RETAINING HUMAN RESOURCES IN THE DIGITAL TRANSFORMATION ERA: RESEARCH TRENDS FROM A SCOPUS BIBLIOMETRIC ANALYSIS

Dinh Thi Mung[1], Vu Thi Le Giang[2], Tong Thanh Thuy[3] and Pham Thi Phuong[4]

[1]University of Labour and Social Affairs (Campus II),
Ho Chi Minh City, Vietnam
[2]Dai Nam University
[3]University of Labour and Social Affairs (Campus II),
Ho Chi Minh City, Vietnam
[4]University of Labour and Social Affairs

ABSTRACT

In the context of widespread digital transformation, retaining talent, especially technical personnel, has become a strategic challenge for global enterprises. This study applies bibliometric analysis on 471 academic publications extracted from the Scopus database for the period 2020 to 2025, processed using the Bibliometrix/Biblioshiny tool. The results indicate a clear shift in the research landscape from traditional theoretical frameworks such as job satisfaction, organizational commitment, and turnover intention toward more multidimensional approaches, where digital transformation, artificial intelligence, ESG, and employee experience play central roles. Keyword mapping, co-occurrence analysis, and thematic evolution mapping confirm the convergence of interdisciplinary research, while also highlighting a significant gap in studies related to the retention of technical personnel, a labor group directly impacted by automation and Industry 4.0 technologies yet insufficiently explored in current literature. Based on these findings, the study proposes an integrated approach that connects digital technology, sustainable development, and employee well-being to build new theoretical frameworks and empirical evidence for talent retention in the digital age.

KEYWORDS: Talent retention; Digital transformation; Technical workforce; Employee experience; Sustainable development (ESG); Bibliometric analysis; Bibliometrix.

1.0 INTRODUCTION

In the context of globalization and rapid technological advancement, digital transformation has become an inevitable trend across nearly all areas of business operations. The adoption of digital technologies, artificial intelligence, and flexible work models not only presents opportunities to improve operational efficiency but also poses significant challenges in human resource management. Among the most pressing challenges is employee retention, particularly of technical personnel — the core workforce responsible for implementing and operating new technological systems. In practice, the wave of mass resignations following the COVID-19 pandemic, combined with intense competition in the global labor market, has made this issue more urgent than ever.

Although a substantial body of research has explored factors influencing employee retention, much of it still relies on traditional theoretical frameworks such as job satisfaction, organizational commitment, or turnover intention. These studies often fail to fully capture the impact of changes in the digital era, where elements like digital organizational culture, employee experience, psychological safety, and corporate social responsibility (CSR/ESG) are becoming increasingly critical. Moreover, there is a notable lack of in-depth research focusing specifically on technical personnel, who are among the most directly and significantly affected by digital transformation and are more likely to leave their organizations without effective retention strategies in place.

Addressing this gap, the present study aims to provide a comprehensive analysis of the international knowledge development on the topic of talent retention in the context of digital transformation through bibliometric analysis. By leveraging the Scopus database for the period 2020 to 2025, this research seeks to clarify publication trends, knowledge structures, thematic evolution, and future research directions. These insights serve as a crucial foundation for identifying underexplored academic issues and offering practical implications for businesses.

The main contribution of the study lies in its systematization of the field's development, identification of research gaps related to technical personnel retention, and exploration of integrated approaches that connect technology, ESG, and employee experience. From a practical perspective, the findings provide valuable guidance for managers in designing appropriate HR strategies that ensure long-term employee engagement and enhance competitiveness in the digital age. The structure of the paper includes five sections: following the introduction, Section 2 presents the research methodology; Section 3 analyzes the results; Section 4 discusses theoretical and practical implications; and finally, Section 5 concludes with suggestions for future research.

2.0 RESEARCH METHODOLOGY

This study is designed based on bibliometric analysis, a quantitative approach that has gained increasing popularity in the fields of management, business, and social sciences. This method enables the systematic organization and comprehensive evaluation of knowledge development within a research area, thereby identifying trends, structures, academic relationships, and knowledge gaps that warrant further exploration. The use of bibliometric analysis is particularly suitable for studying talent retention, as the topic is rapidly expanding under the influence of digital transformation and the demands of sustainable development, both of which require an integrative and generalizable approach.

