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Research Article

Revolutionising HRM: Upgrading Human Resource Capital through Virtual Reality

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ABSTRACT

Human Resource Management (HRM) is being transformed by cutting-edge technologies, with Virtual Reality (VR) leading the way. VR is revolutionizing recruitment through immersive experiences that reveal company culture and work environments. It enables virtual office tours and interactive skill assessments, attracting top talent and streamlining hiring. This paper presents a comprehensive and refined overview of the current advancements in employee training in HRM via augmented reality. It offers a broad review of the field while also highlighting issues that experienced researchers may have overlooked. The study employs bibliometric analysis, though its limitations include potential gaps in capturing the full range of emerging trends and insights.

Keywords: Employee training, Virtual Reality, HRM practices, E-Learning and Employee Engagement.

INTRODUCTION

Human Resource Management (HRM) is experiencing a significant shift, thanks to the integration of cutting-edge technologies. Virtual Reality (VR) is emerging as a standout innovation, offering exciting new opportunities for employee training and recruitment. VR is reshaping recruitment by offering immersive solutions for candidate assessment and engagement. It allows recruiters to create virtual experiences that highlight company culture, values, and work environments. For instance, VR can be used to provide virtual office tours, giving candidates an inside look at the workplace. Additionally, VR-based assessment tools can evaluate skills and cultural fit through interactive simulations. By incorporating VR, organizations can attract top talent, streamline hiring, and enhance the candidate experience. Looking forward to 2025 and beyond, analytical thinking and innovation skills crown the skill-set list that employers believe will grow in prominence in the next five years **(Ling Li, 2022).** Artificially intelligent machines are taking over tedious, mechanical and mundane human tasks, such as documenting, scheduling, inspecting equipment, collecting data and conducting preliminary analyses **(Huang et al. ,2019; Huang & Rust, 2018).** According to Hancock et al. **(2020),** roughly 30–40% of employees would need to upgrade their skills significantly, within the next decade. Virtual reality is described as a game changing technology that can impact several industries, such as human resources (hr). By placing users in immersive digital environments, VR allows companies to offer more interactive and engaging training sessions for employees. Augmented reality on the other hand enhances real world views by layering digital content like 3-d models text, or video over the user's surrounding both AR and VR technologies rely on cameras and sensors to accurately track movements adjusting the experience in real time based on how the user interacts. Organizations can even gamify the whole experience of employees. They could use VR to make the environment more competitive Ex. -when wearing VR headset users can move in virtual spaces as they would in real life. VR is also beneficial for training in soft skills like leadership, diversity, equity, and inclusion (dei). A study by PWC in collaboration with tailspin found that learners in VR environments trained four times faster, were 2.75 times more confident ,and felt 3.75 times more emotionally connected to the content compared

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Research Article

to traditional classroom learning. Platforms like talespin and enworks offer immersive, interactive learning experiences

Vuforia Studio excels in creating augmented reality (AR) experiences, overlaying digital content onto the real world for training and instructional purposes.

Source: PwC VR Soft Skills training efficiency study-2020

Even there is increasing interest in incorporating VR into HRM, little is known about how VR may completely transform HR procedures outside of its immediate uses. The full potential of virtual reality in establishing a smooth link between employee engagement, training, and recruitment has not yet been fully explored in the corpus of existing literature. Furthermore, the cost-benefit analysis of VR in HRM, especially for small and medium-sized businesses, has not been thoroughly investigated in the majority of research.By examining VR's overall effects on human capital management, assessing its efficacy across various HR tasks, and assessing its scalability for businesses of all sizes, this study aims to close these gaps. By filling up these gaps, this study hopes to offer a more thorough knowledge of how virtual reality (VR) may revolutionize human resource management (HRM), enhancing human capital and empowering businesses to use technology to optimize the potential of their staff. The strategic role of VR in HRM will be examined in this study, with an emphasis on how it may improve organizational outcomes, improve employee experiences, and get businesses ready for the future of work.

LITERATURE REVIEW

Vasilenko, S. (2019) illustrates how virtual reality is currently used in HR management, with several companies actively employing these technologies. Although research in this area is still limited, a solid groundwork for creating VR programs across various HR functions has already been established. **Lalić, A., Kolić, M., & Jovanović, J. (2020)**. VR and AR technologies are proving valuable beyond entertainment, significantly impacting HRM activities such as training, recruitment, and employee engagement. They enhance productivity, cut costs, and ensure safer working conditions. Empirical studies show VR and AR improve performance, reduce expenses, and provide a competitive edge. Integrating these technologies with HR strategies and production management is crucial for business success. Despite successful examples of VR and AR in HR, challenges remain due to the cost and complexity of implementation. This study highlights the need for further research into new applications of VR and AR across various sectors and regions. Exploring these potential fields could address existing issues and unlock additional benefits. Research on VR and AR in HRMD is recent and underdeveloped, with a significant rise in publications since 2013. Most studies are empirical and qualitative, emphasizing practical applications over theoretical development. The field displays inconsistency and an imbalance, mainly focusing on training and development while neglecting other HR processes. Future research should prioritize quantitative studies and explore VR and AR's application across various HR areas. It is essential to develop VR and AR solutions tailored to HR's specific needs and constraints. Expanding beyond learning and development will drive innovation and improve VR and AR's impact in HRMD (**Ferreira et al., 2021)**

