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Evolution and Current Trends of Human Resource Development in the Maritime Industry through performance analysis and science mapping procedures

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ABSTRACT

The maritime industry plays a vital role in the global trade and has experienced significant growth in the recent years. The success of the industry is largely dependent on the development of its human resources. This paper presents a bibliometric analysis of articles published in the Web of Science database from 1975 to 2022, focusing on Human Resources Development (HRD) in the maritime industry. The study examines the evolution and regional distribution of HRD knowledge, identifying significant trends, and highlighting key themes and research directions. The analysis reveals that the United States, the United Kingdom, and China are the leading countries in HRD research, while journals like Advances in Developing Human Resources, Human Resource Development International, Human Resource Development Quarterly, and Human Resource Development Review are influential in the field. The research identifies employee development and performance management, creating inclusive and supportive workplaces, and transforming HRD for the future as key areas of study. Future research should explore the impact of technology on HRD practices and innovative strategies for attracting and retaining talent in the maritime industry. These findings provide valuable insights for researchers, practitioners, and policymakers interested in advancing HRD in the maritime sector.

1. Introduction.

The maritime industry plays a crucial role in global trade by transporting goods and commodities between different countries and regions. Over 80% of global trade by volume and 70% by value is transported by sea (Liu et al., 2022). The maritime industry encompasses a wide range of activities, including shipping, ports and terminals, logistics and supply chain management, shipbuilding and repair, and marine services (Jeevan et al., 2021). It is a complex and highly integrated industry that involves many different players and stakeholders. The growth of the maritime industry has been closely linked to the expansion of global trade over the past century. As international trade has grown, so too has the demand for shipping and other maritime services (Liu, 2019). In addition, the maritime industry has also been a key driver of economic development in many countries and regions (Jeevan et al., 2020). Furthermore, the industry has played a vital role in facilitating globalization and has enabled the growth of international trade, which has led to increased economic prosperity in many countries (Notteboom & Rodrigue, 2022)

Human Resource Development (HRD) is essential in the

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maritime industry to ensure that the workforce has the necessary skills and competencies to meet the industry's evolving demands (Jeevan et al, 2019;2022) The industry is constantly evolving, with new technologies, regulations, and operating procedures emerging all the time. HRD helps to address any skills gaps that may arise as a result of these changes, ensuring that the workforce is up-to-date and capable of performing their roles effectively (Armstrong & Taylor, 2023; Gcezengana et al., 2022).

In addition, the maritime industry may be dangerous and complex, with a range of hazards and risks involved in operations (Makransky & Klingenberg, 2022). A safety-first culture by training employees on best practices, safety protocols, and emergency response procedures may be promoted by HRD. HRD also initiatives can provide employees with opportunities for career development and advancement, which can help to boost motivation and retention within the workforce (Mok et al., 2022). Environmental concerns (Fasoulis & Kurt, 2019), changing trade patterns, and the ongoing impacts of the COVID-19 pandemic (Chua et al., 2022) are likely to shape the future of the industry and its role in global trade in the years to come.

Despite these challenges, the maritime industry remains a critical component of the global economy, and it must continue to adapt to the current dynamic conditions and address its challenges to remain a viable and sustainable contributor to global trade and economic development (Salleh et al 2020; 2021). It can be seen that HRD is crucial in the maritime industry to ensure that the workforce is equipped with the skills and knowledge necessary to operate effectively and safely in a complex and ever-changing environment.

The purpose of this paper is to utilise performance analysis and science mapping as an innovative tool to conduct a comprehensive analysis of HRD and its implications in the maritime industry. The objectives of this paper are to analyse the volume evolution and regional distribution of the HRD knowledge base, identify the most significant journals, authors, and articles in HRD, highlight the future themes in HRD new factors for organisational ergonomic, and explore research direction of HRD in the maritime industry. This paper provides insights into the implications of these findings for both the research community and practitioners in the maritime industry. Based on the stated objectives, this paper aims to address the following research questions:

1. *RQ1: What is the volume of the HRD knowledge based evolved over time and where is it distributed regionally?,*
2. *RQ2: Which journals, authors, and articles are considered the most significant in the field of HRD?,*
3. *RQ3: What are the future themes in HRD and what are new factors organisational ergonomic based on such themes?* and
4. *RQ4: What are the research directions of HRD in the maritime industry?*

The remaining sections of this study are organized as follows: section 2 presents the literature review, section 3 describes the research methodology employed, section 4 shows the results and analysis, and section 5 illustrates conclusion.

2. Human Resource Development: the review of literature.

Organizational ergonomics refers to the study of how people interact with their work environment, and how the design of that environment can impact productivity, safety, and well-being (Faez et al., 2021). It involves optimizing the interaction between people, technology, and the physical environment within an organization to enhance overall performance (Reiman et al., 2021; Ngah et al. 2022). Organizational ergonomics encompasses several important factors that can have a significant impact on worker health, safety, and productivity. One key aspect is workplace design, which involves creating a physical environment that promotes worker comfort and well-being (Lee, 2019). This includes factors such as lighting, noise, temperature, and ventilation. Another important aspect is workstation ergonomics, which focuses on optimizing individual workstations to ensure that equipment, tools, and furniture are arranged in a way that reduces the risk of injury and strain while maximizing productivity (Alvaro et al., 2022).