Research data were collected from the Scopus database, one of the most reputable academic data sources, known for its wide coverage and high publication quality. The search query was conducted on August 26, 2025, using a set of keywords combining two groups: the first group reflects the theme of "talent retention" (employee retention, talent retention, staff retention), and the second group reflects the context of "digital transformation" (digital transformation, Industry 4.0, artificial intelligence, AI, hybrid work). The time filter was limited to the period from 2020 to 2025 to ensure data relevance and reflect the period during which global businesses faced profound changes in technology and working models. After removing duplicate records, conference notes, commentary articles, and irrelevant publications, the final dataset included 471 academic publications used for analysis.

The data processing and analysis procedure followed three main steps. First, descriptive statistics were conducted to determine the number of publications by year, country, author, and journal, thereby providing an overview of the research landscape. Second, keyword co-occurrence analysis was performed to identify major thematic clusters and their interrelationships within the global knowledge structure. Finally, thematic evolution analysis was applied using evolution and structure maps, allowing the study to track the shifts and development of research themes over time. This step enabled the identification of foundational topics, leading clusters, emerging themes, and specialized research directions.

All data processing and visualization were conducted using the Bibliometrix package in the R environment (version 4.2.2), in combination with the Biblioshiny interface. Bibliometrix facilitates advanced analyses of knowledge structure and evolution, while Biblioshiny supports data visualization through trend charts, keyword maps, thematic evolution maps, and thematic maps. The combination of these tools ensures that the results are not only comprehensive but also visually intuitive, transparent, and easy to interpret, thus providing a strong foundation for the analyses in the following sections.

3.0 RESEARCH FINDINGS
3.1. Publication Trends Over the Years

Data from the Scopus database (Figure 1) reveals a significant upward trend in academic publications related to employee retention in the context of digital transformation during the 2020–2025 period. Specifically, 37 publications were recorded in 2020, rising to 53 in 2021 and reaching 63 in 2022. This foundational stage was primarily characterized by studies grounded in traditional theoretical frameworks, focusing on variables such as job satisfaction, turnover intention, and organizational commitment.

In 2023, the number of publications increased to 81, marking a notable expansion in research focus to include newer topics such as employee experience, transformational leadership, and psychological safety. Notably, 2024 witnessed a sharp rise to 118 publications, a nearly 46% increase from the previous year, reflecting growing interest in the impact of digital transformation, hybrid/remote work models, and the integration of ESG into talent retention strategies. By 2025, the number of publications reached 119, suggesting the field has entered a phase of stabilization while still maintaining strong academic interest.

Overall, the steady growth from 2020 to 2025 highlights three key trends:

(i) Shifting research focus: A transition from traditional HR management models toward multidimensional approaches that integrate technology, organizational dynamics, human factors, and sustainability.

(ii) The influence of digital transformation and ESG: Publications from 2023–2025 emphasize the role of AI, hybrid work, mental well-being, and sustainable development in maintaining employee motivation and engagement.

(iii)Timeliness and future potential: With strong growth rates, the topic of talent retention in the digital transformation era remains a strategic research direction, suitable for further exploration through interdisciplinary lenses in the future.

This emerging trend not only reflects shifts in management practices but also lays the groundwork for deeper investigation into the knowledge structure and the formation of dominant research trajectories, which will be discussed in the following sections.

