

Human Resource Management in Metaverse: An Exploratory Review of the Emerging Literature

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Abstract

Metaverse, by providing interactive virtual environments, is redefining and creating new spaces for attracting, training, evaluating, and shaping employee experiences in Human Resource Management (HRM). Accordingly, the present study provided a structured review of the emerging literature on HRM in the context of Metaverse and its related technologies. To this end, the study was designed as a systematic search-based review with qualitative content analysis. Relevant studies were identified through searches in Scopus and Web of Science, while SpringerLink and ScienceDirect were additionally consulted. Retrieved studies were screened and selected for final analysis. Data were examined using qualitative content analysis, complemented by descriptive indicators to depict the prevailing trends. Findings indicated that metaverse entails significant implications for HRM across three dimensions of technical, human, and organizational. From a technical perspective, technologies such as Artificial Intelligence (AI), Blockchain, and Digital Twins have contributed to optimizing certain HR processes, while challenges related to cybersecurity and protection of organizational knowledge remain salient. From a human perspective, the literature revealed a duality between increased productivity and the emergence of negative psychosocial outcomes for employees including technostress and digital fatigue. At the organizational level, Metaverse has prompted a rethinking of HR strategies and business models. However, it is accompanied by challenges such as resistance to change and lack of coherent evaluation frameworks. The content analysis showed that the dominant focus of research has been on technical and economic dimensions, with comparatively limited attention to social, ethical, and cultural aspects—reflecting conceptual reductionism. Moreover, several research gaps were identified, including a lack of long-term empirical studies, insufficient consideration of contextual and cultural differences, and the absence of novel organizational models. By presenting an initial conceptual overview of the emerging literature on HRM in Metaverse, this study proposed directions for future research in this field.

Keywords

Human Resource Management (HRM), Metaverse, Content Analysis, Exploratory Review.

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Introduction

In today's digital world, we are confronted with new challenges and opportunities. One of these emerging areas is HRM within the Metaverse. The Metaverse, as a multidimensional virtual space, provides numerous opportunities for human interaction, learning, and professional development. These transformations in the way work is performed and social interactions take place have created a fundamental need to rethink traditional HRM practices. In this study, Metaverse is not treated as a synonym for Virtual Reality (VR), Augmented Reality (AR), or isolated virtual worlds. Rather, it is understood as a broader socio-technical environment characterized by persistent, immersive, and interactive digital spaces in which users participate through digital identities and interconnected platforms. In this sense, technologies such as VR, AR, and Mixed Reality (MR) are enabling interface technologies, while artificial intelligence (AI), Blockchain, and Digital Twins function as supporting technological infrastructures that enhance interaction, data processing, interoperability, and digital asset management within the Metaverse. This distinction is important because it helps separate the Metaverse as an organizational environment from the individual technologies that make its development and use possible.

[Buhalis et al. \(2023\)](#) argued that although some individuals perceive Metaverse as merely referring to virtual worlds, prevailing definitions largely conceptualize it as the convergence of virtual and physical worlds. Metaverse is built upon an immersive virtual environment in which individuals can work and engage in social interactions with other users through avatars, MR and VR headsets, and other compatible tools. It enables users to communicate freely with others in a quasi-face-to-face environment and to engage in social interaction. Major technology companies portray Metaverse as a transformative phenomenon, emphasizing how it can positively influence the individuals' work, leisure, and social interactions. Its potential impact on the way business is conducted, how people interact with brands and others, and how shared experiences are developed is likely to be transformative, as the distinct boundaries between the physical and digital worlds are expected to become partially blurred from current perspectives. Nevertheless, although technology and infrastructure have not yet developed sufficiently to allow the scalable creation of a new, fully immersive virtual world—one in which avatars can seamlessly move across platforms—researchers are increasingly examining the transformative effects of Metaverse. Metaverse functions as a tool that complements the real world and it simultaneously positions itself as the ultimate objective of this process. It enables the exchange of diverse experiences and new knowledge among users. Accordingly, users are able to generate financial wealth, create new artifacts, and find opportunities to present different aspects of themselves. However, limitations exist within these platforms in terms of social activities, and a need for greater coherence (such as a global perspective) is strongly felt ([Dwivedi et al., 2022](#)).

Various factors have influenced HRM, among which the information technology revolution is particularly prominent. Since the early invention of computers, HRM practices have increasingly relied on electronic tools to enhance the process efficiency. These systems have played an effective role in cost reduction and in creating competitive

advantages ([Hmoud & Várallyai, 2020](#)). Beyond the general digital transformation, Metaverse contributes a qualitatively different organizational environment for HRM by combining immersion, persistence, embodied interaction through avatars, and shared virtual spaces. Unlike conventional digital HR tools or isolated AI applications, Metaverse enables more interactive, experiential, and socially embedded forms of recruitment, training, collaboration, and employee engagement. Its distinctive value lies not merely in digitizing HR processes, but in reconfiguring how employees experience presence, interaction, learning, and organizational participation in blended physical-virtual settings.

Given the nascent nature of the Metaverse concept and the limited number of empirical studies in the field of HRM, a systematic search-based review of the existing literature can help identify the key concepts, themes, and orientations of early research in this area. A qualitative content analysis of published studies makes it possible to systematically examine how the role of Metaverse in HRM practices is represented, the opportunities and challenges that are highlighted, and the existing knowledge gaps. The aim of this article is to provide a structured understanding of the emerging body of literature and to offer conceptual insights for researchers and HR managers, enabling them to better comprehend the potential implications of adopting Metaverse within organizations and to lay the groundwork for future empirical research and informed decision-making.

Literature Review

The Metaverse

The term meta originates from the Greek word meta (μετά), which carries various meanings such as “among”, “with”, “after”, or “beyond”. When combined with other words, it typically conveys the notion of change or transformation, as in metamorphic or metabolism, while verse refers to “world”. Accordingly, we are confronted with a new world of interconnectedness that is being constructed by companies and social media platforms such as Facebook, Instagram, Microsoft, and Apple, all of which are allocating substantial resources to the development of VR products and the establishment of Metaverse. In this sense, “Metaverse” can be described as a technological concept that transcends our current world and the rigid boundaries between the physical and virtual realms, moving toward a space in which new generations construct novel, digitally based forms of connection ([Rojas, 2023](#)).

The term Metaverse has been in formal use since approximately 1992. A study conducted by the United States Congressional Research Service using this term revealed that no technical research articles in English published prior to 1992 had employed it. Today, the term is commonly used to describe a persistent and accessible immersive virtual world in which users can interact with one another and with their surrounding environment, and participate in social activities in ways comparable to interactions in the physical world ([Rojas, 2023](#)).

Metaverse is not merely about simulating the physical world in a digital format; rather, it involves the creation of a new domain in which digital and physical dimensions mutually reinforce one another. Entering this unfamiliar territory requires careful

design and informed decision-making (Kiaer, 2024).

The Metaverse technology offers users a distinct experience achieved through reconciling the physical world with the digital one. Integrating VR into the Metaverse environment is inherently challenging. In fact, Metaverse incorporates many characteristics of the physical world within itself (Pamucar et al., 2022).

