruitment (Shenbhagavadivu et al., 2024), predictive analytics in candidate evaluation, performance assessment of employees, and the management of training programs (Dima et al., 2024). Furthermore, research suggests that a significant shift in the global workforce due to AI is imminent. For instance, the World Economic Forum projects that by 2030, AI and computing technologies will create 11 million new jobs while eliminating 9 million existing ones. The same report highlights that approximately one-third of tasks will be performed by machines and another one-third through human-machine collaboration (World Economic Forum, 2025). These projections underscore the strategic role of HRM and emphasize the need for a redefinition of HR professionals' roles.

While AI creates opportunities in the HRM context, it also introduces notable challenges. (Palos-Sánchez et al. (2022) examine these opportunities and challenges across three dimensions: employees, enterprises, and society. From the employee perspective, automation of routine tasks by AI presents an opportunity to focus on more analytical and strategic roles (Murphy, 2024). Another key benefit is the acceleration of reskilling processes, as AI supports personalized training programs that enable employees to adapt to the digital era (Gorowara et al., 2024). At the same time, challenges such as job insecurity, techno-stress, ethical concerns, and weakened interpersonal relationships due to human-machine interaction have been widely reported (Ali et al., 2024; Du, 2024; F. Khan & Hagglund, 2025).

From the enterprise perspective, AI offers significant opportunities across a broad spectrum of HRM processes, ranging from recruitment to performance evaluation and talent development, by enhancing efficiency, reducing costs, and supporting data-driven decision-making (Kadirov et al., 2024). However, high integration costs, algorithmic biases, data privacy issues, and gaps in ethical governance represent important risks for enterprises (Du, 2024). At the societal level, the use of AI in HRM is reshaping employment structures, creating new job categories, and fostering more inclusive workforce models. Nevertheless, it also brings serious risks such as the deepening of the digital divide and increased unemployment (Bircan & Özbilgin, 2025). Consequently, the sustainability and ethical deployment of AI in HRM depend on balanced strategies that require collaboration among employees, enterprises, and society.

The use of AI tools in HRM has enhanced processes, making them more streamlined and effective, and has created a strong momentum toward shaping the future of this field. This trend has also elevated the academic relevance of the topic. The expanding research on AI within HRM offers important insights into its influence on organizational practices nevertheless, the fast-growing volume of studies makes it challenging to obtain an overall perspective. This fragmented nature underlines the necessity for a holistic evaluation of the area. Previous research indicates that most works are based on systematic reviews (Madanchian et al., 2023) or bibliometric analyses (Laviola et al., 2024), often based on relatively small samples. While these contributions are valuable, only a few studies have made use of topic modeling to explore the incorporation of AI into HRM.

The purpose of this study is to examine the body of research on AI in HRM from the past ten years by applying the structural topic modeling method, with the goal of uncovering the key research themes and their evolution over time. Consistent with this objective, the following research questions are posed:

RQ1: What are the publication performance of research on AI in HRM?

RQ2: What are the main research topics of AI in HRM?

RQ3: What are the temporal trends of AI in HRM research topics?

2. LITERATURE REVIEW

The increasing use of AI technologies in HRM has generated considerable interest in both academic and practical contexts. In line with this trend, literature reviews in the field aim to identify the scope of existing studies,

their methodological diversity, and the research gaps. As previously noted, these review studies can generally be categorized into two dimensions: systematic literature reviews and bibliometric analyses.

Within this framework, Gélinas et al. (2022) analyzed 85 studies and, in addition to six classes of the human resources lifecycle, proposed a seventh dimension entitled “Legal and Ethical Issues.” Similarly, Jatobá et al. (2023) reviewed 61 articles and demonstrated that the AI–HRM literature clusters into four thematic groups: “Strategic HR and Artificial Intelligence,” “Recruitment and Artificial Intelligence,” “Training and Artificial Intelligence,” and “The Future of Work.” Tuffaha (2023), in a review of 34 studies, revealed that biased AI applications could negatively influence core HRM functions such as recruitment, performance management, compensation, and training. In another study, Dima et al. (2024) examined 43 investigations into AI in HRM and highlighted the opportunities and challenges in this field. Finally, Bujold et al. (2024) evaluated 107 articles and noted that most studies focused primarily on technical aspects, while principles of responsible AI—such as bias, transparency, and ethics—were insufficiently addressed.