Figure 1. Trends in publications on employee retention during the period 2020–2025
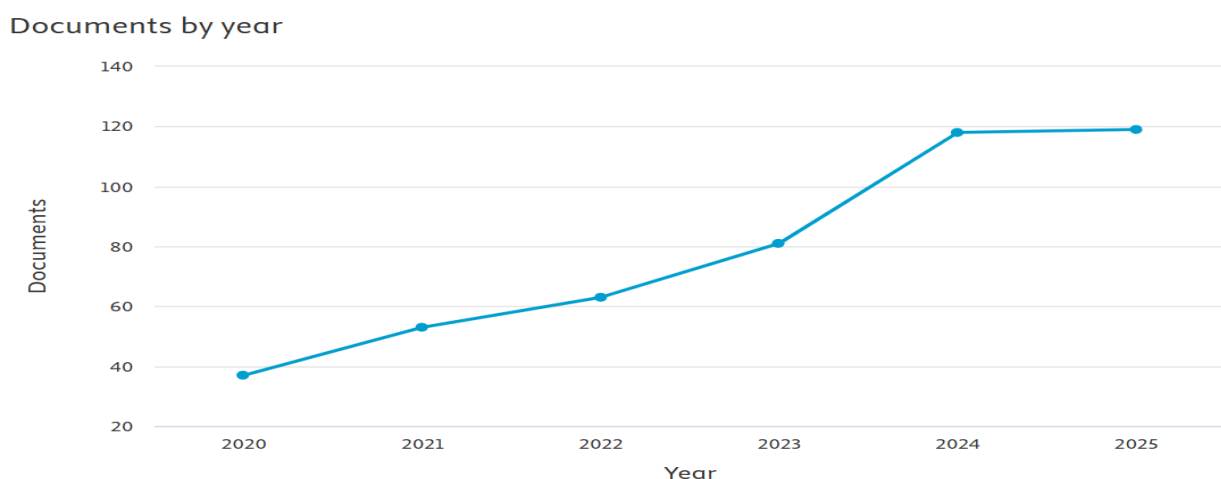
Source: "Documents by year" chart on Scopus, accessed on August 26, 2025.

3.2. Thematic Structure of the Research Field

Based on the analysis of 471 publications from Scopus during the 2020–2025 period (Figure 2), the knowledge structure surrounding employee retention in the context of digital transformation shows a combination of continuity in foundational topics, expansion into technology and sustainability, and the emergence of new directions such as employee experience and flexible work models.

First phase: 2020–2021Research during this period primarily adhered to traditional theoretical frameworks, centering on keywords such as job satisfaction, turnover intention, employment, and organizational commitment. These studies laid the groundwork for developing measurement scales related to employee engagement, work motivation, and attrition risk.

Second phase: 2022–2023The research scope broadened significantly, with a growing focus on keywords like digital transformation, artificial intelligence, talent management, human resource

management, sustainability, and sustainable development. This shift reflects the integration of Industry 4.0 and the growing need for reskilling the workforce to enhance organizational competitiveness.

Third phase: 2023–2025Studies began to focus more intensively on employee experience, with prominent keywords including employee well-being, psychology, and workplace. Flexible work models also became key themes, as indicated by the rise of terms like hybrid work and remote work. In parallel, ESG, sustainability, and corporate social responsibility (CSR) emerged as critical factors for strengthening employee loyalty and trust in a digitized work environment.

Overall, the knowledge structure has shifted from traditional HR management models toward a multidimensional approach that integrates technology, ESG, and employee well-being. This transformation reflects how organizations are adapting to digital disruption and the evolving global labor market.

Figure 2. Evolution of research keywords on employee retention in the context of digital transformation (2020–2025)
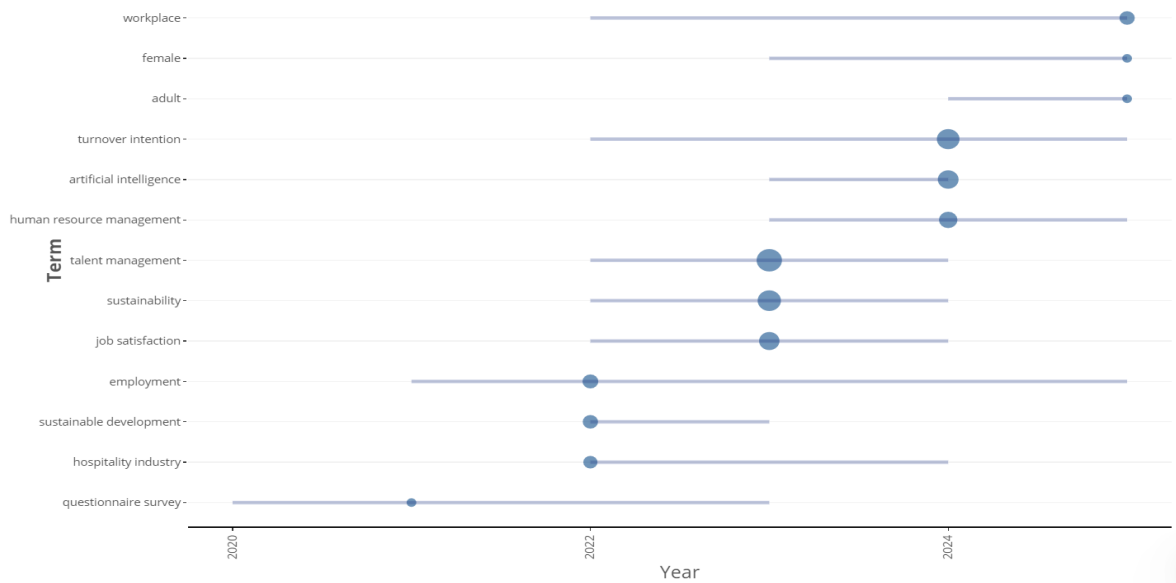
Source: Data extracted from Scopus, processed using Biblioshiny, 2025.

