The Role of Artificial Intelligence in augmenting Green HRM for Sustainable development – A Bibliometric perspective

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Abstract: *Technology is supplanting humans quickly. Forhumans to play a significant role in protecting mother earth, initiatives should be driven to use it in a constructive manner. The 3Rs principle—reuse, recycle, and reduce—should be applied to the use and disposal of gadgets in order to maximize their effectiveness and efficiency. The methods and operations of human resource management (HRM) have been dramatically changed by artificial intelligence (AI). Every organization aspires to operate in an innovative and environmentally responsible manner, and green human resource management is essential to fusing corporate environmental management with human resource management. Artificial intelligence (AI) and green human resource management (Green HRM) integration has a big potential to help firms foster sustainable growth. The goal of green HRM is to integrate sustainable practices and sustainability concepts into various HR roles. These two ideas can work together to provide synergies that result in more productive and sustainable practices when paired with AI. The function of artificial intelligence in utilizing green human resources to achieve sustainable development is the subject of the current study, which is based on a bibliometric analysis. Between 2013 and 2022, 354 records in total are considered. Further based on the literature review and bibliometric analysis this paper also suggests future scope of Green Human Resource Management and Artificial Intelligence in accomplishing and continuing sustainable development in HRM practices in organisations*

Keywords: *Green HRM, Artificial intelligence, sustainability, HRM Practices*

Introduction

The contemporary practices in the business world focuses mainly on two important aspects, first, sustainability and second automation technology with support of artificial intelligence (AI).The concept of sustainable development came into existence during the Brundtland Commission, set up by the United Nations General Assembly in 1983. The Commission's report, Our Common Future (1987) defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs", and set the objective of meeting the simultaneous demands for an environmental protection agenda and for ensuring the development of developing countries (About Sustainable Development – CEPAL). It is mainly after pandemic sustainability

gained more attention in every field of business. Management is the important means for sustainable development because in the office environment, organisation must use more than just an environmentally friendly building along withenvironment friendly practices (Smith and Pitt 2011). Businesses who function while adopting the latest technology will have competitive advantage in the market as it helps in cost and time saving, makes the process very effective.AI applications in HRM have prevented unconscious bias in interviewing, shortlisting and selection and matching the same criteria in precisely fair manners to each candidate. The applications have improved the process via matching features of previously skilled hires with the same capabilities and qualities in future applicants. Just as AI is a new notion in the field of information technology (IT), likewise, the concept of green HRM has evolved to preserve and protect environmental resources to ensure environmental sustainability while at the same time establishing and enhancing productivity (Garg, Srivastava and Gupta, 2018). Jyoti (2019) described that green HRM denotes utilising HR policies to inform effective use of green resources in business premises and address the sustainability of environment that assists businesses in cooperating sustainable business frameworks, giving a boost to all HR functions from recruitment to performance management. Sustainable Green HRM strategies and policies encourage the long-term utilization of wealth in the firm while increasing staff confidence and pride. Green HRM with better AI provides employee job satisfaction and good beingness and people. Policies included in Green HRM are compensation and management reward, security of employment, and teamwork for better productivity. The study conducted by Jogarao et al (2023) demonstrated that GHRM practices significantly influence structural sustainability. AI, with its capacity to analyze vast datasets, automate processes, and generate predictive insights, has revolutionized the way businesses operate. Simultaneously, Green HRM places a strong emphasis on sustainable practices within

the realm of human resource management. It focuses on environmental stewardship, social responsibility, and ethical labour practices. The integration of AI and Green HRM represents a transformative approach to sustainable development within organizations.This exploration delves into the profound implications of integrating Artificial Intelligence and Green HRM, examining how this partnership can drive sustainability at the intersection of technology and human resource management. As we delve deeper into this integration, we will uncover its potential to transform businesses into drivers of sustainable development, fostering a brighter, greener, and more prosperous future for all. This integration not only promises to enhance the efficiency and effectiveness of HR processes but also supports the alignment of business objectives with environmental and social sustainability. Through the application of AI, organizations can make data-driven decisions that promote eco-friendly practices, engage employees in sustainability initiatives, and optimize resource allocation to minimize waste. Green HRM, on the other hand, emphasizes the development of a workforce committed to ethical, sustainable, and responsible practices.The research article uses a bibliometric analysis as it offers a thorough summary and categorization of previous and current research, which aids in determining future research directions in this field of study.

