Natural Resources for Human Health
eISSN: 2583-1194

Original Research

Received 12 March 2026
Revised 21 April 2026
Accepted 25 May 2026

Natural Resources for Human Health 2026, Vol. 6 (3): 902–922

KEYWORDS:
Human Resource Development, Health Workforce Development, Organisational Resilience, Sustainable Healthcare Performance, Theory-Building Bibliometric Analysis

Human Resource Development As A Strategic Capability For Human Health: A Theory-Building Bibliometric Analysis Of Health Workforce Development, Organi-sational Resilience, And Sustainable Healthcare Performance

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ABSTRACT: Purpose: This study creates a theory-building lens for HRD as a strategic organizational capability that bolsters health workforce development as well as staff and system resilience alongside sustainable healthcare performance. In contrast to most prior bibliometric studies that examined publication trends, research productivity, and collaboration networks, this study attempts a preliminary integrated theoretical analysis of the evolution of HRD in healthcare. This study seeks to advance the HRD field by introducing an Integrated Human Resource Development Strategic Capability Framework that positions HRD as the primary organizational capability that not only builds workforce development and organizational resilience, but also undergirds the sustainability of the healthcare system. This study purposely avoids presenting bibliometric evidence as a stand-alone contribution. Instead, the study consolidates the intellectual framework of HRD research and integrates a strategic capability model that articulates the interrelationships between Human Resource Development, Health Workforce Development, Organisational Resilience, and Sustainable Healthcare Performance.

Design/methodology/approach: A theorizing bibliometric method was used on publications available on the Scopus database for the years 2020 to 2025. The author's bibliometric data were collected using a structured search of the database guided by specific HRD and healthcare-related terms. The data set was analyzed using MS Excel and VOSViewer to illustrate trends and productivity as well as HRD in terms of its leading journals, key authors, institutions, nations, and sponsors. This was followed by analyses of citation structures, keyword co-occurrence, patterns of collaboration, bibliographic coupling, and co-citation. In contrast to a sole focus on standard descriptive bibliometric indicators, the results of the analyses were integrated to produce a strategic capability framework that delineates the major lines of development of HRD in healthcare.

Findings: Findings indicate that research on Human Resource Development (HRD) has been growing rapidly throughout the world. It shows that scholars are beginning to realize that considering workforce capabilities and their development are vital to the sustainability of the healthcare system. The field's advanced intellectual structures have begun to include themes related to health workforce capability, digital transformation, workplace learning,

workforce resilience, leadership, employee well-being, healthcare innovation, and sustainable performance. Based on the results, the proposed model places HRD as a core strategic capability of health workforce development and is the key contributor to developing workplace resilience and sustainable performance in health care by enhancing the quality, resilience, and innovative health care services combined with ongoing learning within the organization.

Originality/value: The study moves beyond traditional bibliometric mapping in the fields of Human Resource Development and healthcare management to establish a theory-building explanation on intellectual development. The proposed Integrated Human Resource Development Strategic Capability Framework offers a theory of HRD, Integrated Strategic Capability Framework, and provides a resilient healthcare workforce developed within the framework of sustainable healthcare systems and services. The framework is designed to address the evolving needs and interests in healthcare systems of researchers, healthcare system leaders, and healthcare service managers.

1. INTRODUCTION

Human Resource Development (HRD) is now understood as a strategic capability for healthcare organisations to enhance workforce skills, flexibility, and the sustainability of healthcare over the long term. Once understood narrowly as employee training and the continuing professional education of employees, HRD has becomeMcLean & Jiantreerangkoo, 2020; Callahan et al., 2021). Complex, and driven by the intersection of challenges posed by technology, changes in demographics, the growing complexity of healthcare, and chronic workforce shortages, healthcare organisations are required to build resilient and skilled w a complex organisational capability that encompasses continuous learning, development of organisational members as leaders, and even knowledge and organisational innovation (Garavan et al., 2020; orkforces to address the challenges posed by rapidly changing healthcare systems.

The COVID-19 pandemic has underscored the HRD strategic imperative in particular. It showcased, amongst many things, under preparedness of healthcare systems, workforce preparedness, and organisational preparedness and resilience to meet the challenges posed by a crisis. Many healthcare organisations were forced to re-engineer how they delivered healthcare services, digitally transform the service delivery, rapidly train healthcare workers to deliver the bulk of needed services in challenging operational conditions (Dirani et al., 2020; Aguinis & Burgi-Tian, 2021; WHO, 2022). The sustained development of human capability is a critical component of resource sustainment. Thus, the HRD has become a strategic capability for healthcare organisations to strengthen workforce readiness and improve organisational learning and adaptive capacity.

Profound transformations of digital technologies dominated the initial decades of the 21st century. In the health care sector, technologies such as artificial intelligence, telehealth, electronic health records, predictive analytics, robotics, and precision medicine have been integrated. These technologies continuously alter the demands of professional roles and the skills required. As a result, professionals in the health care sector are required to constantly update their knowledge and skills. Consequently, HRD must go beyond the confines of traditional education and training to involve the development of digital skills, collaborative skills, leadership skills, and embedded learning in organizations. Organizations that invest strategically in the development of their employees have shown to be more effective and innovative and provide a higher quality of service than organizations that rely primarily on the provision of traditional training (Noe et al., 2023; Salas et al., 2023).

Alongside workforce capability, organizational resilience has emerged as a critical determinant of healthcare sustainability. The health care sector increasingly operates in a disruptive environment characterized by pandemics, an aging population, financial constraints, climate-related disasters, cybersecurity threats, and fast changing patient demands. HRD focuses on leadership capability and organizational resilience through the development of an adaptive workforce to environmental changes. Therefore, HRD and organizational resilience have become intertwined strategic focuses of contemporary health care management.

HRD research is growing. However, current research covers too many topics such as human resource management, healthcare management, organisational behaviour, nursing, medical education, leadership, public health, and digital health. Studies emphasize topics such as workforce training, competency development, employee engagement, leadership, and organisational learning. McLean and Jiantreerangkoo (2020) and Sambrook (2022) argue such areas should be researched as a whole in order to create sustainable performance in healthcare. Likewise, most bibliometric research have only investigated the trends in publications, citations and the ratings of top authors, as well as an analysis of collaboration, and have failed to create a framework of integrated theories to describe the evolution of HRD as a strategic capability in healthcare organisations (Donthu et al., 2021; Lim et al., 2022). These fragmented findings hinder both the theories of HRD and the practices of incorporating HRD into healthcare in order to make it sustainable.

This study aims to address this gap by offering a theory-building approach to bibliometrics combined with innovative techniques such as bibliometric performance analysis and science mapping to describe the state of the art of Human Resource Development (HRD) literature for the period 2020-2025. Unlike traditional descriptive bibliometrics, a variety of techniques, such as co-authorship analysis, keyword co-occurrence, bibliographic coupling, and co-citation analysis, are used to offer a more thorough and sophisticated interpretation of the HRD literature. With the help of bibliometrics, the HRD literature is further developed to present the Integrated HRD Strategic Capability Framework. HRD is positioned here as the most basic strategic capability of an organization, which makes an impact on Health Workforce Development, Organizational Resilience and Sustainable Healthcare Performance. The aim of this research is to offer healthcare leaders and managers, and policy makers, a sustainable and resilient healthcare system and, at the same time, to contribute to the HRD and healthcare management domains.

2. METHODOLOGY

2.1 Research Design

In this research, we used a theory-building bibliometric design aimed at analyzing the development of Human Resource Development (HRD) research in the healthcare sector. Most bibliometric studies are descriptive and focus on publication lists and citation counts. In contrast, a theory-building bibliometric method focuses on the evolution of scientific knowledge and the development of a conceptual framework (Zupic & Čater, 2015; Donthu et al., 2021). This method helps researchers to detect key publications, the pattern of cooperation, and the relationships among the research themes and the strategic capabilities of the organization.

Because bibliometric analysis provides a new way to map the intellectual structure of a scientific discipline, it has become a popular methodology (Aria & Cuccurullo, 2017; Donthu et al., 2021). In this research, bibliometric performance analysis was supplemented with the science mapping to study publication trends, research collaboration, citations, and the evolution of research themes. Bibliometric results were synthesized to develop a conceptual integrated framework. In this case, it was an Integrated Human Resource Development Strategic Capability Framework that combined Human Resource Development, Health Workforce Development, Organizational Resilience, and Sustainable Healthcare Performance.