The integration of augmented reality (AR) and virtual reality (VR) into Human Resource Management (HRM) offers transformative potential for employee training, recruitment, and engagement. These technologies can create

Journal of Information Systems Engineering and Management
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https://www.jisem-journal.com/

Research Article

immersive training programs, enhance recruitment with virtual workplace tours, and boost job satisfaction through engaging work environments. AR and VR also improve team communication and collaboration. However, their implementation requires significant investment in time, money, and resources. Organizations should weigh the benefits against the costs before adoption. With ongoing technological advancements, AR and VR are likely to drive further innovation in HRM. The World Economic Forum predicts that by 2025, half of all employees will need reskilling due to new technologies. In just five years, over two-thirds of today's essential skills will evolve, with a third involving emerging tech competencies. This article outlines key skills for Industry 4.0 and provides a roadmap for acquiring these future-critical skills **(Priya, 2022 and Li, 2022)**.

Forsberg et al (2023) concluded that VR for social skills training, specifically in the area of dealing with master suppression techniques at work, can be a valuable and scalable addition to the HRD toolbox. VR enables learners to safely practice and reflect on managing workplace challenges, providing insights that are hard to achieve in real life. Key challenges include creating balanced and engaging scenarios. Overall, VR is seen as an innovative tool that can drive meaningful workplace improvements and foster healthy dialogues. The study reveals strong interest in using AI, VR, AR, and Metaverse in HR to improve recruitment, training, and performance evaluation. While participants are optimistic about the benefits, they also recognize challenges such as ethical issues, data security, and potential reality disconnect. The findings emphasize the need to balance the opportunities and risks of these technologies. Future efforts should address these concerns to enhance HR practices effectively and sustainably. Manufacturing firms are increasingly adopting digital transformation to stay competitive, with a reported BDAI score of 2.26 indicating significant progress. Cultivating an agile workforce is crucial in this evolving landscape, and integrating VR applications into HRM practices offers a novel approach to enhance workforce flexibility and adaptability. This study aims to investigate how VR in recruitment, talent management, and performance evaluation impacts workforce agility. The findings could guide manufacturing firms in implementing sustainable HRM practices and assist policymakers in developing effective HRM strategies. Further empirical research with larger samples is needed to validate and expand these insights **(Aydin, & Karaarslan, 2023; Lai et al., 2023). Eric, C., Liu, J., & Martinez, A. (2023)**. VR and AR technologies enhance occupational health and safety training by offering immersive, risk-free simulations of real-world scenarios, improving learning outcomes, especially in high-risk environments. They complement traditional methods with their availability, flexibility, and repeatability. However, challenges include the high cost of hardware and software and the need for specialized expertise in content creation. Overall, VR and AR are poised to become integral to occupational health and safety training, addressing both current and future needs. The study identifies key skills—data analysis, digital, complex cognitive, decision-making, and continuous learning—as crucial for employee upskilling in the AI era. It argues that technology should complement rather than replace human capabilities, emphasizing the need for higher cognitive and technological skills. Outsourcing intelligence to machines alone is neither practical nor ethical; evolving collective intelligence through techno-cognitive skills is seen as the optimal path forward. The research offers a roadmap for future studies in this emerging field (**Jaiswal et al., 2023**). **Narin et al., (2024)** explores participants' views on integrating emerging technologies like AI, virtual reality, augmented reality, and the Metaverse into HR management. Findings reveal strong interest in using these technologies to improve recruitment, training, and performance evaluation, with optimism about increased efficiency and better candidate assessment. However, participants also express concerns about ethical issues, data security, and potential detachment from reality. The study emphasizes the need to balance the benefits and challenges of adopting these technologies in HR. Future efforts should focus on addressing these concerns to enhance HR practices in the digital era. Below is a table 1 summarizing Indian companies that have implemented Virtual Reality (VR) in Human Resource Management (HRM) along with the observed impacts:

Table 1: Indian Companies

Company	VR Implementation	Impact	Source
Infosys	Adopted VR for employee onboarding and training with	Accelerated learning curves; enhanced employee engagement and	InternationalJournal of CreativeResearch Thoughts