The Metaverse goes beyond being a novel alternative space. It may also become a potential necessity that societies are compelled to adopt in response to escalating environmental crises. This expansive digital realm presents compelling prospects such as the creation of cost-effective spaces, the promotion of equality, and the removal of numerous barriers. In doing so, it provides individuals—regardless of their geographical, cultural, or economic backgrounds—with opportunities for experience, sharing, and growth (Kiaer, 2024).

The Metaverse can be regarded as a technological masterpiece; indeed, it represents a social revolution that opens up new avenues for communication and offers individuals unprecedented levels of freedom and choice. Through this vast virtual space, people can transcend physical, social, and geographical constraints and present themselves in ways that were previously impossible. With options ranging from avatars to immersive virtual environments, Metaverse enables richer forms of self-expression, democratizes access, and facilitates the formation of more authentic relationships (Kiaer, 2024).

Letafati and Otoum (2023) argued that data can be fed into AI and machine learning algorithms to create “personalized interactive partners” that influence social interaction behaviors of Metaverse users. By leveraging physical and mental attributes inferred from biometric data, these interactive partners may manipulatively guide users toward undesirable situations and behaviors. Consequently, the Metaverse users may be subject to manipulation not only by businesses and institutions, but also in a human-centered manner by other individuals.

In Metaverse, spatial distance constraints are largely reduced, enabling interactions that replicate the richness of face-to-face exchanges without the associated environmental and economic costs. Fundamentally, Metaverse allows spatial limitations to be minimized, making it possible to conduct complex discussions or collaborative tasks without the need for physical relocation. Within the ongoing discourse on mobility and its multifaceted implications, Metaverse is increasingly recognized as a central paradigm. This paradigm envisions a future in which the demands of global collaboration and interaction can be met without sacrificing the environmental and economic sensitivities. As stakeholders around the world seek solutions to the complexities of mobility challenges, innovations such as Metaverse may provide pathways toward sustainable connectivity (Kiaer, 2024).

HRM in Metaverse

Studies that have integrated advanced AI technologies with HRM functions have predominantly focused on talent acquisition (Ore & Sposato, 2022). Within this stream of research, some studies have examined how organizations can enhance the quality of

recruitment processes by conducting interviews in Metaverse, thereby enabling improved person–job fit (Kişi, 2022).

Factors including AI exert a significant influence on HRM, thereby transforming the nature of work, employees, and work environments. While AI-enabled HRM is increasingly regarded as a strategic approach to enhancing organizational productivity, the academic literature has yet to provide a comprehensive strategic framework to guide HR managers in its adoption and implementation. Nevertheless, the existing research in this area offers a valuable foundation for the development of such a framework (Malik et al., 2023).

Research Background

Zvarikova et al. (2022) stated in their study that brands and organizations can enhance the employee's productivity and the performance of virtual teams by leveraging virtual avatars in immersive work environments through the integration of workplace technologies. In February 2022, they conducted a quantitative review of the existing literature in the Web of Science, Scopus, and ProQuest databases. The search terms included “Metaverse”, “virtual HRM”, “immersive work environments”, “data visualization tools and algorithms”, and “behavioral analytics”. Among studies published between 2021 and 2022, only 81 articles met the eligibility criteria. After excluding controversial findings, unverifiable results, overly ambiguous content, and duplicate or similar titles, a total of 12 sources—predominantly empirical in nature—were ultimately selected. The data visualization tools employed included Dimensions (bibliometric mapping) and VOSviewer (layout algorithms), while PRISMA was used as the reporting quality assessment tool. Methodological quality was evaluated using AMSTAR, Distiller SR, MMAT, and ROBIS.

In this line of research, VR and text analysis tools play a central role in analyzing the performance indicators in the contexts of virtual work, remote workforce management, and distributed teamwork. The study contributes to the existing literature on virtual employee training, skill development, workplace technologies, and deep-learning computer vision algorithms in immersive Metaverse environments. Specifically, it demonstrates that VR-based recruitment tools integrate sensory immersion, affective data, voice biometrics, and cognitive computing systems within three-dimensional digital worlds. To conduct this investigation, a quantitative review of articles published in March 2022 in key databases such as Web of Science, Scopus, and ProQuest was undertaken. The search terms included Metaverse, virtual employee training and skill development, workplace technologies, deep-learning computer vision algorithms, and immersive environments. Among studies published in 2022, only 83 articles met the eligibility criteria. After removing the controversial findings, unverifiable results, ambiguous content, and similar titles, 14 sources—primarily empirical—were selected. Data analysis was performed using visualization tools such as Dimensions (bibliometric mapping) and VOSviewer (layout algorithms), while quality assessment relied on instruments including PRISMA, AXIS, Dedoose, ROBIS, and SRDR. This research highlights the growing role of VR and related technologies in shaping the future of

virtual work environments, particularly in employee development and recruitment processes within the Metaverse (Hawkins, 2022).

Koohang et al. (2023) addressed several key issues in their study, describing the term Metaverse as the next generation of the Internet. The Metaverse is defined as a virtual platform that leverages extended reality technologies—such as AR, VR, MR, three-dimensional graphics, and other emerging technologies—to deliver real-time interactions and experiences that are not feasible in the physical world. Organizations have gradually begun to recognize the impact of Metaverse and the role it can play in optimizing profitability. The aim of this article was to provide insights into several critical domains including marketing, tourism, manufacturing, operations management, education, retail, banking services, healthcare, and HRM that are likely to be influenced by the adoption and use of Metaverse. For each domain, the study presented an overview, identified opportunities and challenges, and proposed a potential research agenda.

Chowdhury et al. (2023) argued that AI has been increasingly adopted in HRM due to its potential to create value for consumers, employees, and organizations. However, recent studies indicated that organizations have not yet realized the anticipated benefits of AI adoption, despite substantial investments of time, effort, and resources. The existing research in HRM has examined AI applications, their expected benefits, and their impact on the human workforce and organizations. The purpose of this article was to systematically review the multidisciplinary literature spanning international business, information management, operations management, public management, and HRM, in order to provide a comprehensive and objective understanding of the organizational resources required to develop AI capabilities in HRM. The findings suggested that organizations must look beyond technical resources and place greater emphasis on developing non-technical resources, such as human skills and competencies, leadership, team coordination, organizational culture and innovation mindset, governance strategies, and strategies for integrating AI with employees, in order to benefit from AI adoption. Based on these findings, the authors proposed five research directions to advance the knowledge on AI in HRM. From a theoretical perspective, the study identified the essential organizational resources needed to achieve business benefits by proposing an AI capability framework that integrates the resource-based view and the knowledge-based view. From a practical standpoint, the framework provided managers with a systematic approach to objectively assess organizational readiness and to develop strategies for adopting and implementing AI-based practices and processes in HRM.