Similar findings were also reported in bibliometric analyses. For example, Palos-Sánchez et al. (2022) examined 73 studies in the context of AI in HRM using bibliometric methods and found that most research focused on recruitment and selection processes, while other HRM subfields were relatively neglected. Mathushan et al. (2023), analyzing 67 articles, demonstrated that the HRM-AI field represents a continuously evolving research domain and identified ten clusters ranging from multi-agent systems to human–robot interaction. Kaushal et al. (2023), through the evaluation of 344 studies, reported that AI has been particularly integrated into fundamental HRM functions such as recruitment, selection, orientation, training, and performance analysis, while also playing a central role in talent acquisition, management, and retention. Supporting these findings, Arora et al. (2024), in their study of 1,414 articles, identified a growing interest in the application of diverse AI techniques in HRM, thereby confirming the field’s increasing relevance. More recently, Benabou and Touhami (2025), through a systematic literature review and bibliometric analysis of 77 studies, examined the current state of AI applications in HRM and identified three key themes: the transformative role of AI, human–AI collaboration, and the opportunities and challenges of applications. Similarly, Koştı and Kayadibi, (2025), in their bibliometric analysis of 522 studies, revealed a shift in research focus from technical infrastructure toward more human-centered and ethical dimensions.

In addition to the prevalence of systematic literature reviews and bibliometric analyses, only a limited number of studies have examined AI–HRM research using topic modeling approaches. For instance, Venugopal et al. (2024) applied the BERTopic method to 389 AI–HRM studies. Their findings showed that AI proved beneficial in key HRM activities such as hiring, employee retention, and managing performance, while at the same time drawing attention to ethical challenges like algorithmic bias, protection of personal data, and building employee trust.

As the literature review suggests, existing studies have largely concentrated on identifying the main themes, opportunities, and challenges in HRM-AI. However, most of these works provide general assessments of the field and do not thoroughly address the temporal evolution of research topics. Against this backdrop, the present study aims to analyze the thematic structure and temporal dynamics of AI applications in HRM based on a comprehensive dataset of 1.999 studies, employing the structural topic modeling method. By virtue of its large sample size and the use of a distinct methodology, this study distinguishes itself from prior research and is expected to contribute original insights to the HRM-AI literature by providing a more in-depth understanding of the field.

3. METHOD

3.1. Structural Topic Modeling (STM)

Topic modeling is a text analysis method that uncovers hidden themes in documents by examining word distributions (Blei, 2012). The STM model, introduced by Roberts et al. (2013), builds on Latent Dirichlet Allocation (LDA), one of the most common techniques in this area. However, unlike LDA, STM incorporates metadata associated with the text (e.g., year, gender, etc.) into the analysis process, thereby overcoming this limitation of LDA (Park et al., 2025; Roberts et al., 2016). Metadata in STM can be used to capture either topic prevalence, topic content, or both. Topic prevalence refers to the extent to which a document is associated with a particular topic, and the inclusion of metadata as a covariate allows topic distribution to vary according to the selected variable. Topic content, on the other hand, refers to the words selected to represent a given topic. Incorporating metadata as a content covariate enables the choice of words within a topic to vary depending on the specific context (e.g., year, gender, platform). These advantages render STM more powerful than traditional topic modeling approaches. In sum, by modeling texts contextually, STM enables deeper analyses compared to classical LDA (Roberts et al., 2019).

3.2. Data Collection and Preprocessing

One of the most critical steps in topic modeling studies is the construction of a suitable and reliable dataset. For this purpose, the Scopus database, which is internationally recognized for its high academic credibility, was selected. To construct the dataset, academic publications containing the terms “human resource management” and “artificial intelligence” in their titles, abstracts, or keywords were retrieved from Scopus. After applying the necessary filters, a total of 1,999 peer-reviewed academic studies published in English between 2016 and 2025 were obtained.

Since the quality of data preprocessing directly affects both the performance of the model and the interpretability of the findings, this process was carried out meticulously. Accordingly, a systematic four-step preprocessing procedure was implemented. First, all words in the texts were converted to lowercase. Second, web links, numerical expressions, punctuation marks, and special symbols were removed from the dataset. Third, meaningless English stopwords (e.g., the, and, or, a, an) were eliminated. Finally, lemmatization was performed to reduce words to their meaningful root forms. After completing these steps, the cleaned text data were transformed into numerical form using the bag-of-words approach, and a document-term matrix was constructed on this basis.