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Research Article

	immersive learning modules.	understanding of company policies and processes.	
Tata Consultancy Services	Integrated VR into employee training programs, including simulating client interactions.	Improved communication skills, project management abilities, and client satisfaction.	International Journal of Creative Research Thoughts
Larsen & Toubro (L&T)	Utilized VR to simulate construction site conditions and safety scenarios for employee training.	Increased site safety awareness; improved decision-making in high-risk environments.	L&T Official Site
Tech Mahindra	Implemented VR for leadership development and gamified employee training programs.	Boosted employee participation; enhanced leadership skills and retention of training content.	Business Today
Reliance Industries	Leveraged VR for safety training in hazardous environments, simulating emergency response scenarios.	Reduced workplace accidents; provided a safer, controlled learning environment for employees.	Reliance Sustainability Report

Research Methodology and Data Analysis

This bibliometric review uses a systematic approach to explore the overlap between Human Resources Management, Virtual Reality and Employee Training. The methodology involves several critical steps: choosing databases, developing a search strategy, establishing inclusion and exclusion criteria, collecting data, and analyzing the results.

Selection of Databases and Search Strategy

The initial step in the bibliometric analysis method is to find databases that will help the study goal. The ISI, Google Scholar, WOS, and Scopus datasets are reliable and up-to-date. Our study was conducted in the context of the Scopus Index, one of the most popular databases used by researchers globally. An extensive search carried out across academic resources via Scopus. Keywords and search items will include variants of “Personal Training” ,”E-Learning”, “Employee Training”, “Virtual Training”, “Human Resource Management”, “ Augmented Reality” and “Generative Artificial Intelligence” .

Inclusion and Exclusion Criteria

Only peer-reviewed journal articles, academic books, and conference papers published in English considered. Publications must focus on the intersection of Virtual Reality, Augmented Reality, and Human Resources Management and Employee Training, addressing relevant concepts, theories, or empirical studies. Exclusion criteria include non-academic sources, opinion pieces, and publications not directly related to the research topic

Data Collection-

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Publications found in the initial database search imported into reference management software for sorting and removing duplicates. Key bibliographic details, including authors, publication date, journal or conference name, and abstract, will be recorded.

Analysis Methods:

Bibliometric techniques used to quantitatively assess the data, revealing trends, patterns, and connections within the literature. Citation analysis will help pinpoint leading authors, significant papers, and citation networks in the field. Co-word and co-citation analyses explore thematic links and the intellectual framework of the research. Visualization tools like VOSviewer employed to create visual representations of the bibliometric data, aiding in its interpretation.

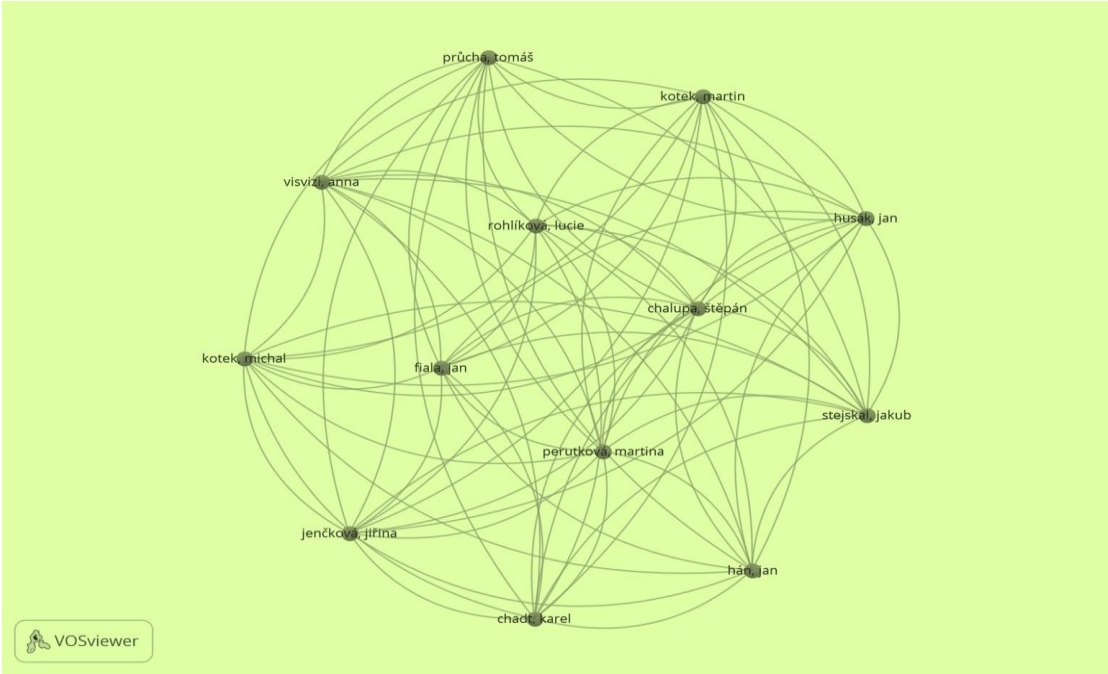
Quality Assessment:

The quality of the included publications evaluated based on criteria like methodological robustness, theoretical significance, and relevance to the research topic. For empirical studies, the strength of the evidence assessed by examining factors such as sample size, research design, and the quality of statistical analysis.