Similarly, Sharma and Sohal (2024) stated that the emergence of Metaverse has introduced new opportunities and challenges for HRM as digital technologies continue to evolve. To examine the state of HRM research in the Metaverse era and to identify key themes and gaps in the existing literature, this study conducted a bibliometric analysis. The authors analyzed the distribution of publications, authors, journals, and keywords related to HRM in the context of Metaverse through a systematic review of scientific publications indexed in the Scopus database. The findings indicated a growing scholarly

interest in this field, with studies primarily focusing on digital leadership, workforce management, remote work, and virtual collaboration. The authors proposed a future research agenda aimed at addressing identified knowledge gaps and advancing the understanding of HRM in the Metaverse era. This study contributed to the expansion of the research literature on HRM in digital contexts and provided valuable guidance for researchers, practitioners, and policymakers seeking to leverage the opportunities and addressed the challenges associated with Metaverse.

A study conducted by [Saeed et al. \(2024\)](#) examined the impact of immersive virtual environments—particularly the Metaverse—on employee training and recruitment. The Metaverse was introduced as the next frontier for stimulating strategic business opportunities, suggesting that future trends will involve increased corporate investment in training programs based on digital technologies. As a technology in the field of learning and development, Metaverse aims to create a fully immersive experience by integrating the virtual and real worlds. Organizations are increasingly moving toward Metaverse environments to enhance the interactivity and flexibility of training while maintaining the quality of educational content and programs. However, the existing academic literature on Metaverse has largely focused on recruitment and employee retention processes, whereas training and development aspects—especially the employees' learning experiences within the Metaverse environments—have been largely overlooked. Understanding the employee's experience is critical for achieving desirable learning outcomes. The objective of this study was to address this research gap by employing a novel structured topic modeling analysis method to analyze feedback from 889 employees regarding various training programs conducted in Metaverse environments. Specifically, the employee reviews from leading training platforms such as STRIVR, Spatial Computing, Mursion, Program ACE, Rewo, Gather, and ARKit were examined. The preliminary results identified nine themes, five of which relate to positive aspects and four to potential concerns. In particular, real-time collaboration, enhanced hands-on applicability, alignment with technology-based training, real-time feedback analytics, and customizable learning environments emerged as positive dimensions, while accessibility and inclusion, ethical considerations, privacy and security concerns, and cultural resistance were identified as negative aspects. This study demonstrated the promising potential of Metaverse in enhancing training and development performance within HRM. By leveraging the innovative capabilities offered by Metaverse, organizations can capitalize on these advancements to gain competitive advantages. Overall, this research was significant for improving the understanding of Metaverse applications in virtual recruitment, hiring, and training processes in HRM.

Human Resource Technology (HRTech) solutions encompass software and hardware tools designed to automate HR processes, collect, process, and analyze data, and utilize these data for strategic decision-making and the execution of professional HR tasks, while simultaneously addressing security and privacy priorities. As in many other domains, digital transformation and emerging technologies have increasingly permeated HR processes. These technologies are utilized by HR professionals as well as various

stakeholders involved in HR operations. This study evaluates the application of AI, VR, AR, and Metaverse in HRM, with a focus on current trends and potential opportunities. A survey was conducted to assess the perspectives and critiques of HR professionals regarding these technologies. Participants included HR managers, academic experts specializing in HRM, and employees who had completed HR-related courses at various levels. The results obtained were subjected to comparative analysis in this article (Aydin et al., 2024). Subsequently, a summary of the conducted studies is presented in Table 1.

Table 1.
A Summary of the Conducted Studies

Author(s) & Year	Article Content	Findings	Research Method
Zvarikova et al., 2022	Increasing the employee's productivity and virtual team performance through workplace technology integration	Brands and companies can use virtual avatars in immersive workplaces to boost productivity and virtual team performance.	Systematic Review & Scientometrics
Hawkins, 2022	Examining the role of VR and related technologies in employee training and development	Increasing the role of VR and immersive technologies in shaping the future of work, especially in talent development within the Metaverse.	Systematic Review
Koohang et al., 2023	Enabling real-time interactions and experiences not possible in the physical world	High potential of these technologies to enhance the user experience, interaction, and improve training and recruitment processes. Challenges include privacy and security issues.	Review
Chowdhury et al., 2023	Multidisciplinary systematic literature review on AI capabilities in HRM	Organizations must develop non-technical resources like human skills, leadership, culture, and effective strategies for AI integration.	Systematic Literature Review
Sharma & Sohal, 2024	Opportunities and challenges Metaverse introduces for HRM	Rising attention to HRM-related issues within the Metaverse context.	Bibliometric Analysis
Saeed et al., 2024	Impact of immersive virtual environments, especially Metaverse, on employee training and recruitment	Improvement of organizational training functions by leveraging the Metaverse potential.	Structural Topic Modeling (STM)
Aydin et al., 2024	Assessment of AI, VR, AR, and Metaverse in HRM, with a focus on current trends and opportunities	Emerging technologies show strong potential for improving training, recruitment, and talent retention. Challenges include data security and reduced human interaction.	Comparative Analysis
Koohang et al., 2023	Enabling real-time interactions and experiences not possible in the physical world	High potential of these technologies to enhance the user experience, interaction, and improve training and recruitment processes. Challenges include privacy and security issues.	Review

(Source: The Researcher's Findings)

In recent years, numerous studies have examined the impact of Metaverse on HRM, indicating that Metaverse serves as a new platform for employee recruitment, hiring, and retention, as well as for enhancing the organizational training performance and developing the employee's skills. By simulating the work environment, it also enables group interactions within that space. These studies suggest that Metaverse can provide a more effective learning experience, offering employees the opportunity to practice new skills in a safe and risk-free environment. However, challenges related to the use of Metaverse exist, including issues of privacy intrusion, data security, and unequal access

to emerging technologies. Overall, the research background indicated that Metaverse holds significant potential for exploration in the field of HRM.

Methodology

This study was designed as a systematic search-based review with qualitative content analysis. The purpose of this approach was to provide a structured synthesis of the existing literature on Metaverse in HRM and to identify the main conceptual themes emerging from prior studies. Content analysis is a research method used to identify patterns, themes, and biases in textual, visual, or multimedia data. This method, which involves categorizing and coding data into meaningful themes, reveals the underlying ideas, trends, and relationships, enabling the examination of connections, attitudes, and representations across various contexts ([Harwood & Garry, 2003](#)). By breaking down data into manageable units, this approach is particularly valuable in exploratory research for extracting new concepts or patterns.

Qualitative data analysis primarily involves a process known as coding, whereby raw data are elevated to a conceptual level. Coding goes beyond merely rewriting or summarizing data; it is not limited to note-taking or compiling a list of codes. In this process, the researcher actively engages with the data, posing questions, making comparisons, and extracting and developing concepts that represent the data. Coding can be likened to mining the “conceptual ores” from the data. Each analyst, depending on the type of qualitative research, applies a set of specific strategies. The researcher’s focus involves identifying the potential themes, formulating analytical questions, and examining them in a manner that fosters both curiosity and deep understanding ([Corbin & Strauss, 2014](#)). To construct concepts from a textual data source, the text must be carefully examined to uncover the meanings, ideas, and thoughts contained within it. One process of textual content analysis is open coding, which involves labeling concepts and defining and developing categories based on their characteristics and dimensions. This method is widely used for qualitative data analysis ([Khandkar, 2009](#)).

