Metaverse and Modern Business: A Bibliometric View on Marketing, Management, HR, and Finance

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Abstract

The emergence of the Metaverse enables us to explore the different business domains such as human resources, marketing, management, and finance in unconventional manners. This study uses bibliometric analysis to explore scholarly literature on Metaverse and business domains. English-language publications from 2008 to April 2024 are analysed using VOS viewer software and the Scopus database to uncover key trends, insights, and patterns. The bibliometric analysis explains a stable number of publications until a stream in 2021 and increasing citations over time. Co-citation analysis explores thematic clusters. One cluster focuses on Metaverse's effect on the marketing and business domains, and the second cluster explains the transformative effect on tourism and hospitality. Cluster 3 focuses on AI integration and ethical innovation. Bibliographic coupling analysis identifies influential journals and different research areas. "Psychology and Marketing" and "Technological Forecasting & Social Change" journals show high citation counts, underscoring their significant influence and interconnectivity within their fields. Author keywords analysis shows the dominant research topics. These clusters display technology and business integration convergence, AI-driven ethical innovation, and digital consumer engagement within the Metaverse. These findings offer businesses, policymakers, educators, and researchers' insights. These insights tell strategic decision-making, technological advancement, ethical considerations, and customer experience within Metaverse. Coverage bias and interpretation bias are some limitations that are acknowledged by this. Future research directions include exploring interdisciplinary integration, telepresence, value creation, the sharing economy, sustainability, and AI integration within the Metaverse.

Keywords: Metaverse, Bibliometric analysis, metaverse marketing, Modern Businesses

Introduction

The metaverse has become a key topic of discussions about the future of business, particularly in areas like marketing, management, human resources, and finance in the age of rapid technological progress and digital transformation. Neal Stephenson, a fictional science-fiction writer, created the phrase metaverse in "Snow Crash" novel to allude communal world formed via the merger of augmented physical reality with continuous virtual settings. Initially, the hypothetical concept of the metaverse was confined to science fiction. However, thanks to recent technical advancements (Hatami et al., 2024) and the vast use of digital experience have moved the metaverse closer to becoming a tangible reality.

This research paper explores the convergence of metaverse and contemporary business practices, also focusing on the disciplines of marketing, management, human resources, and finance. This research analyses existing literature, which indicates the key trends, themes, and research gaps in existing studies (Gao et al., 2024). However, the primary objective that deliver possible impact understanding on metaverse could have on various business disciplines, as well as to make suggestions for both future research and practical applications. However, the metaverse demonstrates a paradigm shift in various persons engaging with digital technology, resulting in the evolution of borders between real & virtual worlds (Dwivedi et al., 2022). Multidisciplinary perspectives on emerging issues, possibilities, and agendas for study, practice, and policy are presented in this article, which goes beyond the hype surrounding the metaverse. Both of these are now offering new avenues for businesses to engage with customers, automate processes, and reimagine traditional business models. This is most notable through the development of virtual reality (VR), augmented reality (AR), mixed reality (MR), and other immersive technologies. *International Journal of Information Management* provides both of these opportunities. Hence, the metaverse gives a broad spectrum of different opportunities such as virtual shops, immersive advertising campaigns, virtual meetings, and collaborative environments.

In management and marketing, the metaverse offers new avenues for different brands to engage customers in immersive and interactive ways (Buhalis et al., 2022). Virtual reality allows marketers to create realistic simulations of things & services, which enables consumers to visualize and experience them in virtual environments. Additionally, the social nature of the metaverse enables connections among peers & content created by users., empowering consumers to become active participants in brand storytelling and co-creation (Inmor et al., 2025). By using the power of the metaverse, different marketers can cultivate deeper brand engagement, enable the creation of communities, foster community building, and drive brand loyalty in previously unpredictable ways.

In the management domain, the metaverse presents threats and opportunities to leadership and decision-making. Virtual collaboration software and immersive workplaces facilitate real-time collaboration among dispersed teams, overcoming communication gaps and driving an innovative culture. Management of virtual teams and working in virtual spaces requires new skills and methodologies (Ebrahim et al., 2009) and traditional management techniques reinterpretation. Leaders must transform their leadership style to adapt to the

unique dynamics common in the metaverse, achieving autonomy and responsibility and promoting virtual team togetherness and belonging.

In the human resources domain, the metaverse raises profound concerns about the future of work and employee engagement. Remote work and virtual employment have seen remarkable growth in the past few years in digital technology during the COVID-19 pandemic (Amankwah-Amoah et al., 2021). The metaverse has further revolutionized work, which offers opportunities for flexible work arrangements, personalized learning experiences, and virtual talent acquisition. But it also threatens privacy, ethics, and security concerns in virtual workplaces. Human resource practitioners must weigh these challenges and ensure that workers are valued, supported, and connected in the virtual space.

In the finance domain, the metaverse opens new avenues for financial transactions, investment, and economic models. Blockchain technology, cryptocurrencies, & non-fungible tokens are already playing a noticeable role in creating the metaverse economy, which allows secure and decentralized transactions in virtual world (Yilmaz et al., 2022). Moreover, the virtual economies & digital marketplaces in the metaverse present opportunities for new business & revenue streams. However, regulatory challenges and concerns about fraud, money laundering, and market manipulation remain key considerations for financial institutions and policymakers.

Despite the potential implication for business and the increasing interest in the metaverse, however a notable gap in the existing literature regarding its impact on marketing, management, HR, and finance. The metaverse's transdisciplinary implications on present business operations have not been extensively studied. This study addresses this gap through bibliometric analysis of current studies to provide a comprehensive assessment of the metaverse's impact on key business domains.

