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SYNTHESIZING RESEARCH ON COMPETENCY AND TALENT MANAGEMENT IN THE AI ERA: A BIBLIOMETRIC APPROACH

Dr. Priti Nigam, Dr. Purvi Chavla

Associate Professor,
M.K.Amin Arts & science College and College of commerce, Padra
Dept. of Commerce & Business Management
The Maharaja Sayajirao University of Baroda, Vadodara

Assistant Professor,
M.K.Amin Arts & science College and College of commerce, Padra
Dept. of Commerce & Business Management
The Maharaja Sayajirao University of Baroda, Vadodara
Email Id: purvi.chavla-padra@msubaroda.ac.in
Mob. No: 9925193473

Abstract

With Artificial Intelligence (AI) revolutionising organisational talent management practices, competency management emerges as a critical enabler for aligning workforce capabilities with technological innovation. AI-driven talent management systems necessitate the identification, measurement, and continuous development of competencies that empower the workforce to remain agile and responsive amidst constant change. In this context, competency frameworks play a pivotal role in mapping existing capabilities, forecasting future talent needs, and designing targeted learning and development programs. Moreover, these frameworks enable AI systems to match candidates with roles more precisely and optimise workforce planning.

This study employs bibliometric analysis using R Studio to examine the research landscape at the intersection of competency management, talent management, and AI. Data were systematically compiled from Scopus and Web of Science databases, focusing on publications from the last fifteen years. The 'bibliometrix' package in R Studio was used to conduct descriptive analytics, co-word analysis, and thematic mapping.

The results reveal a growing scholarly interest in integrating AI with competency and talent management frameworks, particularly for enhancing recruitment processes, skill assessments, and personalised development strategies. Co-occurrence analysis identified key thematic clusters such as AI-driven talent Management, competency mapping as a driver of digital transformation. Additionally, the research highlights a geographic concentration of studies originating from developed economies, alongside a gradual yet increasing contribution from emerging economies.

Importantly, the findings underscore the strategic role of competency management in facilitating AI-enabled talent management, especially within Indian organisations. The study advocates for the development of systematic competency models that align AI applications with organisational goals, workforce capabilities, and evolving industry demands.

In conclusion, the research calls attention to critical challenges, including digital skill gaps, ethical dilemma, and the necessity of continuous upskilling. The insights derived offer valuable guidance for future research and practical strategies for organisations aiming to harness AI for sustainable workforce development and resilience in the digital era.

INTRODUCTION

In an era characterized by rapid digital disruption, Artificial Intelligence (AI) is reshaping traditional models of organizational management and workforce planning. Among its most transformative applications is its integration into talent management systems, where AI-enabled tools are increasingly employed to enhance recruitment, training, performance evaluation, and career progression (Cappelli & Keller, 2014). As organizations strive to remain agile in response to technological evolution, competency management the systematic identification, assessment, and development of employee competencies emerges as a foundational enabler in aligning workforce capabilities with dynamic operational and strategic goals (Cappelli & Tavis, 2018)

Competency frameworks are central to this alignment. These structured models allow for the precise mapping of required skills and behaviors to specific roles, facilitating data-driven decisions in recruitment, role alignment, and professional development (Vandeweerd et al., 2014). When integrated with AI systems, such

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frameworks not only automate and optimize talent functions but also enable predictive analytics that forecast talent gaps and recommend targeted upskilling interventions (Misra & Sharma, 2019)Furthermore, AI-powered talent analytics have demonstrated promise in transforming competency-based assessments into continuous feedback loops that enhance employee engagement and organizational adaptability (Sharma & Bhatnagar, 2009)

The synergy between AI, competency management, and talent development is particularly critical in emerging economies like India, where workforce digitization and skilling are national priorities(Thippaiah et al., 2014). However, despite growing attention, academic literature in this interdisciplinary space remains fragmented.(Iyengar et al., n.d.) This gap underscores the need for a comprehensive bibliometric investigation that maps the current research landscape, identifies core themes, highlights influential contributions, and guides future inquiry.

To address this need, the present study employs bibliometric analysis using R Studio to systematically analyze scholarly outputs at the intersection of AI, competency management, and talent management. By drawing from high-quality databases such as Scopus and Web of Science, the study provides quantitative insights into the evolution, thematic focus, and geographic distribution of the field over the past decade. The findings serve to both consolidate existing knowledge and spotlight areas for strategic advancement, especially for organizations seeking to build resilient and future-ready workforces in the digital economy.