Job analysis and design are also critical components of organizational ergonomics, as they involve analysing and designing jobs to ensure that they are structured in a way that maximizes worker efficiency and minimizes the risk of injury or strain (Boriboonsuksri et al., 2022). Effective workload management is also important, as it involves managing the demands of the work environment, including workload, pace, and complexity, to reduce the risk of stress and burnout (de Macêdo et al., 2020). Communication and teamwork are additional key components of organizational ergonomics, as they involve fostering effective communication and collaboration among workers, including the use of technology and the design of work processes that promote teamwork and cooperation (Vink, 2020). Training and education are also essential, as they provide workers with the knowledge and skills they need to perform their jobs safely and efficiently, including training in ergonomics principles and practices (Tosi & Tosi, 2020). Finally, promoting a positive workplace culture that values worker health and well-being is critical, including policies and practices that support work-life balance, employee engagement, and job satisfaction (Chanana, 2021). By considering all of these factors, organizations can create a work environment that is safe, healthy, and productive for all employees.

In terms of Human Resource Development (HRD), organizational ergonomics is relevant because it involves optimizing organizational structures, policies, and processes to support employee learning and development. For instance, a well-designed workspace can improve employee engagement and productivity, while flexible work policies can support work-life balance and reduce burnout (Singh et al, 2022). By understanding the principles of organizational ergonomics, HRD professionals can design workplace practices that support employee learning, development, and well-being, ultimately contributing to the success of the organization.

HRD refers to a variety of activities that aim to develop staff skills, knowledge, and competencies in businesses. Since its inception in the 1960s, HRD has grown to incorporate a broader range of activities. HRD originally focused on employee train-

ing to improve job performance. (Mehta, 1964). HRD has grown throughout time to include development, education, and learning activities outside of job-related training. (Swanson, 2022). Human resource development has developed as a result of changes in employment, technology, globalization, and the increasing importance of knowledge and intellectual capital. (Jahanger et al., 2022). Companies may invest in staff development and growth in order to remain competitive and adapt to new challenges.

HRD is currently concentrating its efforts on aligning its activities with the organization's strategy and objectives. (De Alwis, et al., 2022). This strategy stresses developing employees' skills and competencies in order to accomplish the company's objectives. HRD also encourages individuals to acquire new skills in order to adapt to changing work environments by fostering a learning culture. (Urrutia Pereira et al., 2022). HRD has evolved beyond training to include development, education, and learning, with an emphasis on aligning operations with the organization's goals and creating a learning culture. Human resource development may improve organizational performance and competitiveness by developing a well-trained and engaged staff.

As Banmairuroy et al. (2022) point out, HRD benefits both employees and the organization. HRD programs, according to Benitez et al., improve job performance by training workers new skills and knowledge. (2022). These activities also demonstrate that the firm cares about its employees, which increases loyalty, job satisfaction, and productivity. According to Elisa et al. (2022), HRD programs give opportunities for professional development for employees, minimizing attrition and attracting new talent seeking growth and advancement. According to Johnson et al. (2020), HRD programs may identify and train individuals for critical tasks in the company, ensuring skilled and competent employees. According to Jammaers, HRD programs may assist organizations in meeting legal duties, reducing the risk of litigation, fines, and reputational loss. (2022). Human resource development, according to Anwar and Abdullah (2021), connects personnel skills and competencies with organizational goals, boosting efficiency, customer satisfaction, and financial success. HRD develops a motivated, talented, and productive workforce that aids the company's development and success.

HRD results have an impact on both individuals and companies. (Akdere & Egan, 2020). Examples include individual learning and corporate performance. HRD programs equip people with knowledge and skills. A leadership development program may educate workers communication, decision-making, and problem-solving skills that will help them perform better on the job and prepare them for advancement. (Labrague, 2021). Employee job satisfaction, another HRD outcome, helps businesses. (Sabuhari et al., 2020). Training and development programs may increase job satisfaction by providing advancement and a welcoming environment. Employees that are satisfied are more driven and productive. (Ali & Anwar, 2021).

HRD improves firm efficiency, innovation, and customer satisfaction. (El-Kassar & Singh, 2019). HRD programs boost employee productivity and competencies. HRD programs that promote creative problem-solving and creative thinking may also drive innovation. (El-Kassar et al., 2022). New products and services may provide businesses a competitive edge. Finally, well-trained and competent employees may provide superior service to customers, improving customer satisfaction and loyalty. (Islam et al., 2021). Finally, HRD programs have the potential to improve employee work satisfaction, motivation, retention, productivity, creativity, and customer satisfaction, as well as organizational performance.

HRD enhances employees' skills, knowledge, and capabilities in order to improve job performance and company goals. HRD effectiveness is determined by a number of factors. HRD programs are influenced by organizational culture. (Asbari et al., 2020). A positive or supportive company culture may drive employees to participate in training programs and seek chances for advancement, while a negative or unsupportive culture may stymie learning and development, reducing HRD effectiveness. (Bontrager et al., 2021). HRD requires strong leadership. (Dirani et al., 2020). Leaders that promote training and employee development may help to create a learning culture. Leaders who do not value HRD or provide resources may harm it. (Swanson, 2022). Technology also improves the efficacy of HRD.

Technology has made online, gamified, and mobile learning possible. (Mastana, 2021). However, IT infrastructure and human technical abilities may have an impact on these strategies. (Fischer et al., 2020). Economic, societal, and labor-market events may also have an impact on HRD. Economic downturns may limit HRD resources, while labor market upheavals may necessitate the acquisition of new skills and competences. (Scully-Russ & Torraco, 2020). HRD must adapt to these outside factors. According to current study, HRD must address these difficulties and adapt to altering expectations. (Clauss et al., 2019). This includes adapting programs to the organization's needs and individuals, using technology to provide training in novel and exciting ways, and aligning HRD with strategic goals. HRD may assist employees enhance their skills, knowledge, and competences, allowing the firm to prosper.