This research paper explores key questions at the intersection of the metaverse and modern business practices. Firstly, it explains the evaluation of academic interest in the metaverse and its relevance to business and management studies with the view to unearthing temporal patterns and trends. Secondly, the research seeks to delineate the main thematic areas and research agendas with the Metaverse in business studies, and thus point out emergent issues and overarching themes. Thirdly, the paper seeks to point out seminal works and collaborative frameworks emerging from the metaverse literature and thus determines landmark studies and seminal scholars spearheading the academic debate. Utilizing a

bibliometric approach, the research seeks to map the shape of the research landscape, scrutinize the chronological trends, identify key players and publications, and determine gaps in the current literature. Through this comprehensive research, the paper strives to present discerning readings of the emerging terrain of the metaverse and its deep implications for modern business practices and management paradigms.

In a nutshell, the convergence of immersive technology, virtual experiences, and digital connectivity is transforming the landscape of modern business. The metaverse demonstrates a disruptive force with the ability to change how businesses interact with customers, recruit talent, manage teams, and perform financial transactions. The report sheds light on the metaverse's growing trends, difficulties, and possibilities in human resources, digital marketing, and finance. Through this investigation, we contributed metaverse's business implications and practical applications in this rapidly evolving industry.

Literature Review

Metaverse words meta (virtuality) & verse (world), transcend fiction & manifest in practical applications. Virtual & augmented reality technology permits individuals to engage naturally in virtual settings using avatars and holograms. Metaverse has created an immersive virtual environment that explains how people connect with technology, businesses, and each other. Metaverse has become a significant turning point in the digital world. It also defined the space where people interact through avatars for different purposes such as economic, social, & educational (Dionisio et al., 2013; Meta, 2021). However, Metaverse impact extends across various sectors, prompting significant changes and new paradigms. Metaverse is necessary for grasping its wide implications for modern businesses and their sub-domains. Metaverse intersects with different business functions impacting multiple domains.

Marketing: Scholars have associated Metaverse with different marketing strategies, ranging from virtual product launches to brand experiences, and tailored advertising campaigns. Virtual reality offers an environment to engage new customers creating memorable brand interactions.

Management: exploring the influence of Metaverse on team collaboration, organizational structures, and leadership dynamics is important. Virtual collaboration platforms enable teams across various platforms to transform traditional workplace dynamics and managerial practices.

Finance: it is essential to investigate the financial implications of Metaverse. Metaverse

covers different aspects such as virtual currencies, investment perspectives, and risk management strategies. The rise of management strategies introduces new opportunities for financial transactions, regulatory frameworks, and traditional financial models.

Different business applications of Metaverse highlight its wider impact on employee training, employee engagement, talent acquisition, development, organizational dynamics, and workforce management. Marketing, management, and finance can give more comprehensive knowledge of Metaverse's impact on strategic goals and operations. By studying the different applications of Metaverse, researchers have identified the Metaverse as a fertile platform for business innovation.

Metaverse has been introduced as a fertile ground for other innovations by researchers. Now, companies are working to explore the new reality to adapt to changing dynamics, enhance customer experience, attract new customers, and drive profitability (Zhou et al., 2018; Hassouneh & Brengman, 2011). Organizations submerge themselves in the Metaverse to encounter new challenges and opportunities. The new adaptive strategies have been made to attract new and existing customers (Kraus et al., 2022; Aharon et al., 2022; Ferrigno et al., 2023; Meta, 2023). Also, Metaverse has shaped the economy beyond its impact on other companies. The growing economic landscape is characterized by novel business models, virtual transactions, and digital assets. After the immersive experience, the users engage with and contribute to a vibrant ecosystem where creativity, value creation, and entrepreneurship develop. Metaverse has opened exciting possibilities and challenges traditional notions of commerce (Meta, 2023).

Technology plays a vital role in transforming Metaverse from concept to reality. This technology comprises hardware and software parts. Users can interact with this latest technology using different devices such as tablets, cell phones, and glasses (Meta, 2021). Glasses provide instant access to augmented and virtual reality and have emerged as the dominant interface. These encounters serve bridge among digital & physical worlds, allowing individuals to interact with immersive information. The software ecosystem of the Metaverse encloses a rich array of different platforms, applications, and services. Users can enhance their everyday experience with the help of Augmented Reality. On the other hand, Virtual reality submerges users in entirely synthetic environments, creating a sense of presence and interactions (Kozinets, 2023).

Metaverse is developing significant potential in different fields such as healthcare, education,

and more. However, there are also so many challenges concerning security, privacy, and economic consequences. Researchers, legislators, and industry leaders should collaborate to lessen the hurdles and make Metaverse useful for everyone. (Pew Research Center, 2022). The Metaverse is a transforming force that requires people's attention and thinking. Its effect will help determine how we live and connect in the coming decades.

The Metaverse has introduced a novel form of economic activity using advanced technology. Using its digital landscape, different platforms are introducing their currencies or tokens, each intricately linked to real-world exchange rates (Syuhada et al., 2023). These digital tokens and currencies serve as Metaverse's lifeblood transactions and ownership. The advent of the Metaverse has unlocked Pandora's box of opportunities, possibilities, and entrepreneurs. Companies harness the power of virtual reality to conduct product testing, enabling them to refine their offerings and adapt to different cultural contexts (Papagiannidis et al., 2008).

In the expanding Metaverse, creators and other entrepreneurs possess the opportunity to evaluate, innovate, and profit from their digital offerings (Zhou et al., 2018; Meta, 2021; Damodaran, 2023). However, navigating the virtual landscape comes with challenges, particularly concerning ownership rights. The precedent set by Second Life in transferring ownership rights for user-generated content (Meta, 2021; Zhou et al., 2018).