THEORETICAL FOUNDATION

The integration of Artificial Intelligence (AI) with competency and talent management is grounded in multiple interrelated theoretical perspectives that collectively explain how organizations can strategically leverage technology to align human capital with dynamic business needs. This study draws upon foundational theories in Human Capital Theory, Competency-Based Management, and Sociotechnical Systems Theory(Carroll, 2016), while also incorporating emerging insights from AI-driven human resource analytics.At its core, Human Capital Theory (Poston & Dhaliwal, 2015)posits that investments in employee knowledge, skills, and abilities yield economic returns for both individuals and organizations. In the context of AI-enhanced talent management, this theory underlines the importance of systematically identifying and developing competencies that drive organizational value. AI tools expand the scope of such investments by enabling real-time analysis of workforce capabilities, automating assessments, and recommending targeted learning interventions Thus, competency frameworks act as vehicles for converting raw talent into strategic capital(C. C. Chen et al., 2022).Competency-Based Management (CBM) provides the structural foundation for aligning organizational goals with employee behavior and performance. According to(Madhavi & Mehrotra, 2019), CBM involves the identification of specific skills, attitudes, and knowledge required for effective job performance. These frameworks enable organizations to map existing talent, forecast future skill demands, and design targeted development pathways. When integrated with AI technologies, CBM systems are transformed into dynamic platforms capable of adaptive learning, predictive modeling, and personalized development. This technological augmentation supports more agile, responsive HR functions and enhances talent mobility across the organization(Madhavi & Mehrotra, 2019).Moreover, the concept of Strategic Talent Management (Collings & Mellahi, 2009)supports the deliberate identification and development of high-potential employees as a source of competitive advantage. In this light, AI is not merely a technological tool but a strategic enabler that enhances an organization's ability to attract, develop, and retain critical talent. Competency frameworks serve as the bridge between strategy and execution, allowing AI systems to effectively map talent potential to organizational needs.

In summary, the theoretical grounding of this research lies in the convergence of human capital enhancement, structured competency models, ethical systems thinking, and strategic talent alignment. Together, these perspectives frame the rationale for analyzing how AI, competency management, and talent development intersect in both academic literature and organizational practice. They also justify the use of bibliometric analysis as a method to uncover dominant research themes, conceptual structures, and emerging trends in this complex interdisciplinary domain.

RESEARCH QUESTIONS

This study employs a bibliometric analysis approach to investigate the intellectual and thematic landscape at the intersection of competency management, talent management, and artificial intelligence (AI). Given the growing significance of AI in reshaping workforce structures and HR functions, this research aims to systematically map scholarly output, identify key contributors and concepts, and highlight emerging research directions. The following five dimensions structure the research questions that guide this analysis:

1.1. General Research Trends

The convergence of AI with talent and competency management has gained significant academic traction in recent years. Early studies predominantly focused on conceptual foundations, while more recent work has explored the practical implementation of AI in HR functions such as recruitment, competency assessments, learning and development, and strategic workforce planning. Analyzing temporal publication trends provides

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insight into the trajectory of academic interest, highlighting critical turning points and surges in productivity. Moreover, identifying the most cited papers and core journals in this field reveals foundational theories, influential contributions, and preferred dissemination outlets.

RQ1: How has the volume of research on competency management, talent management, and artificial intelligence evolved over time?

RQ2: What are the most frequently cited papers in the research intersecting AI, competency, and talent management?

RQ3: Which journals have published the highest number of articles in this domain?

1.2. Authorship and Collaboration Patterns

Understanding authorship and collaboration patterns sheds light on the field's intellectual structure. This includes identifying the most prolific and influential authors, institutional affiliations, and regional research hubs. Co-authorship and collaboration networks reveal the degree of academic synergy, knowledge sharing, and global engagement within the field. These patterns offer valuable insights for early-career researchers and institutions seeking to contribute meaningfully to this growing body of knowledge.

RQ4: Who are the most influential authors in the AI-competency-talent management intersection based on citations and publications?

RQ5: What are the major institutional and country-level contributions to this research domain?

RQ6: How has global academic collaboration in this field evolved over time?

1.3. Conceptual and Thematic Evolution

As AI technologies have evolved, so have the theoretical and practical understandings of how they intersect with talent and competency management. The use of keywords, co-word analysis, and thematic mapping allows for the identification of dominant and emerging research themes. Early conceptualizations focused on digital skill frameworks, while recent research emphasizes algorithmic decision-making, ethical talent analytics, and AI-enabled competency development. Mapping the conceptual evolution of the field can help identify shifts in research emphasis and guide future inquiries.

RQ7: What are the most frequently occurring keywords and themes in research at the intersection of AI, competency management, and talent management?

RQ8: How have key themes in this intersection evolved across different periods?

1.4. Citation and Network Analysis

Citation and co-citation analyses offer insights into the foundational structure of the field, identifying key authors, institutions, and regions with high academic impact. Network analysis of citation relationships uncovers clusters of influence, intellectual traditions, and research communities. Understanding these patterns can help researchers trace theoretical lineages and better appreciate the collaborative nature of this domain.RQ9: What is the co-citation network among influential authors, institutions, and countries in the AI-competency-talent management literature?

1.5 Research Gaps

Although the integration of Artificial Intelligence (AI) with talent and competency management is gaining scholarly momentum, this study identifies a significant research gap in the systematic alignment of AI-driven technologies with structured competency frameworks across diverse organisational contexts. While existing research often highlights the benefits of AI in recruitment, assessment, and learning, it lacks comprehensive insights into how competency models can be operationalised to guide AI applications in dynamic talent management environments. Furthermore, the literature remains geographically skewed, resulting in limited exploration of region-specific challenges and innovations particularly in rapidly transforming labour markets like India. Ethical dilemmas, digital skill gaps, and the practical execution of upskilling strategies within AI-enabled systems are also underexplored. This underscores the need for deeper empirical and theoretical investigations into human-centric, ethically governed, and contextually adaptable AI-competency integration, offering pathways for building inclusive, future-ready workforces in the digital age.