3.3. Data Analysis

In this research, the STM method was applied to uncover latent topics within the texts. As STM functions as an unsupervised learning model, the precise determination of the topic number (k) plays a crucial role in ensuring valid and reliable outcomes. Choosing an excessively high k may result in overlapping or narrowly specified topics, whereas setting it too low can lead to overly broad and ambiguous topics (Ulstein, 2024). To address this, several trial models were tested with k values ranging between 10 and 40 in order to determine the most suitable number of topics for the dataset.

These models were evaluated based on the metrics of semantic coherence and exclusivity. Semantic coherence measures the extent to which the identified topics are perceived as meaningful by humans, specifically assessing how semantically related the most probable words within a topic are. Exclusivity, on the other hand, evaluates the uniqueness of a topic by examining how frequently its dominant words appear in other topics (Chen et al., 2024). Topics with higher exclusivity scores contain more specific and distinguishable words, thereby facilitating interpretation.

Based on these evaluations, it was determined that the highest semantic coherence and exclusivity scores were obtained when $k = 19$ (Figure 1). Accordingly, subsequent analyses were conducted using a 19-topic structure. In addition, publication year was incorporated into the model as a metadata covariate. During the interpretation process, both the highest probability words and the FREX words calculated as the weighted average of frequency and exclusivity scores to capture the relative importance of words within topics were considered. On the basis of these two measures, meaningful and representative labels were assigned to each topic.

Finally, the temporal trends of the identified topics were determined using the Mann–Kendall statistical test. All analyses were conducted in the RStudio environment using the “stm” package.

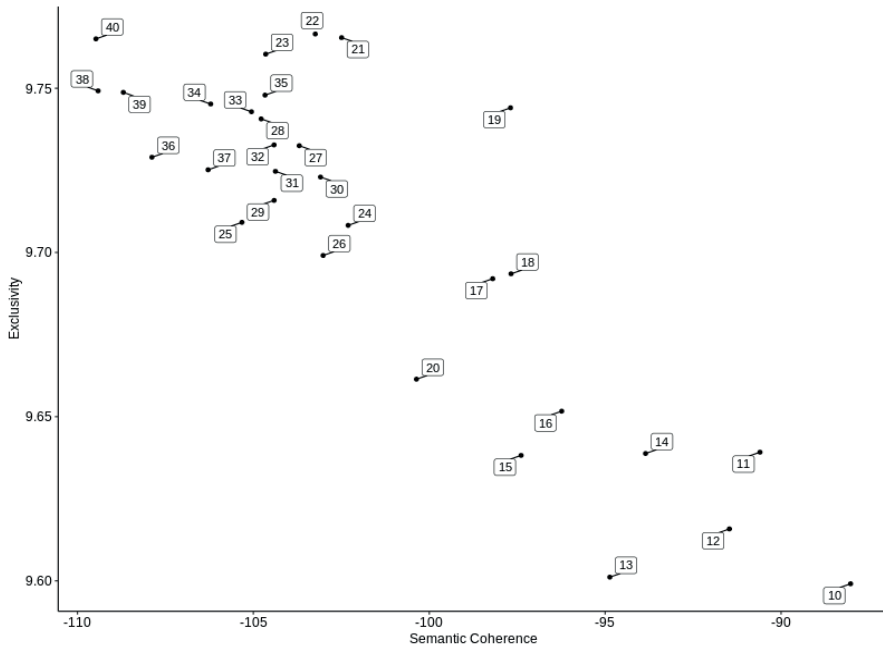


Figure 1. Comparison of semantic coherence and exclusivity scores of topic models

4. RESULTS

4.1 Publication Performance (RQ1)

The findings regarding the progression of 1.999 studies on AI in HRM conducted between 2016 and 2025 are presented in Figure 2. The figure shows that research on the use of AI in HRM has exhibited an exponential

upward trend over the years. During the 2016–2019 period, the share of publications within the total remained limited, ranging between 2% and 5%. However, starting in 2020, a noticeable acceleration occurred, with this share rising to the range of 7%–11%. In the years 2023–2025, a substantial surge was observed, as the number of publications increased from 328 to 430, accounting for approximately 16%–22% of the total.