Axial coding focuses on identifying relationships among the conceptual categories derived from data analysis. The purpose of axial coding is to add depth and structure to the existing categories. In other words, axial coding transforms the fragmented and raw data into a coherent analytical structure, revealing the connections between categories and subcategories ([Gorra & Kornilaki, 2010](#)). According to [Alhassan et al. \(2023\)](#), selective coding aims to identify the main category that represents the central phenomenon, around which all other categories are integrated.

An important aspect of the coding framework is its iterative nature, where the three coding techniques—open, axial, and selective—occur cyclically and simultaneously, allowing the analyst to move back and forth between stages. Activities within each coding technique are also iterative. For example, researchers may begin to identify the categories while still labeling certain concepts. This structure ensures that the analysis progresses dynamically and concurrently with the discovery of new data and concepts, allowing central categories and phenomena to emerge naturally and gradually ([Alhassan et al., 2023](#)).

This study employed a structured literature review approach combined with qualitative content analysis to examine the role of Metaverse in HRM. A systematic search was conducted primarily in the Scopus and Web of Science databases. In addition, SpringerLink and ScienceDirect were consulted to complement the search process and facilitate access to the full texts of relevant studies. The database search was conducted in April 2025. The search was performed using topic-specific keywords related to Metaverse and HRM, as presented in Table 2. Boolean operators such as AND and OR were used to combine the search terms, and quotation marks were applied where necessary to retrieve exact phrases such as “HRM”. No restriction was imposed on the year of publication in order to provide a comprehensive overview of the existing literature.

To ensure the relevance and quality of the selected studies, explicit inclusion and exclusion criteria were applied. Only English-language, peer-reviewed journal articles were included in the review. The search was further limited to studies directly related to the intersection of Metaverse and HRM and to publications within the fields of management, business, and economics. Books, book chapters, conference papers, editorials, and other non-peer-reviewed sources were excluded. Studies that were not published in English or were not directly relevant to the research topic were also removed.

The study selection process was conducted in several stages. First, the records retrieved from the databases were screened at the title and abstract level in order to assess their relevance to the research topic. At this stage, unrelated studies, as well as books and conference papers, were excluded. This screening process resulted in a preliminary dataset of 21 peer-reviewed journal articles. In the next stage, duplicate and overlapping records were identified and removed, leading to a final sample of 19 articles for analysis. The numbers reported in Table 2 represent the initial records retrieved from each database. These records were then screened for relevance and document type before the final sample was determined. The overall process of identification, screening, and final inclusion of studies is summarized in the PRISMA 2020 flow diagram (Figure 1), while the database sources, search keywords, and retrieved records are reported in Table 2.

As shown in the PRISMA flow diagram (Figure 1), the screening process resulted in a final sample of 19 eligible journal articles.

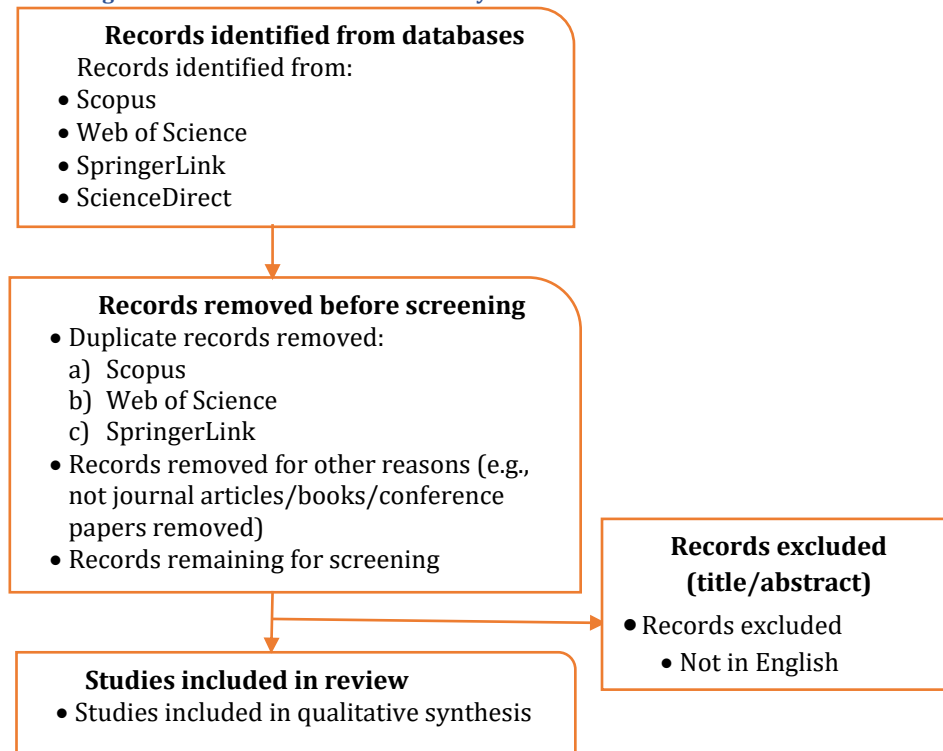
The study selection process is summarized in Figure 1, while database-specific search and screening results are reported in Table 3.

Table 2.
The Process of Data Collection

Database	Search Keywords	Final Selected Articles
Scopus	“Metaverse” AND “human resource management”	7
	(“HR” OR “HRM” OR “human resource management”) AND “Metaverse”	
Web of Science	“metaverse” AND “human resource management”	9
	(“HR” OR “HRM” OR “human resource management”) AND “Metaverse”	
Springer Nature Link	“Metaverse” AND “human resource management”	4
	(“HR” OR “HRM” OR “human resource management”) AND “Metaverse”	
ScienceDirect	“Metaverse” AND “human resource management”	1
	(“HR” OR “HRM” OR “human resource management”) AND “Metaverse”	

(Source: The Researcher's Findings)

Figure 1.
The PRISMA Flow Diagram for Literature Search and Study Selection



(Source: The Researcher's Findings)

Table 3.
The Database-Specific Search Results and Screening Outcomes

Database	Duplicate records removed	Records removed for other reasons (e.g., not journal articles/books/conference papers removed)	Records remaining for screening	Records excluded	Not in English
Scopus	46	18	18	7	7
Web of Science	50	41	41	10	9
Springer Nature Link	378	85	85	4	4
ScienceDirect	2	1	1	1	1

(Source: The Researcher's Findings)

Table 3 details the filtering process for each database. 'Records remaining for screening' represents the number of records left after removing duplicates and non-journal/book/conference materials. From these, 'Records excluded' refers to those removed during title/abstract screening, and 'Not in English' refers to language-based exclusions.

The final set of 19 articles was analyzed by the authors using qualitative content analysis through a three-stage coding process. First, each article was read carefully several times to identify meaningful units, key concepts, and recurring ideas related to the role of Metaverse in HRM. These initial elements were recorded as open codes. In the second stage, the open codes were compared across the selected studies and grouped into broader axial categories based on conceptual similarity and thematic relevance. In the final stage, selective coding was applied to integrate these categories into higher-level themes representing the main patterns, opportunities, challenges, and research

gaps identified in the literature. To enhance the analytical consistency, the coding and categorization process was conducted iteratively by the authors, with repeated comparisons between the original texts, open codes, axial categories, and final themes. Codes with similar or overlapping meanings were reviewed and refined until conceptual clarity and internal consistency were achieved.