Data analysis

Employee Training And Virtual Reality

Co-AUTHORSHIP and AUTHORS



The data illustrates a clear connection between authorship and their contributions to employee training and virtual reality. Each author's body of work reflects their impact on shaping and enhancing employee training methodologies through the use of virtual reality. They have conducted research that pushes the boundaries of how virtual reality can be utilized in professional development.

The dataset identifies the most productive contributors as follows:

Kotek,Martin

Fiala,Jan

Husak,Jan

Chadt,Karel

Journal of Information Systems Engineering and Management
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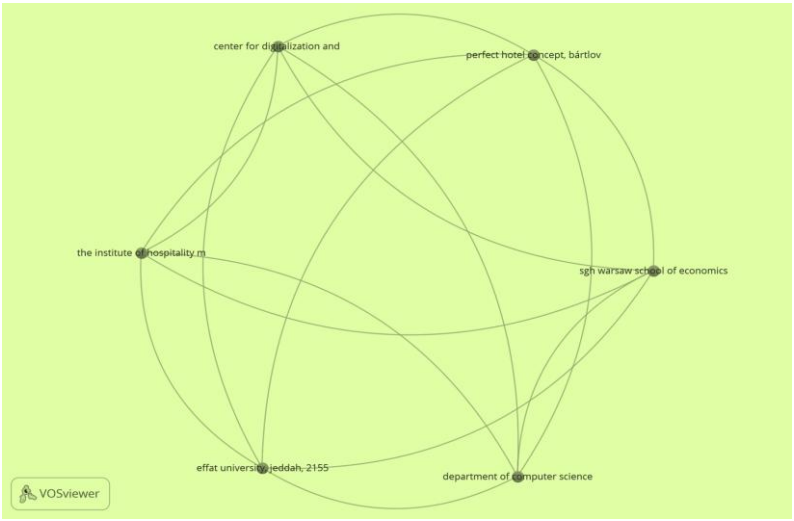
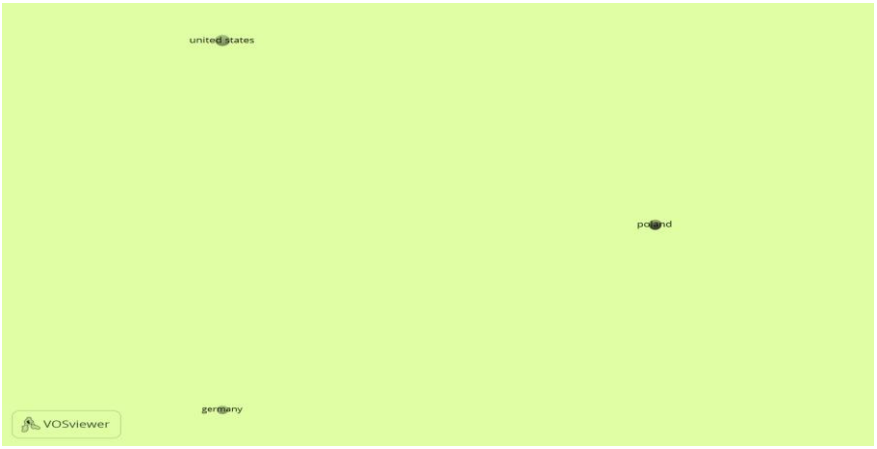
Co-AUTHORSHIP AND ORGANISATION



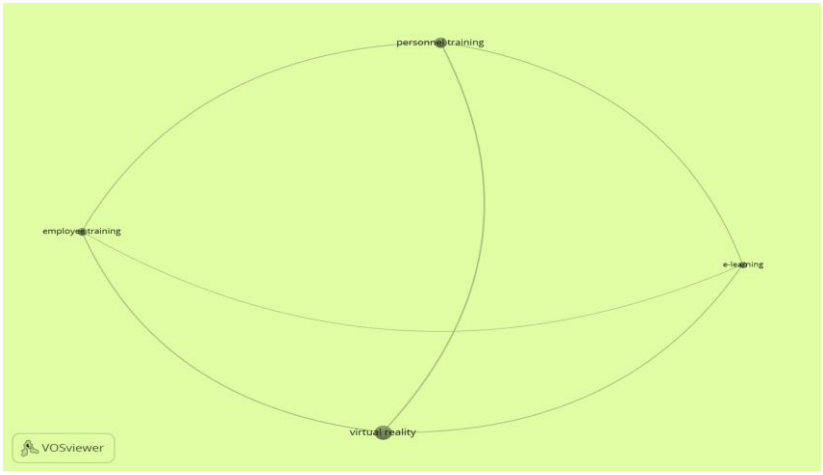
The above data illustrates in which organisations virtual reality is being used for training purpose.