In conclusion, HRD plays a vital role in enhancing employee skills, knowledge, and competencies, which ultimately leads to a motivated and productive workforce, improved organizational performance, and competitiveness. By investing in HRD programs, organizations can foster a culture of innovation and creativity, improve job performance, satisfaction, and motivation, and increase productivity and efficiency. To ensure the effectiveness of HRD, it is important to consider factors such as organizational culture, leadership, and alignment with organizational goals and objectives. Therefore, HRD should be a priority for organizations that seek to thrive in today's competitive business environment. In the Table 1 shows the summary of the HRD statements and the references.

Table 1: The summary of the HRD statements and their references.

Statement	Reference
Initially, HRD mainly focused on training employees to improve their job performance.	Mehta, 1964
The scope of HRD has expanded to include development, education, and learning activities that go beyond job-related training.	Swanson, 2022
The evolution of HRD has been influenced by several factors, including changes in the nature of work, advances in technology, globalization, and the increasing importance of knowledge and intellectual capital.	Jahanger et al., 2022
HRD emphasizes aligning its activities with the organization's strategy and creating a learning culture.	De Alwis et al., 2022; Urrutia Pereira et al., 2022
HRD provides numerous benefits for both employees and the organization, including job satisfaction, motivation, and productivity.	Banmairuroy et al., 2022; Benitez et al., 2022; Elisa et al., 2022; Johnson et al., 2020; Jammaers, 2022; Anwar and Abdullah, 2021
HRD outcomes can range from individual learning to organizational performance.	Akdere & Egan, 2020
HRD can improve employee job satisfaction, motivation, and retention, as well as organizational effectiveness by improving productivity, innovation, and customer satisfaction.	Sabuhari et al., 2020; Ali & Anwar, 2021; El-Kassar & Singh, 2019; El-Kassar et al., 2022; Islam et al., 2021
Organizational culture, effective leadership, and alignment with organizational goals and objectives impact the effectiveness of HRD.	Asbari et al., 2020; Bontrager et al., 2021; Dirani et al., 2022; Van et al., 2022.

Source: Authors.

The maritime industry is an important component of worldwide trade and commerce. It entails the movement of products, people, and services over diverse waterways such as oceans, seas, rivers, and canals. This sector encompasses a wide variety of activities, including shipbuilding and repair, as well as port and terminal operations (Chen, 2022).

One of the key operations in the maritime business is shipping. It entails transporting merchandise and passengers by sea on different sorts of vessels (Andersson et al., 2016). Terminals and ports are critical components of the maritime sectors. It offers infrastructure for ships to load and unload cargo, and it serves as an important hub in commodities logistics and supply chain management. Ports and terminals must also ensure that ships follow numerous rules and safety requirements (Aneziris et al., 2020). Shipbuilding and maintenance are also important operations in the maritime sector where technical skill is required to ensure vessel safety and dependability (Rao & Jayasree, 2022). Finally, marine services include a variety of operations such as marine insurance, maritime law, and maritime consultancy (Pinto et al., 2015; Doumbia-Henry, 2020). As a result, the maritime sector is complicated and heavily regulated, and it plays an important part in global trade and commerce. Its businesses include everything from shipping and logistics to shipbuilding and maritime services.

HRD practices help maritime firms perform and compete better. In the maritime industry, popular HRD approaches include on-the-job training, classroom training, simulation-based training, coaching and mentoring, and e-learning (Renganayagalu et al., 2019). These strategies help employees develop their knowledge, skills, and talents so that they can execute their jobs successfully. Gena et al (2020) discovered that strong HRD practices improve the performance and competitiveness of the maritime sector. Effective human resource development may improve shipping safety and efficiency while also increasing customer satisfaction and competitiveness (Hansen et al., 2020). HRD programs may also address industrial skill gaps and shortages, ensuring that the workforce is properly trained and equipped to meet industry requirements (Divine et al., 2021).

However, technological advancements and changing regulatory frameworks need businesses to adapt and upskill their workforce. Environmental sustainability issues are also becoming more prevalent in the maritime industry. Because the industry contributes significantly to global greenhouse gas emissions, businesses in the sector must adopt sustainable practices (Rony et al., 2023). Another change that impacts HRD in the maritime sector is the increasing emphasis on safety and security. The maritime industry has always been subject to risks related to accidents, piracy, terrorism, and cyber threats. However, the frequency and severity of these risks have increased in recent years, prompting businesses to invest in safety and security measures.

Thus, HRD approaches may assist maritime firms in improving their performance and competing. HRD may also improve safety, efficiency, customer satisfaction, and organizational performance. Maritime enterprises must prioritize human resource development in order to remain competitive and sustainable. HRD approaches may aid in the transition of operations to sustainability. Mane et al. (2018) stated that maritime companies may ensure that their employees have the knowledge and skills necessary to carry out sustainable practices by providing sustainability and environmental stewardship training and development (Fawehinmi et al., 2020). This may improve environmental performance, reputation, and competitiveness in a market where customers and stakeholders value sustainability. As a result, sustainability-focused HRD may aid the success of maritime firms.

3. Methodological direction.

Bibliometric analysis is a quantitative method used to study scholarly literature, scientific publications, and other forms of written communication (Rojas-Sánchez et al., 2023). The main domain of bibliometric analysis is to analyse patterns of information use, citation, and publication within a particular field of study or discipline (Zhang et al., 2022). This analysis can be used to evaluate the impact of publications, researchers, institutions, citation counts, h-index, and journal impact factor and emerging trends for future research (Dothu et al., 2021; Gilstrap et al., 2023; Martínez-Vega & Rodríguez-Rodríguez, 2022).