Literature Review

The integration of AI and Green HRM holds tremendous potential for sustainable development. AI-powered tools can optimize recruitment processes, matching candidates with sustainability-aligned job requirements (Li & Wu, 2019). AI-driven personalized learning platforms enhance employees' acquisition of sustainability-related skills and knowledge (Marler & Boudreau, 2017). Performance management is streamlined through AI-based real-time monitoring of sustainability goals. Moreover, AI aids in resource allocation by optimizing energy consumption, waste management, and resource utilization (Gupta et al., 2021).

While the integration of AI and Green HRM offers numerous advantages, it comes with ethical and practical challenges. Data privacy, transparency, and concerns about job displacement need to be addressed to ensure responsible and ethical AI implementation (Lepak & Gowan, 2016). The integration of AI in Green HRM holds promises for sustainable development. AI-driven systems can efficiently analyze vast datasets to identify eco-friendly practices, thereby aiding in decision-making for sustainable operations (Bendoly et al, 2019). However, challenges such as data security, ethical considerations, and the need for employee upskilling pose significant hurdles in the effective integration of AI and Green HRM.

To stay ahead, organizations should anticipate emerging trends, such as hybrid workforce management and ethical AI adoption in Green HRM. Collaboration between AI experts and HR professionals is crucial for innovation (Rasmussen, 2023). Organizations must nurture a culture of continuous learning and adaptability to remain at the forefront of AI-driven sustainable development (Wright and Schultz 2018).

Objectives

i. To analyse the condition of research, future potential, and current growth patterns in Artificial Intelligence and Green HRM for sustainable development

ii. To provide a comprehensive data on publications related to a particular field, including information on authors, institutions, countries and keywords.

Methodology

For data extraction, it is very important to choose an appropriate database. The data source selected for this bibliometric study is Dimensions. This selection is done because 1) it is an integrated database that allows researchers to search and analyze grants, patents, clinical trials, policy documents, and publications 2) it can map out and analyze the research landscape; see relationships between researchers, publications, patents, grants, and policy documents, allowing users to see the whole research lifecycle as well as examine any one point in Compare journals, funders, authors, and research institutions and 3) it uses machine learning approach to create links between data. The present research study was selected from 2013 to 2022 span of time. A total 354 research papers were published in this period. This search string was based on Dimensions to search Artificial Intelligence and Green Human Resource Management with full data in Commerce and Management. This search was done on 25th August 2023.

### Figure 1- Data Retrieval Process for Bibliometric Analysis
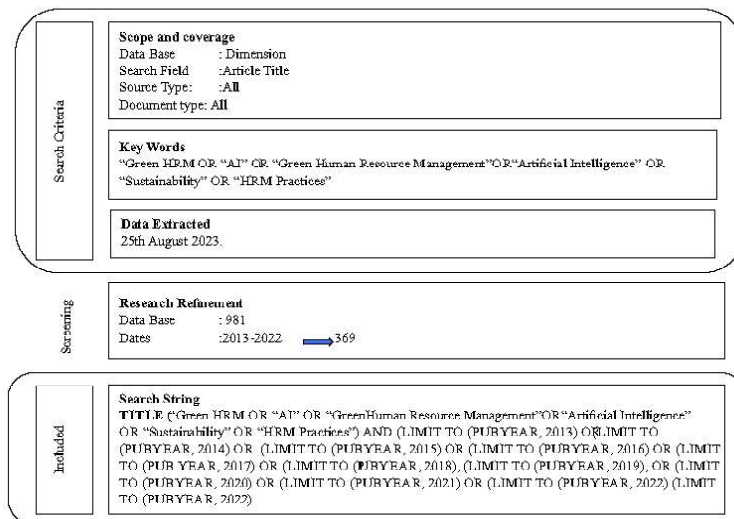
Analysis of Countries