Countries



The analysis shown above gives the information as in what countries the virtual reality has been inculcated in the Human Resources Training process

CO-OCCURENCE AND KEY WORDS



Journal of Information Systems Engineering and Management
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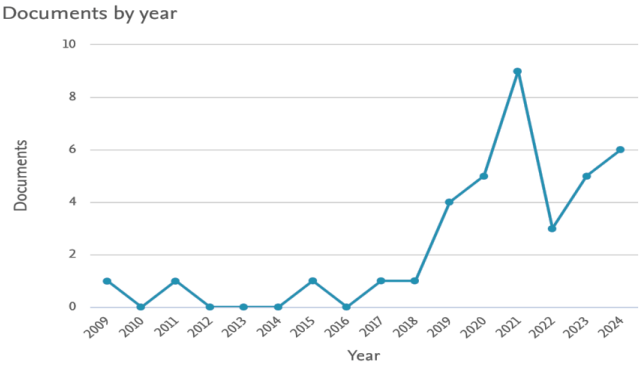
The data set shown above highlights the main keywords which are being used that is Employee Training", "Virtual Reality" ,"E-Learning" and " Personal Training "

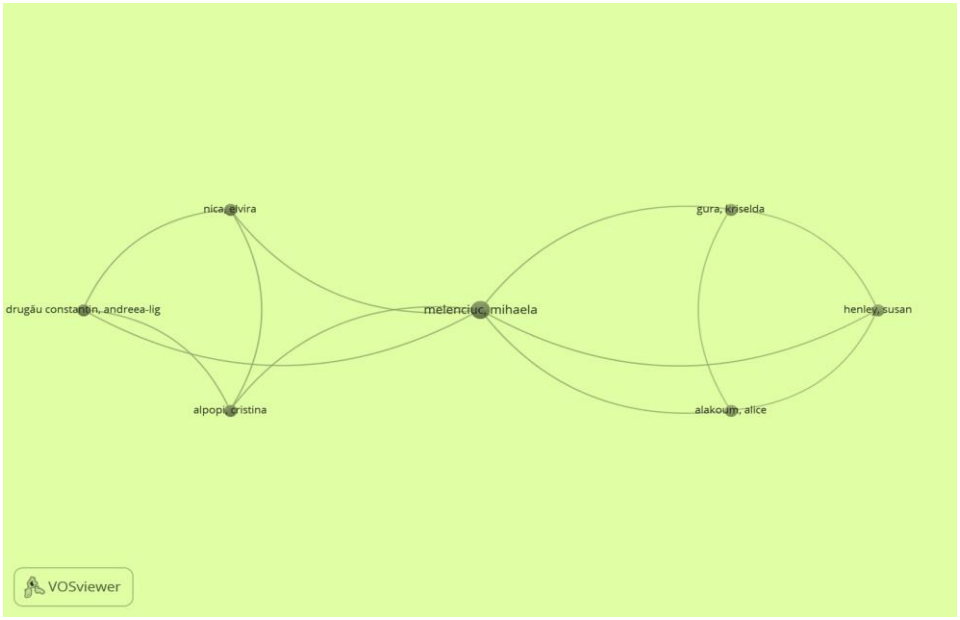
Year	Documents
2024	6
2023	5
2022	3
2021	9
2020	5
2019	4
2018	1
2017	1
2016	0



The dataset spans publications from 2016 to 2024, with a noticeable slowdown speed in 2012-2014. There is an increasing trend in publications in recent years, peaking in 2021 (COVID ERA), indicating growing interest and research activity in "Virtual Reality" and "Employee Training".

Engagement And Virtual Reality

CO-AUTHORSHIP AND AUTHORS



The above data tells us about which author has contributed in finding the relationship between "Engagement" and "Virtual Reality"

Few names of the authors are mentioned below:

Nica,Elvira

Alpopi,Cristina

Alakokum,Alice

CO-AUTHORSHIP AND ORGANISATIONS

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https://www.jisem-journal.com/