In the marketing field, the Metaverse represents a frontier for creative expression. It has transformed advertising strategies, product packaging, and environmental designs to align with its nature. In the tourism field, the efficacy of virtual tours boosts real-world sales and ongoing research that is virtually experiencing a destination for the future (Gursoy et al., 2022). The virtual platforms act as a bridge that provides a preview of a location before a physical travel decision (Ampountolas et al., 2023). Researchers and marketers face many challenges with tailoring Metaverse campaigns (Dwivedi et al., 2022, 2023; Buhalis et al., 2022; Cheah & Shimul, 2023). Crafting messages that resonate within the digital dimension requires precision and creativity.

In the context of virtual commerce, the design of storefronts plays a vital role in enhancing the shopping experience. These optimal design strategies identify cues contributing to consumer engagement (Hassouneh & Brengman, 2015). Moreover, the excitement linked with unboxing is a significant aspect of the consumer journey. This excitement extends into the virtual space that influences its customers and warrants attention

for its impact on future studies (Chen & Yao, 2022; Branca et al., 2023).

A deep comprehensive study is important to realize environmental objectives within Metaverse. Consumers must recognize the variety of enterprises they can initiate (Papagiannidis et al., 2008; Zhou et al., 2018). It is important to identify products and services that flourish in the digital ecosystem and effective monetization strategies. The communication platforms on Metaverse use unique approaches (Sharma et al., 2011), where the artistry lies in formulating messages that align with the identities of avatars and digital personas.

As we navigate this uncharted domain, business leaders must grapple with uncertainty. Some marketers view the Metaverse as the next evolution of the internet, while skeptics remain cautious (Carlson, 2022; Huddleston, 2022). Metaverse provides a dynamic space where marketing, ownership, and creativity converge. In conclusion, the Metaverse is not just a buzzword, it is a transformative force that invites us to reimagine business, redefine ownership, and craft experiences beyond the ordinary.

Methodology

This chapter outlines the methodology for conducting a bibliometric analysis on the topic. The two software VOS viewer (Version 1.6.20) and the Scopus database are mostly used to study scholarly literature published in English from the year 2008 to 9 April, 2024. The following sections detail the step taken to collect, analyses, and interpret the data.

Data Collection: The first step begins with gathering relevant scholarly literature from the Scopus database, a complete bibliographic database that delivers access to a huge collection of peer-reviewed journals conference papers, and academic publications from different disciplines.

Selection Criteria: The inquiry is limited to English-language publications to ensure consistency and uniformity in the data set. Publications dates range from 2008 to April 9, 2024, to indicate recent studies in the time frame.

Search Term: A mix of keywords on the metaverse and marketing impact, management, HR, and finance is employed to pull relevant literature. Keywords such as "metaverse", "virtual reality", "augmented" reality, "business", "management", "human resources", and finance are some of the terms employed. The search strings employed in the Scopus database were as follows: "Metaverse" AND ("Business" OR "Business Finance" OR "Economics" OR "Management" OR "Entrepreneurship" OR "Innovation" OR "Strategic Management" OR

"Corporate Governance" OR "Marketing" OR "Human Resources" OR "Operations Management" OR "Information Systems" OR "International Business" OR "Sustainability" OR "Leadership" OR "Organizational Behaviour" OR "Corporate Social Responsibility" OR "Supply Chain Management" OR "Consumer Behaviour" OR "Business Ethics")**.**

The search results are retrieved from Scopus in a standardized format, including bibliographic information such as the title, authors, abstract, publication year, journal or conference title, and citation count. The data is pre-processed before the bibliometric analysis to ensure accuracy and consistency. Preprocessing involves cleaning and structuring the dataset by eliminating duplicates, correcting errors, and standardizing metadata. Duplicate records are detected and removed to avoid redundancy and maintain data integrity. Metadata fields such as author names, journal titles, and publication years are also standardized to ensure uniformity across the analysis.

Bibliometric Analysis

The bibliometric analysis is performed via VOS viewer software (Version 1.6.20), which allows for bibliometric maps visual representation & facilitates interpretation (Van Eck & Waltman, 2010), also describing secret patterns & dynamics in information (Zupic & Cater 2015). However, three further analyses were conducted: co-citation, bibliographic analysis, & topic combination analysis.

Ethical conscientiousness is of central importance in bibliometric studies that ensures the proper and ethical handling of data within the framework of set guidelines and rules, through the observance of these ethical standards, scholars maintain the credibility and integrity of the analysis, building trust and confidence in the results. Using rigorous data collection, preprocessing, analysis, interpretation, and synthesis, this research hopes to determine prominent trends, patterns, and observations in the scholarly literature, providing a better insight into the relationship between the metaverse and modern business practices.

Analysis and Results

The bibliometric result findings are interpreted and integrated to extract meaningful insights and conclusions about the research topic. A thorough picture of the academic environment surrounding the metaverse and its consequences for marketing, management, human resources, and finance is given by identifying important trends, gaps, and patterns in the literature.
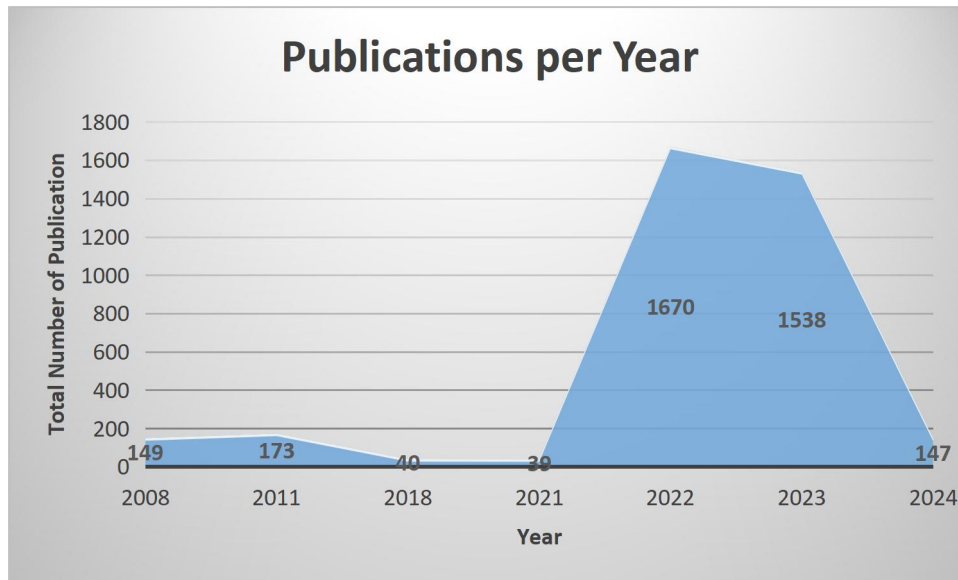
Publications Published Per Year