Local Most Productive and Most Cited Countries

Table 1 displays the local (in the data corpus), most productive (in the sense of the number of papers published), and most cited nations based on a bibliographic coupling connection analysis. Each author's institutional affiliation is mentioned in the bibliometric data, and this information establishes the author's nation affiliation. Therefore, the country affiliation refers to the nationality of the study setting, the study institution, and the community that is housing the author rather than the author's nationality. A nation could only be included in the study if it has at least 25 published publications. Forty nations fulfilled the requirement. The total link strength, citation count, and number of documents were computed for each of the forty countries. The total number of documents in the chosen local data corpus is referred to as the number of documents for a given country. The total number of citations for an article that Dimensions records for that particular article is the number of counted citations for that nation. Table 1 presents a decreasing list of the countries based on the total number of citations. China has far and away the most citations (N=617), followed by India (1232) and the United Kingdom (848).India (95) has the strongest link strength (Total link strength) with other countries, followed by China (87) and France (70).
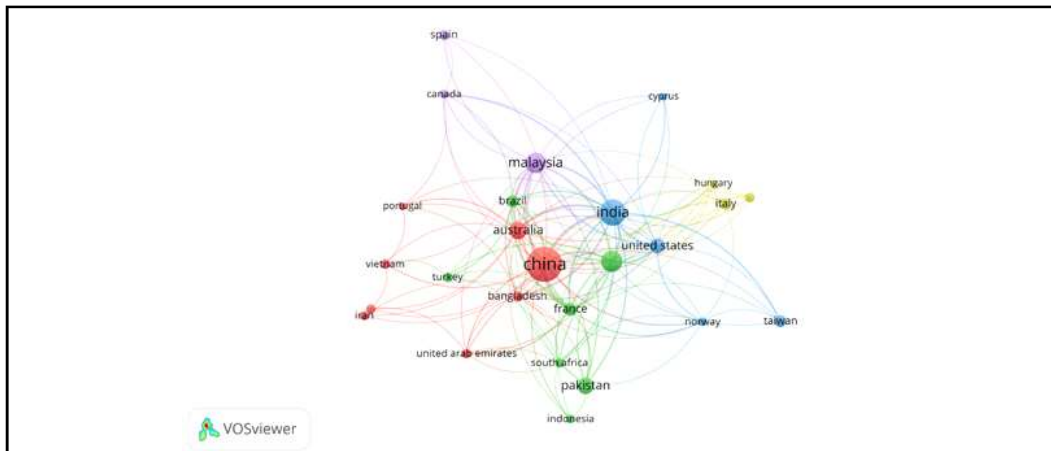
Table 1: Top Ten Countries with most Citations

| Sl. No.	Country	Documents	Citations	Total link strength
1	China	96	1617	87
2	India	54	1232	95
3	United Kingdom	36	848	57
4	France	13	701	70
5	Brazil	11	644	29
6	Australia	24	570	47
7	United States	18	521	47
8	Malaysia	33	503	64
9	South Africa	7	337	19
10	Vietnam	8	331	7

Analysis of Organisation

Local Most Productive and Most Cited Organisations

Figure 2 displays the most prolific (in terms of the number of papers published) and highly referenced local (in the data corpus) organizations based on a bibliographic coupling connection analysis. The organization's density visualization, complete with papers, citations, and total link strength, is shown in Figure 2. A minimum of three citations from published works was the criterion for an organization to be included in the analysis. Nine organizations satisfied the requirements. The total connection strength, citation count, and number of papers for each of the nine organizations were determined. The total number of documents in the chosen local data corpus is referred to as the number of documents for an organization. The total number of citations for an article that Dimensions records for that particular article is the number of counted citations for that organization. The density depiction of Figure 2's organization is based on the total bibliographic coupling connection strengths. The work of the Indian Institute of Technology, Delhi has been cited the most (N = 408), followed by that of the Management Development Institute (N = 232) and O. P. Jindal Global University (N = 113), according to the Density Visualization figure.