2.2 Data Source and Search Strategy

Scopus was the only database used for literature searches. In Baas et al. (2020), Scopus appears to have the broadest literature coverage with respect to peer-reviewed articles in the disciplines of healthcare, management, and the social sciences. Scopus appears to have some of the best indexing, citation coverage, and bibliometric research features of any database (Aria & Cuccurullo, 2017). The time frame for the search was limited to the years 2020 to 2025. This timeframe represented a period of rapid digital changes in the workplace, including disruptions to the healthcare system from the COVID-19 pandemic. This search was a outlined strategically by a series of keywords related to the field of Human Resource Development and healthcare.

The search was constructed with the following syntax: TITLE-ABS-KEY ("human resource development) AND PUBYEAR > 2020 AND PUBYEAR < 2025

In the first phase of the search, a set of criteria was used to include or to exclude search results. The search was limited to peer-reviewed, English-language articles found in Scopus. Duplicate records, editorial articles that could not be cited, and irrelevant articles in the field of Human Resource Development and healthcare were excluded. The final database contained a total of 538 articles.

2.3 Bibliometric Analysis

The bibliometric analysis was comprised of two related steps: performance analysis and science mapping analysis. Performance analysis identified trends, document types, and primary subject areas. It also included leading publication sources, authors, institutions, countries, and sponsors, as well as the most cited works. These components describe the authorship, visibility, and the overall advancement of HRD research in healthcare.

Analysis of the science mapping followed the performance analysis and was conducted using VOSviewer (Van Eck & Waltman, 2010). The mapping was done for the analysis of the intellectual substratum of the discipline. Four complementary network analyses were conducted: Co-authorship network of the countries to analyze scholarly collaborations, Co-occurrence network of the keywords to analyze research themes and trends, Coupling network analysis to analyze the conceptual alignment of the countries based on the bibliographic citations, and Co-citation network to analyze the HRD research foundational authors and seminal HRD research works. All, or a combination of, the aforementioned analyses was used to describe the performance and knowledge structure for HRD research and the conceptual frameworks for HRD research.

2.4 Integrated Strategic Capability Framework

The final step of the research was to construct a theory-building conceptual framework, which is a bibliometric integral. The recurring themes within the bibliometric framework were analyzed from the perspective of strategic capability. They were not viewed as descriptive results. Citation networks and keyword clusters were used alongside bibliographic relationships.

The proposed framework identifies Human Resource Development as the primary strategic capability that constructs Health Workforce Development, which then enhances Organisational Resilience and ultimately impacts Sustainable Healthcare Performance. This capability pathway illustrates the advanced stages of the HRD literature and provides a theoretical approach as to why and how healthcare organisations develop workforce capability towards long-term organisational sustainability. The developed framework builds on previous bibliometric work by illustrating how science mapping, as an advanced research approach, can assist in the development of an organisational theory, rather than simply illustrating the productivity of research.

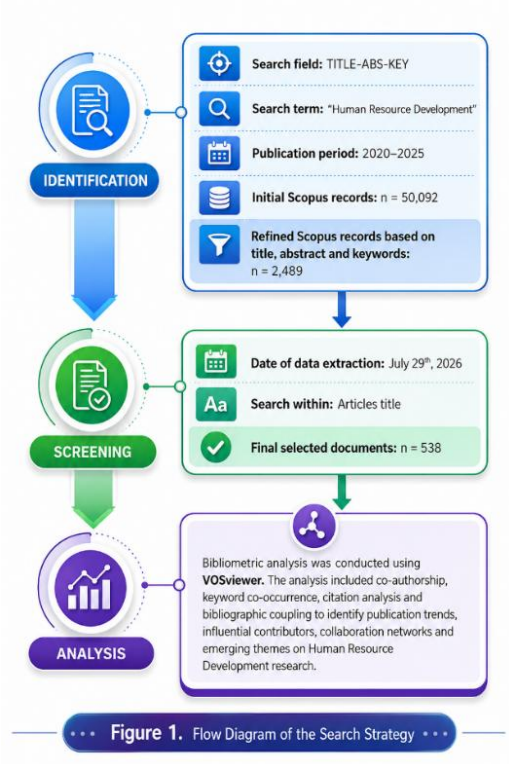

Figure 1. Flow Diagram of the Search Strategy

3. RESULTS AND ANALYSIS

3.1 Publication Characteristics of Human Resource Development Research

Figures 2-4 show different characteristics of Human Resource Development (HRD) research in the healthcare sector. They show different document types, different leading publication sources, and different publication subject areas. All combining show HRD research's different development stages from 2020-2025.

Figure 2 shows that 55.2% of HRD research were published as journal articles (297 of 538 publications). They were followed by book chapters (98; 18.2%), conference papers (54; 10.0%), and each of editorials and review articles contributed 32 publications (5.9%). The remaining were errata (11; 2.0%), books (8; 1.5%), notes (5; 0.9%), and letters (1; 0.2%). The high number of peer-reviewed journal articles published in HRD research shows that the research is developing in a scholarly dimension. It shows that HRD research is growing in a development scholarly dimension, and published articles contain the main empirical research investigations, and theoretical contributions of the various HRD research. Review articles show that HRD research is growing and consolidating different scholarly dimensions and contributing to the identification of research gaps. Conference papers show that HRD research is growing, and developing in different research areas.

The focus of HRD research remains in specialized journals covering workforce capability, organizational learning, and PD. The leading journals are HRD Review (54), HRD International (27), HRD Quarterly (26), the European Journal of Training and Development (19), and Advances in Developing Human Resources (17). The concentration of articles in these journals shows that HRD has progressed as a specialized field of research with dedicated journals. The articles in the various journals show the interdisciplinary character of HRD, covering organizational behavior, leadership, education and training, health care management, and organizational capabilities.

The interdisciplinary nature of HRD research is also shown in Figure 4. Business, Management and Accounting is the dominant area with 315 articles (32.1%). This is followed by Social Sciences (169; 17.2%) and Economics, Econometrics and Finance (98; 10.0%). These three areas alone account for 59.3% of the total articles, exemplifying the strong focus of HRD research on management and organizations. Engineering (70; 7.1%) and Computer Science (63; 6.4%) are also well represented, showing the impact of digital transformation, artificial intelligence, and information technology on the development of the workforce. The impact of Medicine, Environmental Science, Decision Sciences, Psychology, Nursing, and the Health Professions is also shown, as HRD research has moved beyond the traditional management boundaries.

The data in Figures 2-4 indicate that between 2020 and 2025, there was a consolidation of published scholarship in Human Resource Development research. Publications in peer-reviewed journals were predominant. Leading outlets were dedicated HRD journals. The integration of many disciplines suggests that HRD is viewed more as a strategic capability of the organisation than as a training function. The integration of management, healthcare, engineering, computer sciences and social sciences suggests that the field is evolving intellectually in order to deal with the complexities of developing a health workforce and transforming an organisation to be digitally resilient, while also ensuring sustainable performance of healthcare.

