Digital Human Resource Transformation – A Bibliometric Analysis

M. Lalitha Kavya, Sowdamini T., Akankhya Pande

Abstract:

Research in the field of digital HR transformation has gained significant momentum due to the influence of business transformation driven by digital technology. However, despite its growing prominence, the research on this topic remains relatively scattered and dispersed. Therefore, the authors employed bibliometric analytic methodologies in this article to portray the intellectual structure of literature related to digital developments in HR. A comprehensive analysis of 184 articles from the Scopus database is conducted using bibliometric methods, including citations, co-citations, and keyword analysis. Using bibliometric analysis, this paper thoroughly evaluates advancements made possible by digitalization in HR management. Utilizing visualization software such as Biblioshiny and VOSviewer, the analysis reveals the incremental trend of publications, research studies, affiliated organizations, and research-driven nations over time. Notably, the examination of the co-citation network using VOSviewer yields significant findings. This study contributes to the evolving body of HR literature and expands our understanding of HR digitalization through the application of bibliometric analysis.

Keywords: Digital HR Transformation, HR Technology, HR Analytics, Artificial Intelligence, Bibliometric analysis, Digital human resources

JEL Classification: M150, O330

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INTRODUCTION

The world has changed dramatically from a period when technological developments shaped the day-to-day operations of businesses to a time when technology conditions the business models of new-age businesses and, at the same time, influences how they relate to their customers and providers. HRM cannot continue to elude this development, where all aspects of enterprises are gradually heading toward transformation through technological improvements. Digital technology has emerged as a new game-changer, drastically altering how employees and prospects engage and communicate with businesses. Because nearly all businesses use technology and web-based applications today, providing HR services to everyone has undergone a significant transformation.

Recent studies have also demonstrated that organizations that successfully employ cutting-edge Digital HR solutions perform better than those that do not (Anuj Kumar, 2021). HR professionals need to be skilled in both traditional HR tasks and abilities and be able to apply their knowledge and skills through technology. To function in a quickly changing global context, HR professionals need to equip their operations and themselves. To transform HR into a viable business partner, fundamental procedures, including recruitment, succession planning, performance management, training, etc., must be implemented from the ground up.

Another factor that must be taken into account is the reason why an organisation needs to change its HR procedures in the first place and how doing so will help the corporation's bottom line. This is so that the organisation may be supported more effectively by solving the problems and seizing the opportunities presented by HR transformation. Therefore, before using digital technology in the HR sector, firms must concentrate on the actual problems and the potential areas where digitization might affect the company's bottom line.

Conceptualization:

The process through which firms use digital technologies to alter and develop new business models and cultures is known as "digital transformation." It brings about some modifications in human society overall. The primary goal is to raise corporate performance. Changes in organisational thinking, work habits, and the acquisition of new skills are all necessary for transformation. The ability to respond to or commit to continual change is what distinguishes a digital transformation from what we frequently think of as a more conventional transformation process.

The topic of digital transformation (DT) is increasingly important for businesses around the world (Gerald C. Kane, 2015; Michael Fitzgerald, 2013; Singh, Madaan, Swapna, & Kumar, 2023). Businesses that have trouble adjusting to the digital era are anticipated to experience "digital Darwinism," in which incumbents might be replaced. Only the more flexible businesses, open to hi-tech advancements, will continue to survive in the market environment (Schwartz, 2001). The term “digital human resource technology” (HRT) refers to a broad category of hardware and software created and used to automate the HR function in businesses utilising the most recent information technology innovations. Digital HRT makes HR's efficacy, efficiency, and connectedness increase through the use of ‘social, mobile, analytics, and cloud technology (Ashutosh Jani, 2021). Ulrich (1997) discovered that digital HRT was helpful for effectively managing HR operations, modernising HR methods, and shrewdly developing connections between individuals through social networks for a stronger sense of belonging. The implementation of Digital HRT may be greatly influenced by the user's impression of the usefulness and convenience of use according to the “Technology Acceptance Model (TAM)” designed by Davis (1989), who contends that perceived usefulness and perceived usability play a part in the adoption of technology.

In order to change customer connections, internal processes, and value propositions, it is now necessary to combine classic technology like ERP with digital advancements like mobility, social media, and smart embedded devices. This digital attitude begins with going outside the box and considering how one's own space might be applied to other industries and models. To fully utilise the digital environment, we must be imaginative while implementing the models. A new attitude must be created for this, and our perspective must be modified appropriately. HR managers must strike a balance between the big thinkers and the doers in order to effectively use their right and left brains. All of this will result in organisational change, which fosters the creation of fresh outputs and experiences. Rich data sets provided by digital technology serve to enhance connections, business processes, and other organisational functions for excellent experiences and results.

Research Questions:

The goal of this study is to give an overview of Digital HR in order to spur further research and promote the field of Digital HR scholarship. With this objective, the current study's goal is to provide evidence for the following line of inquiry: What have been the publication trends in Digital HR during the last ten years in terms of prolific authors, most prominent journals, important themes, and the field's intellectual and social structure? To learn this information, the subsequent questions will be answered.

1. How has the amount of works published in this field changed over time?
2. What nations published in this area most effectively?
3. In which journals are the majority of articles in this field published??
4. Which authors in this discipline possess the most citations and publications?
5. Which articles in this field received the most citations?
6. What were the key areas of study in this area?

BACKGROUND OF THE STUDY

The world of work has advanced significantly over the years, from the skilled artisans of the 19th century to 20th-century manufacturing workers to the digital workforce and robotics of the 21st century, which are now enabled by artificial intelligence (Thite, 2022). Digital innovations, in conjunction with demographic changes and globalisation, have fundamentally changed how we live, work, communicate and conduct business. They are also muddling the lines between various businesses, clients, and suppliers and between employees, internal and external, personal and professional spaces, gadgets, and time. In the field of robotics and artificial intelligence, machines now perform tasks that humans once performed, as well as some "thinking work" (Phan, Wright, & Lee, 2017).

In response to needs and changes in the external environment, the “HR function has continuously evolved from labour welfare to personnel administration to strategic HR to digital or smart HR” (Bondarouk, Ruel, & Parry, 2017). The HR department's focus has changed from being reactive to being proactive, adaptable, and strategic, just as the external business setting has moved from being locally focused and stable to being globalized and incredibly uncertain. "The history of HR is modest and broad," claims (Cohen, 2015). The current scenario is enlightening and demanding, and the future of HR offers opportunities for the discipline as well as new, more difficult but thought-provoking issues.

Human resource management (HRM) has traditionally placed a strong emphasis on three dimensions: career development, organisation development, and training and development. Since then, these three aspects have been broadened to incorporate business strategy as the core and technology as a support system (Werner, 2014). People are interacting with technology in three different ways: through it, inside it, and with each other more frequently as a result of

technological advancements that have shifted the HRD profession into a new domain. Therefore, technology is now seen as the fourth dimension of human resource development. “Workplace transitions from manual to computerised, knowledge-based to information-based, egocentric to collaborative, and hands-on to minds-on hands-on to minds furthermore on have been brought about by the digital revolution” (Thite, 2022).

In this upgraded avatar, time-consuming top-down HR methods are making way for bottom-up, technologically assisted solutions that empower people to take care of themselves (Pandey, Kumar, Mangla, & Jain, 2021). This change places more responsibility for managing growth on the individual rather than the business (Evans & Rodriguez-Montemayor, 2016). The process of rethinking and rebuilding the HR department or function inside the organisation for better performance is known as human resource (HR) transformation. The case for shifting HR's emphasis from a traditional people- and administrative-focused position to an outcome-focused strategic role is supported by HR transformation. Ulrich's (1997) HR Business Partner model has the most significant influence on it (Francis & Baum, 2018). Additionally, the fast advancement and spread of information and communication technology have sparked a corporate transformation in numerous organisations (Morgan & Page, 2008; Mariam H. Ismail, 2017; Abdul Qadir, 2017).

The literature presents various interpretations of digital transformation. The concept of a “digital transformation stems from the merging of personal and business IT environments and captures the impact of emerging digital technologies, including social, mobile, analytics, cloud, and the Internet of Things, in terms of transformation (SMACIT)” (White, 2014; Gerald C. Kane, 2015; Sebastian, et al., 2017). In a broad sense, it is the merger of digital business technologies and processes in a digital economy. In-depth knowledge of digital transformation refers to the application of these technologies to three organisational dimensions: internally, where core business, decision-making, organisational culture and structures are affected; externally, where an emphasis is placed on a holistic approach, in which practically all organizations segments and operations are directly impacted, frequently resulting to completely new business models, with a focus on digitally optimizing the user experience and transforming its entire life cycle (Kaufman & Horton, 2014; Schuchmann & Seufert, 2015).