METHODS

Figure 1: PRISMA 2020 flow diagram

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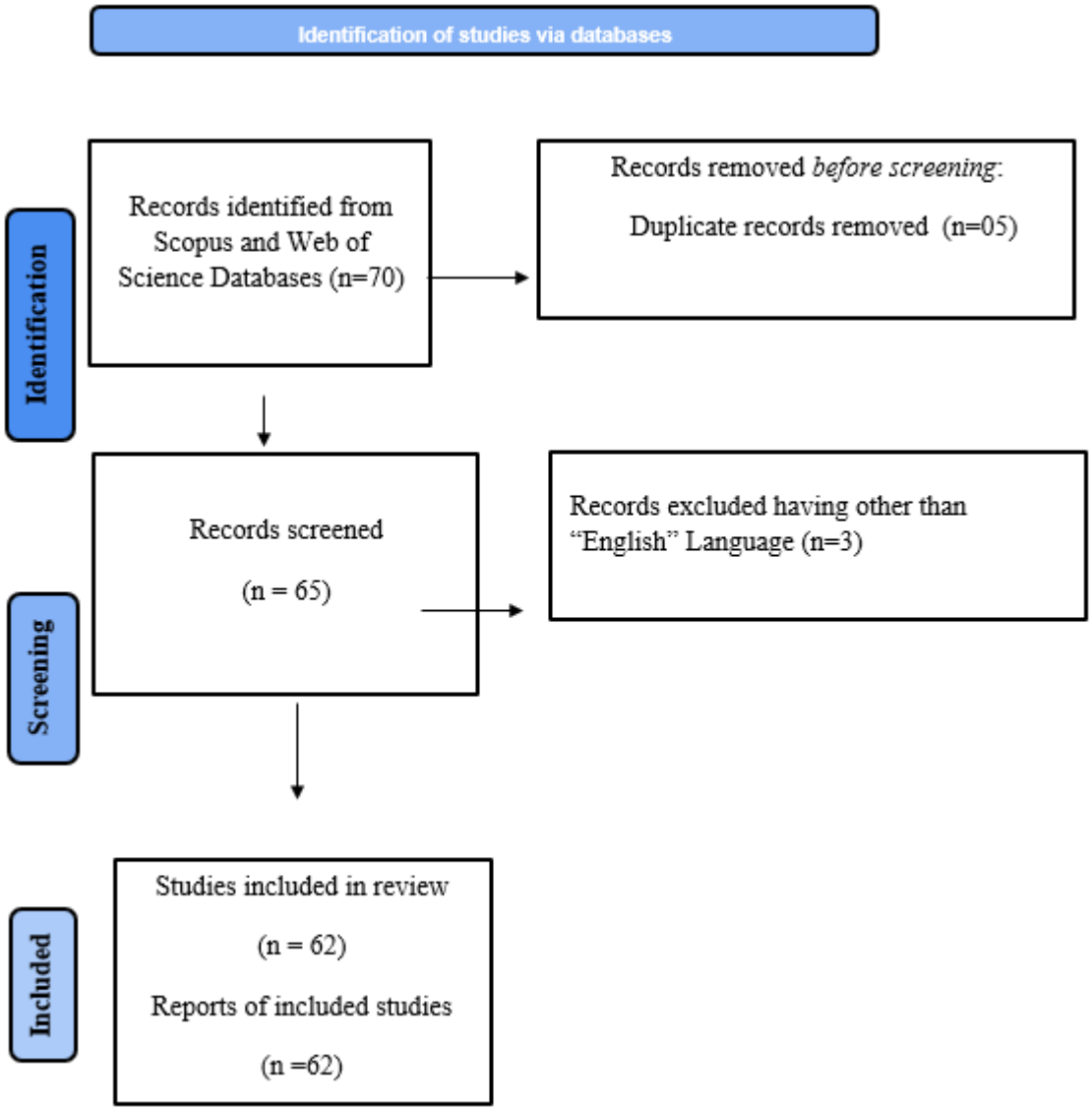

(Source:(Matthew J. et al., 2021).

70 records were initially retrieved from Scopus and Web of Science, two of the most comprehensive academic databases. To ensure data accuracy, 05 duplicate records were removed using Biblioshiny, an R-based tool for bibliometric analysis (Aria & Cuccurullo, 2017). After duplicate removal,65 records were screened for eligibility. As part of the refinement process, 03 records were excluded because they were either not in English and in Russian, German, Spanish. These were filtered out using Bibliometrix, ensuring that only peer-reviewed journal articles, Book & book Chapters retained for analysis. Following the rigorous screening process, 62 studies were included in the bibliometric review. "These selected records provide a comprehensive dataset for analyzing the evolution, impact, and future directions of Talent Management, Artificial Intelligence & Competency Management.

FINDINGS

This study employed two bibliometric techniques for data analysis: performance analysis and science mapping. Performance analysis was conducted to address the research questions by examining publication and citation trends, identifying the most prolific authors and countries, and highlighting the most frequently cited sources and papers. Subsequently, science mapping techniques were applied to explore Research Questions 1, 2, and 3, followed by a detailed content analysis. The evolution of the research topic was illustrated through thematic mapping, while co-word analysis was conducted to examine and visualize the relationships between key concepts. Furthermore, thematic maps generated using Biblioshiny were utilized to trace the development of the research domain over time, offering a comprehensive perspective on its progression and emerging trends.

Performance Analysis

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This section presents the results from the perspective of performance analysis. It includes descriptive statistics of the data, notable trends in publication and citation patterns, prominent authors, leading countries, highly influential sources, and the most cited publications.