Figure 3: Local Most Productive and Most Cited Organisations (Density visualization)
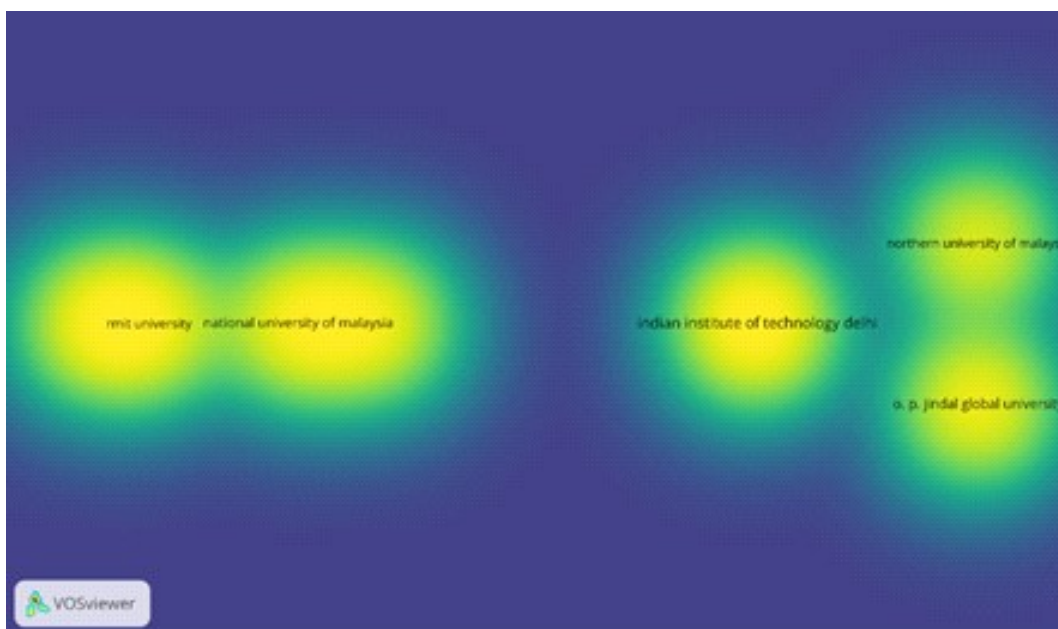
Analysis of Authors

### *Local Most Productive and Most Cited Authors (Overlay Visualization)*

The most referenced and productive local (in the data corpus) papers were identified by a bibliographic coupling connection analysis. Writers are displayed in Figure 3. There had to be a minimum of 25 published papers per nation in order for an author to be included in the analysis. The threshold for an author to have a minimum of two documents is two. Two citations is the minimum for an author. 79 authors out of 1122 met the required number. The total number of links, citations, and documents for each of the 84 authors were computed. The total number of documents in the chosen local data corpus is the number of documents for authors. The total

number of citations for an article that Dimensions records for that particular piece is the number of counted citations of authors. Descriptive findings from an analysis of all 79 items' completed templates based on the total number of bibliographic coupling citations are shown in Figure 1. Nine clusters are present. Jabbour, Charbel Jose Ciappetta has the most citations in cluster 7, with 270, followed by Bag, Surajit in cluster 1 with 224, and Kant, Ravi in cluster 1 with 208. The figure represents 9 clusters. Cluster 1 has 38, cluster 2 has 10 items, cluster 3 has 6 items, cluster 4 has 6 items, cluster 5 has 5 items, cluster 6 has 4 items, cluster 7 has 4 items, cluster 8 has 4 items and cluster 9 has 2 items.