Further evidence that the complexity of digital transformation is greater than that of earlier IT-enabled transformations comes from the literature's descriptions of its nature. The fact that DT is seen as one of the biggest difficulties in recent years in every industry, without exception, serves as a support for this (Schuchmann & Seufert, 2015). Compared to other types of technology-enabled business transformation, digital transformation is more complicated and must take into account the strategic roles that emerging digital capabilities and technologies must play for effective digital innovation (Yoo, Henfridsson, & Lyytinen, 2010). According to (Mariam H. Ismail, 2017), DT is the process through which corporations integrate an array of different digital technologies, magnified by pervasive connectivity, to outperform rivals and gain a long-term competitive advantage. This is done by simultaneously impacting the business model, the relationships with potential customers, operations (which includes decisions and procedures), and, at the same time, influencing people (utilising their talents, experience, and culture) as well as networks (containing the full value system).

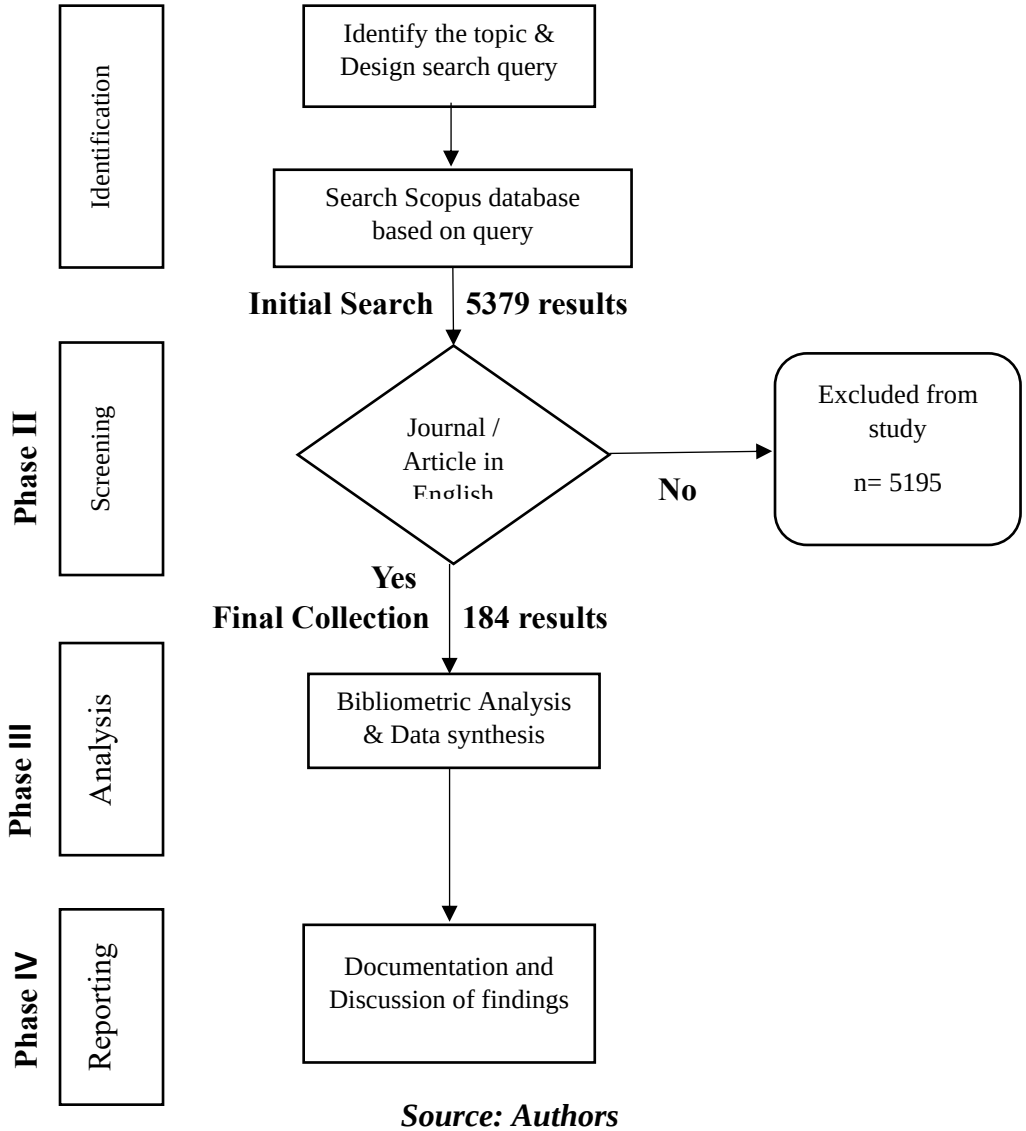
METHODOLOGY

A literature review is a tool for emphasising a study topic's knowledge limitations and locating prospective research gaps. Bibliometrics is a comparative quantitative evaluation method that draws on published academic literature's bibliographic data. It examines numerous characteristics of the bibliography, including the number of articles, citations, co-authorship, and important subjects. Numerous uses exist for bibliometric analysis (Engler, 2014, p. 193).

Bibliometrics is a method for tracking the evolution of disciplines across time based on their "social, philosophical, and intellectual frameworks" (Zupic & Cater, 2015). It analyses and categorises bibliographic data by using representative summaries of the literature that has already been published.

Bibliometric technique is used by researchers to explore the dynamics of collaboration in the current literature in more detail and to spot evolving patterns in the journal, conceptual structure, and research elements (Khan, et al., 2021; Raghuram, Tuertscher, & Garud, 2010) and involves creating appropriate search criteria, conducting literature searches, and finalising the analysis in an iterative approach (Saunders, Lewis, & Thornhill, 2009). In order to deliver a thorough outline of the area and list of important works in the field, analyzing the research on HR digitization is done using a similar process. The overarching goal is to help the discipline evolve, identify major research areas and indicate possible future research areas. *Figure 1* below gives a quick overview of the approach used in this study.

Fig. 1: Overview of the methodology



Source: Authors

Search Criteria

The author came up with the optimal search phrases after determining the investigation's scope and using the formerly published work on Digital HR, advice from faculty, and suggestions from practicing managers. The search for articles employed the following Boolean string: ("HR technology" OR "Digital HR" OR "HR Transformation" OR "AI in HR" OR "artificial intelligence in HR" OR "HR analytics" OR "People Analytics" OR "Workforce Analytics" OR "Blockchain" OR "Machine Learning") AND (HR OR "Human Resources" OR "Human Resource Management" OR "Human Resource Development" OR HRD OR HRM)

Database selection and data collection

The "Scopus database was used exclusively for data collection because it has the largest citation and abstract database from more than 20,000 peer-reviewed publications in the domains of social sciences, science, technology, and the arts and humanities" (Donthu, Kumar, & Pattnaik, 2020; Shahzad, Fahed, Farrukh, & Yasmin, 2020). The initial search, as per the above-provided string, provided a search result of 5379 documents. The final portfolio of 184 journal articles available in English between 2012 and 2022 was considered after searching for the aforementioned keywords in Scopus's abstracts and titles.

Table 1: Research protocol for data collection

Data-Set	**Elsevier's Scopus**
Source	Abstract-Title-Keyword
Year	From 2012 to October 2022
Subject Area	"Business, Management and Accounting"
Document Type	Article
Publication stage	Final
Source Type	Journal
Language	English
Research Keywords	Digital HR Transformation, HR Technology, HR Analytics, Industry 4.0, IoT, Artificial Intelligence, Blockchain, Machine Learning
Query String	TITLE-ABS-KEY (("HR technology" OR "Digital HR" OR "HR Transformation" OR "AI in HR" OR "artificial intelligence in HR" OR "HR analytics" OR "People Analytics" OR "Workforce Analytics" OR "Blockchain" OR "Machine Learning") AND (HR OR "Human Resources" OR "Human Resource Management" OR "Human Resource Development" OR HRD OR HRM)) AND (LIMIT-TO (PUBYEAR,2022) OR LIMIT-TO (PUBYEAR,2021) OR LIMIT-TO (PUBYEAR,2020) OR LIMIT-TO (PUBYEAR,2019) OR LIMIT-TO (PUBYEAR,2018) OR LIMIT-TO (PUBYEAR,2017) OR LIMIT-TO (PUBYEAR,2016) OR LIMIT-TO (PUBYEAR,2015) OR LIMIT-TO (PUBYEAR,2014) OR LIMIT-TO (PUBYEAR,2013) OR LIMIT-TO (PUBYEAR,2012)) AND (LIMIT-TO (SUBJAREA,"BUSI")) AND (LIMIT-TO (DOCTYPE," ar") AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (SRCTYPE, "j")) AND (LIMIT-TO (LANGUAGE, "English"))
	Note: The search query string was last performed on October 28, 2022. The number of publications could be larger if this string has been successfully used up to this point because some works might be accepted by editors and published on Scopus.