Before conducting the content analysis, VOSviewer was used in an exploratory and descriptive manner to map the overall research landscape and identify the prevailing patterns and conceptual relationships in the field. VOSviewer is used for bibliometric analysis, mapping scientific networks, and identifying research clusters and emerging trends (Fathi, 2024). In this regard, the findings of Abbasi et al. (2025) indicated that bibliometric methods, particularly analyses conducted using VOSviewer software, are effective tools for analyzing and reviewing the scientific literature across various fields. The software supported bibliometric visualization of connections among keywords, publications, and authors and helped organize the broader body of retrieved literature at the initial stage. However, its outputs were used only as a complementary tool to support the qualitative interpretation and were not considered the sole basis for theoretical conclusions.

Findings

After collecting the relevant studies, all published research in the field was examined and analyzed using VOSviewer software without any initial filtering. The clustering in VOSviewer was based on two main criteria: high frequency of occurrence of a keyword and co-occurrence among the keywords provided. In other words, a keyword that appeared frequently became a central node, and other keywords that appeared together with it across articles were grouped into the same cluster.

When entering the data into the software, it was specified that each keyword must appear at least five times, allowing even keywords from earlier years to have an opportunity to influence the analysis. Additionally, a few highly frequent words that were not relevant to the research objective (i.e., identifying focal points) and did not meaningfully impact the output—such as *Article*, *Research*, *Methodology*, *Economics*, *Literature Review*, and certain terms related to oil extraction—were removed. This step ensured that the software could clearly highlight the core keywords of each cluster, providing a more precise and interpretable visualization of the research landscape.

The conceptual map in Figure 2 was generated using VOSviewer, displaying the clustering of keywords related to Metaverse and HRM based on their co-occurrence in scientific literature. In this keyword network, two primary concepts—“HRM” and “VR” (which can be considered an early form of Metaverse in work environments)—were positioned at the center of the network, showing the strongest semantic links with other keywords.

Table 5.
The Categories Derived from Axial Coding

No.	Axial Category	Subcategories / Open Codes	Core Concept	Source
1	Technological Infrastructure for HR in Metaverse	Metaverse, Industrial Metaverse, Workplace Metaverse, VR, AR, Extended Reality, Digital Twins, Physical-Digital Convergence, Generative Organizational AI, AI-Based HR Management, Shadow AI, IoT, Big Data, Predictive Analytics, Blockchain	The Metaverse as a multi-layered technological platform for HR transformation	Chin et al. (2025); Di Donato et al. (2025); Kliestik et al. (2024); Marabelli & Lirio (2024); Mubarak et al. (2025); Zhang & Chen (2024); Vig (2023); Dwivedi et al. (2022)
2	Transformation and digitization of hr functions	Digital HR, Digitization of HR processes, Data-driven performance evaluation, Employee biometric data, Flexible job design, Digital workplace, Digital project management	Redefining traditional HR functions in immersive digital environments	Papageorgiou et al. (2025); Froese et al. (2025); Marabelli & Lirio (2024); Mubarak et al. (2025); Zhang & Chen (2024); Thakral et al. (2023); Dutta et al. (2023)
3	Learning, training, and human capital development in Metaverse	Learning and development in the Metaverse, Educational experience in the Metaverse, Omnichannel learning, On-the-job training, Work-integrated learning, Learning during career transitions, Game-based learning, Simulation-based training, Real-time feedback, Customizable learning environments	Immersive learning as the core of human capital development in Metaverse	Chaudhary et al. (2025); Di Donato et al. (2025); Saeed et al. (2024); Lee (2023); Vig (2023); Dutta et al. (2023); Kumar et al. (2024)
4	Employee experience, interaction, and digital identity	Employee engagement, Social presence, Remote presence, Digital employee identity, Work avatars, Digital collaboration and interactions, Psychological experience, Organizational learning culture	Formation of new work experiences based on digital presence	Papageorgiou et al. (2025); Froese et al. (2025); Marabelli & Lirio (2024); Saeed et al. (2024); Kozinets (2023); Kumar et al. (2024)
5	Empowerment, job satisfaction, and employee performance	Employee empowerment, Job autonomy, Job satisfaction, Role accountability, Organizational performance indicators, Employee creativity	Strengthening human agency and enhancing employee performance in Metaverse environments	Papageorgiou et al. (2025); Kumar et al. (2024); Mubarak et al. (2025)
6	Ethical, legal, and privacy challenges in Metaverse	Employee privacy, Biometric data, Digital surveillance, Ethical concerns, Shadow AI, Organizational knowledge leakage, Diversity, equity, and inclusion challenges, Intellectual property rights	Tension between digital innovation and ethical responsibility in HR	Chin et al. (2025); Marabelli & Lirio (2024); Saeed et al. (2024); Kozinets (2023); Vig (2023); Dwivedi et al. (2022); Kumar et al. (2024)
7	Organizational acceptance, culture, and change management	Cultural resistance to technology, Digital transformation culture, Change management in HR, Organizational digital readiness, Organizational absorptive capacity, Digital trust	Metaverse as an organizational transformation project in HR	Di Donato et al. (2025); Mubarak et al. (2025); Saeed et al. (2024); Zhang & Chen (2024); Lee (2023); Kumar et al. (2024)
8	Sustainability, diversity, and social responsibility in hr	Green HRM, Social sustainability, Environmental sustainability, Sustainable Development goals, Carbon footprint reduction, Diversity and inclusion opportunities, Recruitment of diverse talents	Aligning Metaverse HRM with sustainable development and organizational equity	Chaudhary et al. (2025); Saeed et al. (2024); Di Donato et al. (2025); Dutta et al. (2023); Mubarak et al. (2025); Kumar et al. (2024)

(Source: The Researcher's Findings)

According to Table 5, the open codes extracted from the 19 articles were organized into eight axial categories, representing the technological, human, organizational, and ethical dimensions of HRM in Metaverse.

Following the axial coding process, selective coding was conducted. Based on the content and conceptual relationships among the codes, the final categorization was determined. The resulting categories from the selective coding stage are presented in Table 6.

Table 6.

The Categories Derived from Selective Coding

No.	Selective Code	Related Axial Categories	Integration Logic
1	Technological transformation of HR in Metaverse	Technological infrastructure for HR in Metaverse; Transformation and digitization of HR functions; Learning, training, and human capital development in Metaverse	Focus on immersive, AI-driven, and data-driven technologies that provide the foundation for transforming HR processes, learning, and human capital development
2	Reimagining the employee experience and roles in the Metaverse ecosystem	The employee's experience, interaction, and digital identity; Empowerment, job satisfaction, and the employee's performance	Emphasis on human, psychological, and behavioral dimensions of employees and the formation of new work experiences based on digital presence
3	Responsible and sustainable hr leadership in Metaverse	Ethical, legal, and privacy challenges in Metaverse; Organizational acceptance, culture, and change management; Sustainability, diversity, and social responsibility in HR	Focus on value-driven, cultural, ethical, and sustainability considerations that shape the long-term orientation of Metaverse-based HR

(Source: The Researcher's Findings)

Following the coding process, the intra-coder reliability method was employed to ensure the reliability of the qualitative coding. The coding procedure was conducted in two iterative stages with a three-week interval. The consistency of coding decisions across these two stages was assessed, and any discrepancies were resolved through a review and refinement of the coding framework.