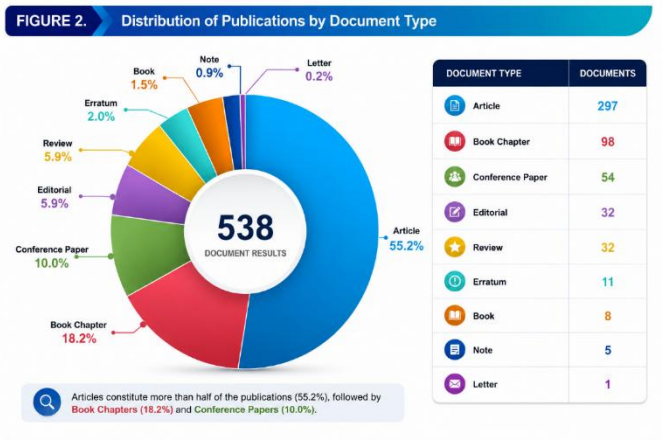

Figure 2. Distribution of Publications by Document Type
Source: Scopus database, Elsevier (2026)

Natural Resources for Human Health
eISSN: 2583-1194

Figure 3. Leading Publication Sources on Human Resource Development Research
Source: Scopus database, Elsevier (2026)

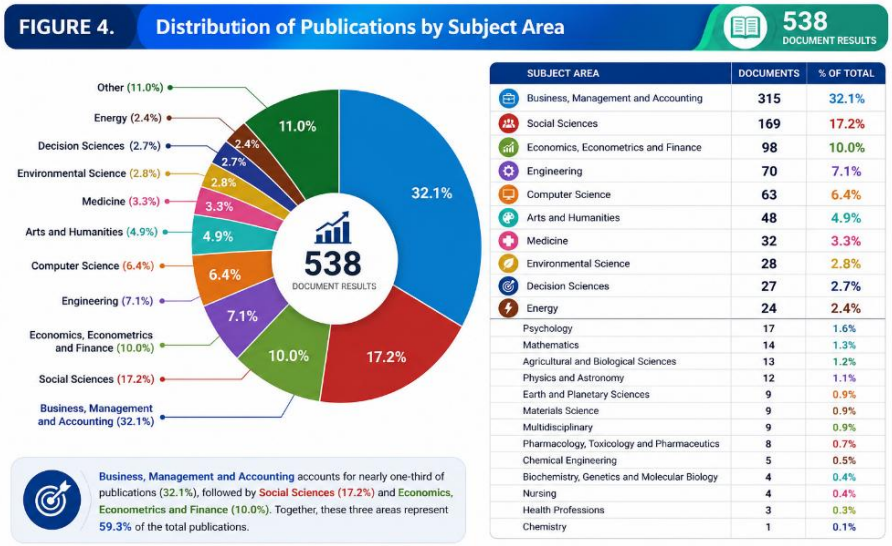

Figure 4. Distribution of Publications by Subject Area
Source: Scopus database, Elsevier (2026)

3.2 Annual Publication Trends on Human Resource Development Research (2020–2025)

The annual publication trends for HRD research for the years 2020–2025 are found in Figure 5. The data indicate a positive trend, even with fluctuations during the study period. HRD has great academic and practical importance in relation to the challenges faced in healthcare today. Interest in HRD is increasingly being recognized internationally as a means to build healthcare workforce capacity and a framework to enhance workforce and organizational resilience for optimal sustainable healthcare operations and services.

Following a slight decrease to 76 publications in 2021, the number of published works subsequently increased to reach 101 publications in 2023 and was forecasted to peak in 2024. The increased publication trends in the years 2023 and 2024 indicated that scholars focused more on HRD in the post-pandemic years, as healthcare organizations started to focus more on developing workforce capabilities and the need to build organizational learning, leadership, employee well-being, digital transformation, and organizational resilience. The increased research efforts in the years 2023 and 2024 were indicative of the

scholarly global interest in how healthcare organizations can improve workforce adaptability to change and how to maintain and provide sustainable healthcare services in complex, challenging, and dynamic situations.

In 2025, the total number of publications saw a modest decrease, dropping to 88. This reduction needs to be interpreted carefully. Scopus indexing of documents for the most recent publication year is usually incomplete at the time of the query. Thus, what seems to be a decrease is likely a delay in database indexing, not a decrease in research. A similar publication pattern is reported in most bibliometric studies, whereby the most recent year shows an incomplete or partial indexing, and not a reduction in research or scientific productivity.

In general, publication trends indicate that research in HRD in the healthcare context is evolving, and growing in maturity. After 2022, the increasing research publications in this area are indicative that HRD is being understood in healthcare as a strategic organizational capability, and not as a purely functional training role. The increasing publications in this area signal the intersections of HRD with health workforce development, organizational resilience and adaptive capacity, digital transformation, leadership, and sustainable healthcare performance, and support the inclusion of HRD in contemporary healthcare management and organizational sustainability.

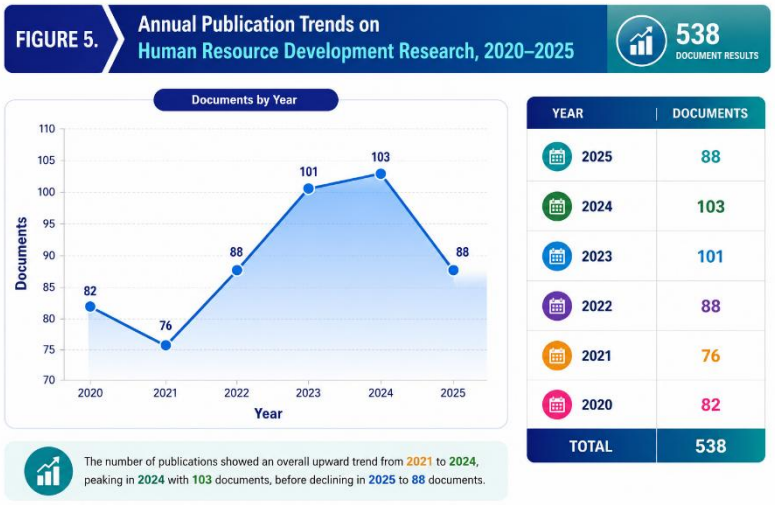

Figure 5. Annual Publication Trends on Human Resource Development Research, 2020–2025
Source: Scopus database, Elsevier (2026)

3.3 Most Productive Authors on Human Resource Development Research

The ten authors with the highest output in Human Resource Development research from 2020 to 2025 are shown in Figure 6. The number of publications indicates that many authors, rather than just a handful, are actively engaged in the area of interest. Thus, it is likely that a number of active research communities support this research area. The distribution stems from the cooperative and interdisciplinary approach to research in HRD, especially in healthcare. In HRD research, organizational learning, workforce development, and leadership, along with employee capability, are studied from many different theories and research methods.

Egan, T. and Yoon, S.W. were the most productive authors, having published seven times each during the research period. They were followed by Kim, S., Lim, D.H., McLean, G.N., and Park, S. who published six times. Byrd, M.Y., Crocco, O.S., and Nachmias, S. published five times, and Alizadeh, A. published four times. The range in the number of publications among the leading authors is small, and these authors represent the primary and most engaged authors of HRD research in this period.

The results suggest distributed intellectual leadership over published scholarship. The results indicate members of the HRD field prefer to publish in groups. This cooperative way of publishing is usual in mature fields of study. The authors leading the publications showed a wide range of interests. This shows growth in the HRD field.

The leads have a wide range of interests, as seen in the HRD publications, which shows the growth of the field. The leads have made publications that have advanced the international interpretation of HRD. The publications have made key advances to

HRD to develop strategic arguments in the field and to advance HRD to strategic levels of thinking to develop the workforce in health care and make the health care system sustainable and resilient. The publishing also shows that HRD is an interdisciplinary field and is expanding to include management, health care, education, and other fields.

Figure 6. Most Productive Authors on Human Resource Development Research, 2020–2025
Source: Scopus database, Elsevier (2026)

3.4 Worldwide Scientific Production on Human Resource Development Research

Between 2020 and 2025, the Scopus database shows global scientific research on Human Resource Development (HRD). In the distribution, HRD is seen as a global research field and is gaining more research interest in both developed and developing countries. There is still research productivity concentration in few countries, however the participation of North American, European, and Asian countries indicates a wider international acknowledgment of HRD as a vital element for advancing workforce development, resilience of organizations, and performance of sustainable healthcare.

In total, the US published the most papers with 141, 26.2% of the research. There has been a long history of research in the US related to HRD, research in organizations and learning, and health service management. Strong, advanced, and well funded US collaboration on research between universities and health services brings the US to the forefront of HRD research. The prominence of US research explains the major impact and role of US research, services, and scholars for the development of this area. Asia has demonstrated a greater ability to provide HRD research. Indonesia and Japan are each at 48 publications. Asia shows the growing investment of countries in the development of their healthcare workforce at the VC. Rapid development of the economy and healthcare, combined with government reforms and workforce capability initiatives, have increased research output in the Asia region and indicate the significant potential of HRD research in the region.