Inclusion and exclusion/ Refinement of results

According to (Ramos-Rodrıguez & Ruız-Navarro, 2004), peer-reviewed scientific journal articles are "certified knowledge." The bibliographic data for the chosen publications was saved in CSV formats and included information on the paper's title, authors, affiliations, source, keywords, citations, and references.

Software

One of the extensive science mapping tools used for bibliometric analysis is the R-based, open-source Bibliometrix package (Aria & Cuccurullo, 2017). In a similar vein, bibliometric networks are built using the VOSviewer programme (Van Eck & Waltman, 2017). While Biblioshiny is an open-source, completely accessible application developed in the R studio for conducting a detailed science mapping evaluation of scientific literature. “VOSviewer is a downloadable Java tool designed for analysing and presenting citation networks of research literature” (Pham-Duc, Tran, Hoang, & Do, 2022). Each tool has benefits and restrictions, but when we combine the data from both, it gives us a complete picture of how the knowledge base in the area of Digital HR research has evolved around the world.

This software was chosen because it creates and presents bibliometric networks more effectively. Based on bibliographical coupling, co-citation and co-authorship, these networks encompass the graphs of academics, journals, researchers, and publications. Additionally, it makes use of text mining capabilities that may be used to visualise and create co-occurrence networks of significant terms collected from a corpus of scientific publications (Jang & Khan, 2017).

ANALYSIS AND FINDINGS

Descriptive analysis

The basic overview of the literature is better captured by a preliminary study of the data (Qamar & Samad, 2022). The literature gathered from the Scopus database is summarised in *Table 2*. Our collection comprises 184 articles from 459 authors that were published between 2012 – 2022 (as of October 28, 2022), consisting of 643 author keywords related to studies on Digital HR transformation.

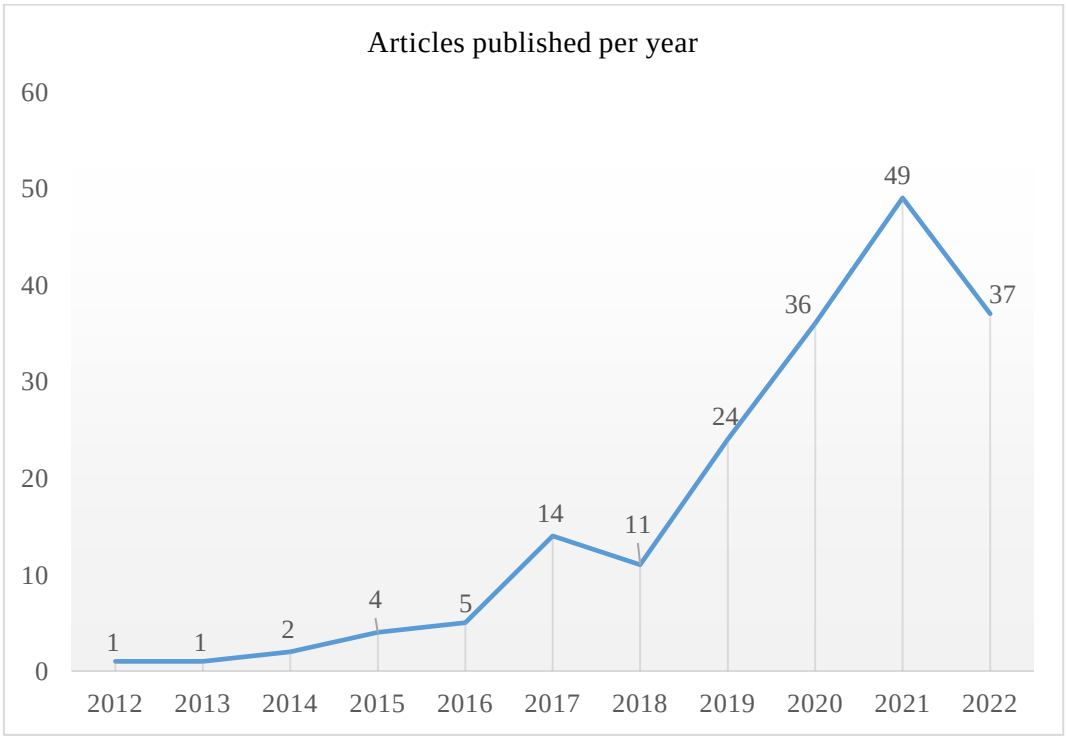
Table 2: Overview of the literary works

Description	Results
Timespan	2012:2022
Sources (Journals)	100
Documents (Articles)	184
Annual Growth Rate	43.49%
Average citations per doc	18.87
References	9333
Author's Keywords (DE)	643
Authors	459

Publication trend: *Figure 2* shows the yearly output of articles related to Digital HR available in the Scopus database through 2012–2022 period. The x-axis shows number of publication and y-axis shows year of publication. The figure clearly shows that between 2012 and 2015, studies on digital human resources were hardly ever conducted. The number of articles published has gradually increased over the years since 2016 (n=5), and the year 2021 (n=49) saw the most publications, followed by 2022 (n=37) and 2020 (n=36).

Influential journals: Based on the data collected from Scopus and further iterations The 10 leading journals that published articles on digital HR are included in *Table 3*, besides the overall number of citations those publications earned. From the table below its evident that "International Journal of Human Resource Management" has published more articles (n=10) about digital HR and has the highest citations (n=307) among the list, followed by Human Resource Management Journal with just (n=4) number of articles but has good citation score of (n=213) which is closely followed by Human Resource Management Journal with (n=4 articles) but with total citations of (n=206).

Fig. 2: Trend in publications of Digital HR



Source: Scopus database

Table 3: Top ten most contributing journals

Source (Journals)	Articles	Total Citations
International Journal of Human Resource Management	10	307
Human Resource Management Journal	4	213
Human Resource Management Review	4	206
Business Horizons	5	191
Journal Of Organizational Effectiveness	8	185
Management science	2	156
Human Resource Management	5	123
Management decision	2	62
Technology in society	2	57
International journal of scientific and technology research	6	49

Author influence: Based on the quantity of articles published and mostly cited, we have identified the authors who are the most productive and is presented in *Table 4*. If number of documents is considered we have 8 authors competing but if citation score of the authors is considered Ulrich D tops the list with (n=248 citations for 2 articles).

Table 4: Top ten most productive authors

Author	Documents	Authors	Citations
Black J.S.	3	Ulrich D.	248
McCartney S.	3	Wu L.	156
Nawaz N.	3	Black J.S.	102
Van Esch P.	3	Van Esch P.	102
Wang X.	3	Vrontis D.	59
Van Esch P.	3	Hamilton R.H.	54
McCartney S.	3	Pillai R.	49
Wang X.	3	Sivathanu B.	49
Avrahami D.	2	Avrahami D.	36
Chalutz Ben-Gal H.	2	Chalutz Ben-Gal H.	36

Source: VosViewer

Additionally, the h-index, g-index, and m-index measure the author's output and influence, as shown in *Table 5.* In general, the "h-index is determined as the number of publications with at least h citations, the g-index represents the number of cited papers with at least g2 citations, and the total citations as reported in the Scopus database, which combines the h and g indices; PY start stands for the author's first year of publishing" (Qamar & Samad, 2022). It is evident that Black JS, McCartney and Van Esch P lead the list.

Influential articles*:* An article's impact and level of acceptance in the scientific community are shown based on how many citations it gets. The top 10 most significant articles on Digital HR are shown in *Table 6*. The local citation displays the number of times a certain article has been cited by other articles within the 184 articles that were the subject of this study, as opposed to the total citation, which displays the number of citations an article has received over the whole Scopus database.