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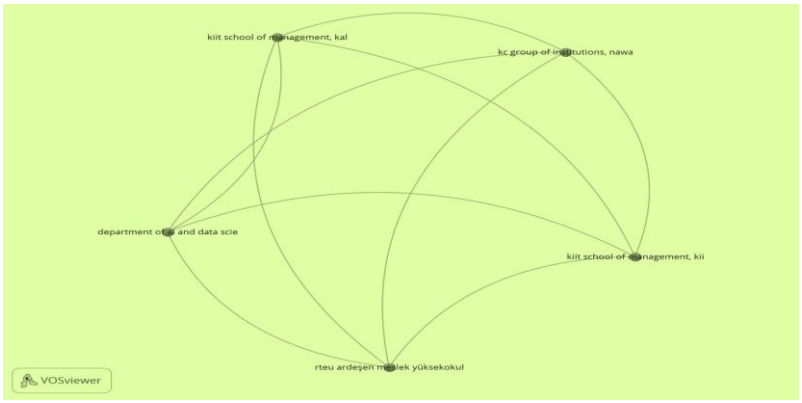
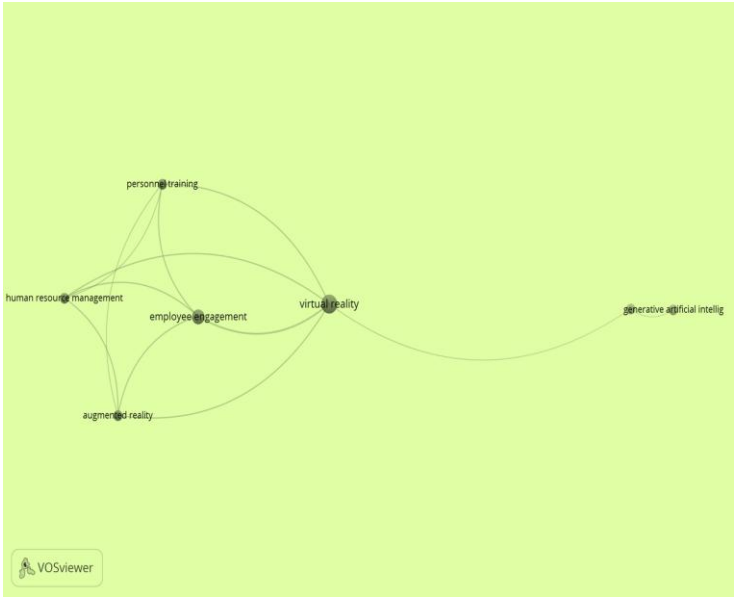


The data above provides the names of the organizations where research into the relationship between engagement and virtual reality has been conducted.

CO-AUTHORSHIP AND COUNTRIES

The above data shows the names of the countries in which research has been conducted. In this case research has been done in India and Romania .

CO-OCCURENCE AND KEY WORDS

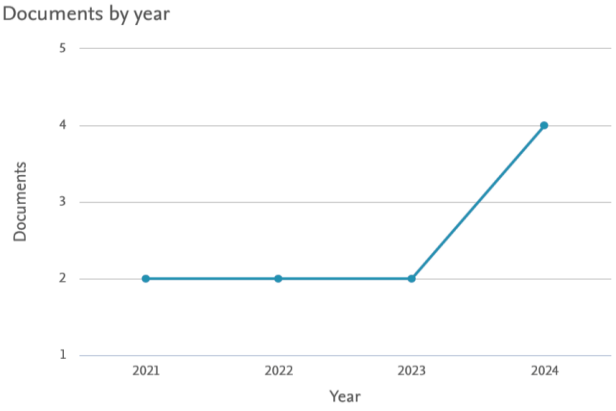


Journal of Information Systems Engineering and Management
2025, 10(34s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

The above data highlights the keywords mostly used in the research area that is “Personal Training”, “Employee Engagement” , “Virtual Reality”, “Augmented Reality” , “Artificial Intelligence” and “Human Resources Management “.

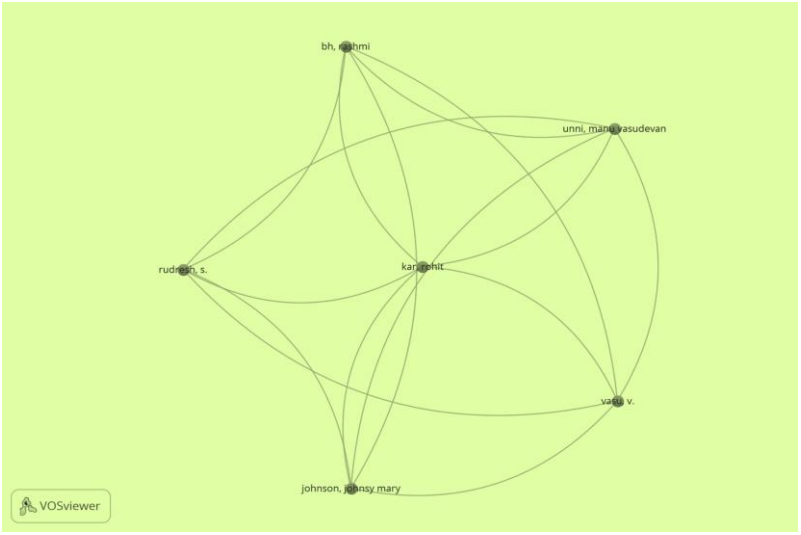
Year	Documents
2024	4
2023	2
2022	2
2021	2



The dataset spans publications from 2021 to 2024, where not much work was being done till 2023. There is an increasing trend in publications in recent years from 2023, indicating growing interest and research activity in “Engagement” and “Virtual Reality”.