The UK follows at 5th position with 34 publications, showing that European countries are still involved in the development of HRD theory and practices. UK research has formed an important part of organizational learning, research on workplace capability, and the complement of the North America contribution in Leadership and Professional Education. In collaboration, the USA and UK provide the most important theoretical contributions to the HRD research of the whole world. The geographical diffusion in Figure 8 indicates that HRD research is expanding beyond Western research centers. Contribution from Southeast Asia and other fast-growing economies illustrates that more countries are viewing workforce capability as a key strategic resource for sustaining healthcare. Indonesia, Malaysia, Thailand, China, and India, among others, are active participants in research and in practice. This is a result of increased investment in the development of healthcare services, resilient organizations, digital health, and sustainable management of healthcare in these countries. The diversity of the research participants improves the field by the introduction of multiple contexts and varying policy and organizational frameworks.

The data illustrates the expanding geographical participation and the growing interconnectedness of international Human Resource Development research. The fast growing research activity in Asia, while the United States continues as the leading country, suggests the more balanced knowledge production and research in the field. The emerging international HRD research encourages and supports cross-country collaboration and the sharing of best practices, and advances the theory related to HRD as an organizational capability to build resilient and sustainable healthcare workforces and services.

Figure 7. Most Productive Institutions on Human Resource Development Research, 2020–2025
Source: Scopus database, Elsevier (2026)

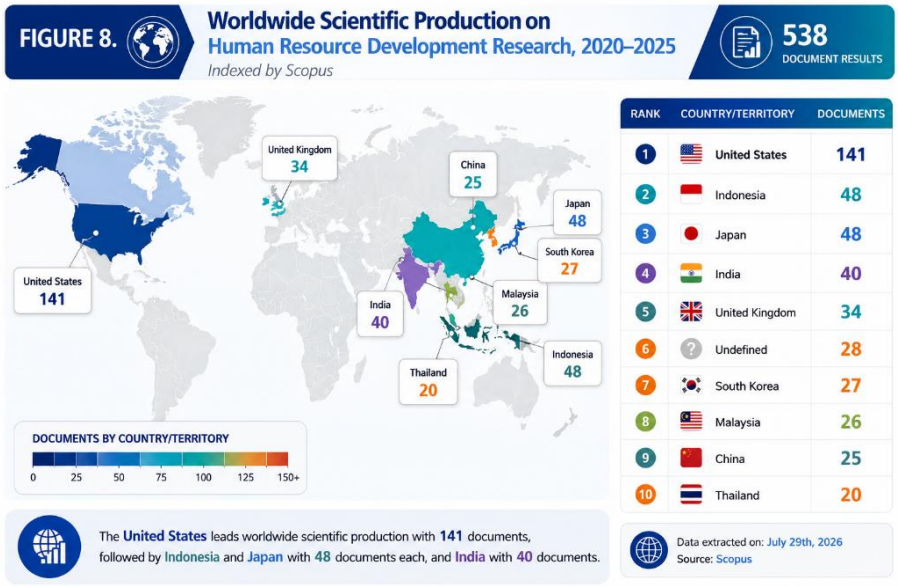

Figure 8. Worldwide Scientific Production on Human Resource Development Research, 2020–2025 Indexed by Scopus

3.5 Research Support and Influential Publications

The analysis of funding sponsors and prominent HRD research publications shows the research support structure and the intellectual impact of HRD research. Figures 9 and 10 portray this analysis. Taken together, they show the structural support for HRD research at an institutional level and the research works that shaped the intellectual context of the discipline the most.

As shown in Figure 9, support for HRD research funding came from multiple national governments, public funding agencies, and higher education institutions. The Japan Society for the Promotion of Science was by far the most active funding organization, sponsoring nine research publications, a number that is far greater than other funding organizations. CAPES, the European Commission, and the Ministry of Education sponsored three publications each, while the following organizations sponsored two publications each: the Conselho Nacional de Desenvolvimento Científico e Tecnológico, the Council of Scientific and Industrial Research, the Disaster Prevention Research Institute of Kyoto University, the National Defence University of Malaysia, Thailand Science Research and Innovation, and the United States Agency for International Development. The data indicates that HRD research receives continuous support from sponsors in both developed and developing nations. It shows that support for workforce capability development is growing in the global community. It appears that human resource development is becoming a major factor in government and research council perceptions of the effectiveness and sustainability of workforces and health systems. The various sponsors for HRD research indicate that the research has moved from being a strictly academic discipline to being a strategic policy area for national workforce development, innovation, and sustainable health systems.

The intellectual reach of the discipline is demonstrated further in Figure 10, which shows the ten most cited articles for the period 2020-2025. The most cited article was work design and received a citation count of 74; this article continues to position work design and employee capability and the effectiveness of work organizations and support. The second most cited article was by Cascio and received a citation count of 63. The last article was by DeRue and Ashford, and received a citation count of 57. These articles show an increasing focus and interest in workforce and organizational flexibility and the strategic development of human capital. Other significant publications help shape the HRD research agenda, as well. Kane et al. (2021)'s research discussed the intersection of digital transformation and HRD, showing the growing intersection of technology and digital development within the workforce. Marler et al. (2022) analyzed the effects of artificial intelligence on HRD, while Aguinis et al. (2022) explored employee development and organizational performance from a meta-analytic perspective. Recent work analyzed the future workforce through the lens of reskilling and upskilling, as well as sustainable organizational success and global HRD interventions. This work and more illustrates the expanding boundaries of HRD research. No longer is HRD limited to education and training. Now, it includes strategic organizational capability, flexibility, resilience, and sustainability.

The findings in Figures 9 and 10 combined show the strong commitment from institutions associated with the direction of research in HRD and scholarship of a high influence who provide answers to the most pressing issues facing organizations. The combination of funding and research of a high citation level shows a movement away from traditional employee development toward new ideas and themes such as workforce capability, digital transformation, organizational resilience, sustainable performance, and health care. The movement of ideas described here is more evidence that HRD has become a core strategic capability of organizations that underpins the development of the health workforce and the sustainability of health care organizations.

Figure 9. Most Active Funding Sponsors on Human Resource Development Research, 2020–2025
Source: Scopus database, Elsevier (2026)

Figure 10*:* Most Cited Articles on Human Resource Development Research, 2020–2025
Source: Scopus database, Elsevier (2026)

3.6 Country Co-authorship Analysis

Figure 11 shows the country co-authorship network of Human Resource Development (HRD) research from 2020 to 2025. Network visualizations capture the degree to which countries participate in international scientific collaboration and publishing in HRD. The size of a node indicates a country's publishing productivity. Links indicate the degree of collaboration. The structure of the network reveals the groups of countries that tend to collaborate and the clusters of countries in a global network of collaboration and participation in knowledge dissemination that supports the growth and advancement of HRD research.

The collaboration network shows that the United States is the most significant and the largest node with many direct links to countries in North America, Europe, Asia, and Oceania, as well as countries in the Middle East. Its position shows the United States is the most significant, principal, and the largest international research and collaboration link in HRD research. This position is maintained by the exchange and collaboration of research and knowledge in a number of active areas. Collaboration links to the United Kingdom, Australia, Canada, Germany, Thailand, Indonesia, India, Japan, and China indicate that the United States has a significant role in linking various global research communities.

Multiple regional collaboration clusters are found in the network. A key example highlights the United States, United Kingdom, Australia, Spain, Jordan, the Netherlands, and Morocco. This cluster demonstrates the presence of established research partnerships of the English-speaking countries with European research. A second cluster represents the emerging role of Southeast Asia in International Human Resource Development (IHRD) and covers Indonesia, Thailand, Germany, Canada, New Zealand, South Africa, and Bangladesh. The third cluster encompasses China, South Korea, and Japan, and exemplifies the growing involvement of East Asian countries in HRD research with regional scientific collaboration. Lastly, India stands as a collaboration center for research partnerships with Bahrain, the Philippines, and Poland, while also connecting with the broader international collaboration network.

The network demonstrates that in HRD research, there are high levels of international collaboration and no isolated research activities in individual countries. Countries with lower levels of HRD research are active members of the international research collaboration network through partnerships with countries that have high research output. This is indicative of the collaborative research effort in HRD. Collaboration is proven to increase the quality of research methods and techniques, and promote the transfer of innovative practices related to the development of the workforce.

The co-authorship network implements a global approach, pertinent given the international issues involving the healthcare workforce. This includes workforce shortages and the intersection of digital transformation and resilience, along with employee wellbeing and the performance of sustainable healthcare systems. All of these create common challenges. These challenges

promote collaborative research to derive knowledge and evidence-based, transferable solutions. Because so many countries participate, new and innovative research practices are included, and the results can be used in comparative research. This also develops new theories that can be applied internationally.