Table 5: Author Impact

Author	H-Index	G-Index	TC	NP	PY-Start
Black JS	3	3	102	3	2019
McCartney S	3	3	18	3	2020
Van Esch P	3	3	102	3	2019
Chiappetta Jabbour CJ	2	2	13	2	2021
Florkowski GW	2	2	14	2	2019
Fu N	2	2	9	2	2021
Hamilton Rh	2	2	54	2	2020
Jain P	2	2	4	2	2020
Kar Ak	2	2	12	2	2021
Nawaz N	2	2	7	3	2020

Source: Biblioshiny

From Table 6 its is clearly evident that Huang & Rust (2018) tops the highest total number of citations list (n=719) and also the highest total citations per year (n=143.8), which shows that the study on artificial intelligence in human services is the major interest area for most of the academicians. This article was published in the "Journal of Service Research" to address how businesses should choose between humans and robots for executing and completing activities and have built a theory of AI job replacement. If the number of local citations is considered (Marler & Boudreau, 2016) tops the list (n = 34). This article was published in "The International Journal of Human Resource Management" and conducted an evaluation of the published, peer-reviewed literature on HR analytics utilising an integrative synthesis. This shows that academicians in India were mostly interested in HR analytics during the year 2016.

Table 6: Top ten influential articles

Title	Author	Country	Source	Total Citations	TC per Year	Local Citations
Artificial Intelligence in Service	(Huang & Rust, 2018)	China, USA	Journal of Service Research	719	143.8	7
HR and analytics: why HR is set to fail the big data challenge	(David Angrave, 2016)	UK	Human Resource Management Journal	200	28.57	32
Artificial Intelligence in Human Resources Management: Challenges and a Path Forward	(Prasanna Tambe, 2019)	France, USA	California Management Review	169	42.25	15
An evidence-based review of HR Analytics	(Marler & Boudreau, 2016)	USA	International Journal of Human Resource Management	161	26.83	34
Are we there yet? What's next for HR?	(DaveUlrich & H.Dulebohn, 2015)	USA	Human Resource Management Review	144	18	15
Three-Way Complementarities: Performance Pay, Human Resource Analytics, and Information Technology	(Sinan Aral, 2012)	USA	Management Science	144	13.09	12
Learning from practice: how HR analytics avoids being a management fad	(Rasmussen & DaveUlrich, 2015)	Netherlands, USA	Organizational Dynamics	104	13	19
When eliminating bias isn't fair: Algorithmic reductionism and procedural justice in human resource decisions	(T.Newman, et al., 2020)	USA	Organizational Behaviour and Human Decision Processes	60	20	7
AI-enabled recruiting: What is it and how should a manager use it?	(StewartBlack & Esch, 2020)	New Zealand, USA	Business Horizons	58	19.33	10
Innovating through digital revolution: The role of soft skills and Big Data in increasing firm performance	(Francesco Caputo, 2019)	Italy, UK	Management Decision	58	14.5	9

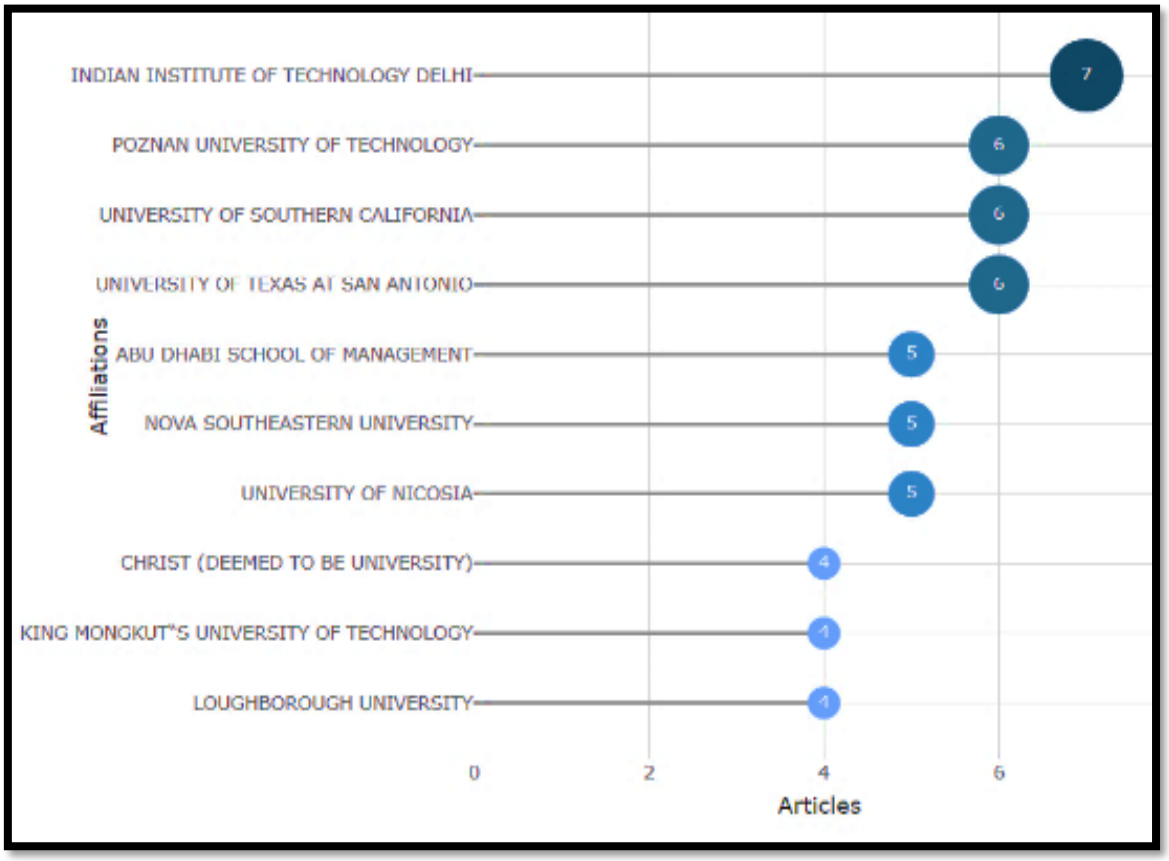
Bibliometric Analysis

The bibliometric analysis, a quantitative method of addressing the expanding body of literature on a research topic (Ikpaahindi, 1985), was used to evaluate the Digital HR Transformation literature.

Affiliation Statistics:

Figure 3 lists the leading ten organizations that publish publications on Digital HR based on the connection of the corresponding authors. Indian Institute of Technology Delhi tops the list with 7 articles, followed by Poznan University of Technology, the University of Southern California, and the University of Texas at San Antonio with 6 articles each.

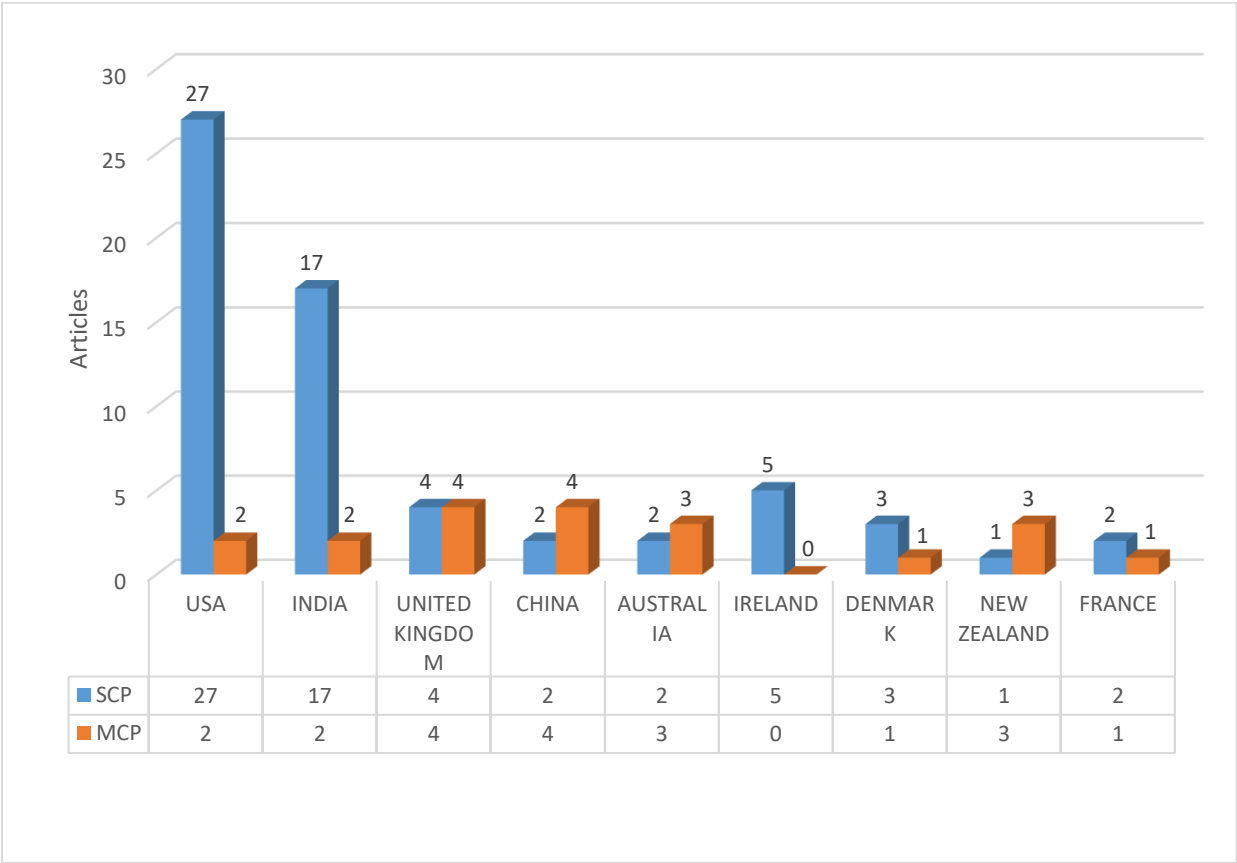
Fig. 3: Top ten most contributing organizations