As can be observed in Table 6, the following conclusions can be drawn:

- 1. Technological Transformation of HRM in Metaverse:** This selected code indicated that the existing literature regards Metaverse as an emerging technological platform that, through immersive technologies, AI, and data analytics, enables the redesign of HRM, training, and human capital development.
- 2. Recreation of the Employee's Experience and Role in the Metaverse Ecosystem:** This selected code emphasized the shift in HRM focus from process-centricity to experience-centricity, where employees, with digital identities, play a more active role in learning, interaction, and value creation.
- 3. Responsible and Sustainable Governance of HRM in Metaverse:** This selected code demonstrated that the successful realization of HRM in Metaverse requires simultaneous attention to ethics, privacy, organizational acceptance, culture, and sustainable development goals.

Recent research indicated that Metaverse, as an emerging technology, has extensive impacts on various areas of HRM, organizational productivity, and digital business development. These impacts can be analyzed across three key dimensions of technical, human, and organizational.

From a technical perspective, advancements related to AI, Blockchain, and digital twins have optimized decision-making processes, recruitment, and the development of financial technologies. However, challenges such as knowledge leakage, cybersecurity, the need for precise policymaking, dependence on cryptocurrencies, and the requirement for advanced infrastructure persist.

From a human dimension, the review of articles revealed the existence of two conflicting currents in the literature. On one hand, numerous studies pointed to a significant improvement in the efficiency of HR processes. On the other hand, substantial evidence indicated threats to the psychosocial well-being of employees, such as technostress, digital fatigue, and the need to establish work-life balance. This duality revealed the paradoxical nature of novel technologies in the workplace.

From an organizational perspective, Metaverse is redefining HR processes, business strategies, and social and environmental sustainability. However, the lack of scientific evaluation frameworks and the need for further studies on fairness and social inclusion in this space remain as the existing research gaps. Implementation barriers such as resistance to change and the need for process redesign are among the organizational challenges in this path.

A comparative reading of the reviewed studies revealed both convergence and divergence across the emerging literature. There is broad agreement that Metaverse has the potential to transform HRM through immersive training, recruitment innovation, and enhanced virtual collaboration. However, the studies differed substantially in how they assess the implications of such transformation. Technology-oriented contributions tend to emphasize efficiency, innovation, and process optimization, whereas more critical and human-centered studies draw attention to technostress, digital fatigue, privacy concerns, and resistance to change. The literature also contained an underlying contradiction: the same immersive and always-connected features that are presented as drivers of engagement and flexibility were, in other studies, associated with overload, boundary erosion, and psychosocial strain. This comparison suggests that the current field remains conceptually fragmented and that future research should move beyond descriptive optimism toward more balanced and context-sensitive analysis. To move beyond descriptive summarization, a cross-study comparison was conducted to identify convergence, divergence, and emerging contradictions across the reviewed literature. Table 7 presents this comparative synthesis across the technical, human, and organizational dimensions.

As shown in Table 7, the literature is characterized by broad agreement on transformative potential, yet diverges in its assessment of feasibility, employee's well-being, and governance readiness, revealing persistent tensions in this emerging field.

Table 7.

The Comparative Synthesis of the Reviewed Studies across the Technical, Human, and Organizational Dimensions of Metaverse in HRM

	Technical	Human	Organizational
Main areas of convergence	Most studies agreed that Metaverse can enhance HRM through immersive training, virtual recruitment, AI-supported processes, and new forms of digital interaction. There is also broad recognition of the relevance of enabling technologies such as AI, Blockchain, and Digital Twins.	There is broad agreement that Metaverse may improve engagement, immersive learning, collaboration, and employee's experience in HR-related activities. Several studies also acknowledged its potential to support communication and participation in virtual work environments.	Many studies converged in portraying t Metaverse as strategically relevant for organizational innovation, workforce transformation, and the redesign of HRM processes. There was also shared recognition that organizational support and policy frameworks are important.
Main areas of divergence	Studies differed in the extent to which they view these technologies as practically feasible, scalable, and organizationally ready for implementation. Some presented the Metaverse as an immediate innovation opportunity, while others stressed infrastructure limitations, data security risks, interoperability problems, and high implementation costs.	Studies diverged in their assessment of the employee adaptation and well-being. Some framed immersion as empowering and motivating, while others emphasized technostress, digital fatigue, identity concerns, emotional strain, and resistance to change.	The literature differed in how prepared organizations are assumed to be for Metaverse adoption. Some studies highlighted the strategic opportunities and competitive advantages, whereas others stressed the governance gaps, unclear performance indicators, cultural misalignment, ethical concerns, and the absence of coherent implementation models.
Emerging contradictions	The same technological features that are presented as drivers of efficiency, innovation, and connectivity were also associated with heightened cybersecurity risks, privacy concerns, and technical complexity.	The immersive and interactive qualities of the Metaverse were presented simultaneously as sources of engagement and as triggers of overload, boundary erosion, and psychosocial pressure.	Metaverse was framed both as a pathway to organizational transformation and as a phenomenon for which many organizations still lack the structures, evaluation criteria, and governance capacity required for effective adoption.
Implication for future research	Future research should examine the implementation conditions, technological readiness, and sector-specific adoption barriers, rather than assuming uniform feasibility across organizations.	Future studies should investigate the employee's experience longitudinally and across contexts, with greater attention to well-being, inclusion, digital inequality, and individual differences in adaptation.	Future research should develop context-sensitive organizational models, governance frameworks, and evaluation criteria to assess when and how Metaverse adoption creates meaningful HRM value.

Despite the growing interest in Metaverse in HRM, the reviewed literature still leaves several important gaps unresolved. First, most studies remained conceptual or qualitative, and long-term empirical evidence on the real organizational effects of Metaverse adoption is still limited. Second, the literature has largely emphasized technical opportunities and efficiency gains, while paying less attention to contextual, cultural, legal, and institutional differences across countries. Third, psychosocial outcomes such as employee's well-being, digital fatigue, and resistance to immersive work environments remained underexplored. Finally, the field lacked robust organizational and governance models for the ethical, inclusive, and sustainable implementation of Metaverse-based HRM practices.