HRM And Virtual Reality

CO-AUTHORSHIP AND AUTHORS



CO-AUTHORSHIP AND ORGANISATION

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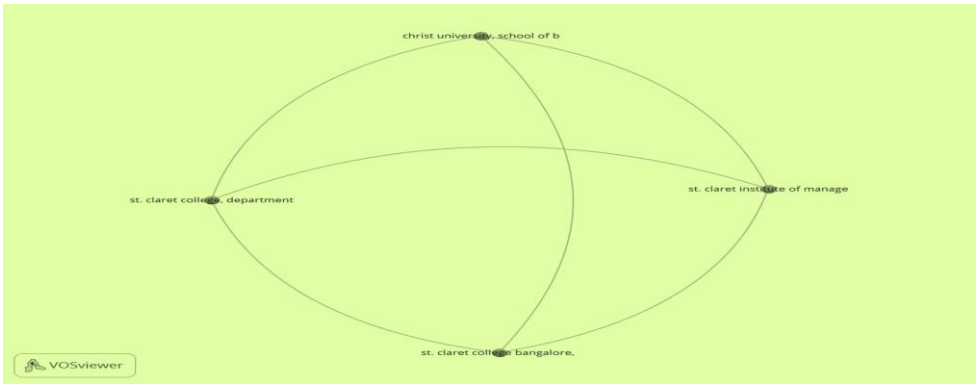
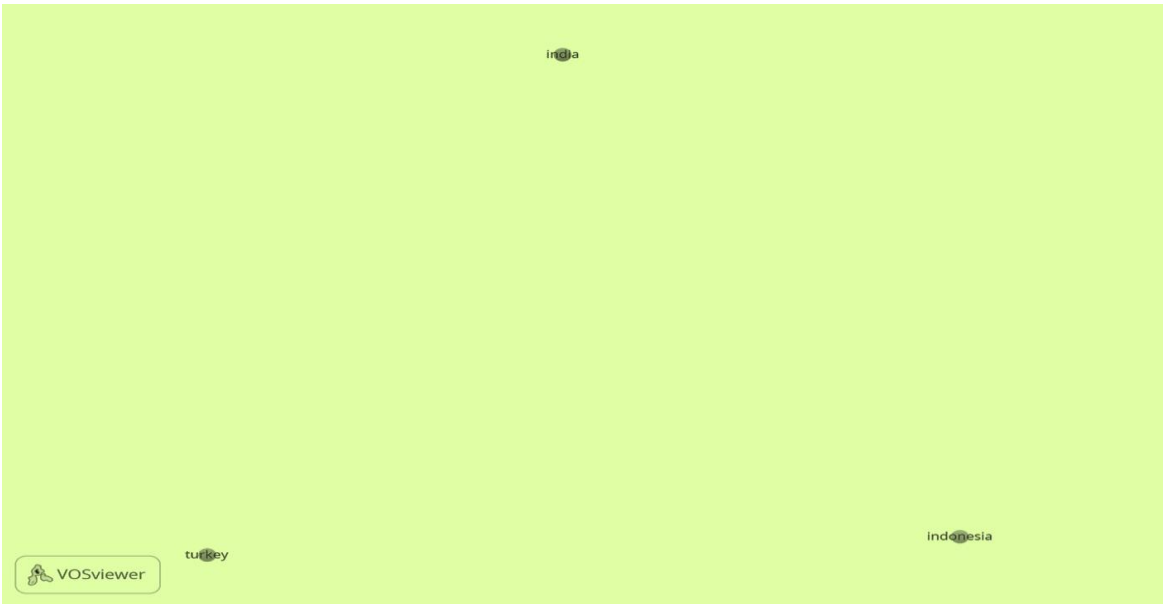
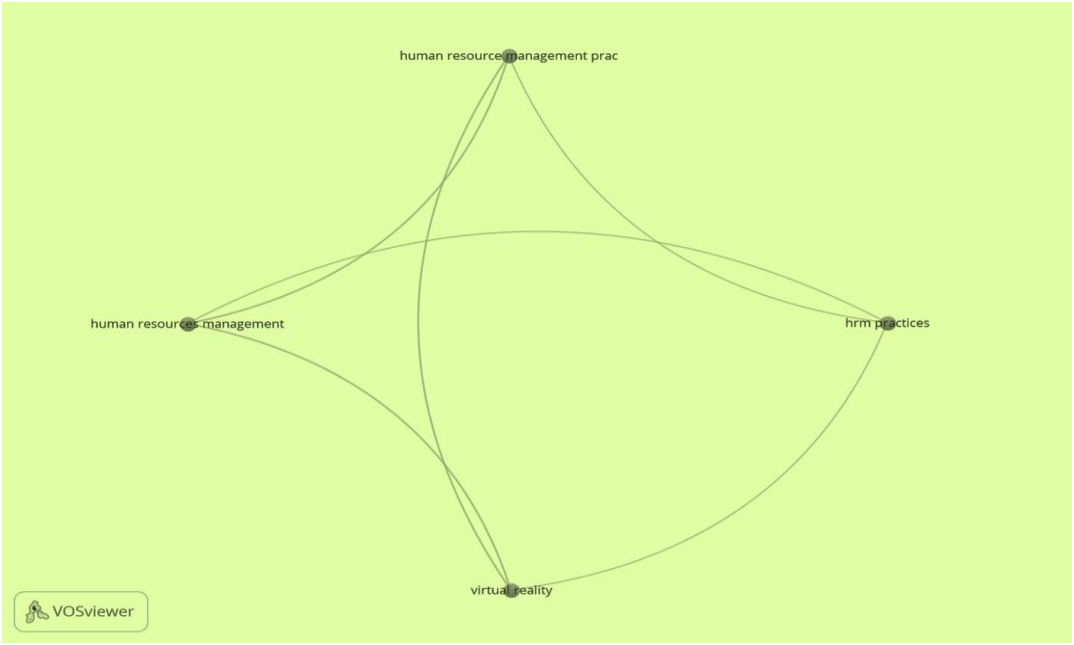