Figure 4 : Local Most Productive and Most Cited Authors (Overlay Visualization)
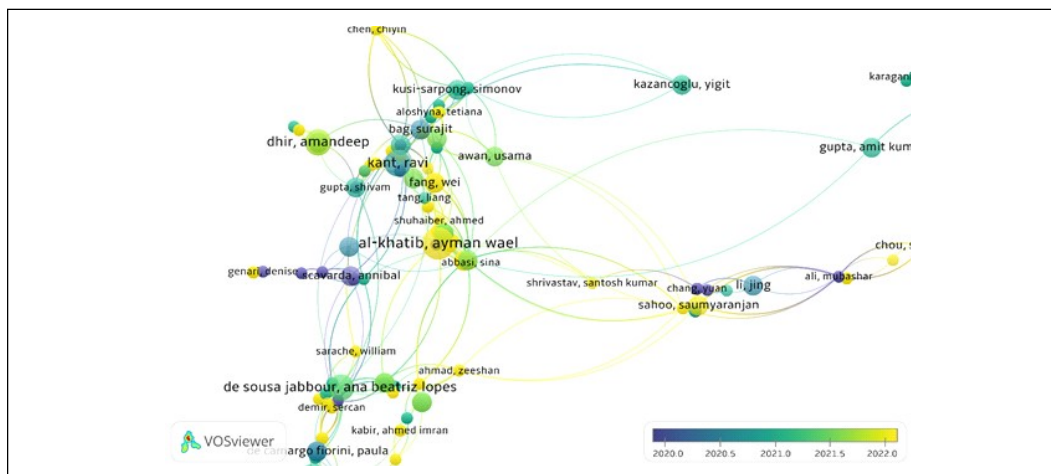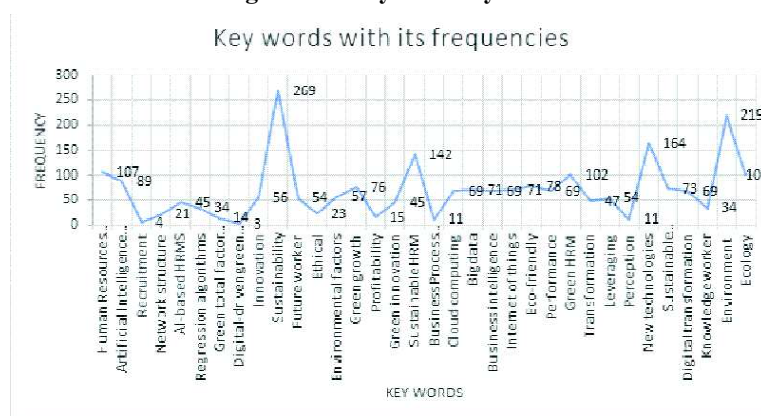

Analysis of Keywords

As shown in Table 2, the most active keyword is sustainability appears in 269 publications. Meantime, keywords such as environment (219), New technologies (164) sustainable HRM (142), HRM (107) and Green HRM (102) appear in more than 100 publications, respectively. Findings demonstrate the popular theme of sustainability in HRM. However, the theme of Artificial intelligence seems to lack attention from the scholars, as compared to the theme of sustainability and theme of Environment, especially in the HRM context. The keyword of Artificial Intelligence appears in only 89 publications.

Figure 5: Analysis of Keywords

Table 2: Analysis of Keywords

Key words	Frequency
Human Resources Management (HRM)	107
Artificial Intelligence (AI) technology	89
Recruitment	4
Network structure	21
AI-based HRMS	45
Regression algorithms	34
Green total factor productivity (GTFP)	14
Digital-driven green economy development model	3
Innovation	56
Sustainability	269
Future worker	54
Ethical	23
Environmental factors	57
Green growth	76
Profitability	15
Green innovation	45
Sustainable HRM	142
Business Process management	11
Cloud computing	69
Bigdata	71
Business intelligence	69
Internet of things	71
Eco-friendly	78
Performance	69
Green HRM	102
Transformation	47
Leveraging	54
Perception	11
New technologies	164
Sustainable development	73
Digital transformation	69
Knowledge worker	34
Environment	219
Ecology	102