Discourse analysis of the articles indicated the predominance of technical and instrumental approaches over theoretical discussions. Consequently, the social, cultural, and ethical dimensions of novel technologies have been largely marginalized. This discursive orientation, primarily focused on economic efficiency and technical capabilities, has led to a form of conceptual reductionism that overlooks the human and

social complexities of digital transformations. This approach may represent a one-dimensional discourse that emphasized the economic and functional benefits of novel technologies while ignoring their more complex and multifaceted consequences. Therefore, a need is felt for more comprehensive and multi-dimensional discursive approaches to place attention on human, social, and ethical dimensions alongside a more accurate understanding of the challenges and opportunities of these technologies. Furthermore, the literature in this field is transitioning from a stage of technological enthusiasm to a stage of critical reflection. This discursive evolution is evident in the shift of key terms from concepts like "digital transformation" to "intelligent organizational adaptation" throughout the evolutionary path of research. In the following section, based on the reviewed studies, the obtained strengths and weaknesses in this research area are pointed out.

a) Strengths of the Existing Research

The reviewed studies in the fields of Metaverse, AI, and HRM are significant from several perspectives. First, these studies encompassed a wide range of academic disciplines, including management sciences, information technology, organizational psychology, and social sciences. This breadth has fostered a comprehensive approach to examining the impacts of these technologies on organizations and employees.

Second, the focus on analyzing the benefits and challenges of Metaverse and AI has led these studies to examine the opportunities for productivity and organizational issues from both theoretical and practical aspects. Some of this research has managed to adopt interdisciplinary approaches in studying the effects of novel technologies and provide practical solutions for organizations.

Furthermore, recent research has explored emerging trends in this field, which include digital transformation in HRM, the use of Metaverse in recruitment and employee's training processes, and the role of immersive technologies in improving organizational interactions. These topics are of high importance for policymakers and organizational managers and can aid in making informed decisions regarding the implementation of digital technologies.

b) Weaknesses of the Existing Research

Despite the mentioned advantages, current research is accompanied by limitations. One of the most significant weaknesses is the shortage of empirical studies. Much of the research relied on qualitative methods and theoretical analyses, and sufficient empirical data to evaluate the real-world impacts of these technologies in organizational environments has not been provided. This results in research findings lacking adequate empirical validity in some cases.

Additionally, the lack of attention to cultural and legal contexts is another challenge in existing research. Most studies have adopted a general, global perspective on the topics of Metaverse and AI and have paid less attention to cultural differences, labor laws, and local policies in different countries. This issue challenges the generalizability of some findings across diverse organizational environments.

Moreover, a technological bias is evident in some studies. Much of the research has focused on the potential benefits of novel technologies, while insufficient attention has been given to challenges related to organizational change, employee's resistance to new technologies, and associated training needs. This can lead to an inaccurate assessment of the capabilities of Metaverse and AI in work environments.

Research in the field of Metaverse, AI, and HRM has progressed through several evolutionary stages. From 2018 to 2021, the focus was primarily on defining concepts, theoretical frameworks, and preliminary models for using these technologies in work environments, while empirical evidence was limited. From 2022 to 2023, research shifted towards applied and empirical investigations, utilizing field data to analyze the impacts of Metaverse and AI on organizational productivity, recruitment processes, and team interactions. From 2023 to 2024, researchers began examining the social, legal, and ethical challenges of these technologies, including psychological effects, data security, and digital inequality. Finally, from 2024 onward, research is moving towards futures studies and the development of regulatory frameworks, focusing on creating interdisciplinary models, legal regulations, and evaluating the long-term impacts of these technologies on employee's well-being and organizational structures.

By examining the evolutionary path of research in Metaverse and HRM, several research gaps can be identified. First, although numerous studies have investigated the impact of Metaverse on productivity and HR processes, comprehensive research that empirically evaluates the long-term effects of these technologies in real work environments remains limited. Second, many studies have focused on the benefits and challenges of novel technologies at organizational level, but individual and social effects, including the employee's mental health, interpersonal interactions, and cultural changes within organizations, have been less explored. Third, despite extensive research on data security and privacy in Metaverse, comprehensive legal and ethical frameworks for governing this domain have yet to be developed. Fourth, studies have predominantly been conducted in developed countries, with limited research on the impact of the Metaverse in organizations located in developing countries, considering cultural and economic differences. Fifth, the methodologies employed in studies have often included in-depth qualitative research, but longitudinal studies and digital ethnography have been less utilized. Sixth, studies have mainly focused on the role of Metaverse in optimizing current organizational processes, but few have explored novel organizational models based on Metaverse and AI. Finally, gaps in the policy domain are also evident, as limited research has provided practical solutions and regulatory models for the sustainable implementation of these technologies. Examining these gaps can chart new pathways for future research in this field.

Discussion and Conclusion

The diffusion of digital technology into all spheres of life, coupled with the ever-expanding reach of communication technology, has brought about significant changes, particularly in work life. This transformation has substantially impacted the managerial

practices of firms as well. In contemporary organizations, traditional approaches to managing business processes are no longer sufficient. Complex processes within firms have become manageable only through the use of technology. Rapid advancements in Internet technology have also led to diversity in understanding and implementation of HRM (Vardarlier, 2019). Different HRM practices can improve and sustain organizational performance (Ahmad & Schroeder, 2003). The results obtained from analyzing research related to HRM in Metaverse indicated that this emerging technology has brought about fundamental shifts in both traditional and modern HRM practices. Data extracted from reputable scientific databases and analyzed using VOSviewer software also revealed that, although the primary focus is on novel technologies such as VR, AI, Blockchain, and Digital Twins, these technologies are not merely tools for achieving greater efficiency; rather, they serve as catalysts for rethinking organizational models, human interactions, and decision-making systems.

However, an examination of research approaches revealed a kind of conceptual imbalance. Studies have predominantly concentrated on technical and economic aspects of Metaverse, paying less attention to its human, psychological, cultural, and ethical dimensions. This one-dimensional orientation can lead to overlooking the negative and complex consequences of novel technologies in workplaces. For instance, concepts such as technostress, digital fatigue, privacy threats, and feelings of alienation in simulated environments are among the challenges that require serious attention in future research and policymaking.

The added value of this review is threefold. First, it consolidated a fragmented and emerging body of literature on HRM in Metaverse into a structured synthesis across technical, human, and organizational dimensions. Second, it moved beyond a descriptive account by identifying key tensions and imbalances in the literature, particularly the dominance of technological and economic perspectives over psychosocial, ethical, cultural, and institutional concerns. Third, it offered an initial conceptual framework that positions Metaverse not simply as a collection of digital tools, but as a socio-technical environment that reconfigures HRM functions, employee experiences, and organizational arrangements. In this sense, the contribution of the paper lay not only in summarizing the prior studies, but in providing an integrative lens for future research, practice, and policy.

Beyond identifying the opportunities, challenges, and research gaps, this study also offered a conceptual contribution by synthesizing the literature on Metaverse-based HRM into three interrelated dimensions: technical, human, and organizational. This synthesis suggests that Metaverse should be understood not merely as a set of digital technologies, but as a broader socio-organizational environment that simultaneously reshapes HR processes, employee experiences, and organizational arrangements. In doing so, the study revealed a major imbalance in the current literature, where technological and economic issues receive greater attention than psychosocial, ethical, cultural, and institutional dimensions. Therefore, the added value of this review lay in providing an integrative conceptual lens through which future research can examine both the opportunities and contradictions of Metaverse adoption in HRM.