The step-by-step of research methodology is illustrated in Table 2. The Web of Science (WOS) database has been selected for this study. The database widely regarded as one of the most prominent and frequently utilized scientific databases worldwide. It contains over 12,000 journals and conference proceedings in various fields, including natural sciences, social sciences, and humanities (Liu, 2017). The database is known for its stringent selection criteria, which guarantee the accuracy and dependability of the data it contains (Pranckutė, 2021). Furthermore, WOS employs extensive data cleaning and normalization procedures to ensure the data's consistency and accu-

racy (Ahmi, 2022; Jing et al., 2023). Therefore, using a sample of the WOS database to meet the study's specific objectives and answer the research questions is a sound approach.

First, the authors used a specific keyword combination and a Boolean search to find articles on the necessity of HRD. This approach is a common technique used by authors to identify relevant articles on a specific topic (Longoria., 2022). The authors employ the keyword "Human resources development" throughout WOS data collection to identify relevant articles on the necessity of HRD.

Second, the WOS files were saved and exported as Plain Text Files. Citation information, bibliographical information, abstracts, keywords, funding details, and other information were extracted for bibliometric analysis. The authors then combined and deduplicated the files into a single file. The files were filtered by year (excluding 2023), language (English), type of document (article), and incomplete information such as missing authors, etc. After this step, 1,573 articles met the inclusion criteria for this study.

Third, the scholar ran bibliometric analysis and reported the results by using performance analysis and science mapping that were employed to represent the findings. Performance analysis summarized the prolific research constituents, such as authors, institutions, countries, and journals (Dothu et al., 2021). Moreover, science mapping focused on the conceptual and structural connections between the research components (Selvaduray et al. 2022; Bonkra et al., 2023). Co-word analysis was employed as techniques in science mapping in this research.

The 'Bibliometrix' R-package Derviş (2019) and VOSviewer software Eck and Waltman (2014) are employed to represent results based on the objectives as a enrichment techniques. The techniques, particularly network analysis, can enhance performance analysis and science mapping (Saini et al., 2022). Network analysis is useful for illustrating bibliometric analysis (Baker et al., 2020; Tunger and Eulerich, 2018). Using network analysis, as demonstrated by Dothu et al. (2021), can present add-on performance analysis and science mapping to enrich the outcome of bibliometric analysis. Therefore, the use of network analysis, coupled with science mapping software such as 'Bibliometrix' R-package and VOSviewer, can enhance performance analysis and science mapping in bibliometric analysis.

4. Results and analysis.

The outcomes and findings of the study are presented in a systematic and evaluated manner based on the four research questions posed in Section 1. The data collection specifically focuses on addressing the research inquiries to establish comprehensive answers to each question. Various tools, including 'Bibliometrix' R-package and VOSviewer version 1.6.18, are utilized for analysis and presenting the findings. This approach is intended to enhance clarity and comprehensibility of the research work, making it simpler for others to understand and evaluate the results.

Table 2: A step-by-step guide for conducting bibliometric analysis:

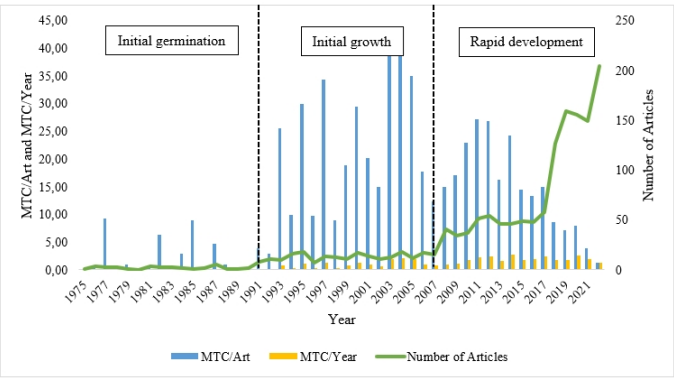
Step	Outcome
1st step	Identify research objectives: To identify most significant journals, authors and articles in HRD; To identify the key themes, trends, and research directions and its implications in the maritime industry
2nd step	Selection of database: WOS database
3rd step	Determining keyword: "Human Resource Development"
4th step	Extracting file and duplicating data: File in .txt were extracted and duplicated
5th step	Selecting of criteria research and cleaning data: English, not publish in 2023, article and no authors available as a criterion. 1,573 documents were listed as a collecting sample
6th step	Choosing main technique: Performance analysis and Science mapping
7th step	Choosing software to enrich main technique: The 'Bibliometrix' R-package and VOSviewer version 1.6.18
8th step	Analysing and results: Performance analysis was a main technique by using 'Bibliometrix' R-package to identify most significant journals, authors and articles in HRD. Science mapping was analysed as a main technique to identify the key themes, trends, and research directions and its implications in the maritime industry. Co-word analysis was used as a main technique. VOSviewer software was also conducted to enrich main technique. The software shows cluster analysis in colour for visualization.
9th step	Discussion and conclusion: Future research direction of Human Resource Development (HRD) in the maritime industry

Source: Authors.

4.1. *Reconfiguring the HRD knowledge base: volume and regional distribution.*

The study analyzed 1,573 articles on Human Resource Development (HRD) in the WOS database from 1975 to 2022. Three stages of development were identified: the initial germination stage (1975-1991), the initial growth stage (1992-2007), and the rapid development stage (2008-2022). The number of articles steadily increased in each stage, with over 100 articles published in 2022. However, the MTC/Art level was only 1.29 in 2022, indicating that recent articles may take time to have an impact. The study used various tools, including 'Bibliometrix' R-package and VOSviewer version 1.6.18, to present the findings and enhance clarity and comprehensibility. Figure 1 depicts the annual aggregated level of publication and citations in a simple descriptive study. The initial germination stage, the initial growth stage, and the rapid development stage were classified as three stages of development (Liu et al., 2020).