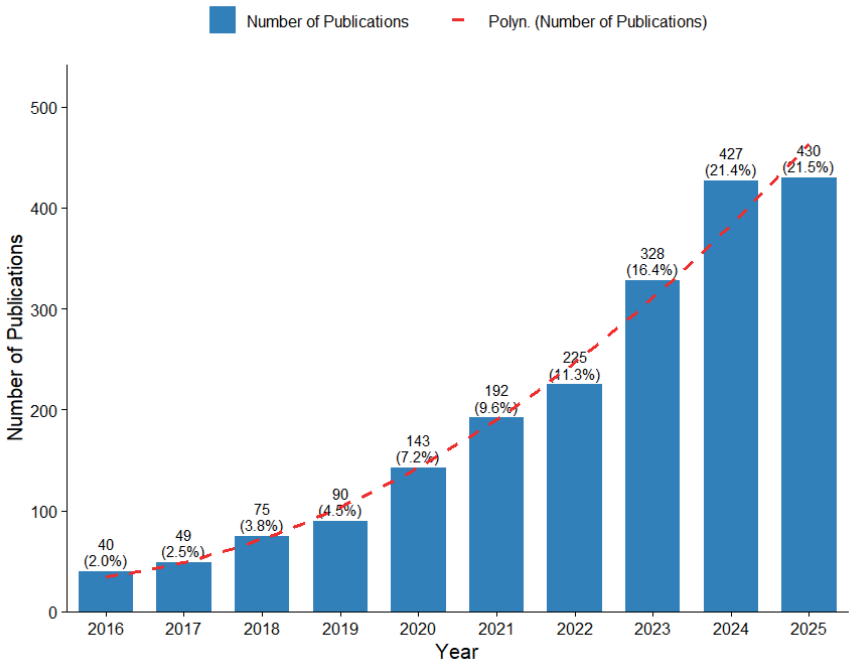


Figure 2. Yearly Distribution of Publications

4.2. Topic Identification (RQ2)

Table 1 displays the 19 topics derived from the STM analysis, together with the most influential keywords, their relative proportions in the corpus, and the assigned labels. The topics are organized in descending order according to their share within the text. Examination of the table shows that the most prominent theme in the HRM-AI literature is “Digital Transformation in HRM” (6.33%). This is followed by “Ethical Recruitment” (6.23%) and “Chatbot Applications in HRM” (6.00%). Conversely, topics studied at comparatively lower levels include “Knowledge Management in HRM” (3.62%), “GenAI in Evaluation” (2.76%), and “Talent Acquisition” (2.27%).

Table 1. Labels, Keywords, and Rate for 19 Topics

No	Topic Label	Highest Probability Words	FREX	Rate (%)
16	Digital Transformation in HRM	digital, transformation, industry, change, automation, customer, company, sector, machine, smart	digital, transformation, manufacturing, customer, blockchain, revolution, industry, digitalization, product, smart	6.33
4	Ethical Recruitment	employee, recruitment, workplace, workforce, bias, retention, concern, selection, impact, efficiency	bias, recruitment, workplace, retention, privacy, fairness, workforce, concern, selection, stress	6.23
7	Chatbot Applications in HRM	application, field, function, company, chatbot, tool, opportunity, development, interview, manager	chatbot, marketing, behaviour, function, field, interview, analyse, organisation, managerial, opportunity	6
5	Intelligent Systems	enterprise, development, big, intelligent, application, financial, company, analyze, personnel, promote	enterprise, financial, big, accounting, intelligent, internal, reform, mode, forward, modern	5.91
1	Internet of Things (IoT)	platform, iot, application, smart, thing, device, sensor, internet, realtime, detection	device, iot, sensor, city, record, thing, computing, detection, platform, camera	5.73
14	Machine Learning	machine, learning, employee, accuracy, predict, algorithm, feature, technique, turnover, dataset	turnover, attrition, predict, dataset, accuracy, forest, classifier, machine, nlp, resume	5.63
12	Occupational Safety	risk, safety, control, operation, security, worker, maintenance, production, personnel, monitoring	safety, plant, control, risk, accident, maintenance, gas, helmet, security, transportation	5.6
9	HRM in Tourism	industry, job, worker, skill, change, people, future, tourism, market, hospitality	tourism, hospitality, job, labor, hotel, employment, industry, worker, disruptive, market	5.3
13	Project Management	project, software, manager, development, engineering, stakeholder, framework, tool, quality, skill	project, software, engineering, stakeholder, cycle, phase, lifecycle, product, manager, workshop	5.12