3.3. Keyword Co-occurrence Map

The analysis of 471 academic publications from the Scopus database during the 2020–2025 period reveals that the field of employee retention in the context of digital transformation is undergoing a profound restructuring of its knowledge base. The keyword co-occurrence map (Figure 3) clearly illustrates this evolution through the formation and expansion of three tightly connected thematic clusters, reflecting a shift from traditional approaches toward multidimensional research directions that integrate technology, sustainability, and employee experience.

The first cluster centers on talent management in the digital transformation context, with prominent keywords such as talent management, digital transformation, artificial intelligence, and human

resource management. Research in this group emphasizes the importance of building flexible HR strategies while leveraging AI and digital technologies to optimize processes, reskill employees, and enhance competitive advantage. The growth of this cluster reflects an inevitable trend in the digital era: to retain talent, organizations must align with technological innovation and modern operational models.

In parallel, another key cluster focuses on sustainability and employee engagement, linked to keywords such as sustainability, employee retention, leadership, organizational culture, and turnover. Studies in this group analyze the impact of ESG, corporate social responsibility (CSR), and organizational culture on employee motivation, loyalty, and commitment. The findings suggest that in a globally competitive labor market with rising sustainability expectations, companies that successfully integrate ESG policies and foster a positive culture tend to retain a more stable workforce and strengthen long-term engagement.

The third cluster represents emerging themes related to mental well-being, organizational psychology, and flexible work models, with key terms such as employee well-being, psychology, workplace, hybrid work, and work engagement. Recent studies show that in the post-COVID-19 era, psychological health, emotional safety, and employee experience have become top priorities in modern HR management. Hybrid and remote work models have not only transformed organizational operations but also reshaped employee expectations, prompting HR leaders to adopt more human-centered strategies rather than purely performance-driven approaches.

Overall, the keyword map demonstrates a strong interconnection between the three clusters, highlighting an increasingly interdisciplinary and convergent knowledge landscape. The shift from traditional models based on job satisfaction and turnover intention to integrated approaches involving digital transformation, ESG, and employee experience signals a new phase of depth and expansion in this research domain. These findings open up potential opportunities for future studies, particularly in exploring multidimensional HR management models that enhance talent retention in the digital era. This reflects a paradigm shift in knowledge, from traditional frameworks to integrated approaches where technology, ESG, and human factors jointly shape retention strategies.