Source: Biblioshiny

The literature's distribution of authors by country under study is shown in *Table 7*, and the same is depicted in *Figure 4*. The USA is the most producing nation, with 29 publications with a main author from their nation. India comes in second with 19 publications. The location of the corresponding author serves as the basis for the classification. SCP and MCP stand for 'Single Country Publication and Multiple Country Publications', respectively. USA and India are the top countries in publishing (SCPs) whereas United Kingdom and China mutually lead, with four (MCPs).

Fig. 4: Country wise production



Source: Authors

The MCP ratio reflects the degree of international collaboration. The MCP ratio in Table 7 shows the percentage of all publications that were co-authored by authors from nations in addition to the corresponding author. It should be highlighted that New Zealand had the greatest MCP ratio of (0.75), meaning 75% of the publications there (as corresponding authors) were written in collaboration with authors from other nations. China comes second with (0.667), meaning 66.7% of MCP, and Australia is in third place with 60% of MCP. Ireland has no MCP, and all the articles they publish are single-country publications. The MCP ratio is considerably lower in the major contributing nations, such as the USA and India.

Table 7: Corresponding author's country-wise scientific production

Country	Articles	SCP	MCP	Freq	MCP-Ratio
USA	29	27	2	0.159	0.069
India	19	17	2	0.104	0.105
United Kingdom	8	4	4	0.044	0.5
China	6	2	4	0.033	0.667
Australia	5	2	3	0.027	0.6
Ireland	5	5	0	0.027	0
Denmark	4	3	1	0.022	0.25
New Zealand	4	1	3	0.022	0.75
France	3	2	1	0.016	0.333
Germany	3	2	1	0.016	0.333

Source: Biblioshiny

Table 8 lists the top ten nations whose authors appear in the papers in some position (either corresponding or co-author). The USA is the first on the list with 101 articles, followed by India with 81 items. Researchers from both developing and established economies have participated, which demonstrates that Digital HR potential has been recognised on a global scale.

Table 8: Top ten country's scientific production

Region	Freq
USA	101
India	81
UK	31
China	21
Australia	17
Germany	15
Netherlands	15
Ireland	11
Indonesia	10
Israel	10

Source: Authors

From the *Figure 5*, it is clear that the USA (pink line) has been at the forefront of research into digital human resources since 2012 and that trend has continued, while India (green line) only started to pay attention in 2016 and has subsequently experienced growth. Despite the fact that other nations haven't been publishing as much as they should, the rate of publication has only recently begun to rise.

Keyword analysis: A scientific method for identifying connections between a research field's subfields is the keyword analysis (HE, 1999). The most commonly used author keywords are

displayed in *Figure 6*. Artificial Intelligence, HR analytics are the highly used keywords by the authors.

Figure 7, author keyword dynamics over the past ten years, shows that the study on Artificial Intelligence in HR has increased from 2018 and is currently a trending and highly interested keyword in the research community.