The chart representing publications from (2008 – 2024) years displays a significant trend and changes in research output:

Figure 1: Publications per Year

The number of publications in the field remained relatively stable from 2008 to 2017, ranging from 149 to 173, indicating consistent interest. However, there was a significant surge in 2021, with 1670 publications, suggesting a sudden increase in research activity possibly due to a notable development or heightened interest. Subsequently, there has been a noticeable decline in publications, with 1538 in 2022 and further down to 147 in 2024. It's worth noting that the data collection for 2024 only includes the first quarter, so while decline papers published, however coverage for this period appears robust.
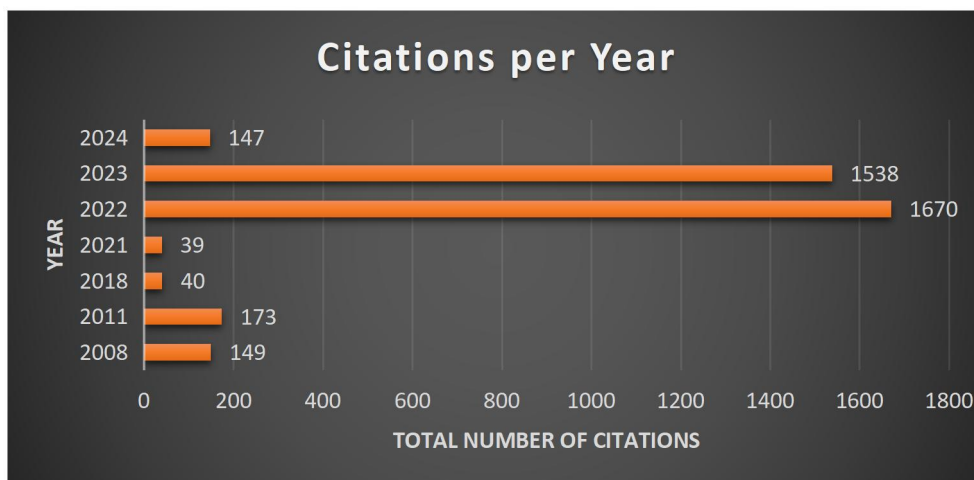
Citations Received Per Year

The bar graph depicting citations received per year shows a changing trend in the impact of publications over time.

Figure 2: Citations per Year

In the beginning, citation counts were modest, which implied that the research areas were in their infancy or had yet to be well known. Later, there was a sharp spike in citations, reflecting greater interest, perhaps sparked by major advances or increasing relevance of the subject. This plot is crucial for evaluating research impact, which will aid in recognizing phases of elevated interest and possible areas of literature gap, thus directing future research. The following table revealed the most frequently cited papers on the topic. See the Appendix 1.

Co-Citation Analysis

The figure presents the top twelve references identified through reference co-citation analysis. To be included, references had to exceed a minimum of ten citations, as per citation frequency. Each reference has been labelled, with size representing citation frequency-larger the size, the greater the citation frequency (van Eck & Waltman, 2022). Distance among references means the probability of the reference being cited together, with shorter distance indicating a co-citation relation stronger than average. Lines linking references denote strong co-citation links, whereas varying colours indicate different clusters of cited references. Even, clusters reveal that references from the same group are more often cited together. Three different clusters were found through the analysis.
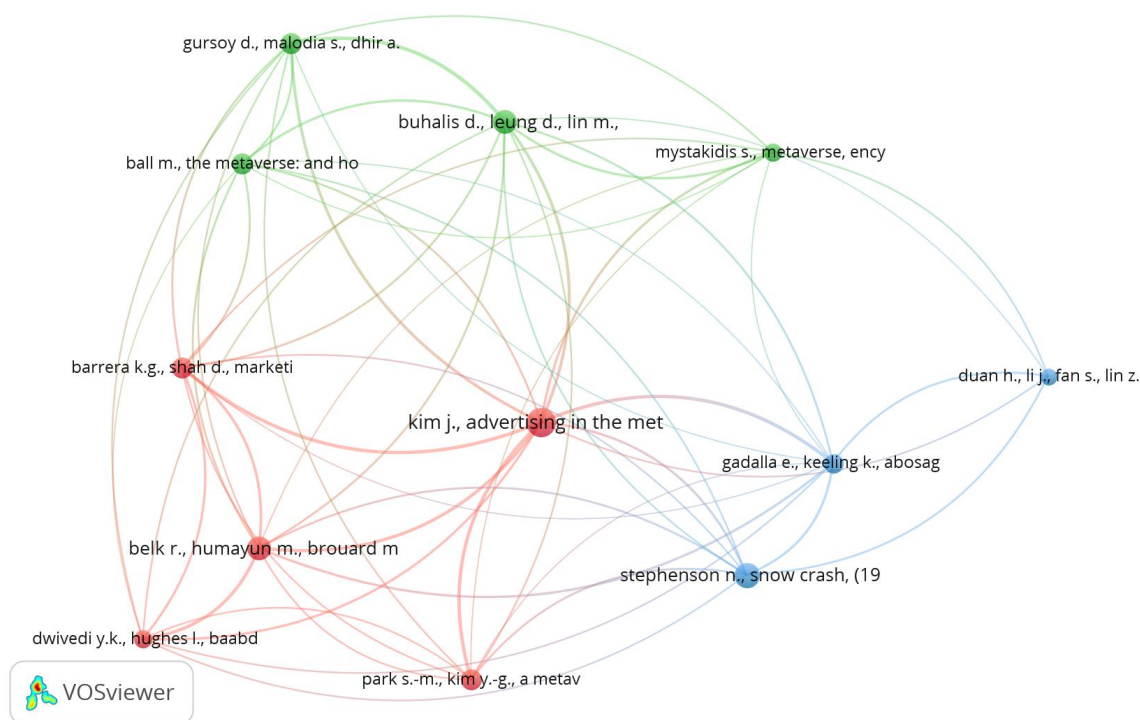
Figure 3: Co-Citation Analysis