Human Resource Development (HRD) research is now an expansive and integrated field due to international collaboration (as indicated in Figure 11). Even though the United States is still the global center, the active collaborations of Asian and European countries and many other countries that are proliferating in research indicate a diverse new order in the practice of international research. This active collaboration is intellectually developing HRD, integrating different cultures, organizations, and healthcare. This describes HRD's evolution as the strategic capability for developing the healthcare workforce, strengthening the resilience of organizations, and ensuring sustainable healthcare systems.

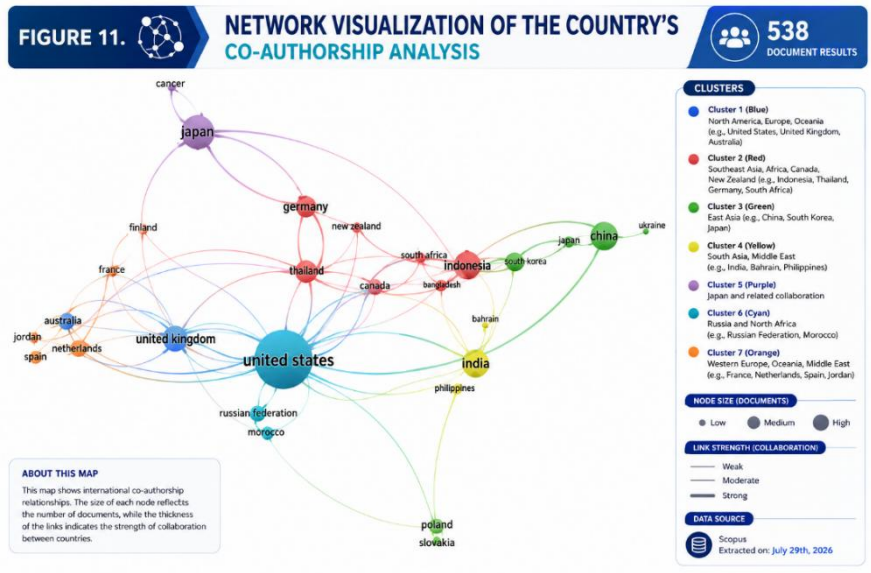

Figure 11. Network Visualization of the Country's Co-authorship Analysis
Source: Generated by the author(s) using VOSviewer (van Eck & Waltman, 2014)

3.7 Keyword Co-occurrence Analysis

The keyword co-occurrence analysis for Human Resource Development (HRD) research for the years 2020 to 2025 is shown in Figure 12. This network captures the relationships among frequently used author keywords and constructs the field's conceptual [illegible] analysis, the size of the nodes corresponds to the number of times a keyword was used, and the strength of the lines is proportional to the keyword co-occurrence. Keyword pairs that are closely linked are likely to be present in the same publications, and thus represent the same research theme, and/or a conceptual relationship. This analysis reveals seven research clusters and highlights the diverse and developing nature of research in HRD.

"Human resource development" is the largest, and most centrally located, keyword, and thus confirms its position as the core concept of all major HRD research themes. In addition, several keywords are likely to be present in the same research publications, including personnel development, human resource management, education, training, workforce development, sustainability, innovation, and leadership, among others. Given the position of the HRD node, research in this field has moved beyond the training of employees to encompass the potential of the entire organization and work sustained effectiveness and innovation.

The first research cluster, which is centered on human resource development, represents the core concepts of the field. This research cluster integrates HRD, personnel development, and workforce development, which is in line with the unfilled HR function, and organizational learning and capability, which are greater and are at the core of HRD.

This second cluster emphasizes the relevance of education, training, and professional development as a result of the prevalence of certain keywords including education, learning, employee, and professional development. It shows the importance of formal

and continual training, as well as the development of competencies, in the context of the healthcare field. The presence of education-related terms indicates that organizations prepare employees to respond to changes in the healthcare field rapidly and that workforce development and lifelong learning are fundamental ways to expand the capabilities of employees. A third cluster includes the keywords of sustainability, literature review, review, bibliometric analysis, and sustainable development. This cluster shows a growing interest in assessing the sustainable development of HRD research and the sustainability of organizations. It also shows that the field is developing and that a growing number of bibliometric and review studies indicate that researchers synthesize the body of work and identify new directions to develop the research.

Finally, there is a cluster of keywords that are related to HRD's strategic role in improving organizational effectiveness. This demonstrates the value and importance of leadership, employee engagement, organizational commitment, and employee retention. It is increasingly evident in HRD research that maintaining a skilled workforce will impact the sustainability of the organization, and that workforce capability must also be considered in relationship to operational requirements. An emerging cluster concentrating on digital transformation and analytics can be identified in the network. The increasing combination of digital solutions in the HRD research is shown by the presence of digital transformation, artificial intelligence, data analytics, and information technology along with bibliometrics and topic modelling. This shows the rapid change in the development of digital capabilities in the healthcare sector. The healthcare sector's technological progress requires reskilling the digital workforce, workplace digital literacy, and active organizational learning to fuel adaptive innovations to improve service and support the ongoing transformation in the digital workplace.

Additionally, smaller thematic clusters regarding change management, innovation, and organizational strategy, along with business continuity management, security, and risk management indicate that HRD research has moved beyond traditional workforce development to encompass advanced research on organizational capability. Keywords that pertain to sustainability and resilience, along with innovation and digital transformation, indicate that HRD is being viewed as a strategic capability that provides a competitive edge and supports organizational flexibility and long-term performance in the healthcare sector. The keyword co-occurrence network shows the progressive transformation of the discipline of Human Resource Development. The integration of the various concepts is especially noticeable in the connection of workforce development, organizational learning, leadership, and performance. These findings offer a strong theoretical foundation for the Integrated Human Resource Development Strategic Capability Framework, which posits that Human Resource Development is the core organizational capability that strengthens Health Workforce Development, enhances Organizational Resilience, and improves Sustainable Healthcare Performance.

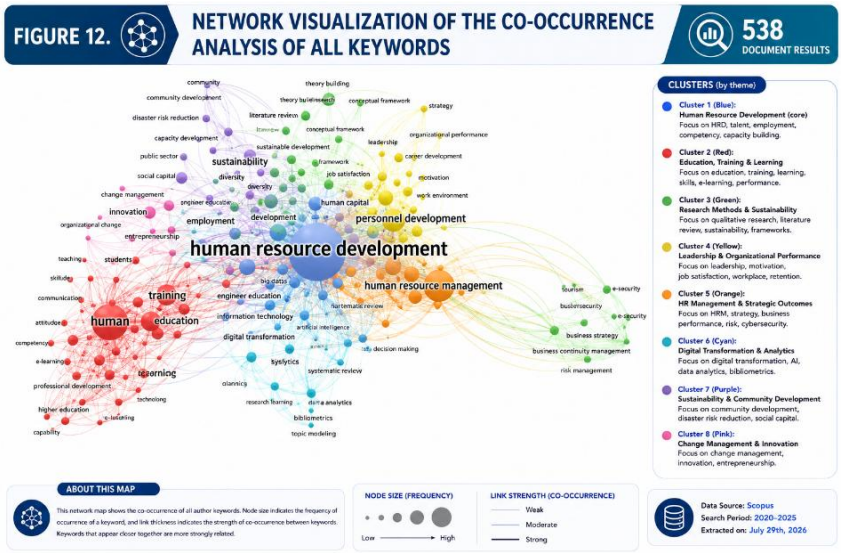

Figure 12. Network Visualization of the Co-occurrence Analysis of the All Keywords
Source: Generated by the author(s) using VOSviewer (van Eck & Waltman, 2014)

Natural Resources for Human Health
eISSN: 2583-1194

3.8 Bibliographic Coupling Analysis of the Countries

Between 2025 and 2020, HRD Investigators' bibliographic coupling network is depicted in Figure 13. It is a method that reveals the degree of scholarly relationship between countries based on their citations. Countries with a high degree of bibliographic coupling have similar research concerns and dimensions.

The United States is the most connected country in the network. It is connected to the United Kingdom, China, Canada, Germany, Australia, Japan and India in a broader network of core countries of HRD research. China is also a knowledge center in HRD research, as it is in the coupling of the West and Asia.