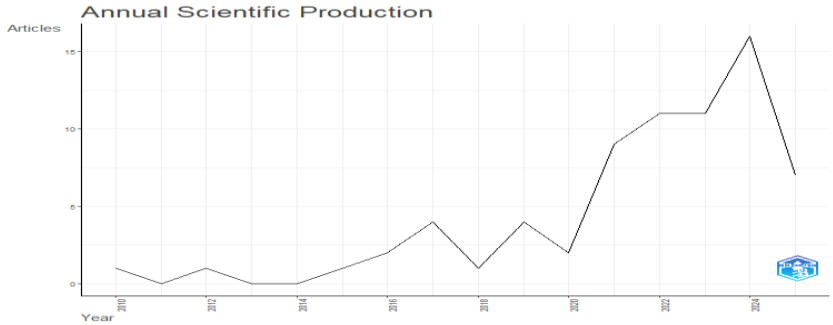
DESCRIPTIVE DATA COLLECTION STATISTICS

Table 1: Principal information about the compilation of bibliographic data

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2010:2025
Sources (Journals, Books, etc)	65
Documents	70
Annual Growth Rate %	13.85
Document Average Age	3.37
Average citations per doc	14.87
References	0
DOCUMENT CONTENTS	
Keywords Plus (ID)	405
Author's Keywords (DE)	261
AUTHORS	
Authors	230
Authors of single-authored docs	10
AUTHORS COLLABORATION	
Single-authored docs	10
Co-Authors per Doc	3.3
International co-authorships %	20
DOCUMENT TYPES	
article	37
article; book chapter	1
article; early access	4
article; retracted publication	1
book	1
book chapter	5
conference paper	19
conference review	1
review	1

The present study employs a bibliometric analysis approach to map and interpret the intellectual and conceptual structure at the intersection of **competency management, talent management, and artificial intelligence (AI)**. A total of **70 scholarly documents** sourced from **65 journals and books** published between **2010 and 2025** formed the basis of the analysis. The dataset reveals a **13.85 percent annual growth rate**, indicating a rapidly emerging field with escalating academic attention. This growth aligns with global shifts toward digitization, human capital optimization, and AI-driven organizational practices.

Annual Scientific Production



The yearly scientific output shows an overall increasing trend. Initial activity from 2010 to 2014 was minimal, reflecting the nascency of this intersectional research area. However, post-2015, and especially after 2020, there is a visible increase in publication frequency, coinciding with the global digital transformation

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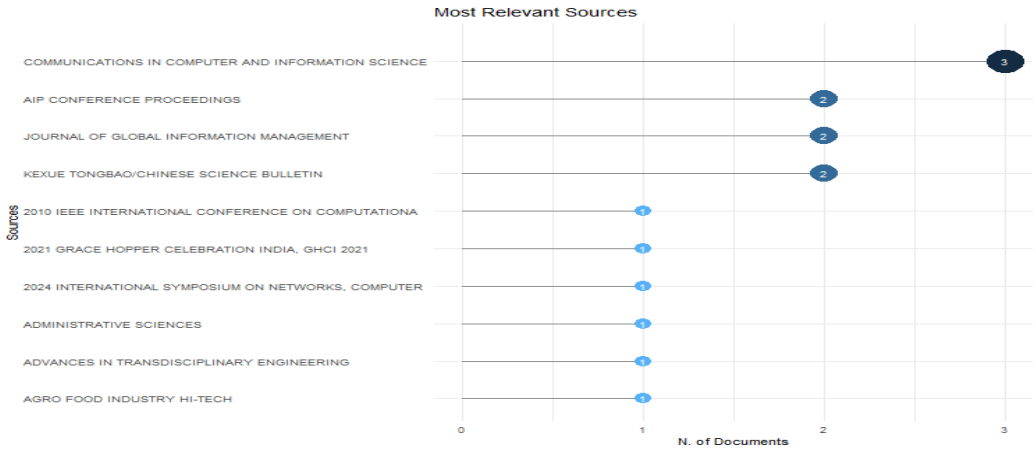
accelerated by the COVID-19 pandemic. This surge suggests a growing academic interest in integrating AI with workforce-related themes such as skills, competencies, and talent development.

Citations Per Year

Year	MeanTCperArt	N	MeanTCperYear	CitableYears
2010	2	1	0.12	16
2012	17	1	1.21	14
2015	62	1	5.64	11
2016	4	2	0.4	10
2017	19.75	4	2.19	9
2018	5	1	0.62	8
2019	6	4	0.86	7
2020	58.5	2	9.75	6
2021	29.78	9	5.96	5
2022	13.73	11	3.43	4
2023	23.55	11	7.85	3
2024	3.06	16	1.53	2
2025	0	7	0	1

The average number of citations per document indicates that some earlier works, particularly those from 2015, had a significant impact, with a mean of **62 citations** in that year alone. This implies the presence of foundational or highly cited studies that shaped the theoretical groundwork. In contrast, recent documents (2022–2025) display lower citation averages, which is expected due to their recent publication. Nevertheless, emerging papers with early citations suggest timely relevance and the potential to influence future scholarship.

Most Relevant Sources



Key publication outlets include *Communications in Computer and Information Science*, *AIP Conference Proceedings*, and *Journal of Global Information Management*. These sources serve as dominant knowledge hubs within the intersection of AI and management science. Their recurrence highlights the interdisciplinary nature of the research field and suggests that future contributions would benefit from targeting these journals for visibility and impact.