Cluster1

From the co-citation analysis, we observed a thematic focus on the Metaverse's influence on business and marketing, as well as the financial and technological aspects within this virtual space:

- **Marketing in the Metaverse:** The study by Barrera and Shah probably sets the stage for examining marketing strategies within the Metaverse, providing a framework and agenda for future research.

- **Financial Dynamics:** Belk, Humayun, and Brouard examine financial tools specific to the Metaverse, including NFTs and cryptocurrencies, and how they impact ideas about money, ownership, and digital assets.

- **Multidisciplinary Perspectives:** Dwivedi et al. offer an extensive overview of the Metaverse, addressing its challenges and prospects in different fields, and providing research, practice, and policy agenda.

- **Advertising Strategies:** Kim's research agenda on Metaverse advertising focuses on how companies can leverage this virtual space for innovative and engaging consumer

interaction.

- **Metaverse Framework:** Perk and Kim offer a thorough description of the Metaverse, including its taxonomy, essential elements, uses, and the issues involved in its development and uptake.

- **Cultural impact:** The presence of Stephenson's snow crash underscores the cultural and conceptual places of the Metaverse, which highlights its journey from a science fiction into a serious academic and practical matter.

All above works collectively underscore the Metaverse's growing relevance of the Metaverse in technology and modern business and growing area for additional study and investigation.

Cluster 2

Cluster 2 represents a thematic concentration on the transformative effects of the Metaverse in the sector of tourism and hospitality.

- Ball M. discusses the broad implications of the Metaverse and its potential to revolutionize different aspects of life and business. This work likely gives a general overview of the Metaverse's impact.

- Buhalis D., Leung D., Lin M. emphasize the Metaverse as a disruptive technology in tourism marketing and management. Their research most likely examines how the Metaverse is transforming tourism business operations and their marketing efforts.

- Gursoy D., Malodia S., Dhir A. provide an overall overview of different current trends and future research directions of research in the hospitality and tourism sector of the Metaverse.

- Mystakidis S. offers an encyclopedic research article on the Metaverse, which likely acts as a wide resource for better understanding its components and implications.

It is clear that the Metaverse is viewed as a game-changer in the area of hospitality and tourism, presenting novel means to interact with other consumers, build vast experiences, and even shape the future of the industry. The presence of these works in the cluster points towards an interest from scholars in studying and investigating the real-world uses of the Metaverse within these industries.

Cluster 3

Cluster 3 appears to center on the use of the Metaverse for social good and its effects on retail service quality:

- Duan H., Li J., Fan S., Lin Z., Wu X., Cai W. present a prototype of a university campus in the Metaverse, likely exploring how virtual environments can be used for educational purposes and to foster social good.

- Gadalla E., Keeling K., and Abosag I. outline the future retail services quality framework in the 3D internet, an early consideration of how the Metaverse might revolutionize retailing and service levels.

It is clear that the Metaverse is not only envisioned as a business and entertainment platform but also as a social innovation tool and means to improve service quality. The work indicates an innovative approach to tapping the potential of virtual worlds to serve society and improve customer experience in retailing.

Bibliographic Coupling Analysis

Bibliographic Coupling Analysis is a method that is used to measure the similarity between documents based on the number of shared references in their bibliographies (Kessler, 1963). The argument here is that if two publications reference a third work, then it follows that they are similar in topic. As the number of common citations increases, the coupling increases in strength. This backward measure of similarity has been central to citation analysis, assisting researchers in finding related studies and making literature reviews easier.

Table 1: *Bibliographic Coupling Analysis of journals*

Source	Documents	Citations	Total link strength
Business horizons	5	132	55
Information technology and tourism	7	18	97
International journal of contemporary hospitality management	5	207	122
Journal of global fashion marketing	6	31	147
Journal of retailing and consumer services	8	24	215
Psychology and marketing	8	308	251
Technological forecasting and social change	10	340	102
Technology in society	6	122	111

Interpreting the Data

Business Horizons has a moderate number of documents (5) with a high number of citations

(132), but a lower total link strength (55), proposing these documents could be older or foundational, cited across several fields. Information technology and tourism demonstrate a higher document count (7) with fewer citations (18) but a high total link strength (97), proposing these documents are closely interconnected and often cited together, potentially representing a specialized field of study. International Journal of Contemporary Hospitality Management demonstrates a moderate document count (5) with a high citation number (207) and link strength (122), proposing influential work that is well-bibliographically linked within its discipline. Journal of Global Fashion Marketing demonstrates a moderate document count (6) with fewer citations (31) but a high total link strength (147), proposing a specialized field of study with strong intracommunity links. Journal of Retelling and Consumer Services demonstrates a higher document count (8) with fewer citations (24) but the highest total link strength (215), proposing a highly specialized field of study with strong intracommunity links. Psychology and Marketing demonstrates a high document count (8) with a very high citation count (308) and the highest total link strength (251), indicating a significant impact and strong bibliographic coupling within the marketing field. Technological Forecasting and Social Change has the highest number of documents (10) with the highest citation count (340) but a moderate link strength (102), suggesting broad influence across various research areas.