The bibliographic coupling network also reflects the research interests of the connected countries. The United States and the United Kingdom are in the red cluster, while Japan, Indonesia and Malaysia are in the blue cluster, and China in the green. India is in the center of a cluster that combines the countries of South Asia and the Middle East and is a center for HRD research. The bibliographic coupling network shows an increase in the interest and related research of countries in HRD research, as an internationally accepted strategic research area of developing countries to improve the health workforce and sustain the organizational performance of the health system.

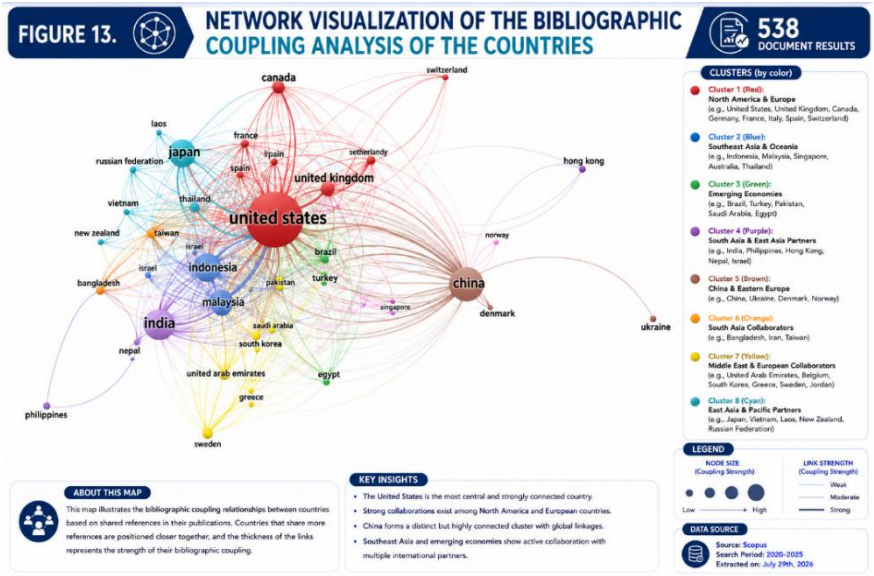

Figure 13. Network Visualization of the Bibliographic Coupling Analysis of the Countries
Source: Generated by the author(s) using VOSviewer (van Eck & Waltman, 2014)

3.9 Co-citation Analysis of the Cited References and Authors

Cited references and cited authors co-citation maps can be found in Figures 14 and 15. They show the co-citation networks of Human Resource Development (HRD) research and a portion of its intellectual foundations. Co-citation analysis reveals the major theoretical perspectives and knowledge structures in a research field by identifying references and authors that have been cited together.

HRD literature is shown in the co-citation mapping of cited references in Figure 14. It is organized into a number of interconnected clusters, each representing a major research focus of HRD. Using the clusters to guide which themes were important, the largest were found to be HRD, training, organizational learning, and leadership, as well as employee development and the design of work. These themes constitute the core of the HRD literature. Work that is emerging in the field is reflected in the core HRD literature in the themes of digital transformation, the use of AI, the future of work, and organizational sustainability. The patterns suggest that traditional work in HRD has been extended to include a focus on the strategic issues of the innovation and the sustainability of organizations. Other patterns suggest that contemporary research in HRD has moved beyond training the workforce to the work of organizational capability and the innovation of organizations.

Figure 15 presents a co-citation author network showcasing contributors to HRD research. Completely dominating the network are authors McLean, G.N. Swanson, R. A., Holton, E. F., Callahan, J. L., Bierema, L. L., Torraco, R. J. and Knowles, M. S. Each implies an influence regarding the branch's theoretical development. The presence of several interconnected author clusters shows the integration of multiple research traditions: adult and organizational learning, leadership development, human capital, and strategic human resource development.

The results from the co-citation analysis also indicate that there is a well-developed, interconnected, and co-existing intellectual basis for research on HRD. The interconnected nature of the key authors and resources confirms that there is a developing theoretical coherence and at the same time an incorporation of new ideas such as digital transformation, organizational resilience, sustainability, and future workforce development. Taken together, they support the idea that HRD has matured as a strategic organizational capability with a core focus on developing the health workforce and sustaining the performance of the health care system.

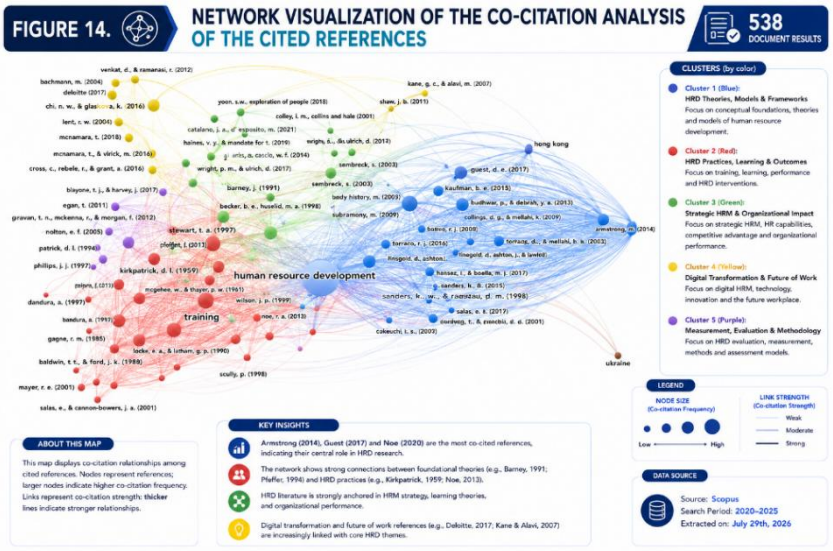

Figure 14. Network Visualization of the Co-citation Analysis of the Cited References
Source: Generated by the author(s) using VOSviewer (van Eck & Waltman, 2014)

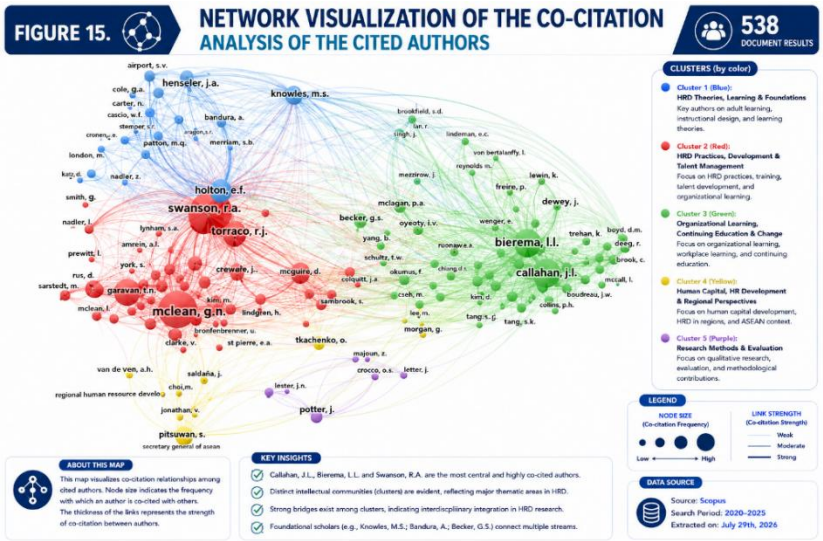

Figure 15. Network Visualization of the Co-citation Analysis of the Cited Authors

4. DISCUSSION

4.1 The Evolution of Human Resource Development as a Strategic Capability

The bibliometric evidence illustrates that from 2020–2025, Human Resource Development (HRD) underwent a dramatic change. The field began moving away from a focus on employee training and professional development, and began incorporating and addressing a wider range of strategic capabilities, such as workforce development, organizational learning, leadership, digital transformation, and organizational resilience and adaptability. The consistent annual growth in publications combined with the prevalence of HRD-related articles in peer-reviewed journals shows that HRD is becoming a well-established and internationally recognized area of research. This is a direct result of changes in the needs and priorities of organizations, especially in the field of healthcare, and in particular, the significance of workforce capability for organizational sustainability and the long-term success of the organization (Garavan et al., 2020; McLean & Jiantreerangkoo, 2020; Noe et al., 2023).