Figure 3. Keyword co-occurrence map on employee retention in the context of digital transformation
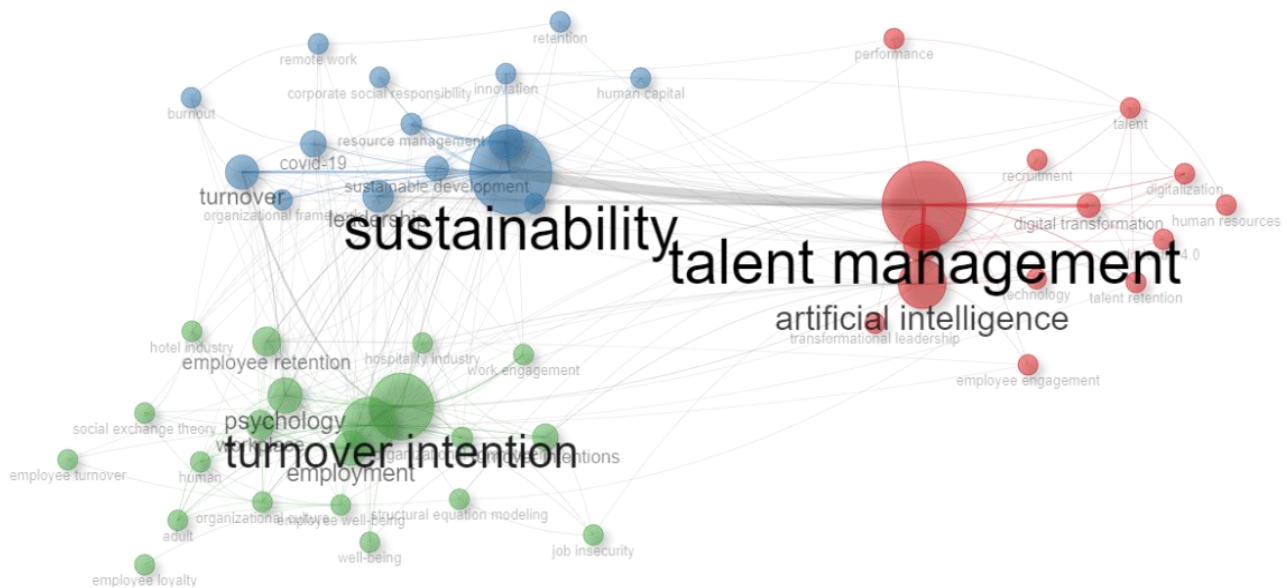
Source: Data extracted from Scopus, processed using Biblioshiny, 2025.

3.4. Future Research Directions

In the upper right quadrant of the thematic map, the group of themes related to job satisfaction, employee well-being, and workplace psychology emerges as a central pillar. This suggests that even amid rapidly changing technological landscapes, the core drivers of employee retention still revolve around satisfaction levels and psychological safety, which are becoming top priorities in the digital work environment.

At the same time, foundational themes located in the basic themes quadrant, including sustainability, employee retention, and leadership, continue to play a crucial role. Aligning human resource management with sustainable development is not only symbolic but also creates long-term value for organizations, especially as ESG becomes a global competitive standard.

Conversely, some traditional concepts such as organizational commitment and turnover intention appear in the peripheral areas of the map, indicating limited influence in the current knowledge landscape. However, if these are connected with emerging elements such as hybrid work models, digital organizational culture, or emotional wellness policies, they may be revitalized and offer fresh perspectives for future research.

It is also worth noting that the niche themes quadrant includes topics like talent management, digital transformation, and artificial intelligence. While these themes are not yet dominant across the entire field, they demonstrate depth and specialization. They represent promising directions for scholars who seek to build new research frameworks, as the intersection of talent management and digital technologies holds strong potential for both practical relevance and academic value**.**