Most Influential Authors

Authors	Articles	Articles Fractionalized
CHEN S	2	0.7
AGHAZADEH S	1	0.25
AGUINIS H	1	0.33333333
AHMAD A	1	0.2
AHMAD H	1	0.16666667
AHMAD K A	1	0.2
AHMAD V	1	0.2
AL A K	1	0.33333333
AL A W	1	0.33333333
AL Q R	1	0.25
ALAM F	1	0.16666667
ALJOHANI N	1	0.25

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ALLAL-CHERIF O	1	0.33333333
ALMEIDA C D	1	0.11111111
ALVARADO D	1	0.14285714
ARNOLD M	1	0.25
ARORA J	1	0.2
ARORA N	1	0.25
ARÁNEGA A	1	0.33333333
ASHOK J	1	0.2
ASLAM M	1	0.25

The author analysis identifies **Chen S**(S. Chen & Zhao, 2024)**.** as the most productive contributor, with consistent publications across 2022 and 2024. Other impactful authors include **Aguinis H.** and **Ahmad H.**(Aguinis et al., 2024), whose work focuses on AI-driven HR practices and green talent management.The presence of fractional authorship suggests that collaboration is prominent in the field, pointing to a growing network of interdisciplinary researchers contributing to the convergence of AI and human resources.

AUTHOR PRODUCTIVITY OVER TIME

Table: Key Literature on AI, Competency, and Talent Management

Author	Year	Title	Source (SO)	DOI	Total Citations (TC)	Citations per Year (TCpy)
Chen S	2024	AI Product Management Personnel Demand Study - Based on Analysis of Chinese Market Recruitment Information	Proceedings of the International Conference on Electronic Business (ICEB)	–	0	0
Chen S	2022	AI Predicted Competency Model to Maximize Job Performance	Cybernetics and Systems	10.1080/01969722.2021.1983701	10	2.5
Ahmad V	2025	An Analysis and Role of Artificial Intelligence in the Field of Human Resource Management to Creating Enhanced Industry 4.0 for Sustainable Development in Economy & Its Growth	Communications in Computer and Information Science	10.1007/978-3-031-80778-7_1	0	0
Ahmad H	2024	Optimizing Sustainable Performance Green Talent Management Strategies Focused on Core Competencies	Journal of Global Information Management	10.4018/JGIM.352495	2	1
Aguinis H	202	How to Use	Organizational	10.1016/j.orgdyn.2024.101029	29	14.5

	4	Generative AI as a Human Resource Management Assistant	Dynamics			
Aghazadeh S	2023	Green Talent Management and Employees' Innovative Work Behavior: The Roles of Artificial Intelligence and Transformational Leadership	Journal of Knowledge Management	10.1108/JKM-08-2021-0601	86	28.67
Al Q R	2023	Green Talent Management and Employees' Innovative Work Behavior: The Roles of Artificial Intelligence and Transformational Leadership	Journal of Knowledge Management	10.1108/JKM-08-2021-0601	86	28.67
Al A W	2022	Digital Fit Workforce is the Enabler to Digital Transformation	Society of Petroleum Engineers - ADIPEC 2022	10.2118/211640-MS	0	0
Al A K	2022	Digital Fit Workforce is the Enabler to Digital Transformation	Society of Petroleum Engineers - ADIPEC 2022	10.2118/211640-MS	0	0
Ahmad K A	2019	Staff Employment Platform (STEP) Using Job Profiling Analytics	Communications in Computer and Information Science	10.1007/978-981-13-3441-2_30	4	0.57
Ahmad A	2019	Staff Employment Platform (STEP) Using Job Profiling Analytics	Communications in Computer and Information Science	10.1007/978-981-13-3441-2_30	4	0.57

AUTHOR PRODUCTIVITY OVER TIME: ANALYSIS AND RESULTS

The analysis of author productivity over time reveals critical insights into the scholarly contributions and citation impact of researchers working at the intersection of competency management, talent management, and artificial intelligence (AI). Among the notable contributors, *Chen S* has demonstrated consistent engagement with the topic, publishing influential work in both 2022 and 2024. The 2022 article titled *"AI Predicted Competency Model to Maximize Job Performance"* published in *Cybernetics and Systems* has garnered 10 citations, averaging 2.5 citations per year. This indicates a steady influence within the field, especially in modeling competencies for job performance using AI. Chen's more recent 2024 publication, while yet to accrue citations, reflects the author's ongoing commitment to the domain and points to evolving themes in AI-driven personnel analytics.