11	Neural Network Algorithms	network, algorithm, neural, propose, scheduling, energy, staff, technique, allocation, support	scheduling, neural, network, energy, consumption, allocation, text, building, minimize, fault	4.87
15	Innovation Adoption	adoption, employee, relationship, impact, innovation, examine, investigate, reveal, positive, collect	adoption, positively, relationship, structural, equation, perceive, positive, readiness, rpa, intention	4.71
10	Training in HRM	education, training, high, quality, university, algorithm, personnel, efficiency, ability, propose	education, university, training, weight, quality, high, school, ability, calculation, experimental	4.66
3	Decision Support	decision, support, recommendation, expert, group, staff, order, people, selection, propose	decision, treatment, recommendation, expert, rank, making, support, fit, fuzzy, preliminary	4.52
18	Robotics	task, robot, interaction, trust, algorithm, worker, coordination, team, autonomous, action	robot, autonomous, trust, coordination, task, uncertainty, action, mission, multiagent, coordinate	4.19
6	Green HRM	performance, employee, sustainable, green, environmental, behavior, training, impact, development, goal	green, performance, sustainable, ghrm, environmental, appraisal, employee, motivation, behavior, corporate	3.99
2	Agile Team Management	team, member, agile, teamwork, change, support, communication, manager, dynamic, performance	agile, member, team, teamwork, humanai, intervention, active, share, cognition, coordination	3.97
8	Knowledge Management in HRM	knowledge, service, healthcare, create, company, innovative, support, transfer, solution, customer	knowledge, transfer, service, ict, healthcare, sharing, community, innovative, exchange, cyber	3.62
17	GenAI in Assement	assessment, generative, social, tool, chatgpt, genai, task, application, administrative, question	generative, chatgpt, assessment, genai, administrative, gai, prompt, medium, question, feedback	2.76
19	Talent Acquisition	talent, firm, acquisition, employer, competitive, skill, advantage, hiring, hire, structure	talent, employer, acquisition, firm, brand, hiring, reputation, hire, competitive, qualified	2.27

4.3. Temporal Evolution of Topics (RQ3)

The temporal changes and trends of the 19 topics reflecting research on AI in HRM over the past decade are presented in Figure 3 and Table 2. As shown in Figure 3, the topics “Ethical Recruitment,” “Green HRM,” “Innovation Adoption,” “Digital Transformation in HRM,” and “GenAI in Assement” have exhibited a steady increase, becoming more prominent over time. The findings in Table 2 confirm that these upward trends are statistically significant. In contrast, the topics “Internet of Things,” “Agile Team Management,” “Decision Support,” “Knowledge Management in HRM,” “Neural Networks,” “Project Management,” and “Robotics” have displayed a declining trend over the years, and these trends are statistically significant as well. The remaining seven topics—“Intelligent Systems,” “Chatbot Applications in HRM,” “HRM in Tourism,” “Training in HRM,” “Artificial Neural Networks,” “Occupational Safety,” and “Talent Acquisition”—did not demonstrate any statistically significant upward or downward trend during the past decade.