Figure 4. Thematic map of employee retention in the context of digital transformation (2020–2025)
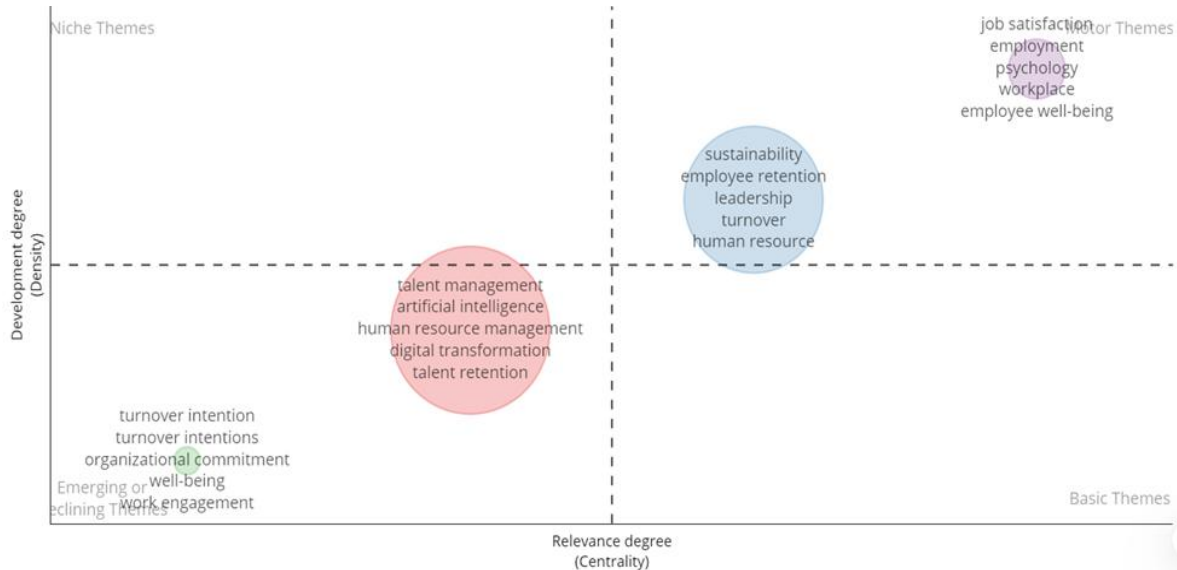
Source: *Data extracted from Scopus, processed using Biblioshiny, 2025.*

To summarize, the thematic map suggests that future research should move toward an integrated model in which technology, sustainability, and employee experience are considered in parallel. This combination best reflects the real challenges that businesses face in the digital era. At the same time, it creates opportunities for researchers to develop new theories and empirical evidence to address the issue of talent retention in a volatile global environment.

3.5. Evolution of Research Themes Over Time

In the 2020 to 2021 period, research mainly revolved around familiar foundations such as job satisfaction, employee retention, organizational culture, and human resource management. During this phase, studies largely adhered to traditional theoretical frameworks, treating job satisfaction and organizational culture as key variables in explaining employees' intention to stay.

Moving into the 2022 to 2023 period, the thematic map reveals a noticeable shift with increasing prominence of keywords such as digital transformation, artificial intelligence, employee turnover, and sustainable development. This reflects the strong influence of technology, Industry 4.0, and sustainability demands on HR policies. Rather than focusing solely on satisfaction or organizational commitment, researchers began integrating technological and ESG factors, thus expanding the scope of inquiry toward more multidimensional and interdisciplinary approaches.

By the 2024 to 2025 period, themes such as talent management and turnover intention gradually emerged as central connectors, while job satisfaction maintained its stable position as a foundational variable. The rise of talent management indicates that organizations have increasingly recognized that retaining employees is not just about preventing turnover. It is a strategic process linked to talent development, AI adoption, and ensuring a positive employee experience within the new working environment.