Technology in Society has a moderate number of documents (6) with a moderate citation count (122) and link strength (111), indicating a balanced level of influence and interconnectivity. Overall, the analysis can help identify which journals are central to a field, which topics are emerging, and how different research areas are interconnected.

Author Keyword Co-Occurrence

Keyword co-occurrence analysis to identify popular themes is conducted and research topics within the literature. Keywords having high-frequencies co-occurrence represent the major fields of research and emerging trends. The author's keywords co-occurrence study gives insights into the associated topics that have been mainly dealt with in the Metaverse, as well as the evolution of these terms over time (Callon et al. 1983; Su and Lee 2010; Zupic and Cater 2015). Author's keywords were used for the co-occurrence study as they are specific to the content of each publication and also provide important information on the research trend (Li et al. 2009; Zhang et al. 2016).
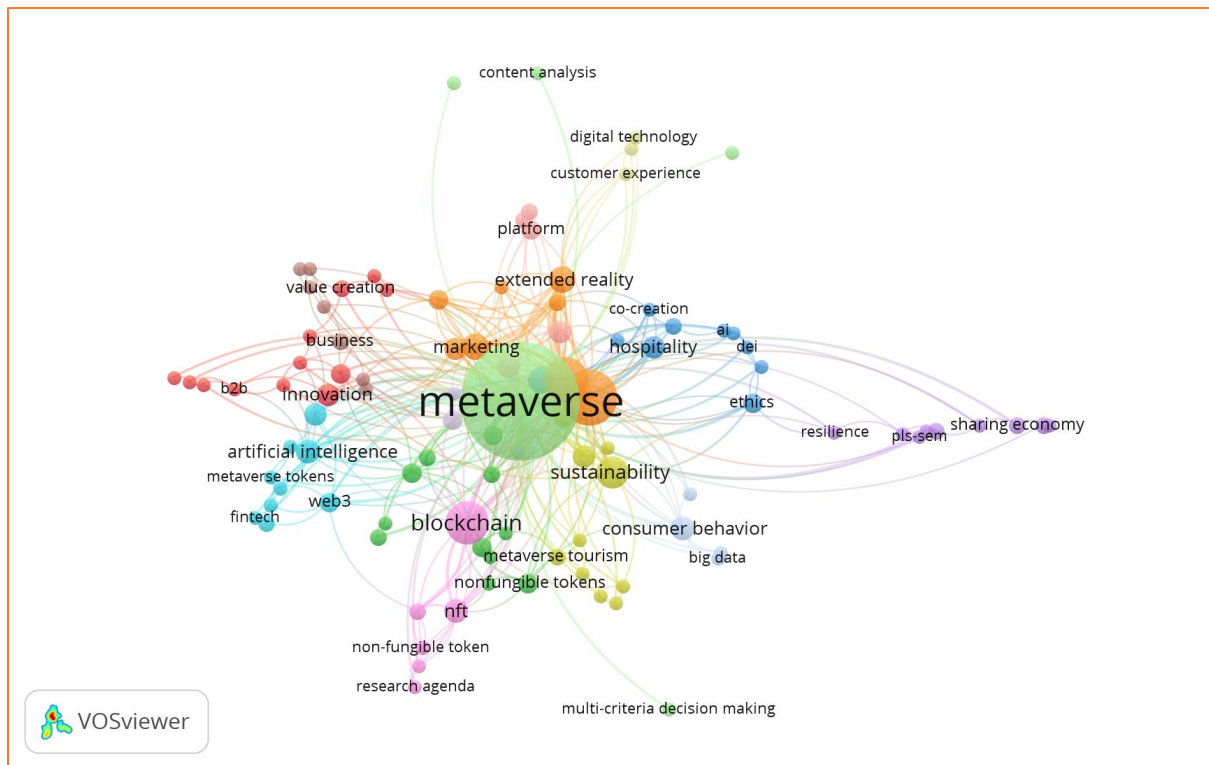
Figure 4: Author Keywords Co-occurrence

Cluster 1

The cluster is described by the author's keywords co-occurrence analysis as "Technology and Business Integration," reflecting the intersection of technology and business. Within this reflecting cluster, different key themes emerge, in which a spotlight on B2B transactions and interactions are included that indicate the influence of technology on inter-business relationships. This analysis demonstrates how technology has transformed business-to-business intersections and transactions and forever altered the way businesses work together. Additionally, the examination of how companies adapt to and integrate new technologies into their operations underscores the importance of technological innovation for organizational success. The word such as Digital Twin and IoT indicate the increased movement towards digitalizing physical assets and harnessing the power of interconnected devices across the industry. Moreover, the cluster addresses critical issues such as privacy concerns, social sustainability, and the importance of building trust in technology adoption. Ultimately, the overarching goal of technology integration in business is highlighted as value creation, emphasizing its potential to drive growth and benefit stakeholders across different sectors. A deepening of the technological and managerial components of the digital transformation

concept outlines how incorporating technology in business surpasses the mere usage of technological instruments; it affects business models, stakeholder relationships, and most of all, social consequences. The cluster also covers the importance of balancing innovation with trust, privacy, and social sustainability to create lasting value.