Figure 1: Annual production of HRD articles and total citations, 1975-2022.

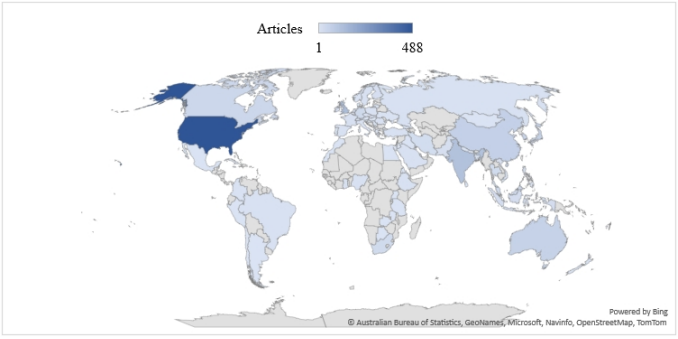


Abbreviation: MTC/Art = Mean Total Citation per Articles and MTC/Year = Mean Total Citation per Year.

Source: Authors compilation from Bibliometrix R package.

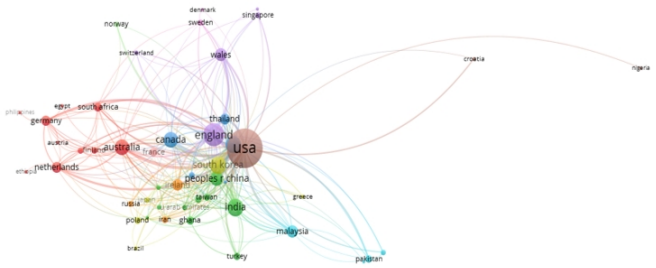
The majority of knowledge in HRD field has been generated, as indicated by the heat map in Figure 2. Between 1975 and 2022, a total of 86 countries (regions) conducted research on human resource development (HRD), according to the core database of the Web of Science, which ranks countries based on the number of articles. The majority of research in this database was conducted in the United States, which accounted for 31.02% of all publications. The US was among the first countries to conduct HRD research, starting as early as the 1970s. It has also had a significant impact on other countries, with a total citation count of 7,738 (as shown in Table 3). A citation analysis country network was generated using the VOSviewer software, and it shows that the USA, United Kingdom, China, Australia, and Korea have a relatively high influence in HRD research and are in the core position of the network (as shown in Figure 3).

Figure 2: Global distribution of HRD research articles from 1975-2022: a total of 1,573 articles.



Source: Authors compilation from Bibliometrix R package.

Figure 3: Country collaboration network based on citation analysis in HRD research.



Source: The authors carries on generating from the WOS database via & VOSviewer software.

4.2. *HRD thought leaders: prominent journals, authors, and articles in the field of HRD.*

This section summarizes the most significant journals, authors, and articles in the HRD field through performance analysis. Donthu et al. (2021) highlighted the importance of evaluating the performance of different research constituents in research studies. Such assessments can help to identify their contributions and influence in the field. Table 4 shows the top 10 journals contributing the most to the HRD database based on the number of articles (NA) and total citations (TC). Four journals - ADHR, HRDI, HRDQ, and HRDR - rank highest in both NA and TC. However, HRDQ is the most influential journal overall, contributing 103 articles and receiving 2,825 total citations. Some journals appear in the top 10 rankings for NA but not TC, while others are in the top 10 for TC but not NA. Overall, Table 4 provides valuable insights into the impact that different journals have on the HRD field.

Table 3: Top 10 countries with the highest scientific production in HRD: ranking by number of articles.

Country	Number of Articles	Percentage of 1,573	Cited time
USA	488	31.02	7,738
United Kingdom	133	8.46	1,524
India	115	7.31	469
Japan	67	4.26	257
China	66	4.20	882
Australia	58	3.69	817
Korea	55	3.50	599
Canada	42	2.67	457
Malaysia	39	2.48	418
Germany	36	2.29	417

Source: Authors.

Table 4: Top journals with the most influence in HRD.

Journals	H-Index	TC	NA
Ranking by NA			
HRDQ	20	2825	103
ADHR	12	606	102
HRDR	25	1550	90
HRDI	13	735	83
EJTD	10	272	72
PR	12	351	23
NHAEHRD	3	31	22
SUS	5	127	14
JSIR	2	16	13
IJHRM	9	284	12

Journals	H-Index	TC	NA
Ranking by TC			
HRDQ	20	2825	103
HRDR	25	1550	90
HRDI	13	735	83
ADHR	12	606	102
HSR	1	433	1
PR	12	351	23
JWB	6	335	6
HRM	7	307	8
IJHRM	9	284	12
EJTD	10	272	72

Abbreviation: Total Citation (TC), Number of Articles (NA), Advances in Developing Human Resources (ADHR), European Journal of Training and Development (EJTD), Health Services Research (HSR), Human Resource Development International (HRDI), Human Resource Development Quarterly (HRDQ), Human Resource Development Review (HRDR), Human Resource Management (HRM), International Journal of Human Resource Management (IJHRM), Journal of Scientific & Industrial Research (JSIR), Journal of World Business (JWB), New Horizons in Adult Education and Human Resource Development (NHAEHRD), Personnel Review (PR) and Sustainability (SUS).
Source: Authors compilation from Bibliometrix R package.