The variety of fields from which HRD-related literature comes shows that HRD research is no longer isolated in management or educational or training-related research. Healthcare-related publications, computer science, and engineering publications, and research from the social sciences, suggest the emergence of HRD as an interdisciplinary research area that deals with the complex problems of modern organizations arising from social and technological workforce and resource shortages, and the restructuring and reform of the healthcare industry. Research related to digital transformation and AI, and studies focused on learning organizations and on the sustainability and well-being of employees, indicate that the field of HRD research has moved beyond the traditional roles and functions of human resources, to encompass the development of an organization's capacity and capabilities. The same can be said of the more recent, and more strategically oriented, HRD research that sees workforce capabilities as the primary resource and advantage of an organization (Callahan et al., 2021; Sambrook, 2022; Vial, 2021).

The maturity of the field is further confirmed by the country co-authorship and bibliographic coupling analyses, and the international collaboration patterns. Strong collaboration networks between the U.S. and Europe and Asia suggest that HRD research has become an extensive, globally interconnected, and knowledge-rich research domain. Simultaneously, the growing contributions from research in Asia shows the increasing geographic diversity in HRD research and the growing strategic importance of workforce capabilities in different healthcare systems and organizational infrastructures. The international collaboration of constituent research communities in HRD encourages the transfer of diverse theories, research methodologies, and different organizational practices, and stimulates the further development of HRD research (Donthu et al., 2021; Lim et al., 2022).

The co-citation analyses suggest that while the theories of adult learning and organisational learning, as well as theories of leadership development and strategic HRD, continue to play a critical role in HRD theories, the theories of HRD are increasingly incorporating new and emerging theories related to digital transformation, sustainable organisations, and the capabilities of the future workforce. When considered as a whole, the burgeoning theories of HRD indicate that the field of HRD has entered a new phase of theoretical integration. It appears that the traditional theories of learning are now more integratively interacting with the theories of contemporary organisational capabilities. Consequently, HRD is shifting from being a function of operational human resources to being a function of organisational adaptation, readiness, and resilient capability that enables the organisation to protect and sustain its capability and readiness in the face of increasing uncertainty and change (Holton et al., 2001; Swanson & Holton, 2009; Garavan et al., 2020).

4.2 Human Resource Development as a Strategic Capability for Healthcare Organisations

This study identifies a fundamental shift for Human Resource Development. The co-occurrence network reveals that HRD focuses more upon organisational learning, leadership and digital transformation, sustainability and employee engagement, and organisational performance. Compared to training and education, these dimensions provide a greater appreciation of HRD. The findings are aligned to the increasing understanding of HRD within healthcare organisations in a rapidly changing context, and the value that HRD creates in developing organisational capabilities (Garavan et al., 2020; Callahan et al., 2021; Noe et al., 2023).

The strategic nature of health workforce development is strengthened by the focus of contemporary research. Healthcare organisations are beginning to understand that workforce capability is built beyond technical competencies to embrace adaptability, continuous learning, and both learning and teaching within and across disciplines. These capabilities have gained significance in a post COVID-19 environment and have shown that resilient healthcare systems are built on skilled and

adaptable healthcare professionals (World Health Organization, 2022; Dirani et al., 2020). As a result, HRD serves as the process for enabling healthcare organisations to strengthen their preparedness in workforce fulfilment to meet future healthcare needs. Digital transformation is now evident in HRD research. The digital technologies, digital transformation, AI, digital analytics, and digital innovation keywords have been associated with developing workforce capability. Digital transformation is seen as much more than a technological endeavor. Evidence suggests that digital transformation is dependent on HRD practices that promote a culture of digital competency, lifelong learning, and flexibility. Recent studies indicate that digital transformation is achieved when technological infrastructures and human capability are developed in tandem (Vial, 2021; Kane et al., 2021; Marler & Boudreau, 2022).

HRD research is more collaborative and international as indicated by co-authorship and bibliometric coupling. Research collaboration is strong in North America, Europe, and Asia, indicating that the development of workforce capability is a strategic imperative in all healthcare systems, regardless of geographic location. Global collaboration leads to the development of new and different research methods, and active participation of developing countries shows that strategic workforce capability is a precursor to sustainable and improved performance within the healthcare system (Donthu et al., 2021; Lim et al., 2022). The research shows HRD should be viewed as an ongoing process within an organization. As such, it focuses on the development of employees' skills, the enhancement of the organization's capacity to learn, the ability of the organization to be flexible to the changing pace of technologies, and the ability of the organization to be resilient in the presence of challenges. The capability approach of HRD expands the existing definitions of HRD. It sees the development of employees as a strategic element in the creation of a sustainable system for the delivery of quality healthcare services, as opposed to the support of the day-to-day functions of HR.

4.3 Theoretical Contributions and Proposed Strategic Capability Framework

This research makes an important contribution to HRD literature in a number of ways. It builds on previous studies that used bibliometric techniques to move beyond simple HRD research to develop a theory-based descriptive account of the discipline. Some of the previous studies that used bibliometrics have analyzed the publications of HRD, the authors, the journals, and the emerging research themes. However, there are very few studies that have attempted to pull all of these studies together in a unified framework to describe the development of HRD research from an intellectual standpoint (Aria & Cuccurullo, 2017; Donthu et al., 2021; Lim et al., 2022). By integrating several bibliometric techniques, this study aims to offer an in-depth account of the development of HRD as a strategic capability in healthcare.

Second, findings advocate for a capability-centered approach to HRD. Converging themes of workforce development, organisational learning, leadership, digital transformation, organisational resilience, and sustainability illustrate that such concepts should not be treated as separate organisational issues as they are seen to be mutually reinforcing organisational capabilities that underpin healthcare organisations. This approach tackles the conceptual fragmentation that characterises a significant portion of the extant HRD literature and offers a better understanding of how workforce capability translates to the success of organisations (Garavan et al., 2020; Sambrook, 2022; Callahan et al., 2021).

This study introduces the Integrated Human Resource Development Strategic Capability Framework in response to bibliometric evidence. Within the framework, Human Resource Development is the primary strategic capability that builds the infrastructure of organisational knowledge, employee skills, and leadership and learning infrastructures. These investments support Health Workforce Development through enhanced workforce readiness, professional capability, teamwork, and flexibility. A capable healthcare workforce further develops Organisational Resilience by contributing to the capacity of the organisation to anticipate, adapt to, and recover from disruptive changes in the environment while maintaining service and operational continuity. Strengthened organisational resilience, in turn, engenders Sustainable Healthcare Performance through enhanced service quality, workforce retention, innovation, positive patient outcomes, and organisational effectiveness over time.

This framework shows the interrelated nature of organizational capabilities, as opposed to seeing them as separate entities. Capability Building is initiated through Human Resource Development, while Health Workforce Development carries these capabilities into the workforce. Transforming this workforce capability into flexibility within an organization is done by Organizational Resilience and the Sustainable Healthcare Performance of an organization focuses on long-term outcomes. The

capability pathway describes the intellectual development that the bibliometric analyses focused upon and aims to establish a base for future studies that will investigate and articulate these interrelated processes in the varying healthcare frameworks.

For this reason, the current study shows that Human Resource Development has resulted in a distinctive strategic organizational capability that focuses on excellence in the workforce and resilience in the organization as well as on sustainable healthcare performance. With this in mind, the developed framework presents a new theoretical approach by integrating the previously unconnected fragments of HRD research and forms a consistent strategic capability model with potentially significant application to research, healthcare policy, and organizational practice.

4.4 Theoretical Contributions

This study provides three significant theoretical contributions to HRD literature. First, this study extends existing bibliometric studies beyond the typically cited performance indicators and science maps, and toward theory-building. Previous HRD bibliometric studies have primarily addressed the trends in the number of publications, the most influential authors, citation and co-citation networks, and authors' collaborations (Donthu et al., 2021; Lim et al., 2022). This study integrates these approaches as a conceptual framework of the intellectual progress made in HRD in the healthcare sector. The study illustrates that bibliometric studies have potential to be used for theory-building, and not just for descriptive analysis.