Analysis of number of research published from 2013 to 2022

Based on the number of research paper published year wise from 2013 to 2022, it is found that the during 2013, 2014, 2015 and 2018 nil papers were published. It started with one paper in the year 2016 and as one can observe the trend, each year from 2020 to 2022, the research papers are just increasing above double each year. In 2020 it is observed that forty-four papers were published, in the year 2021, no. of research papers published was hundred and during 2022, number of papers published was 201. From this it clear th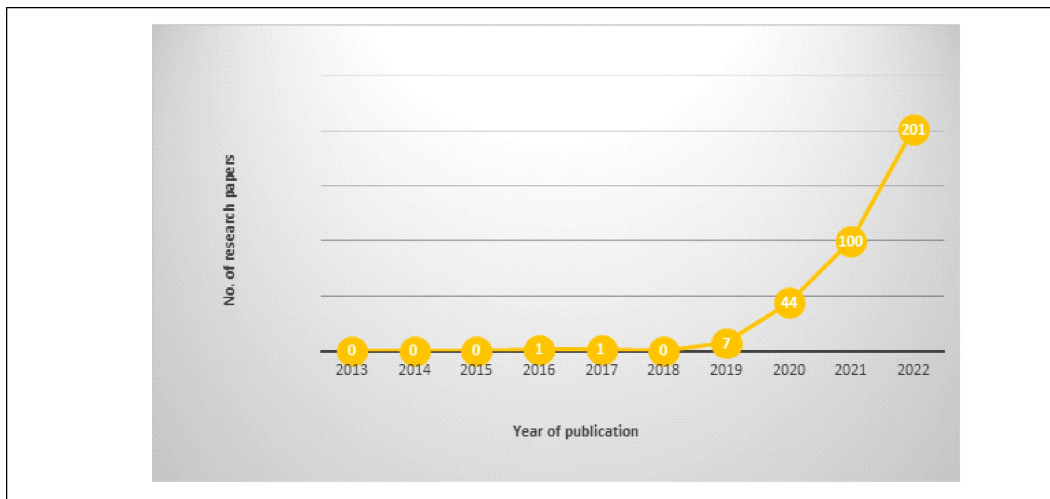at research community is concerned about the integration of AI with Green HRM and support sustainable development. As the need for sustainability grows, research in this field continues to evolve, providing organizations with valuable insights and best practices. These papers underscore the potential for AI and Green HRM integration to drive significant positive change, contributing to both environmental conservation and business success. It is evident that this interdisciplinary approach will remain a subject of significant research and innovation in the coming years. This trend further highlights the urgency and significance of addressing sustainability and responsible practices in the workplace, aided by advanced AI technologies.

Table 3 – No. of research papers with corresponding years

Year	No. of research papers on Integration of AI and Green HRM
2013	0
2014	0
2015	0
2016	1
2017	1
2018	0
2019	7
2020	44
2021	100
2022	201
Total no. of research papers	**354**

Figure 6 -No. of research papers with corresponding years

Findings and Discussions

The study involved reviewing and examining the 363 articles published between 2013 to 2022 on the "Artificial Intelligence" & "Green Human Resource Management"' in full data. The analysis depicts that China is leading is the research area of Green HRM and Artificial intelligence and it is followed by India and United Kingdom. It is evident that they are much concerned about sustainability and proactively integrating its practices with artificial intelligence. It is found that Indian institutions like Indian Institute of Technology work has been most cited followed by Management Development Institute and O. P. Jindal Global University. Lastly it is found that Jabbour, Charbel Jose Ciappetta work is cited highest followed by Bag, Surajitand Kant, Ravi. Further is it found that research papers are enormously increasing each year and is researchers are convinced that this fusion is for the organisation and the environment and it is of paramount importance in today's world, where sustainability and responsible business practices are becoming central to organizational success. The analysis of keywords depicted that business environments are concerned about sustainability and environment though they are lacking adaptation of artificial intelligence technologies.