Bibliometric analysis is a way to evaluate research output by looking at citation and publication patterns. This method helps to identify important researchers and documents in a particular field. In the field of human resource development (HRD), Bibliometrix software has been used to find the top authors based on their total number of citations and number of articles published. Table 5 shows the top ten authors with the highest number of citations and the top three authors with the most articles published. Avey JB, Luthans F, Mhatre KH, Reichard RJ, Shuck B, Reio TG, and Ghosh R are among the most frequently cited authors and the ones with the highest number of articles published in the field of HRD. These findings can be helpful for

authors to explore who is the most influential authors and their works in HRD.

Table 5: Highly impactful authors in the HRD field from 1975-2022.

Author (s)	H-Index	TC	NA	TC/NA
Avey JB and Luthans F	2	1214	2	607.00
Mhatre KH and Reichard RJ	1	738	1	738.00
Shuck B	11	618	18	34.33
Avolio BJ and Peterson SJ	1	476	1	476.00
Reio TG	5	451	7	64.43
Boerstler H, Carman JM, Foster RW, Hughes EFX, Obrien JL, Oconnor EJ and Shortell SM	1	433	1	433.00
Ghosh R	6	271	6	45.17
Arthur MB, Barry S, Inkson K and Pringle J	1	244	1	244.00
Bland CJ, Henry R, Moorhead-Rosenberg L, Starnaman S, Wersal L and Zonia S	1	209	1	209.00
Dennis R and Lansang MA	1	202	1	202.00

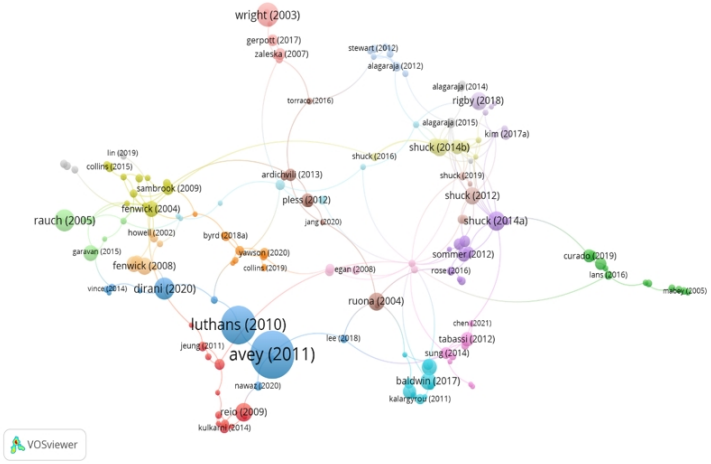
Abbreviation: TC = Total Citation, NA = Number of Articles, TC/NA = Total Citation per Number of Articles.
Source: Authors conduct only top 10 highly cited authors on HRD.

Highly cited references provide important knowledge about a particular field of study, showing the level and direction of research and providing a foundation for investigating trends and frontiers (Liu et al., 2020). Table 6 lists the top ten most cited articles from 1975 to 2022, along with their yearly citation count. The articles focus on HRD strategies related to job satisfaction, performance, and leadership, analysing intrinsic and extrinsic factors that influence these domains. However, it's important to use more than just citation counts to evaluate research impact.

The method of Citation Analysis (CA) tracks instances where a publication cites another to reveal intellectual connections and identify the most influential publications in a particular field (Appio et al., 2014; Donthu et al., 2021). Figure 4 displays the reference values in terms of node size and the connections between articles within the study group through network lines. This visual representation enabled the identification of the individual with the highest number of citations in the group. For example, Avey et al. (2011) have a biggest node size and have interconnection between Luthans et al. (2010), Mitsakis (2020), Lee et al. (2018) and Nawaz et al. (2020).

The aforementioned articles underscore the significance of individual-level attributes, specifically psychological capital, prosocial motivation, and individual relationships, in fostering positive outcomes within the workplace. Additionally, the articles suggest that human resource development programs can effectively contribute to the cultivation of these attributes and consequently promote positive outcomes.

Figure 4: Document collaboration network based on citation analysis in HRD research.



Source: The author carries on generating from the WOS database via VOSviewer software.

Table 6: Top ten highly impactful articles in the HRD field from 1975-2022.

Author(s) (PY)	Title	TC	TC/Y
Avey et al. (2011)	Meta-analysis of the impact of positive psychological capital on employee attitudes, behaviors, and performance	738	56.77
Luthans et al. (2010)	The development and resulting performance impact of positive psychological capital	476	34.00
Shortell et al. (1995)	Assessing the impact of continuous quality improvement/total quality management: concept versus implementation	433	14.93
Inkson et al. (1997)	Expatriate assignment versus overseas experience: Contrasting models of international human resource development	244	9.04
Bland et al. (2000)	Curricular Change in Medical Schools How to Succeed	209	8.71
Lansang & Dennis (2004)	Building capacity in health research in the developing world	202	10.10
Wright & Davis (2003)	Job Satisfaction in The Public Sector: The Role of the Work Environment	190	9.05
Meyer & Collier (2001)	An empirical test of the causal relationships in the Baldrige Health Care Pilot Criteria	162	7.04
Kuratko et al. (2005)	A model of middle–level managers' entrepreneurial behavior	157	8.26
Dirani et al. (2020)	Leadership competencies and the essential role of human resource development in times of crisis: a response to Covid-19 pandemic	154	38.50

Abbreviation: PY = Publication Year, TC = Total Citation, TC/Year = Total Citation per Year.
Source: Authors conduct only top 10 highly cited articles on HRD.