Table 2: *Author keywords co-occurrence*

Keyword.	Occurrences	Total link strength
Artificial intelligence	6	11
Augmented reality	20	67
Avatar	8	5
Blockchain	19	44
Blockchain technology	3	3
Business	3	3
Consumer behavior	9	12
Cryptocurrency	3	9
Digital fashion	4	8
Digital transformation	4	7
Digital twin	4	6
Engagement	4	3
Ethics	4	9
Extended reality	7	30
Hospitality	5	14
Innovation	5	6
Management education	3	4
Marketing	7	24
Metaverse	139	183
Metaverse marketing	3	3
Metaverse tourism	3	1
Mixed reality	3	14
Nft	11	15
Non-fungible tokens	8	7
Platform	4	6

|		
Second life	5	21
Sharing economy	3	4
Social media	3	6
Supply chain management	4	14
Sustainability	11	19
Systematic review	3	2
Technology	5	15
Telepresence	3	3
Tourism	5	15
Tourism industry	3	3
Value creation	3	2
Virtual reality	31	93
Virtual world	12	20
Web3	4	10

Cluster 2: The cluster identified through image analysis can aptly be named "Digital Consumer Engagement," focusing on the interaction between consumers and digital platforms. Within this cluster, various themes emerge, shedding light on the evolving landscape of consumer behavior and engagement in the digital age. Consumer behavior takes centre stage, indicating a keen interest in understanding how digital advancements shape consumer habits and decision-making processes. Additionally, the exploration of digital fashion underscores the impact of virtual trends on the fashion industry, reflecting the convergence of digital and physical realms. The concept of digital transformation further highlights the fundamental shift occurring in businesses and industries as they embrace digital technologies to remain competitive. Engagement emerges as a critical aspect, emphasizing the significance of building strong relationships and brand loyalty through digital channels. The inclusion of Generation Z reflects the influence of this demographic cohort, characterized by their digital nativity and distinct consumer preferences. Discussions on nonfungible tokens (NFTs) and perceived value delve into the intricacies of digital ownership and consumer perceptions in the digital marketplace. Social media significantly influences customer behavior and engagement techniques, highlighting the necessity of cultivating an authentic business presence on these channels. The influence of digital change

on the tourism sector is apparent, particularly in how virtual experiences are redefining travel and leisure pursuits. The rising trend of virtual tourism highlights the allure of immersive digital experiences for contemporary customers, indicating a transformation in conventional tourist models. The cluster offers significant insights into the evolving relationship between consumers and digital platforms, presenting chances for organizations to effectively engage and connect with their target audiences in the digital realm.
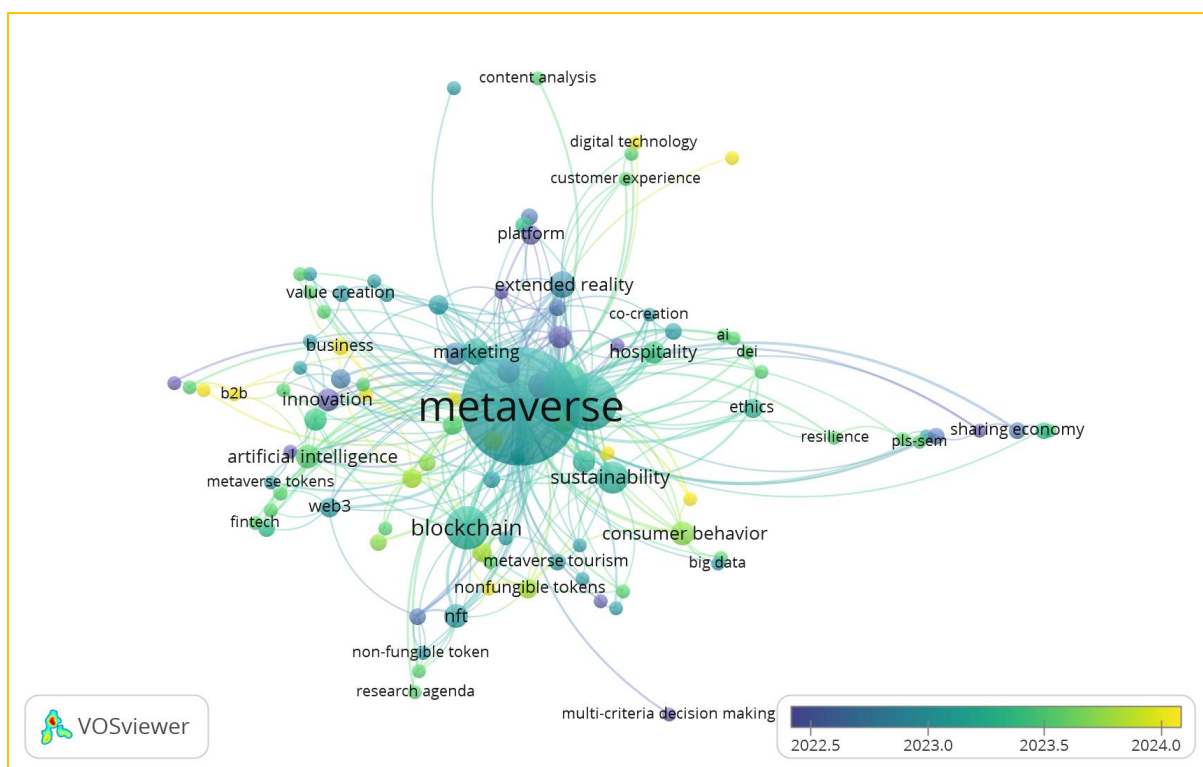
Figure 5: Author Keywords Co-Occurrence Over Time

It's evident that the digital landscape is reshaping consumer behavior and engagement across various industries. The cluster underscores the need for businesses to understand and adapt to these changes to remain relevant and competitive.