Fig. 5: Countries' Production over time

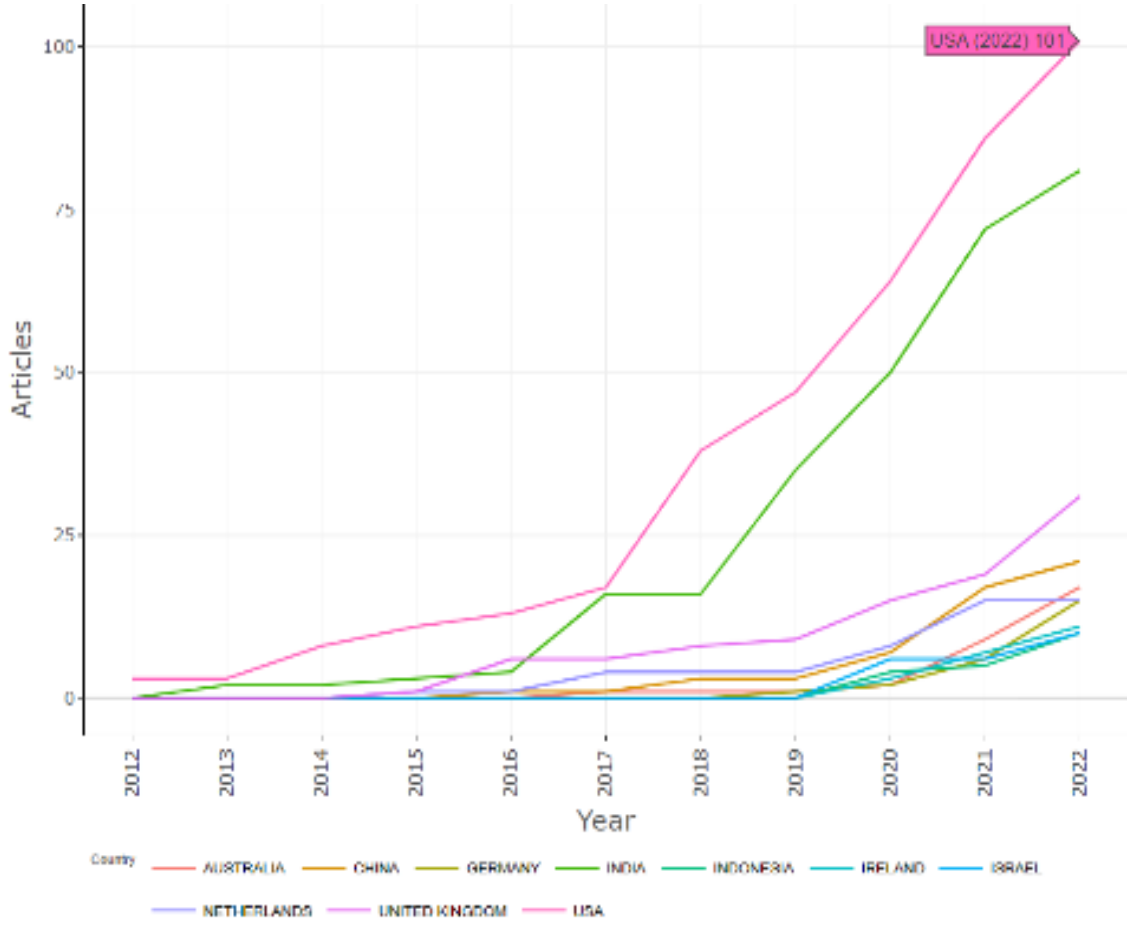
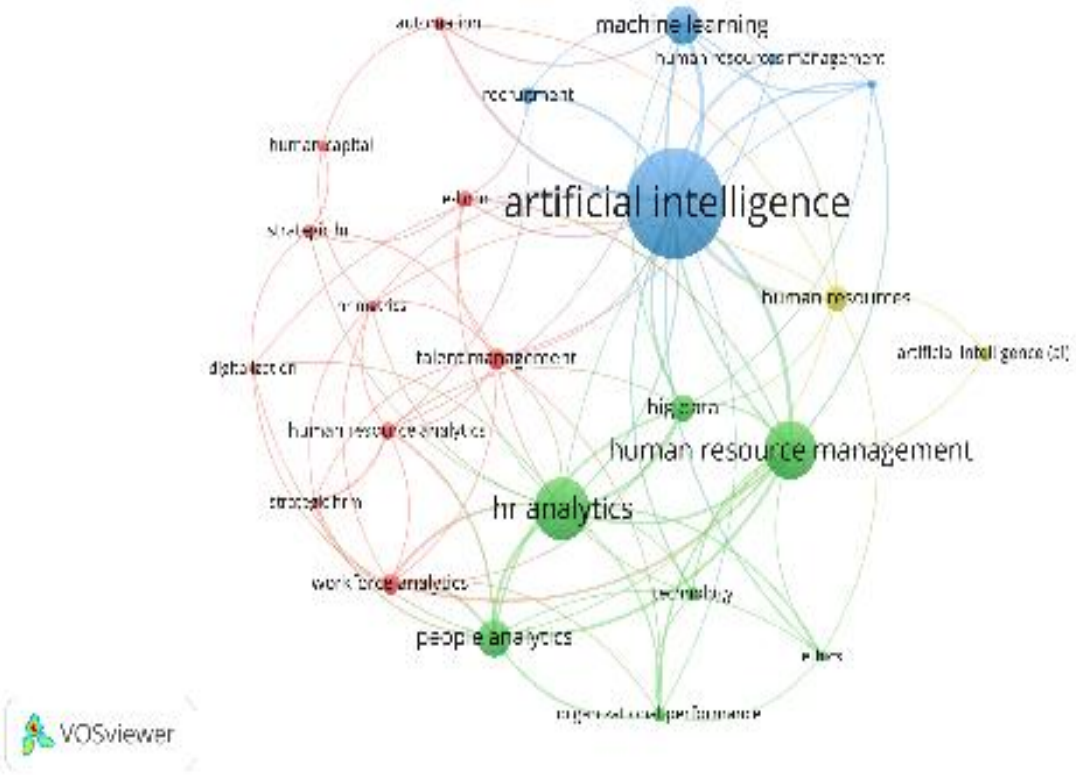
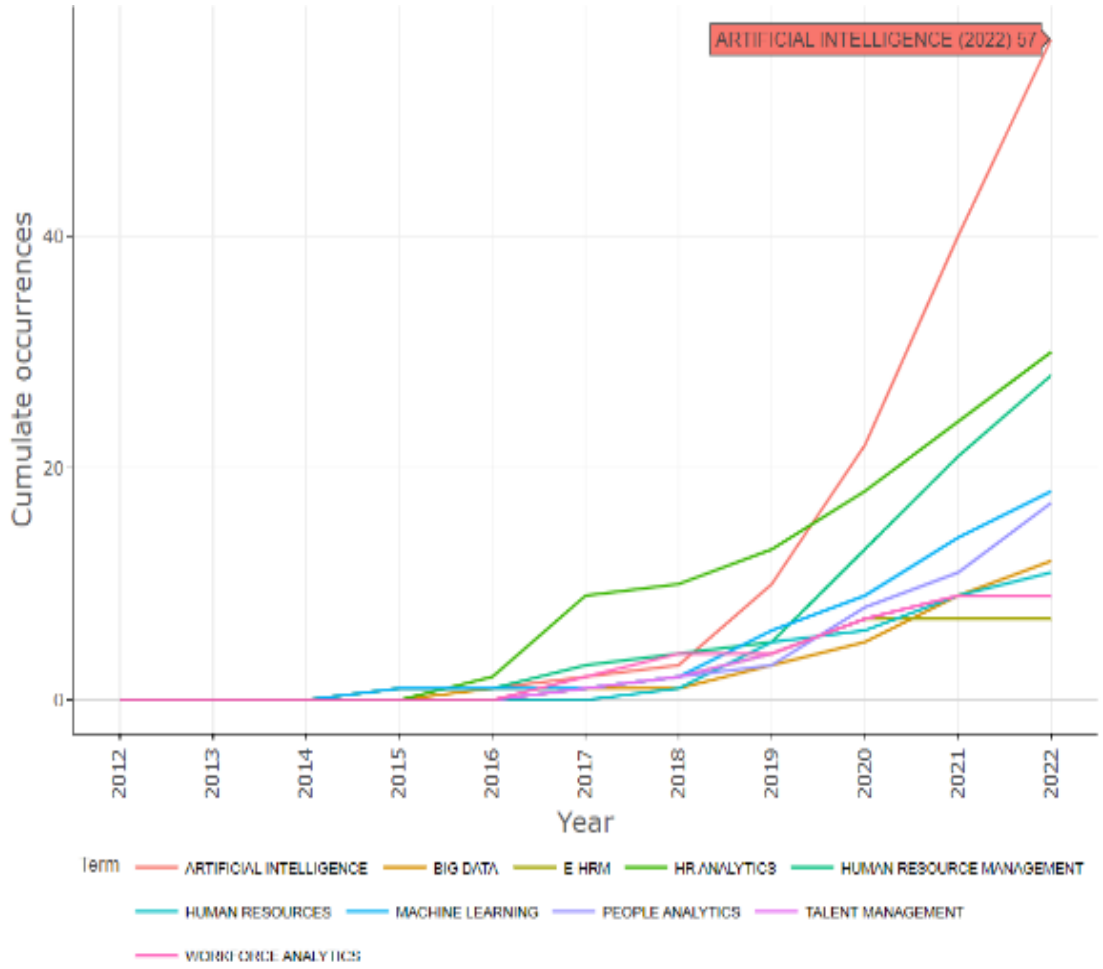


Fig. 6: Most relevant author keywords



The keyword co-occurrence networks can be used to define the research themes and knowledge structure. The heat map of the author's keyword co-occurrences from VOSviewer is displayed in Figure 8 to demonstrate the hotspots in the field of the Digital HR study. Density values are represented by a variety of colours, from blue to green to yellow. Density is used as an index to evaluate and compute the strength of relationships between keywords. The density value increases as separation decreases. Since VOSviewer software has a strong graphical user interface, density maps are produced using it. A more common concept is depicted in Figure 4 with a higher density of yellow colour. Artificial Intelligence has the highest yellow density followed by hr analytics and then machine learning. Another exiting concept seen is job satisfaction is also present in the figure with green density. This means that there are also very few studies related to job satisfaction in relation to Digital HR.

Fig. 7: Author keyword dynamics over time



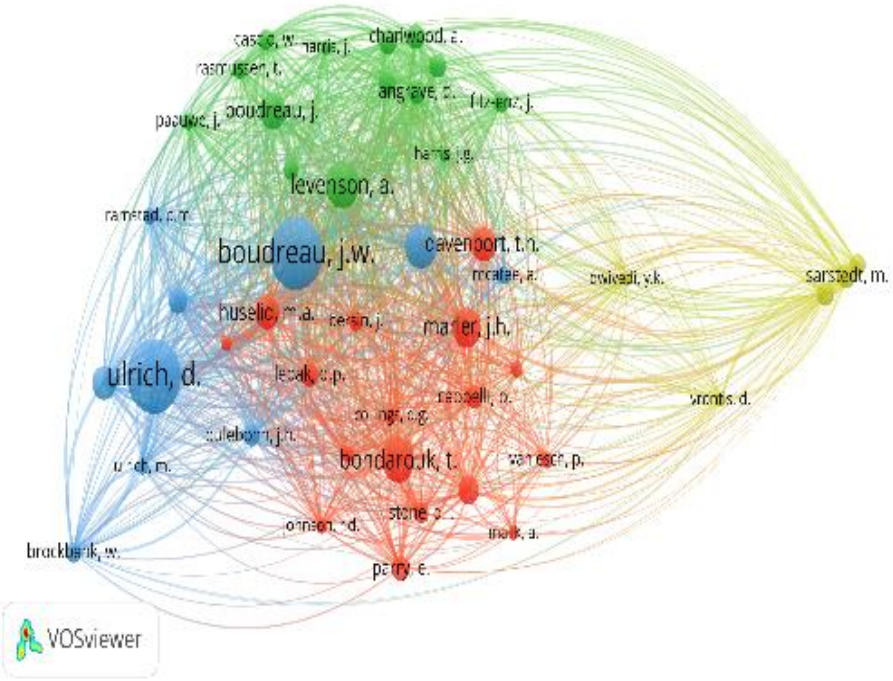
Source: Biblioshiny

Co-citation Analysis

Author Co-citation analysis: A interesting facet of bibliometric research is the analysis of these top writers' co-citations. Small (1973) introduced the concept of co-citation analysis, which he further defined as an examination that looks into the relationships between journals, authors, themes, or keywords and explains how these categories are connected to one another. The degree of relationship between two different articles can be determined by a co-citation study.

Co-citation occurs when a third document includes references to two articles by two different authors (Farrukh, 2021). Co-citations frequently show that the publications being discussed are on related research areas and may cover homogeneous subjects. The scholarly structure in the field of digital HR is ascertained using co-citation analysis on all 184 publications selected for this study's reference list.