Second, this study extends the strategic HRD theory by interpreting HRD as a core capability of an organization. In bibliometric studies, HRD has become broad beyond the boundaries of training and development to include learning in the organization, development of leadership, digital capability, innovation, workforce resilience, and sustained performance of an organization. This capability approach provides a significant interpretation of HRD as a strategic resource of an organization that provides healthcare organizations workforce of high adaptability and resilience that meet the complex demands of the external environment (Garavan et al., 2020; Callahan et al., 2021).

Third, the proposed Integrated Human Resource Development Strategic Capability Framework offers a new way to view the connections between Human Resource Development, Health Workforce Development, Organisational Resilience, and Sustainable Healthcare Performance. In comparison to other research, which has studied these constructs in isolation, this proposed framework is the first to view them as a series of interrelated and sequential organisational capabilities. The integrated nature of the framework is designed to provide a stronger theoretical basis for the empirical research that follows on the role of workforce capability in the continuing sustainability of the organisation in the context of healthcare.

4.5 Managerial and Policy Implications

There are several key implications for both healthcare managers and policymakers. Human Resource Development needs to be repositioned from a support function to a strategic organisational capability and embedded in organisational planning and decision-making. There is a need to invest in the development of the workforce in a way that goes beyond the development of technical skills, to include skills in leadership, digital skills, and an understanding and experience of working in a culture of continuous learning, and interdisciplinary collaboration, as well as knowledge sharing. Investment in these areas is likely to result in a workforce that is more adaptable and resilient, which is especially needed in uncertain times in healthcare.

This study also underscores the importance of linking HRD with digital transformation. With the increasing integration of AI, digital health record systems, telehealth, and advanced analytics in healthcare, the development of workforce capability is critical to ensure that these technologies are purposefully and successfully integrated in healthcare organizations to achieve these aims. Thus, HRD strategies should incorporate flexible systems for the continuous reskilling and upskilling of healthcare professionals so that they may thrive in the digitized healthcare environment (Vial, 2021; Kane et al., 2021).

The findings advocated for more developing the national health workforce strategies that invest at the government policy level. The governments and health providers are recommended to strengthen the partnerships of the universities with the healthcare and research organizations to promote leadership and retention of their workforce and to strengthen continuing education for professionals. Increasing international partnerships will also help to exchange lessons learned and speed up the creation of stronger sustainable resilient healthcare systems.

4.6 Practical Implications

The results of this study provide the basis for a number of practical recommendations that could be useful to various stakeholders such as healthcare organisations, policy makers, and Human Resource Development (HRD) practitioners. The bibliometric data provide a basis for the argument that HRD has now become a strategic organisational capability, moving beyond the traditional focus of HRD on training employees. Healthcare organisations should reposition HRD as a key strategic function that shapes and enables workforce planning and the development of training, skills, and resilience to meet the evolving needs of a healthcare organisation. Integrating HRD with organisational strategy enables healthcare organisations to improve workforce readiness and enhance the organisation's capability to meet the diverse and evolving needs of the healthcare system (Garavan et al., 2020; Noe et al., 2023).

The keyword network shows that the focus on the need for digital transformation is growing. This means that future investments in healthcare should focus on developing both the necessary technology as well as the skills of the workforce. Investments in digital technology in healthcare will not lead to improvements in the functioning of the organisation if healthcare professionals do not have the relevant skills. Therefore, HRD initiatives need to focus on the development of skills relating to digital technologies, data analytics, artificial intelligence, interdisciplinary teamwork, and persistent professional development and training to enable effective digital transformation of the healthcare system (Vial, 2021; Kane et al., 2021; Marler & Boudreau, 2022).

The results demonstrate the need to focus on the building resilience of organizations through the development of the workforce. In HRD literature, resilience, sustainability, and leadership, along with organizational learning, point to the development of people in resilient healthcare organizations. This development of people occurs in addition to the development of technology and the addition of financial resources. For this reason, healthcare leaders should focus on the use of integrated HRD strategies that foster adaptive leadership and promote the enhancement of people through knowledge, well-being, succession, and learning. This fosters flexibility in the workforce and allows health care organizations to ensure the same level and quality of service even in disruptive and uncertain environments (Duchek, 2020; Burnard & Bhamra, 2021; World Health Organization, 2022).

The policymakers should view the research in relation to its geographic distribution as evidence that developing workforce capability is now a global priority. In line with this, national health strategies should focus on establishment of long-term investments in professional education, development of leaders, retention of the workforce, and development of a culture of lifelong learning. In particular, collaborative international research is necessary to develop evidence-based workforce practices and innovative thinking in healthcare management. These initiatives will be critical for countries seeking to develop their healthcare systems in the face of workforce shortages and higher demands for services.

4.7 Limitations and Future Research

Multiple limitations need to be discussed related to the results of this study. The first limitation relates to the bibliometric analysis. This analysis focused on studies published exclusively in Scopus indexed publications. As Scopus is one of the largest databases of reviewed literature, other databases, such as Web of Science, PubMed, Dimensions, etc. were not analyzed. Therefore, results reflect the intellectual structure of the literature available in Scopus and not the entire body of HRD research literature.

The second limitation is related to the bibliometric analysis focus on the years 2020 to 2025. This focus was in this study's interest in the impact of recent digital developments and the post COVID-19 healthcare workforce related challenges. As a result, focus on recent literature excludes publications prior to this date, which may limit the comprehensive understanding of HRD research and the development of its theories and and conceptual frameworks. Future studies may incorporate longer time periods.

The third limitation is focused on bibliometric techniques. These techniques do not analyze relationships and do not examine the relationships between organizational capabilities. Therefore, Integrated Human Resource Development Strategic Capability Framework, is a concept based on a bibliometric synthesis, is not derivatively a result of empirical research and is open for testing. Future research should focus on the relationships and integrate Human Resource Development and Health Workforce Development, Organizational Resilience and Sustainable Healthcare Performance using quantitative, qualitative or mixed research methods.

Subsequent research might investigate sector-specific opportunities for this framework in hospitals, primary care, and public health, as well as in other healthcare contexts. Understanding how the institutional, social, and policy contexts of different countries and healthcare systems impact the Human Resource Development's strategic role in building workforce capability and organizational resilience would benefit from comparative studies.

5. CONCLUSION

This research traced the development of Human Resource Development research in healthcare. It employed a theory building approach, using bibliometrics, focusing on 538 publications, which were reviewed from 2020 to 2025. Findings indicate bibliometrics coverage has identified ongoing growth within the field of healthcare Human Resource Development, a growing interest to collaborate, and convergence of multidisciplinary fields, including, but not limited to, healthcare workforce development, healthcare organizational learning, resilience and sustainability, digital transformation and leadership. Overall, the bibliometric data indicate that healthcare Human Resource Development has moved beyond the historical focus on training and now has the potential to support a strategic capability for the advancement of sustainable healthcare.

The study expands existing literature by developing a new Integrated Human Resource Development Strategic Capability Framework, going beyond the traditional descriptive bibliometric analysis. The framework elaborates on the idea of Human Resource Development being the primary capability that consolidates Health Workforce Development and builds Organisational Resilience, which ultimately aids in the Sustainable Healthcare Performance. The framework consolidates the diverse streams of research into a coherent strategic capability construct and builds on the theory of HRD. It also offers healthcare organizations guidance on how to develop resilient workforces and achieve sustainable organizational effectiveness in the face of challenges in the healthcare system. As a result, the study provides a basis for future research and strengthens the future oriented strategic role of Human Resource Development in the sustainability of healthcare systems.

Generic Ai Declaration

Everyone listed as a report author has used Generative AI in the following ways.

Generative AI helped the authors in the bibliometric drafting stage of the report as it allows users to write, rephrase, and curate more refined drafts of the results conclusively. The authors wish to clarify in this report that all responses given by ChatGPT were evaluated and revised by each contributor. The authors take full responsibility and accountability for the original and accurate content in the report.

Conflict of Interest Declaration

All authors of this report have stated that there are no conflicts of interests.

Acknowledgement

We are very thankful for all the supporters. Special thanks to the reviewers. Your comments and suggestions were helpful. Thanks to the Scopus team and the developers of VOSViewer and Bibliometrics and Advanced Bibliometric Analytics; we appreciate your software.

Ethical Approval

Not applicable

Consent to Participate

Not applicable

Consent to Publish

Not applicable

Competing Interests

No potential conflict of interest was reported by the authors.

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