4.3. Exploring the path forward: key themes in HRD and new contribution factor for organisational ergonomics.

Co-occurrence analysis, which displays the correlation strength of each node, is used as a visualization algorithm for node similarity, where the distance between nodes represents the strength of correlation (Donthu et al., 2021). Using VOSviewer's clustering and mapping methods, the study identifies three core themes in HRD research: "Employee development and performance management" (red cluster), "Creating inclusive and supportive workplaces for employee growth and development" (blue cluster), and "Transforming HRD for the future: strate-

gies, challenges, and innovations" (green cluster) as shown in Figure 5.

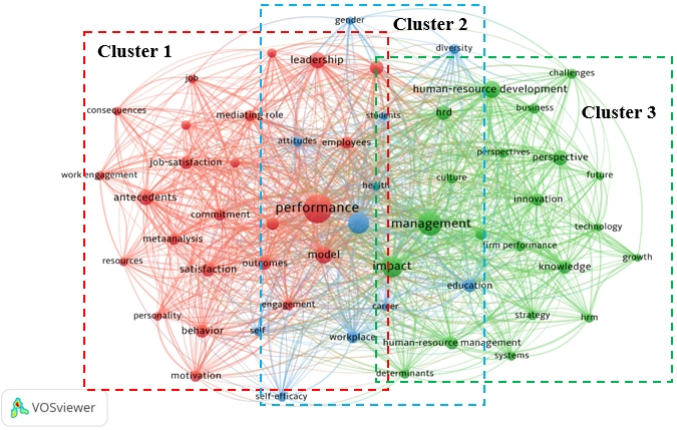
The first cluster emphasizes effective leadership, investment in employee antecedents, monitoring employee satisfaction and behaviour, and addressing outcomes and perceptions that impact productivity and engagement. Effective leadership can provide guidance, support, and feedback to help employees grow and improve their performance (Lee et al, 2019). Similarly, antecedents, such as education, training, and experience, can also have a significant impact on employee performance and development (Faradila et al., 2020). Additionally, employee satisfaction and behaviour play a critical role in influencing motivation, engagement, and productivity, which ultimately impact the organization's outcomes (Rigby & Ryan, 2018). It can be noted that that effective leadership, investment in employee antecedents, monitoring employee satisfaction and behaviour, and addressing outcomes and perceptions are crucial for managing and developing employees, leading to improved performance, motivation, engagement, and productivity, ultimately benefiting the organization especially in the maritime industry.

The second cluster highlight growth importance of valuing diversity and inclusion, providing opportunities for career growth, and investing in education and training to enhance employees' skills and knowledge. This theme acknowledges the pivotal role of education and training in empowering employees to achieve their career goals and enhancing their skills and knowledge to contribute effectively to the workplace (Galvão et al., 2020; Lahiff et al., 2019). It also emphasizes the importance of investing in human capital and cultivating a workplace culture that promotes employee growth, development, and job satisfaction (Halder, 2018; Akdere & Egan, 2020). It can be highlighted that the crucial role of positive workplace environments in promoting employee well-being, self-efficacy, and performance. A focus on human capital and a supportive workplace culture can lead to improved employee outcomes, productivity, and job satisfaction.

The third cluster focuses on the need for HRD to adapt to changes in technology, business models, and the global economy and to leverage knowledge and innovation to create a competitive advantage for organizations. HRD framework and systems need to evolve in response to emerging challenges and opportunities, such as the rise of remote work (Byrd, 2022; Shirmohammadi et al., 2022) and the growing importance of diversity and inclusion (Pleasant, 2017). To achieve this, HRD may leverage knowledge and innovation to drive outcomes that create a competitive advantage for organizations (Azeem et al., 2021; Liao & Marsillac, 2015; Wisshak & Hochholdinger, 2018). An integrated and holistic approach to HRD may be considered the diverse challenges and opportunities that organizations face in the present and future (You et al., 2021). It can be emphasized that a forward-looking approach to HRD is essential, which considers the diverse challenges and opportunities that organizations face in the present and future.

None of the three clusters mentioned directly suggest a new factor for organizational ergonomics. However, the second cluster of organizational factors places significant emphasis on the value of diversity and inclusion, which holds potential relevance for the field of organizational ergonomics. By incorporating "promoting diversity and inclusion in the workplace" as a key factor within the framework of organizational ergonomics, organizations can foster an environment that is more equitable and inclusive. Such an environment can effectively enhance the well-being and job satisfaction of employees, ultimately contributing to the cultivation of a positive organizational culture that supports ergonomics and workplace safety. Thus, the promotion of diversity and inclusion within the workplace emerges as a salient factor that warrants consideration within the context of organizational ergonomics.

Figure 5: Keywork cooccurrence network based on co-words analysis in HRD research.



Source: Authors carries on generating from the WOS database via & VOSviewer software.

Another potentially valuable factor for organizational ergonomics is "Adaptability to change." This factor entails the imperative for HRD to remain agile in response to changes in technology, business models, and the global economy. In addition, it includes the critical need for organizations to establish a supportive workplace culture that fosters employee growth, development, and job satisfaction. Organizations that prioritize adaptability to change may be better equipped to navigate emerging challenges and capitalize on new opportunities, ultimately leading to enhanced employee outcomes, productivity, and job satisfaction. Moreover, by investing in education and training programs to augment employees' skills and knowledge, organizations can create a competitive advantage and achieve long-term success amidst a rapidly evolving business landscape. As such, adaptability to change emerges as a potentially crucial factor that merits consideration within the framework of organizational ergonomics.

4.4. Future research direction of HRD in the maritime industry.

The maritime industry plays a vital role in global trade and transportation, and as such, it is crucial to continually develop and improve its operations. One way to achieve this is by setting research directions that focus on addressing current and future challenges facing the industry.