Fig. 8: Co-citation analysis of co-authors

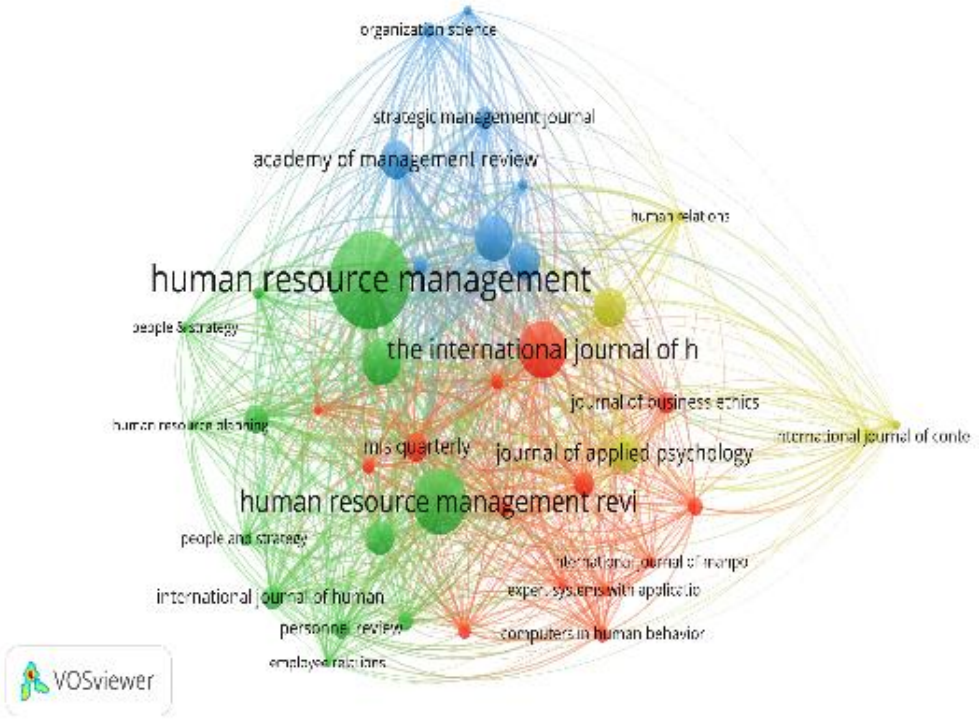


Authors were first chosen via VOSviewer's co-citation analysis. The lowest number of author's citations was set to '20', and '46' authors met the threshold out of the total of 13132 authors from '184' publications. According to the results in the *Figure 7*, Ulrich D. (f =100 citations) and Boudreau J.W. (f = 97 citations) were the maximum co-cited author, also Levson A. (f = 63) which is closely followed by Bondarouk T. with (f = 60) and Brynjolfsson E. (f = 59).

Journal co-citation analysis: The link strength between two journals is thought to depend primarily on how often they are mentioned together in journal co-citation analysis. The co-citation analysis and journal were initially chosen in VOSviewer to do co-citation analysis for journals. Then lowest number of journal citations was customised to '20' and '48' journals met the threshold and the map is displayed in Figure 8.

In Figure 8, it is evident that there are 4 clusters. With 261 citations and 9366 total link strength, "*Human Resource Management"* was the utmost influential journal. Other prominent journals are "*Human Resource Management Review"* (177 citations,5510 link strength) *and "the International Journal of Human Resource Management"* (153 citations,175 link strength).

Fig. 9: Co-citation analysis for journals



Co-authorship Analysis

Co-authorship of authors: The author's bare minimal number of papers is customised to '2' and the bare minimum of citations is '20'. *Figure 9* indicates that based on co-authorship analysis, research on Digital HR is divided into 17 clusters. Most of the collaboration is in cluster 1 (6 link strength, 4 authors, red colour), followed by cluster 5 (3 link strength, 2 authors, purple colours) and Cluster 3 (2 link strength, 2 authors, blue colour). Therefore, it can be concluded that Avrahami D, Chalutz Ben, Pessach D, and Singer G are the authors who highly collaborated.

Co-authorship of Organizations: In VOSviewer minimal quantity papers of an organization is set to '2' and minimum amount of citations is fixed to '5' resulting in 9 organizations meeting the threshold. From Figure 10, it is understood that INSEAD United states and AUT Business School, New Zealand depicted in red colour tops the list with same number of (102 citations, 3 documents, 3 link strength) each.

Co-authorship of countries: In VOSviewer minimal number of papers of the country is set to '3' and minimum amount of citations to '10' resulting in 18 countries out of 59 meeting the threshold. It is clearly evident from the Figure 12, that there is a strongest association (depicted in green colour) between United Kingdom, Australia, India and Denmark in terms of co-authorship.