CO-AUTHORSHIP AND COUNTRIES



CO-OCURENCE AND KEYWORDS



Journal of Information Systems Engineering and Management
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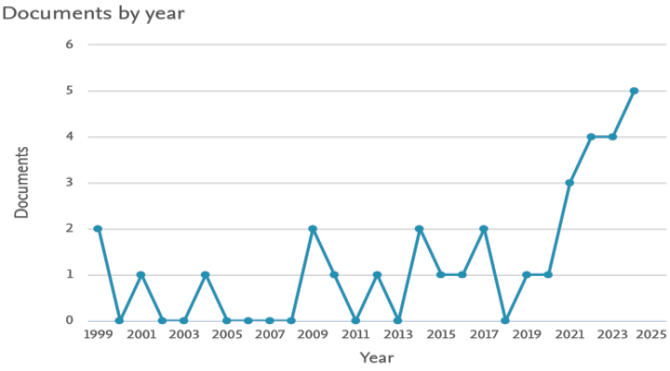
Research Article

Year	Documents
2024	5
2023	4
2022	4
2021	3
2020	1
2019	1
2018	0
2017	2
2016	1



The dataset spans publications from 2016 to 2024, with a continuous amount of research which has been conducted that is total 21 papers on "Human Resources Management" and "Virtual Reality". There is an increasing trend in publications since 2019, indicating growing interest and research activity in "Human Resources Management" and "Virtual Reality". Author keywords provide insights into the main themes and topics covered, such as HRM practices and Virtual Reality. The diversity in publication sources indicates that this topic is of interest to a broad academic audience, spanning multiple disciplines.

CONCLUSION AND DISCUSSION

AR and VR technologies allow HR professionals to create engaging training programs that increase employee retention and reduce expenses. They also enhance the recruitment process by providing candidates with virtual tours of the workplace, offering an immersive view of the company's culture and values. Integrating HRM practices with virtual reality is key to transforming employees, enhancing their efficiency, flexibility, and adaptability in today's dynamic business environment. The Bibliometric Analysis reveals that while Virtual Reality in Employee Training is a specialized area, it has steadily attracted scholarly interest over the past ten years. Notably, the research activity spiked in 2021, indicating a growing awareness of how virtual reality can play a crucial role in training employees, especially in human resources management. Vr learners in the research conducted completed training up to 4x faster than classroom learners and 1.5x faster than e -learners VR-trained employees were 275% more confident to act on what they learned after training—a 40% improvement over classroom learners, and a 35% improvement in comparison to e-learners. By simulating the equipment training with VR, companies saw a huge reduction in training costs.

Practical Implication, Limitation and Future Scope

The potential for Augmented Reality (AR) and Virtual Reality (VR) in Human Resource Management (HRM) looks bright, as these technologies could revolutionize numerous HR functions. The use of Virtual Reality in training process can help the Management in policy making, employee retention and in boosting Efficiency. AR and VR can craft highly interactive and immersive experiences for job seekers, enabling them to explore the company culture and work environment before they even start. Limitations included only one major database "Scopus" therefore may result in limited search results. Exclusion of non-academic sources limits the scope of review

The current study primarily concentrated on training, recruiting, and engaging employees, leaving other HRM processes open for exploration in future research. The research primarily focused on examining the impact of virtual reality on HRM practices, but there is also potential to explore its effects in other industries. While bibliometric analysis is commonly employed, incorporating additional techniques such as content analysis, qualitative methods, network analysis, and advanced tools like machine learning can offer a deeper and more comprehensive understanding of keyword relationships and the underlying quantitative data. Integrating AR and VR technologies into HRM can be costly, and not all organizations may have the financial resources to make such investments.

Employing AR and VR technologies in HRM brings up concerns regarding data privacy and security, as these systems can gather and retain sensitive employee information.

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