Conclusions

The integration of Artificial Intelligence (AI) and Green Human Resource Management (Green HRM) holds immense promise for fostering sustainable development in organizations and society at large. By combining the power of AI technologies with the principles of Green HRM, businesses can achieve environmental sustainability, social responsibility, and economic viability simultaneously. It plays a vital role to enhance effectiveness and efficiency, enables the collection and analysis of vast amounts of data, facilitating informed decision-making, can assess employee well-being and engagement levels, can optimize resource allocation, reduce waste, and promote eco-friendly practices, it will continue to play a pivotal role in shaping green practices within organization, it facilitate communication and collaboration among stakeholders, including employees, suppliers, and customers, fostering a shared commitment to sustainable practices.

Combination of Green HRM principles with AI will support organizations to align their HR practices with sustainability goals. This integration not only improves operational efficiency but also fosters a corporate culture that values environmental conservation and responsible business practices. It positions the

organization to be a leader in the growing movement towards sustainable development and can result in long-term success. AI-driven sensors and IoT (Internet of Things) devices will provide real-time environmental data, enabling organizations to make immediate adjustments to reduce their ecological footprint effectively. Organizations will increasingly collaborate on sustainability initiatives using AI-driven platforms, creating a global network of companies working together to address pressing environmental and social challenges. AI will enable organizations to explore and develop sustainable business models that align profitability with environmental and social responsibility. These models will be more effective in achieving long-term success.

The Green HRM with Artificial Intelligence is a novel idea in developing nations, and further research is required to recognise sustainability concerns and examine the effects of GHRM performs in organizations. Nevertheless, Green HRM is critical for every business and its employees since it sets the firm's emphasis on external CSR efforts. The future of Green Human Resource Management (GHRM) and Artificial Intelligence (AI) together holds great promise and is expected to play a pivotal role in shaping the sustainability and success of organizations. Further it is suggested to adopt artificial intelligencetechnologies for having a green and sustainable organisation

References

Garg, Vikas & Srivastav, Shalini & Gupta, Anubhuti. (2018). Application of Artificial Intelligence for Sustaining Green Human Resource Management. 113-116. 10.1109/ICACE.2018.8686988.

Gupta, M., 2021. The Role of Artificial Intelligence in Adopting Green HRM Practices. In Reinventing Manufacturing and Business Processes Through Artificial Intelligence (pp. 1-18). CRC Press.

Janet H. Marler & John W. Boudreau (2017) An evidence-based review of HR Analytics, The International Journal of Human Resource Management, 28:1, 3-26, DOI: 10.1080/09585192.2016.1244699

Jyoti, K. (2019) Green HRM-People Management Commitment to Environmental Sustainability. Proceedings of 10th International Conference on Digital Strategies for Organizational Success, Gwalior, India, 5-7 January 2019, 1332-1346.

https://doi.org/10.2139/ssrn.3323800

Lepak, D., & Gowan, M. (2016). Human Resource Management: Managing Employees for Competitive Advantage (2nd ed.). Chicago: Chicago Business Press.

Naidu, Dr & Jogarao, Dr & Hemalatha, T. (2023). SCOPUS-002.

Peiyue Li & Jianhua Wu (2019) Sustainable living with risks: meeting the challenges, Human and Ecological Risk Assessment: An International Journal, 25:1-2, 1-10, DOI: 10.1080/10807039.2019.1584030

Rasmussen, T. H., Ulrich, M., & Ulrich, D. (2023). Moving People Analytics From Insight to Impact. Human Resource Development Review, 0(0). https://doi.org/10.1177/15344843231207220

Smith, A. & Pitt, M. (2011), " Sustainable workplaces and building user comfort and satisfaction", Journal of Corporate Real Estate 13(3):144-156

Sustainable Development – (CEPAL)https://www.cepal.org/en/topics/sustainable-development/about-sustainable-development#:~:text =The%20concept%20of%20sustainable%20development, Nations%20General%20Assembly%20in%201983

Williamson, I. O., Lepak, D. P., & King, J. (2003). The effect of company recruitment website orientation on individuals' perceptions of organizational attractiveness. Journal of Vocational Behavior, 63, 242-263.

Wright SA, Schultz AE (2018) The rising tide of artificial intelligence and business automation: developing an ethical framework. Bus Horiz 61:823–832. https://doi.org/10.1016/j.bushor.2018.07.001