Fig. 10: Co-authorship Analysis

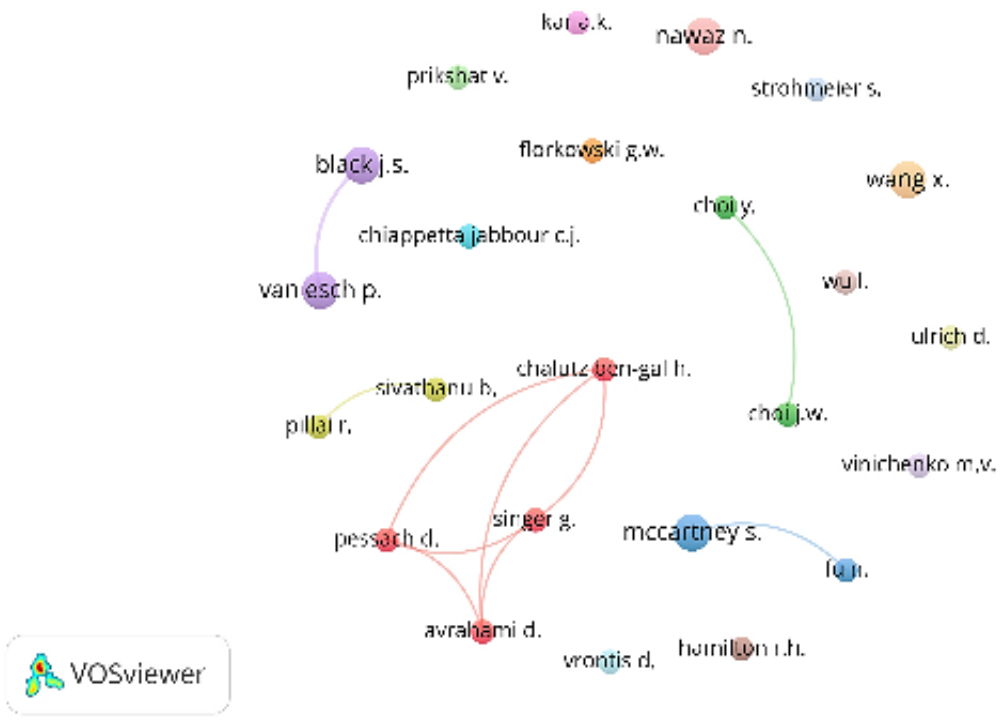


Fig. 11: Co-authorship of organizations

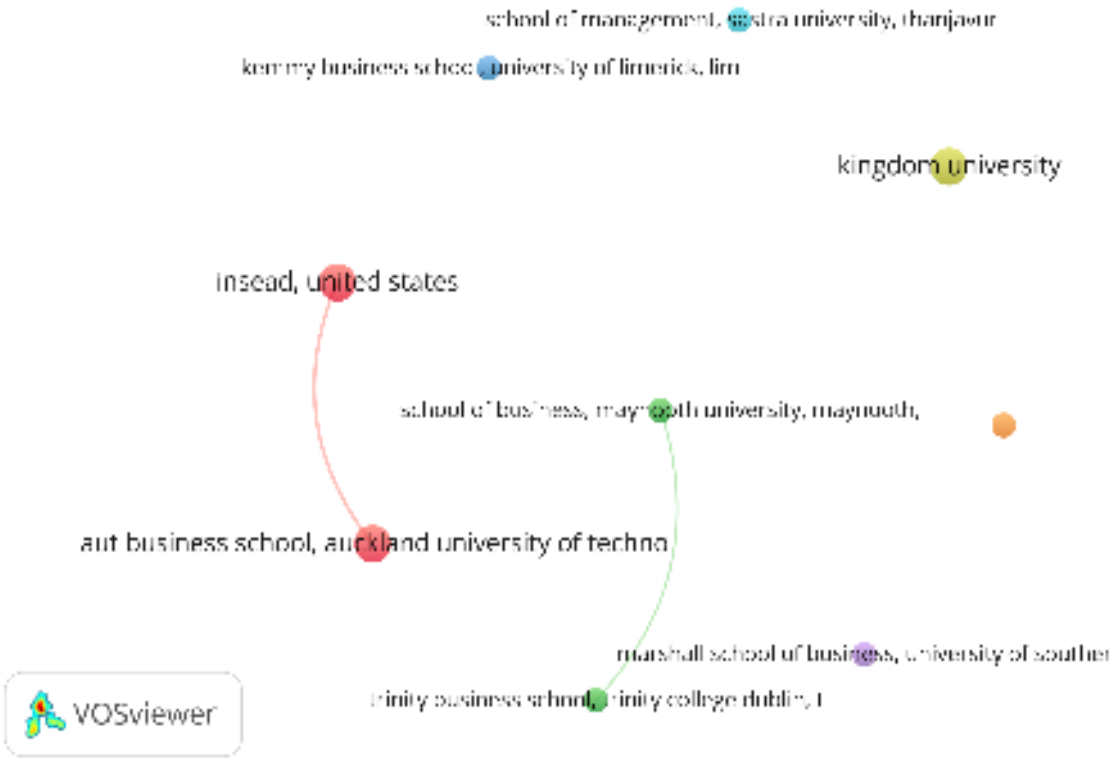
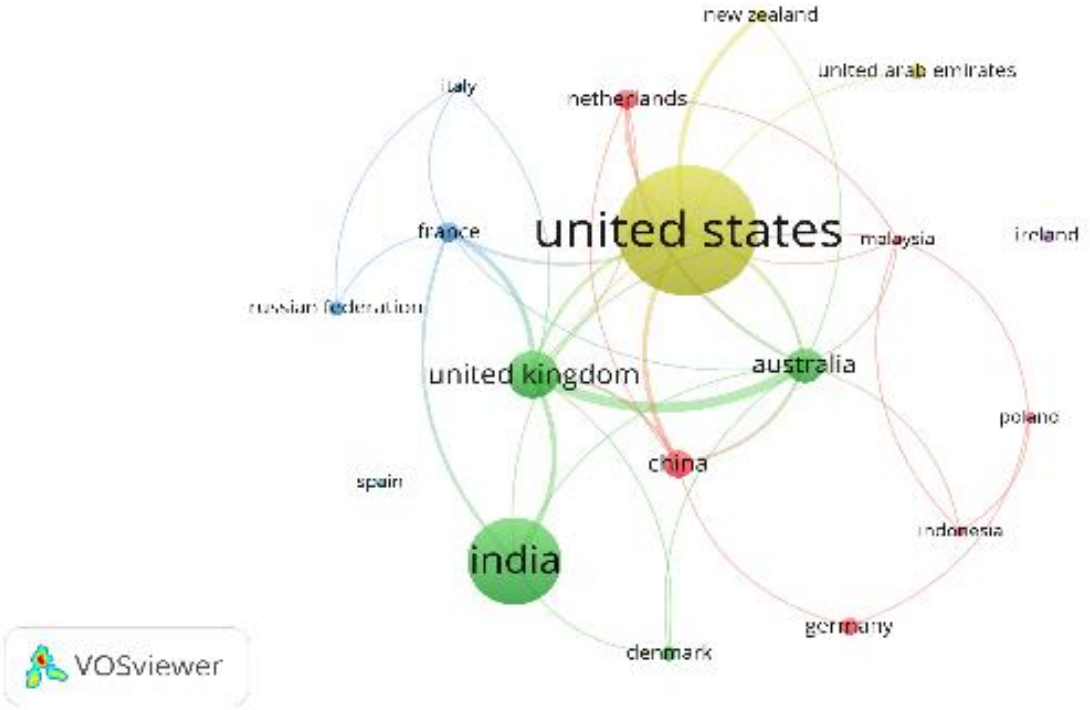


Fig. 12: Co-authorship of countries



DISCUSSION AND FUTURE RESEARCH DIRECTION

Due to the prevalent hybrid work policy and increased technological usage, academicians are paying more attention to the literature on digital HR transformation. Research is more than just a solitary activity. For their expertise and perspectives on particular areas of their field or adjacent fields, researchers rely on one another. Keeping up with the most recent papers will aid in creating the foundations for one's own study because research continuously entails testing, confirming, and rejecting theories. This study expands on previous reviews (Thite, 2022; Harney B., 2021; David Angrave, 2016; Minbaeva, 2021; Qamar & Samad, 2022; Nawaz N., 2021) and enhances the knowledge base on digital human resources. Additionally, it enhances the literature on digital HR transformation by including bibliometric analysis to determine the major subjects, authors, and keywords and to develop a more methodical and detailed grasp of the study topic.

We identified that the study or the research related to Digital HR transformation and the usage of technologies like Analytics, Artificial Intelligence, Machine Learning, and Blockchain in the field of HR had gained momentum from the year 2017, as shown in *Figure 1*. An upsurge in the quantity of publications also denotes that there is a growing importance of study about Digital Transformation. *Figure 3* shows that the majority of research is focused on understanding artificial intelligence, HR analytics, and their role or impact on HR.

Although currently there is an increasing trend in the study of this topic, it is majorly related to recruitment only. Still, there are some areas of HR and employee aspects which are not being studied by researchers. Researchers can learn about the best journals to consult in regard to the digital transformation of HR from *Table 3*. The "International Journal of Human Resource Management" (IJHRM) serves as a venue for researchers and practitioners from all fields of human resource management (HRM). Any area of people management that is pertinent

to the discipline is covered in the papers they publish. The “Chartered Association of Business Schools Academic Journal Guide” rates the “International Journal of Human Resource Management” as 3*, and the “Australian Business Deans Council Journal Quality List” gives the journal an "A" rating.

Tables 7 and 8 demonstrate that authors from the USA and India were the most productive in publishing articles related to Digital HR transformation. Knowing the most influential authors from *Table 4* would help researchers to gain knowledge about the pioneers in the study of Digital HR and their contribution. From the findings of this study, it is evident that Ulrich D and Wu Lynn are the pioneer authors in the area of Digital HR transformation studies and referring to their work would give a clear picture of the subject area.

The following research gaps have been found as a result of our knowledge gained from the reviewed studies. The primary gap relates to the HR topics covered in the literature. Studies examining risks (potential abuses and moral issues), constraints, and competencies needed for the deployment of Digital HR technology are lacking. Additionally, there aren't many research investigating various factors connected to the employee aspect of implementing digital HR. We recommend further studies of this kind in the future to compare outcomes in-depth and to leverage digital HR technology to make better HR decisions about training and development, employee retention, job satisfaction, employee engagement, etc.

Following are some of the suggested research questions for future studies. (1) Which talents and competencies are required of HR professionals to implement Digital HR technologies effectively? (2) What are the dangers and difficulties associated with actually putting Digital HR technologies into practice? How can one measure both the tangible and intangible aspects? (3) How might applying Digital HR technologies to current work HR processes help companies gain a competitive edge?

CONCLUSION AND LIMITATIONS

This study provided a bibliometric analysis of literature published on digital HR transformation from 2012 to 2022. According to the study, academic interest in digital human resources has recently grown. Based on 184 publications from the Scopus database, this study investigates the Digital HR literature. This article provides a thorough summary of the development of studies on Digital HR and its major contributors and research directions. For academics interested in studying Digital HR or establishing new research directions in HR, the information offered in this article will be of interest. This study examines citation and productivity patterns in addition to identifying the most significant sources, authors, organisations, and nations using various bibliometric characteristics.

We demonstrated that, with an annual growth rate of 43.49%, studies on digital human resources had grown globally since 2017, with the USA being the most significant contributor. The majority of the most popular and significant articles are also from the USA. It's interesting to note that the "Indian Institute of Technology, Delhi" tops the list of top publishing organisations for digital human resources according to the corresponding authors' affiliation. Ulrich D. and Wu L. emerged as the most significant authors based on the total amount of citations they received.

The current study has a few limitations, much like every other study. First, while comprehensive, this assessment is not exhaustive. The Scopus database is used in this investigation, and we advise using the Web of Science as well as other sources for comprehensive comparison in future studies. Subsequently, we excluded dissertations, book chapters, and books from our study by only including articles that have been published in scholarly journal publications. By incorporating additional trustworthy sources, more

understanding may be acquired. Furthermore, even though we made an effort to be accurate and thorough, a subsequent assessment might be theory-driven.

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