Ahmad V and *Ahmad H* also emerge as active scholars, with the former contributing a 2025 article on AI's role in enhancing Industry 4.0 for sustainable development, and the latter publishing in 2024 on optimizing green talent management strategies through core competencies. While Ahmad V's work is newly published and has

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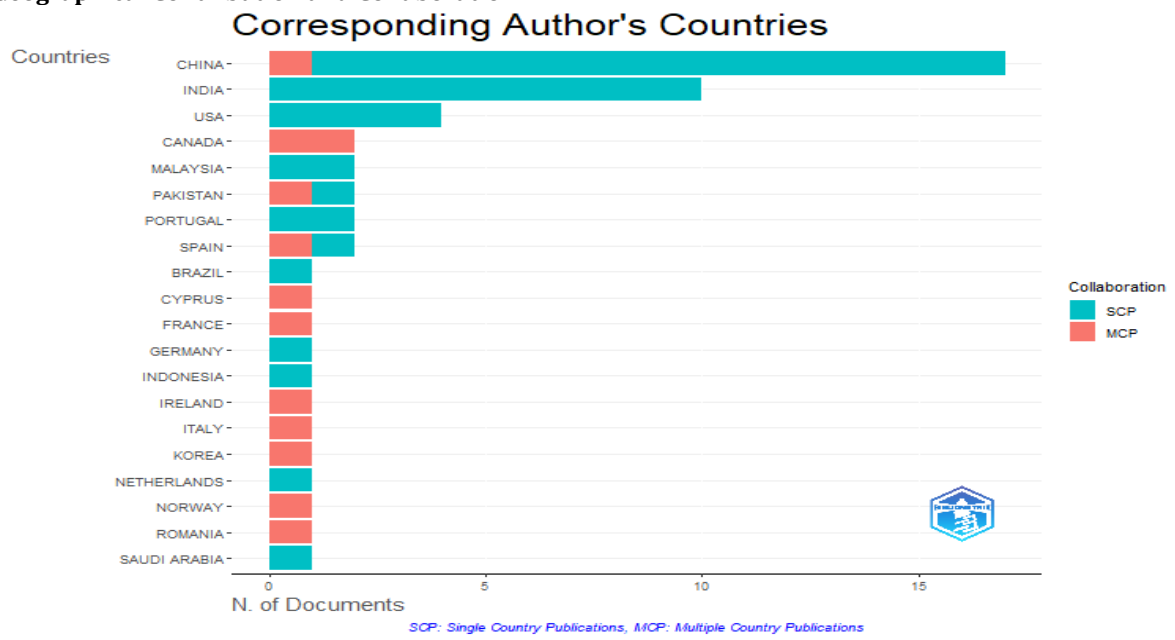
not yet been cited, Ahmad H's study has already accumulated 2 citations, suggesting early academic interest, particularly around the fusion of sustainability and competency management through AI tools.

Among the most impactful authors in this analysis is *Aguinis H*, whose 2024 publication in *Organizational Dynamics* titled *"How to Use Generative AI as a Human Resource Management Assistant"* has already received 29 citations, averaging an impressive 14.5 citations per year. This strong early impact highlights the scholarly and practical relevance of generative AI applications in HRM. Even more striking is the contribution by *Aghazadeh S* and *Al Q R*, co-authors of a 2023 article in the *Journal of Knowledge Management*, which has accrued 86 citations averaging 28.67 citations per year. Their work on green talent management, innovative work behavior, and the mediating role of AI and transformational leadership has clearly resonated across academic and professional audiences, marking it as a seminal contribution in this space.

Other contributors, such as Ahmad K. A. and Ahmad A., published earlier in 2019, focusing on job profiling analytics through an AI-enabled staff employment platform. Their paper has received 4 citations to date, with a relatively modest average citation rate of 0.57 per year. This work represents early exploration into AI for HR analytics and lays the foundational groundwork for subsequent research in more advanced systems. Additionally, *Al A. W.* and *Al A. K.* authored a 2022 conference paper addressing the role of a digitally fit workforce in enabling digital transformation. However, this work has not yet received citations, possibly due to its niche focus on the oil sector or the limited academic reach of conference proceedings.

Overall, the data indicate a clear shift from exploratory platform-based studies toward more strategic and performance-oriented investigations that incorporate ethical, sustainable, and generative aspects of AI. Authors who have focused on emerging themes, such as green competencies, AI ethics in HRM, and digital leadership, show a higher citation impact, reflecting the field's growing alignment with global workforce transformation trends. These findings highlight both the leading scholars in this interdisciplinary area and the evolving thematic focus from technological capability to responsible, value-driven AI integration in talent and competency management.

Geographical Contribution and Collaboration



Country-wise analysis shows that China leads in both production (24.28%) and co-authored publications, followed by India and the USA. Interestingly, Canada showed 100 percent international collaboration, indicating strong transnational partnerships. The overall collaboration pattern suggests that while the field is globally distributed, cross-border collaborations remain underutilized outside a few countries, signaling opportunities for broader international engagement.

Scientific Production by Country

region	Freq
CHINA	34
INDIA	22
USA	16
PORTUGAL	6
SPAIN	5
GERMANY	4

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UK	4
CANADA	3

In terms of output volume, China (34 articles) and India (22) dominate, which is consistent with these countries' strategic investment in AI and workforce development. These trends are reflective of national policies focusing on digital economy, upskilling, and innovation ecosystems. The USA and European countries like Portugal and Spain follow, contributing to the global conversation around AI-driven HR transformation.