Figure 5. Evolution of research themes on employee retention in the context of digital transformation (2020 to 2025)
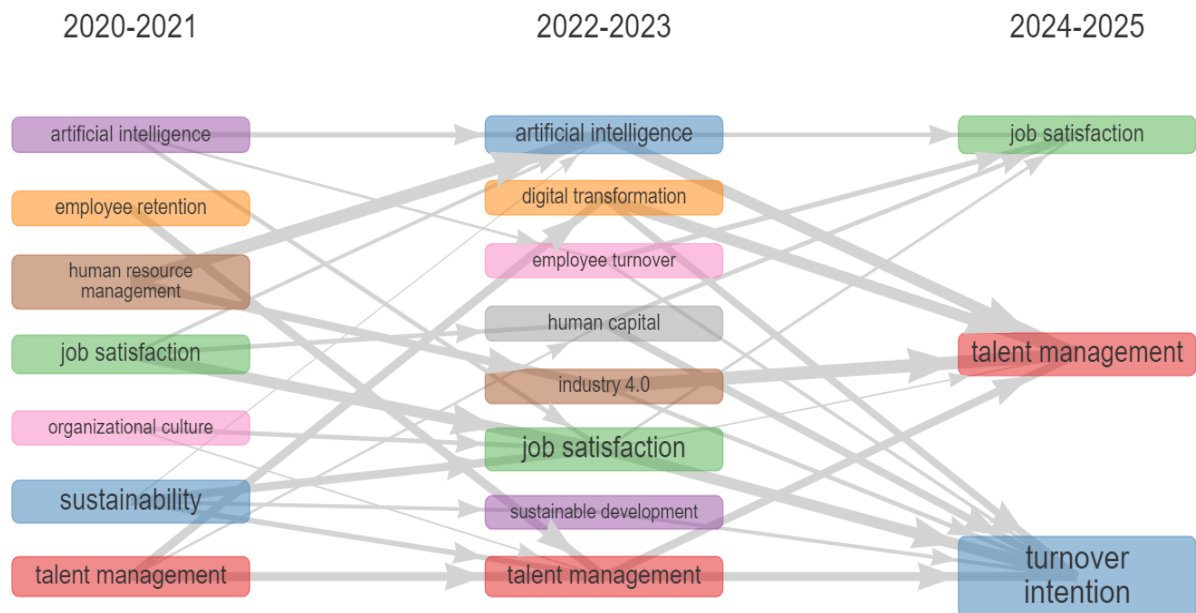
Source: Data extracted from Scopus, processed using Biblioshiny, 2025.

From a broader perspective, the thematic evolution map indicates a clear shift in research focus from classical variables toward newer approaches. This reflects how the academic community is adapting to the global context. Starting from an emphasis on job satisfaction and organizational culture, studies have expanded to include digital technology, ESG, and talent management, eventually progressing toward an integrated framework in which these elements jointly shape talent retention strategies. This progression illustrates the maturity of the research field while highlighting opportunities for future inquiry. In particular, the relationships among digital transformation, sustainable development, and employee motivation require further investigation from both theoretical and empirical perspectives*.*

4.0 DISCUSSION OF FINDINGS

The bibliometric analysis presented in Section 3 shows that the field of employee retention in the context of digital transformation is shifting from traditional theoretical models to multidimensional approaches. These new directions integrate elements of technology, sustainability, and employee experience. While foundational themes such as job satisfaction and turnover intention remain important, emerging topics like talent management, digital transformation, artificial intelligence, and employee well-being are gaining more attention. However, a critical gap persists. Most international studies focus on general HR contexts, with limited empirical evidence specific to technical personnel, who are a core workforce in many businesses and directly impacted by Industry 4.0 and automation.

This gap opens up several avenues for future research. First, it is essential to clarify the mechanisms through which digital transformation, particularly artificial intelligence and big data, affect the

motivation and engagement of technical employees. Second, the role of ESG and organizational culture in retaining this specific workforce remains underexplored, especially in emerging markets.

Third, elements such as emotional well-being, psychological safety, and experience in hybrid or remote work models have only been addressed at a conceptual level. There is a lack of empirical research that measures their concrete impact on engineers, programmers, or technology professionals. Lastly, current studies rarely examine the interaction between talent management strategies and reskilling or upskilling policies as tools for long-term retention of technical staff.

Therefore, the results in Section 3 not only reflect global knowledge development but also provide practical research directions for business settings. Focusing on technical personnel as a distinct case can help fill theoretical gaps and provide valuable empirical evidence for human resource management in times of transformation.

5.0 CONCLUSION AND RECOMMENDATIONS

This study applied bibliometric analysis on 471 academic publications extracted from the Scopus database for the period 2020 to 2025. The objective was to explore trends, knowledge structures, and thematic evolution related to employee retention in the context of digital transformation. The findings indicate a significant shift in the field. Research is moving away from traditional theoretical frameworks based on job satisfaction, organizational commitment, and turnover intention. Instead, it is embracing more multidimensional approaches that place increasing emphasis on digital transformation, artificial intelligence, sustainability (ESG), and employee experience. These findings reflect a growing convergence of interdisciplinary research and open up new opportunities for both academic and practical exploration.