Table 7: Research directions of HRD in the maritime industry.

Area	Research directions
"Employee development and performance management"	1. Investigating the relationship between leadership style and employee performance in the maritime industry, with a focus on identifying effective leadership models and practices that can improve outcomes. 2. Exploring the antecedents of employee satisfaction in the maritime industry, including factors such as job autonomy, work-life balance, and career development opportunities. 3. Examining the impact of employee perceptions of organizational behaviour on job satisfaction and organizational outcomes in the maritime industry. 4. Investigating the relationship between job satisfaction and employee performance in the maritime industry, with a focus on identifying strategies to improve job satisfaction and its impact on outcomes. 5. Developing and validating a model of employee performance in the maritime industry that accounts for factors such as job satisfaction, leadership style, and organizational behaviour. 6. Examining the impact of HRD interventions on employee perceptions of organizational behaviour, job satisfaction, and organizational outcomes in the maritime industry. 7. Investigating the role of organizational culture in shaping employee behaviour and outcomes in the maritime industry, with a focus on identifying key cultural factors that can be leveraged to improve performance and satisfaction
"Creating inclusive and supportive workplaces for employee growth and development."	1. Investigating the attitudes of employees, employers and stakeholders towards gender diversity and inclusivity in the industry. 2. Exploring the different career paths and opportunities available within the industry, as well as the skills and training needed to succeed. 3. Examining the different forms of diversity present within the industry, such as ethnicity, age, and disability, and identifying strategies to promote greater inclusivity. 4. Investigating the effectiveness of current training programs, as well as identifying areas where further training is needed to support career development. 5. Exploring the experiences of women in the industry, including issues related to career progression, work-life balance, and workplace culture. 6. Investigating the physical and mental health risks associated with working in the industry, as well as identifying strategies to promote better health and safety practices. 7. Exploring the factors that contribute to employee motivation and engagement, as well as identifying strategies to support employee wellbeing and job satisfaction. 8. Exploring the experiences and aspirations of students studying in maritime-related fields, as well as identifying strategies to support their transition into the workforce. 9. Investigating the challenges faced by employees in balancing work and personal life, as well as identifying strategies to promote greater work-life balance and flexibility. 10. Exploring the norms, values, and practices that shape workplace culture in the industry, as well as identifying strategies to promote a positive and inclusive workplace culture.
"Transforming HRD for the future: strategies, challenges, and innovations."	1. Exploring the role of training and development programs in the maritime industry, and their impact on employee skills and overall firm performance and investigating how different HRD practices affect innovation and the development of new technologies in the industry. 2. Examining the use of technology and innovation in the maritime industry, and how firms can develop new technologies to gain a competitive advantage. 3. Exploring how technological advancements, such as automation and digitalization, are changing the nature of work in the industry, and their impact on employment and labour relations. 4. Investigating the role of management and culture in the maritime industry, and how different management styles and cultural factors affect employee motivation, engagement, and retention. 5. Focusing on the unique challenges faced by HR managers in the maritime industry, such as attracting and retaining skilled workers, managing a diverse workforce, and addressing issues related to safety and health. 6. Examining the strategies adopted by maritime firms to achieve sustainable growth, and how different factors such as market conditions, technology, and competition influence strategic decision-making

Source: Authors.

HRD is a critical aspect of the maritime industry, as it involves the recruitment, training, and development of the workforce that operates and manages vessels, ports, and other maritime-related infrastructure. Therefore, setting research directions that incorporate HRD can have a significant impact on the industry's overall efficiency and effectiveness.

Table 7 provides some potential research directions for the maritime industry where underline three themes: "Employee development and performance management", "Creating inclusive and supportive workplaces for employee growth and development" and "Transforming HRD for the future: strategies, challenges, and innovations."

Conclusions.

This paper provides valuable insights into the size, evolution, regional distribution, and key themes of human resource development (HRD) in the maritime industry. Primary countries engaged in research on HRD is the United States The most influential journals in this area are Advances in Developing Human Resources (ADHR). Avey JB and Luthans F were identified as notable authors in the field of HRD. Employee Development and Performance Management, Creating Inclusive and Supportive Workplaces for Employee Growth and Development, and Transforming HRD for the Future: Strategies, Challenges, and Innovations are three domain for HRD. The implications of these research domains for both the research community and practitioners in the maritime industry are represented in the paper.

While the paper provides valuable insights into the volume, evolution, regional distribution, and key themes of HRD in the maritime industry, there are some limitations that should be acknowledged. Firstly, the analysis is based solely on articles, which may not capture the full extent of HRD activities in the maritime industry. Other sources of data, such as surveys and interviews with industry practitioners, could provide a more comprehensive picture of HRD practices and challenges in the industry. Moreover, the study focuses on the maritime industry as a whole, without differentiating between different sub-sectors, such as shipping, ports, and logistics etc. Future research could explore how HRD practices and challenges differ across these sub-sectors, and how they can be tailored to meet the specific needs and characteristics of each sub-sector. While the paper acknowledges its limitations, it highlights the importance of future research in this area to address these limitations and provide further insights into HRD and its implications for the maritime industry.

HRD is crucial in the maritime industry to ensure a skilled and safe workforce. It can address skills gaps, promote safety culture, boost productivity, and offer career development opportunities. The industry faces challenges like environmental concerns, changing trade patterns, and COVID-19 impacts, making HRD even more important. The study shows that HRD initiatives can help the industry to address its numerous challenges and improve its competitiveness, sustainability, and contribution to global trade and economic development. Ultimately, by prioritizing and focusing on HRD, the maritime industry can ensure that it remains a viable and sustainable contributor to the global economy.

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