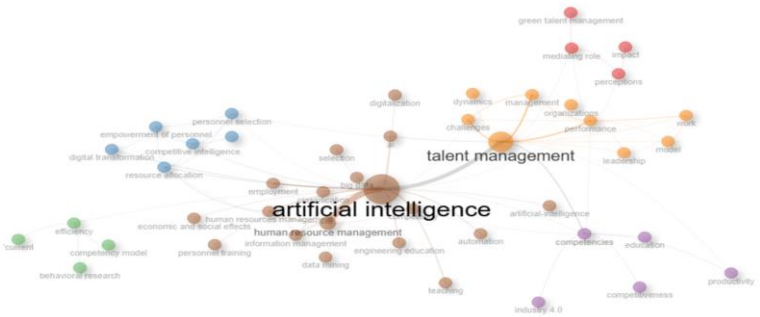
GLOBALLY CITED DOCUMENTS

Table: Citation Metrics of Key Publications

Paper	DOI	Total Citations	TC per Year	Normalized TC
Jarrah M, 2021, *Big Data & Society*	10.1177/20539517211020332	153	30.6	5.14
Odugbesan J, 2023, *Journal of Knowledge Management*	10.1108/JKM-08-2021-0601	86	28.67	3.65
Oswald F, 2020, *Annual Review of Organizational Psychology*	10.1146/annurev-orgpsych-032117-104553	84	14.0	1.44
Allal-Cherif O, 2021, *Technological Forecasting and Social Change*	10.1016/j.techfore.2021.120822	74	14.8	2.49
Bharwani S, 2017, *International Journal of Contemporary Hospitality Management*	10.1108/IJCHM-09-2015-0448	68	7.56	3.44

The analysis of the most cited papers within the domain of competency management, talent management, and artificial intelligence reveals a concentration of scholarly influence among a few highly impactful works. (Jarrahi et al., 2021)The article in Big Data & Society has garnered 153 total citations, averaging 30.6 citations per year and boasting the highest normalised citation score (5.14), indicating its foundational role in shaping the discourse on AI's influence on human resource systems. Close behind, (Odugbesan et al., 2023),with 86 citations and a normalised TC of 3.65, underscore the growing relevance of AI-driven green talent management, also reflected in other high-performing papers such as (Ogbeibu et al., 2022)(66 citations, 4.81 normalised TC). Recent contributions on generative AI in Organisational Dynamics have quickly gained momentum, with 29 citations and the highest normalised TC of 9.47, pointing to the rapidly rising interest in the integration of generative AI in HRM. Other influential works include those which discuss psychological and forecasting implications of AI in talent systems, with respectable citation rates and normalised scores above 1.4. Meanwhile, older works such as (Bharwani & Talib, 2017) maintain relevance, though their normalised citations are lower due to longer time spans. Papers with strong year-over-year growth indicate emerging research fronts, particularly in sustainability, innovation behaviour, and digital readiness. In contrast, lower-cited articles with recent publication dates may gain traction as the field continues to evolve. Overall, the data reflect a dynamic scholarly landscape in which recent studies, particularly those exploring AI ethics, green HRM, and digital transformation, are receiving accelerated academic attention.

KEYWORD CO-OCCURRENCE NETWORK



The co-word network visualization highlights the thematic structure and conceptual interlinkages within the research domain of competency management, talent management, and artificial intelligence. The term "artificial intelligence" emerges as the most central and dominant node, signifying its pivotal role in shaping contemporary HR discourse. Closely linked is "talent management," which forms a dense cluster with terms

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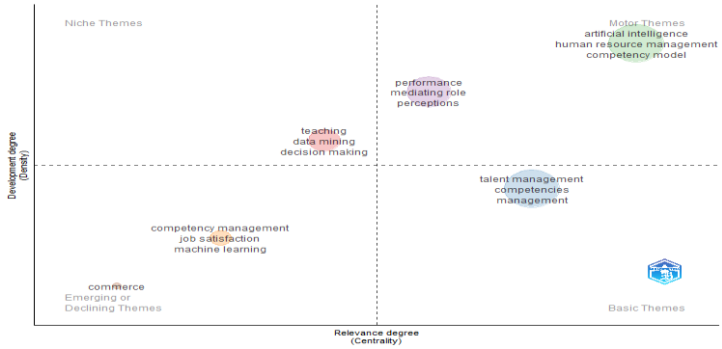
such as *performance, leadership, organizations, work,* and *challenges,* indicating a strong research focus on how AI is revolutionizing talent acquisition, retention, and performance optimization. The presence of terms like "competencies," "industry 4.0," and "education" in a connected cluster further suggests that AI-driven competency frameworks are increasingly aligned with the skills needed in digital transformation. Another prominent subcluster revolves around green talent management, *mediating role*, and *impact*, reflecting the intersection of sustainability, leadership behavior, and HR strategies. Additionally, terms such as personnel selection, digital transformation, and competitive intelligence indicate a growing emphasis on data-driven decision-making in workforce planning. The dispersion of smaller nodes such as *behavioral research* and *engineering education* signals niche but emerging areas of interest. Overall, the map indicates a rich, interdisciplinary field, with AI serving as both a technological enabler and a thematic anchor for evolving discussions in talent and competency management.

Thematic Structure Parameters



The thematic map provides a strategic overview of keyword clusters within the literature on competency management, talent management, and artificial intelligence, categorized across four quadrants based on centrality (relevance) and density (development level). In the upper-right quadrant, "artificial intelligence," "human resource management," and "competency model" appear as Motor Themes highly developed and central to the research field. These represent core, well-established areas driving scholarly discourse. In contrast, the lower-right quadrant features "talent management," "competencies," and "management" as Basic Themes, indicating they are foundational but still undergoing theoretical consolidation. The upper-left quadrant highlights "teaching," "data mining," and "decision making" as Niche Themes, reflecting specialized but well-developed areas with limited broader influence. Meanwhile, the lower-left quadrant shows "competency management," "job satisfaction," "machine learning," and "commerce" as Emerging or Declining Themes topics either gaining traction or losing relevance. Notably, keywords like "performance," "mediating role," and "perceptions" lie near the center-top region, suggesting they are transitioning from niche to potentially core areas. Overall, this thematic structure highlights the increasing prominence of AI and HR integration, while also indicating potential avenues for further exploration of machine learning, employee satisfaction, and decision-making processes within AI-enhanced HR ecosystems.