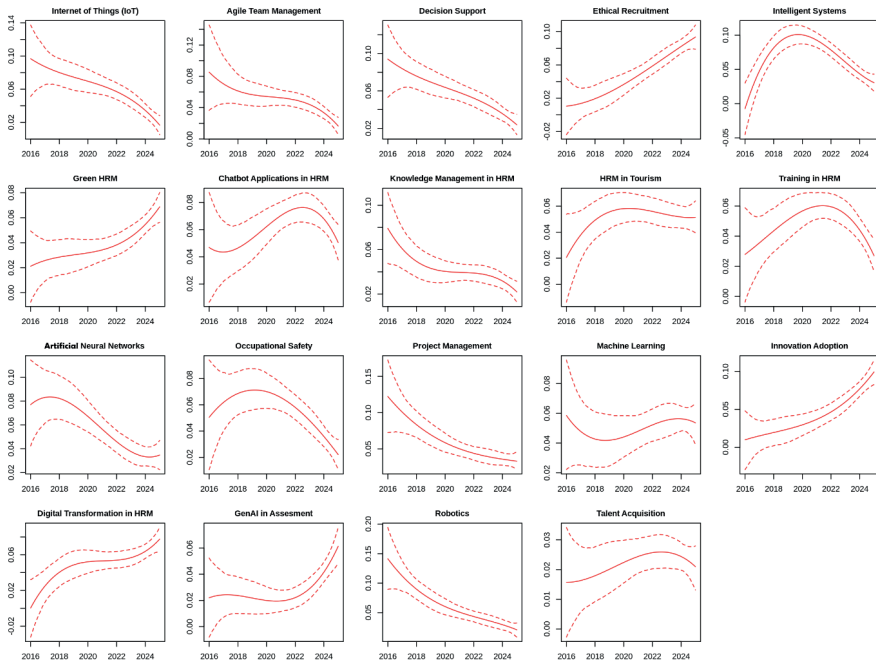


Figure 3. Temporal Distribution of the 19 Topics

Table 2. Trend Analysis of the 19 Topics

Topics	S	z	P-value	Direction
Internet of Things (IoT)	-35	-3.041	0.00236**	↓↓↓↓
Agile Team Management	-27	-2.326	0.02*	↓↓↓↓
Decision Support	-37	-3.22	0.00128**	↓↓↓↓
Ethical Recruitment	37	3.22	0.00128**	↑↑↑↑
Intelligent Systems	3	0.179	0.858	↑↑↑↑
Green HRM	43	3.757	0.000172***	↑↑↑↑
Chatbot Applications in HRM	19	1.61	0.107	↑↑↑↑
Knowledge Management in HRM	-33	-2.862	0.00421**	↓↓↓↓
HRM in Tourism	11	0.894	0.371	↑↑↑↑
Training in HRM	9	0.716	0.474	↑↑↑↑
Artificial Neural Networks	-31	-2.683	0.00729**	↓↓↓↓
Occupational Safety	-19	-1.61	0.107	↓↓↓↓
Project Management	-35	-3.041	0.00236**	↓↓↓↓
Machine Learning	9	0.716	0.474	↑↑↑↑
Innovation Adoption	39	3.399	0.000677***	↑↑↑↑
Digital Transformation in HRM	27	2.326	0.02*	↑↑↑↑
GenAI in Assement	23	1.968	0.0491*	↑↑↑↑
Robotics	-41	-3.578	0.000347***	↓↓↓↓
Talent Acquisition	7	0.537	0.592	↑↑↑↑

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$; $p \geq 0.05$. Direction: ↑ indicates increase, ↓ indicates decrease. S and z denote the Mann–Kendall test and the z-test, respectively.

5. DISCUSSION

5.1. Publication Performance

Research on AI in HRM demonstrated an overall upward trend during the 2016–2025 period. The acceleration in publication numbers, particularly after 2020, indicates the influence of the pandemic in this field. Moreover, the rapid growth observed from 2023 onwards reflects the increasing popularity of artificial intelligence technologies, especially generative artificial intelligence applications. These findings, consistent with previous studies, reveal that the use of artificial intelligence in HRM has recently emerged as a rapidly growing research domain that is gaining significant attention among scholars (Koştı & Kayadibi, 2025).

5.2. Topic Identification

As a finding of the analysis, 19 topics were identified and evaluated according to their proportions within the corpus. Within the scope of this study, the discussion focuses on the three most prominent topics and the three least popular ones.