From a theoretical standpoint, this study contributes to the systematization of international knowledge development in the area of employee retention. Results from the keyword co-occurrence map, thematic map, and thematic evolution analysis clarify not only the structure and movement of key topics but also reveal gaps, especially related to the retention of technical personnel. This group is essential in the Industry 4.0 era but has not been systematically studied, particularly in connection with digital transformation, ESG, and emotional well-being.

From a practical perspective, the results suggest that companies should develop integrated HR policies. These policies should combine talent management with digital transformation, incorporate ESG, and foster a positive organizational culture to enhance long-term employee engagement. For technical employees, implementing reskilling and upskilling programs, offering flexible work environments, and ensuring psychological safety will be key to maintaining loyalty in a highly competitive labor market.

Based on these findings, it is evident that employee retention in the digital era is a strategic research direction with both theoretical value and practical significance. However, the current gap in research on technical personnel remains. Future studies should aim to build integrated models to examine how digital transformation, ESG, and employee experience influence motivation and retention. This represents a promising path forward, particularly in emerging markets like Vietnam,

where empirical evidence can provide substantial value for both academia and human resource management practices.

REFERENCES

1) Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. Journal of Business Research, 133, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

2) Deloitte. (2023). 2023 Global Human Capital Trends: New fundamentals for a boundaryless world. Deloitte Insights. https://www2.deloitte.com/us/en/insights/focus/human-capital-trends/2023.html

3) Ferreira, J. J., Fernandes, C. I., & Ratten, V. (2017). The influence of entrepreneurship education on entrepreneurial intentions. Journal of Business Research, 88, 257–265. https://doi.org/10.1016/j.jbusres.2017.12.044

4) Ghosh, P., Rai, A., Chauhan, R., Baranwal, G., & Singh, R. (2016). Factors influencing employee retention: A comparative analysis of two organizations from heavy engineering industry. Global Business Review, 17(3_suppl), 142S–158S. https://doi.org/10.1177/0972150916631211

5) Hom, P. W., Lee, T. W., Shaw, J. D., & Hausknecht, J. P. (2017). One hundred years of employee turnover theory and research. Journal of Applied Psychology, 102(3), 530–545. https://doi.org/10.1037/apl0000103

6) Khan, S., & Memon, N. A. (2021). Digital transformation and its impact on employee performance: A bibliometric review. Technological Forecasting and Social Change, 163, 120480. https://doi.org/10.1016/j.techfore.2020.120480

7) Kim, Y. J., Kang, S.-W., & Lee, E. (2021). The impact of ESG factors on firm performance: A bibliometric review. Sustainability, 13(2), 636. https://doi.org/10.3390/su13020636

8) Lepak, D. P., & Snell, S. A. (1999). The human resource architecture: Toward a theory of human capital allocation and development. Academy of Management Review, 24(1), 31–48. https://doi.org/10.5465/amr.1999.1580439

9) Malik, P., & Garg, P. (2020). Employee engagement and retention: A review of literature. International Journal of Human Resource Studies, 10(3), 126–146. https://doi.org/10.5296/ijhrs.v10i3.17323

10) Mikalef, P., Krogstie, J., Pappas, I. O., & Pavlou, P. A. (2020). Investigating the effects of big data analytics capabilities on firm performance: The mediating role of dynamic capabilities. Information & Management, 57(2), 103169. https://doi.org/10.1016/j.im.2019.05.003

11) Singh, S., Darwish, T. K., & Potočnik, K. (2016). Measuring organizational performance: A case for subjective measures. British Journal of Management, 27(1), 214–224. https://doi.org/10.1111/1467-8551.12126

12) Thite, M. (2020). Digital human resource development: Where are we? Where should we go and how do we go there? Human Resource Development International, 23(4), 342–360. https://doi.org/10.1080/13678868.2020.1728230

13) Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics, 84(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

14) Vial, G. (2019). Understanding digital transformation: A review and a research agenda. The Journal of Strategic Information Systems, 28(2), 118–144. https://doi.org/10.1016/j.jsis.2019.01.003

15) World Economic Forum. (2023). The Future of Jobs Report 2023. World Economic Forum. https://www.weforum.org/reports/the-future-of-jobs-report-2023