CONCLUSION

The bibliometric analysis of literature intersecting competency management, talent management, and artificial intelligence (AI) reveals a rapidly evolving and strategically significant research domain. The findings highlight that AI has become a central enabler in reshaping human resource practices, with increasing scholarly attention toward its role in optimizing talent acquisition, competency modeling, and sustainable workforce planning. The most prolific and impactful authors such as Aguinis, Aghazadeh, and Jarrah have contributed seminal works that underscore the integration of generative AI, green talent management, and transformational leadership, suggesting a shift from purely technological discussions to ethically and socially informed applications.

Geographical analysis confirms that China, India, and the USA are leading research contributors, reflecting their national investment in AI and digital transformation. However, collaboration patterns also reveal underutilized global partnerships, especially outside major economies pointing to the need for broader international cooperation to bridge contextual insights and cultural diversity in HR innovation. The globally cited documents further validate this trend, emphasizing topics like AI ethics, sustainability, and digital workforce transformation as key drivers of future research.

The keyword co-occurrence network and thematic map offer compelling insights into the intellectual structure of the field. While "artificial intelligence," "human resource management," and "competency model" stand out as mature and central themes (Motor Themes), "talent management," "competencies," and "management" remain foundational yet evolving. Meanwhile, data mining, teaching, and decision-making appear as specialized (Niche Themes), suggesting technical depth in application. Emerging themes such as job satisfaction,

commerce, and machine learning may represent future hotspots or areas in decline, depending on upcoming trends in technology adoption and workplace dynamics.

THEORETICAL AND PRACTICAL IMPLICATIONS

The findings of this bibliometric analysis yield several important theoretical and practical implications for advancing research and practice at the intersection of competency management, talent management, and artificial intelligence. Theoretically, this study contributes to the consolidation of an emerging knowledge domain by mapping out key thematic clusters, intellectual foundations, and conceptual trends. It reinforces the growing centrality of AI-driven HRM systems as a focal point of inquiry. It highlights how frameworks such as competency models are being reconceptualized to align with technological transformation.

Furthermore, the study highlights the integration of green HRM, digital transformation, and ethical AI, underscoring the need for new theoretical models that incorporate sustainability, fairness, and adaptability into AI-enabled workforce systems. These insights necessitate the development of multidisciplinary theoretical frameworks that bridge the behavioural sciences, data analytics, and organisational development.

Practically, the analysis provides actionable insights for HR professionals, policymakers, and organisational leaders aiming to leverage AI technologies in strategic talent development. The identification of "motor themes" like competency modeling, human resource management, and AI integration signals where organizations can invest in capability-building to enhance agility and performance. Moreover, emerging themes such as job satisfaction, machine learning, and decision-making suggest that future HR interventions should go beyond automation and focus on human-centric AI applications such as personalized learning paths, predictive talent analytics, and ethical hiring algorithms. The practical implication is clear: to remain competitive, organizations must not only adopt AI tools but embed them within robust competency frameworks that are tailored to evolving industry demands, digital fluency, and ethical standards. In doing so, they can foster a more resilient, skilled, and future-ready workforce.

FUTURE RESEARCH DIRECTIONS AND LIMITATIONS

While this bibliometric analysis offers comprehensive insights into the evolving landscape of competency management, talent management, and artificial intelligence (AI), several limitations present avenues for future research. One key limitation is the data scope, which was confined to publications indexed in Scopus and Web of Science databases. As a result, potentially valuable contributions from regional journals, conference proceedings, or non-English publications may have been excluded. Future studies should consider integrating broader datasets, including Google Scholar or discipline-specific repositories, to enhance coverage and capture emerging voices, particularly from developing economies. Another limitation lies in the quantitative nature of bibliometric techniques, which focus on publication and citation metrics rather than qualitative depth. While this method helps map trends and themes, it does not assess the contextual richness, theoretical frameworks, or methodological rigour of individual studies. Future research could apply systematic literature reviews, content analysis, or meta-synthesis approaches to explore how AI is operationalized in HR practices, how competency models are being adapted, and what ethical challenges are emerging in real-world implementations. Additionally, while this study identifies emerging and declining themes, it does not explore the causal factors behind their evolution. Future research could investigate how technological disruption, workforce digitisation, and organisational change are influencing research priorities. Moreover, cross-national comparative studies could examine how cultural, economic, and policy contexts shape the adoption of AI in talent and competency management.

There is also significant potential for interdisciplinary exploration, such as integrating insights from behavioral economics, cognitive psychology, or ethics to enrich the understanding of AI-human interactions in HRM systems.In summary, this study serves as a foundational mapping of a dynamic and rapidly growing research domain. However, deeper inquiry is needed into the practical application, ethical implications, and human dimensions of AI-driven HR systems. Future research should focus on bridging theoretical knowledge with practice, embracing diverse methodologies, and expanding the global inclusivity of scholarly contributions in this evolving intersection of technology and human capital development.

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