The findings indicate that the most dominant theme in the HRM-AI literature is “Digital Transformation in HRM” (Table 1). Digital transformation represents one of the core notions of today’s era. With its interdisciplinary nature, it extends its impact across a wide range of fields. Owing to its interdisciplinary character, it exerts influence across multiple domains and offers wide-ranging applications based on collaboration across various sectors (Gurcan et al., 2023). Importantly, digital transformation does not solely represent technological change but also entails a comprehensive process that requires organizations to redefine their business practices and reassess their human capital (Qureshi, 2023). Consequently, HR functions occupy a central position in this strategic transformation. The acceleration of digitalization after the pandemic, the rise of flexible working models, and the widespread adoption of artificial intelligence technologies have collectively fostered intensive implementation of digital transformation in core HR areas such as recruitment, performance management, and employee development (Dyakiv et al., 2024). Taken together, these elements explain why digital transformation has emerged as the most salient and up-to-date theme in the HRM-AI literature, consistently attracting scholarly attention. Another key topic that stands out is “Ethical Recruitment”, a finding that is consistent with previous studies (Kaushal et al., 2023; Venugopal et al., 2024). In recent years, the ethical dimension has increasingly been addressed across multiple HR subdomains, including recruitment processes (Koştı & Kayadibi, 2025). The prominence of this topic can be attributed to the challenges arising from the integration of AI into recruitment practices. Raghavan et al. (2019) reported that the use of AI in hiring raises concerns regarding bias, fairness, and transparency. Because AI models are trained on past data, they may reproduce biases and lead to unequal treatment based on attributes like gender, age, or ethnicity, which in turn intensifies ethical discussions. In addition, the European Union’s AI Act defines AI systems used in recruitment as “high-risk” systems (European Commission, 2024), which further explains the prioritization of this issue by researchers. A third priority topic identified in this study is “Chatbot Applications in HRM.” The growing interest in this topic is largely explained by the potential of chatbots to reduce the routine workload of HR professionals. Chatbots can efficiently conduct preliminary interviews, answer frequently asked questions,

and carry out initial screening during recruitment, thereby streamlining the process for both candidates and HR specialists (N. Khan & Waseem, 2025). Furthermore, the widespread adoption of remote recruitment practices during the pandemic made chatbots even more visible in HR contexts. Beyond recruitment, chatbots also provide valuable support in training, employee development, and performance management (Sangu et al., 2024). Another notable result of this research is the recognition of underexplored areas within the HRM–AI literature. For instance, “Knowledge Management in HRM” has received comparatively little scholarly attention. This limited emphasis may be due to the fact that AI applications in HRM tend to concentrate more on domains like recruitment, performance evaluation, and employee involvement, where outcomes are considered more applicable and directly useful. Ferreira et al. (2022) emphasize that knowledge management in HRM is more closely associated with indirect, long-term, and organizational-level outcomes, which may account for its marginalization in short-term application-oriented AI research.

The relatively low representation of “GenAI in Assement” may be attributed to the novelty of generative AI technologies and the limited number of existing studies in the literature. Moreover, the persistence of ethical concerns surrounding AI has impeded the widespread adoption of experimental studies in this area, further explaining this finding. Another less prominent topic is “Talent Acquisition.” However, this finding contrasts with the study by Kaushal et al. (2023). The discrepancy may be due to differences in the number of publications examined and the time frame covered. It also reflects a shift whereby researchers, in line with technological developments, increasingly study talent acquisition not in isolation but in connection with broader structures such as data-driven approaches, candidate experience, and employer branding. Priksat et al. (2023) likewise emphasize that most HRM-AI studies concentrate on recruitment, within which the concept of talent acquisition has been reshaped. This suggests that researchers encounter challenges in directly associating talent acquisition with artificial intelligence. As a finding of the analysis, 19 topics were identified and evaluated according to their proportions within the corpus. Within the scope of this study, the discussion focuses on the three most prominent topics and the three least popular ones.

5.3. Temporal Trends of Topics

An examination of the findings on the temporal changes of the 19 topics reveals that while some topics exhibit significant upward or downward trends, others display a fluctuating trajectory over the years. For instance, “Digital

Transformation in HRM” and “Ethical Recruitment” demonstrate steady and statistically significant increases, confirming these as leading topics in the field and aligning with our earlier findings. This alignment serves as further evidence of the internal consistency of the study. Moreover, the trend analysis underscores that these two topics are becoming increasingly central in HRM-AI research. Since the reasons for their growth were discussed in detail in the preceding section, they are not repeated here. The trend analysis corroborates and strengthens those earlier findings by situating them within their temporal context.

Another noteworthy finding is the consistent upward trajectory of the topic “GenAI in Assessment.” The increasing trend of this topic may not only be attributed to the novelty of generative AI technologies but also to their direct impact on critical HRM applications such as recruitment and performance evaluation (Manresa et al., 2024; Nyberg et al., 2025). In addition, “Green HRM” and “Innovation Adoption” are among the other topics that show regular and statistically significant growth. The rise in Green HRM can be explained by organizations’ growing need to align with sustainability goals, which increasingly influence not only operational processes but also HRM practices. Supporting this finding, Reddy et al. (2024) emphasized that AI contributes to transforming HR processes into more environmentally friendly systems. The steady increase in Innovation Adoption is closely linked to the acceleration of digital transformation during the COVID-19 pandemic. The pandemic forced organizations to adopt new technologies rapidly to maintain competitive advantage, with HR professionals playing a critical role in supporting employees’ adaptation to these technologies (Singh & Pandey, 2024). Consequently, topics related to technological adaptation in HRM have emerged as increasingly strategic research areas.