The findings suggested that research on Metaverse in HRM is still largely technology-

oriented and remains concentrated on technical and economic dimensions. While this focus highlighted the potential of emerging technologies to optimize HR processes, it also revealed a conceptual reductionism in the current literature, as social, ethical, and cultural implications have received comparatively limited attention. This imbalance is important because Metaverse is not only a technical infrastructure but also a socio-organizational environment that reshapes the employee experiences, managerial practices, and organizational decision-making. In particular, the literature reviewed here showed a dual effect: on the one hand, Metaverse may enhance productivity and process efficiency; on the other hand, it may intensify technostress, digital fatigue, resistance to change, and concerns about cybersecurity and knowledge protection. Therefore, the significance of the present study lay not only in summarizing the existing works, but also in showing that future research should move beyond descriptive accounts and examine how Metaverse-based HRM affects employees, organizational structures, and long-term strategic outcomes across different cultural and institutional contexts. Conceptually, the review suggested that Metaverse should be understood not as a single technology, but as an emerging socio-technical environment shaped by multiple enabling technologies and organizational conditions.

Furthermore, the historical trajectory of research showed that the field of Metaverse and HR studies is transitioning from a phase of technological enthusiasm to a more reflective period. Concepts like "intelligent organizational adaptation" and "digital sustainability" have replaced terms such as "digital transformation", indicating a relative maturity in researchers' approaches. This conceptual shift can provide an opportunity for the formation of interdisciplinary frameworks that simultaneously consider human, social, and environmental dimensions while leveraging technological benefits.

Finally, the findings indicated the existence of fundamental gaps in current research, which provide suitable grounds for future investigations. The necessity for conducting in-depth empirical studies, paying attention to cultural and regional differences, developing novel organizational models within the Metaverse context and formulating legal and ethical frameworks for the responsible utilization of these technologies are among the issues that can pave the way for more informed decision-making in organizations and policymaking institutions. This research, by providing a comprehensive conceptual map of the current state of Metaverse and HRM, has attempted to chart new paths for research, practice, and policymaking in the era of digital transformation.

Based on the reviewed studies, this paper proposed an initial conceptual framework for understanding HRM in Metaverse. In this framework, Metaverse is understood as a socio-technical environment enabled by extended reality technologies, AI, Blockchain, and Digital Twins. Within this environment, HRM functions such as recruitment, training, employee interaction, and performance-related processes are reconfigured. The findings suggested that the implications of this transformation can be understood across three interrelated dimensions—technical, human, and organizational—while ethics, privacy, inclusion, and sustainability operate as cross-cutting conditions that shape the quality and consequences of implementation.

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Appendix.

Table 7.
Results of the Final Article Analysis

No.	Author(s) & Year	Research Method	Findings
1	Chin et al., 2025	Quantitative, advanced statistical analysis	Helps experts and policymakers better understand the paradoxical interaction between employees' unethical use of AI and its consequences; introduces challenges of unethical AI use in the sustainability of multifaceted businesses.
2	Chaudhary et al., 2025	Systematic literature review	To utilize AI in HRM, organizations must focus not only on technical resources but also on human skills, leadership, organizational culture, and integration strategies with employees.
3	Papageorgiou et al., 2025	Exploratory factor analysis & regression	Emphasizes job enrichment strategies including decentralization, team collaboration, and digital technologies to support agile performance management and employee empowerment in the digital/metaverse era.
4	Di Donato et al., 2025	Case study & conceptual analysis	Industrial metaverse is transforming the semiconductor industry by enhancing human participation and promoting sustainable practices.
5	Froese et al., 2025	Systematic literature review	Develops an integrated multi-level conceptual framework reflecting inputs, processes, and outcomes of global virtual work, and identifies key factors across individual, team, organizational, and macro-environmental levels.
6	Wei wei, 2024	Qualitative literature review	Metaverse significantly impacts the service sector, especially tourism. Challenges include privacy, identity verification, intellectual property, and post-pandemic demand for real-life experiences. Sustainable development requires further research and inter-institutional collaboration.
7	Kumar et al., 2024	Structural equation modeling (sem)	Social presence, technostress, and fatigue affect perceived hedonic and utilitarian values, which in turn influence behavioral intention to use metaverse meeting platforms — aligning with sustainable development goals.
8	Kliestik et al., 2024	Systematic review + evidence synthesis	Investigates the role of generative AI and blockchain in improving productivity, HRM, and fintech transformation. Also explores industrial metaverse and data analytics in investment optimization. Challenges include talent shortages and implementation complexities.
9	Saeed et al., 2024	Structural topic model (stm)	Shows that leveraging the potential of the metaverse can improve organizational training functions.
10	Marabelli & Lirio, 2024	Interpretive content analysis	1. Responsible use of AI/metaverse can enhance workforce diversity, equity, and inclusion (DEI). 2. Metaverse expands job access for geographically/physically limited individuals. 3. AI reduces bias in hiring/evaluation, though if poorly trained, it can reinforce biases. 4. Misuse may lead to excessive employee surveillance and decreased job satisfaction.
11	Mubarak et al., 2024	Quantitative, PLS-SEM	Metaverse adoption enhances organizational culture, digital skills, and trust; improves collaboration, innovation, and contributes to social sustainability and employee well-being.
12	Zhang & Chen, 2024	Qualitative & analytical	Digital transformation in HRM is critical for competitiveness and adaptability. Key areas include digital work environments, recruitment, training, and performance. Ethical concerns (e.g., privacy, fairness) must be addressed.
13	Thakral et al., 2023	Structural Topic Modeling (STM)	Highlights importance of HR analytics for data-driven decision-making. Identifies four research areas: applications, techniques, organizational and employee impacts, and emerging opportunities in tech-driven HRM.
14	Lee, 2023	Conceptual analysis & Literature review	Highlights need for organizational agility and capability enhancement in HRD. COVID-19 accelerated change, with trends focusing on comprehensive training and the role of AI and the metaverse in supporting transformation.
15	Kozinets, 2023	Conceptual design / methodology development	While focusing on service research methodology, the paper indirectly addresses employee experience, virtual training, research ethics, and the future of work in the metaverse — offering a framework for further HRM-related studies.
16	Vig, 2023	Qualitative, discourse methodology	Metaverse is in early development and introduces unpredictable changes. Businesses must invest time/resources and develop new strategies in marketing, e-commerce, and HR to harness metaverse potential. Highlights risks and uncertainties.
17	Dutta et al., 2023	Qualitative case study	Examines metaverse's impact on learning and HRD in hospitality/tourism. Emphasizes the need for cultural and organizational considerations for successful adoption.
18	Dwivedi et al., 2022	Informed narrative analysis + multidisciplinary	Explores metaverse's potential across business, education, and social interaction. Opportunities include hybrid engagement and new business models; challenges involve privacy, security, and digital exclusion. Calls for practical, ethical, and social impact research.
19	Bourlakis et al., 2009	Analytical-descriptive	Metaverse offers marketing opportunities like immersive engagement and experiential sales but poses risks to brand credibility. Stresses the need for appropriate policy-making, indirectly related to HRM.