Conversely, the findings also indicate that topics such as “Internet of Things,” “Agile Team Management,” “Project Management,” and “Robotics” have exhibited a declining trend over the past decade. This decline can be explained by the fact that these topics are typically addressed within broader technology management or operational contexts rather than as specific applications of AI in HRM. For example, Internet of Things and Robotics are often associated with automation in physical processes such as manufacturing or logistics, while Agile Team Management and Project Management are more closely tied to organizational processes. Consequently, scholars focusing specifically on AI applications in HRM appear to treat these topics as secondary (Deepa et al., 2024; Prikshat et al., 2023). Another striking finding is the downward trend observed in “Neural Networks.” This

reflects a methodological shift in HRM-AI literature, where recent studies have increasingly moved beyond classical neural networks toward advanced architectures such as CNNs, RNNs, and LSTMs (Liu et al., 2023). The declining trend in “Decision Support” can similarly be attributed to the evolution of the concept from early rule-based systems to more mature and sophisticated frameworks—where it is now embedded within contemporary contexts such as digital transformation and algorithmic decision-making in HRM (Csaszar et al., 2024).

Finally, the trend analysis indicates that several topics did not demonstrate statistically significant trajectories. Overall, these topics attracted intermittent scholarly attention, but their development fluctuated over the years without showing a clear upward or downward trend (Figure 3). This fluctuation accounts for the absence of significant long-term patterns. Two notable examples are “Machine Learning”—a backbone of AI—and “Chatbot Applications in HRM,” one of the most frequently studied themes in the literature. The absence of a significant trend in Machine Learning can be explained by its role as a fundamental enabling technology, which is rarely examined in isolation but rather integrated into specific HRM subdomains such as recruitment, performance evaluation, and training. By contrast, Chatbot Applications in HRM gained substantial visibility during 2022–2023, particularly throughout the pandemic, due to their ability to facilitate communication, automate repetitive tasks, and provide personalized support. However, the subsequent decline in attention after the pandemic finding in fluctuating research interest over time, which explains why, despite being one of the most extensively studied topics, it did not exhibit a statistically significant upward trajectory.

6. CONCLUSION

This research set out to explore how studies on artificial intelligence in human resources management have evolved in terms of publication performance, thematic focus, and overall trends. To achieve this, articles collected from the Scopus database were systematically reviewed and subjected to analysis. The results demonstrate that the field remains dynamic and is continually developing. The findings indicate that digital transformation occupies a central position in HRM-AI research in terms of topic proportions. Furthermore, when topic proportions and trend analysis are considered together, it becomes evident that ethical issues are increasingly being addressed by researchers, and that GenAI technologies, despite being in their early stage, demonstrate steady growth. The trend analysis also points to the growing importance of sustainability at the organizational

level. Moreover, the findings suggest that HRM-AI research is not solely focused on technological tools but is gradually shifting toward addressing the ethical, environmental, and social dimensions of these technologies. In particular, the positive and significant upward trends in Ethical Recruitment and Green HRM highlight that AI applications draw attention not only to efficiency gains but also to their potential for creating more sustainable and responsible workplaces. In addition, findings regarding innovation adoption in organizations indicate that researchers also recognize the importance of the human factor for the successful implementation of AI applications. Overall, this study demonstrates that HRM-AI research is increasingly shifting its focus toward the societal and managerial implications of technology. Nevertheless, as this shift remains limited, future research should place greater emphasis on the ethical, sustainability, and social acceptance dimensions of AI applications in HRM.

As with any study, this research has certain limitations. First, only the Scopus database was used; therefore, future studies could benefit from replicating the analysis with data from multiple databases. In addition, utilizing various topic modeling techniques and contrasting their outcomes may offer a more comprehensive understanding of the field. Nevertheless, despite such limitations, this study is anticipated to provide valuable guidance for both experienced scholars and newcomers to the area.

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