Cluster 3

Cluster 3, "AI and Ethical Innovation," encapsulates the integration of Artificial Intelligence (AI) with the Metaverse—a realm beyond the universe as we experience. AI is a transformative force in this virtual world, powering the development of immersive experiences and automated processes. The cluster also focuses on co-creation, engaging multiple stakeholders in the innovation process, and highlights the importance of Diversity, Equity, and Inclusion to provide equal access to technological innovations. The use of

technology in education is also highlighted, especially in developing leaders to cope with these changes.

Different new technologies are set to change society and business, requiring ethical considerations in their design. In the hospitality industry, immersive technologies such as virtual reality and augmented reality are improving customer experiences. Moreover, management education is important in preparing current and future business leaders with the knowledge to grasp technology's implications. Finally, the use of virtual worlds for education, entertainment, and business demonstrates the varied uses of these virtual. There is a clear and strong focus on the ethical and responsible changes of AI and other technologies. The cluster explains the requirement for inclusive and collaborative innovation and the need to prepare leaders to deal with the challenges and opportunities posed by the technologies.

Practical Implications

Bibliometric analysis in the metaverse context has significant, valuable practical implications, informing strategic business decisions for companies exploring the metaverse and surrounding technologies (Li & Li, 2024). These technological innovations, especially in blockchain and artificial intelligence (AI), increase the security and immersion of virtual spaces (Damar & Koksalmis, 2024). Insights into customer experience in the metaverse allow businesses to refine their services, increasing customer engagement and loyalty (Li & Li, 2024). The study explains the need for ethical and sustainable approaches, proposing that businesses embed these values into metaverse strategies for competitive success (Damar & Koksalmis, 2024). In education, the metaverse provides different opportunities for immersive learning, with bibliometric analysis that shapes curriculum development (Li & Li, 2024). Policymakers can leverage the analysis to understand emerging trends and regulate areas like data privacy and security (Damar & Koksalmis, 2024). Additionally, it aids researchers in identifying literature gaps and future research directions, propelling the field's progress (Li & Li, 2024). This analysis serves as a navigational tool for stakeholders to effectively engage with the dynamic metaverse landscape, seizing opportunities and overcoming challenges.

Limitations and Future Research Directions

Bibliometric analysis has limitations such as coverage bias, where the scope is confined to Scopus-indexed publications, possibly omitting pertinent literature (Öztürk, Kocaman & Kanbach, 2024). Another limitation is Language restriction, as the focus on English-language sources might miss important contributions in other languages (Öztürk, Kocaman & Kanbach,

2024). In addition, differences in the accuracy and completeness of bibliographic information might affect data quality, which in turn might affect the reliability of the analysis (Romanelli et al., 2021).

The bibliometric analysis reveals some promising research directions in digital spaces. As the applications of the metaverse are increasingly at the forefront of technological innovation, interdisciplinary research could investigate how blockchain and artificial intelligence enrich user experiences and secure transactions. Ethical concerns, such as privacy and sustainable development probably will become major areas of investigation. Moreover, the convergence of extended reality with traditional platforms may lead to novel approaches to customer engagement and business marketing. Future studies could also investigate the influence of these technologies in industries such as finance, tourism, and the sharing economy, potentially leading to transformative changes in how we interact with digital spaces.

In the modern technology of the metaverse environment, some challenges require more research base details. Telepresence, the feeling of presence in a virtual world, is pivotal for enriching users' experiences within the metaverse, yet it remains on the fringe of current research. Studies like Barta, Gurrea, and Flavián (2023) delve into this, comparing telepresence in live-stream shopping on Instagram and the metaverse1.

Another under-researched area is value creation, which is also very important. The metaverse is offering unprecedented opportunities for economic models, user-generated content, and new sources of revenue. Mckinsey's value creation in the metaverse report recognizes the potential for creating substantial economic impact by 2030.

In the metaverse, encompassing virtual things, spaces, and user experiences are warranted. Cheng et al. (2022) provide a brief overview and research framework for exploring the metaverse in the digital economy, which could serve as a foundation for understanding collaborative sharing dynamics.

Sustainability in the metaverse is also very important. The study must be aimed at energy consumption patterns, sustainable strategies, and ethical design principles to ensure sustainability endures. De Giovanni (2023) explains the sustainability dimensions of metaverse technologies from the perspective of responsible digitalization in this field.

AI integration offers interesting opportunities to enrich user experiences, and personalization, and optimize interactions in the field of metaverse. Soliman et al. (2024) offer a

comprehensive review of the contribution of AI in the metaverse, assessing its interaction with future technologies.

Scholars are welcome to diversify research areas beyond the boundaries of the metaverse to encompass areas such as telepresence, value creation, and sharing economy dynamics. More study into these areas will set the line for the development of digital ecosystems. Ethical issues must also be studied so that innovation is in harmony with sustainability and the strategic application of AI. Moreover, existing research suggests a trend toward more.

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Appendix:

Table 3: *Top 10 most frequently cited publications*

Title	Authors	Year	Source title	Cited by
The Metaverse: Beyond the Hype - Multidisciplinary Perspectives on Emerging Challenges, Opportunities, and Research, Practice, and Policy Agenda	Dwivedi Y.K.; Hughes L.; Baabdullah A.M.; Ribeiro-Navarrete S.; Giannakis M.; Al-Debei M.M.; Dennehy D.; Metri B.; Buhalis D.; Cheung C.M.K.; Conboy K.; Doyle R.; Dubey R.; Dutot V.; Felix R.; Goyal D.P.; Gustafsson A.; Hinsch C.; Jebabli I.; Janssen M.; Kim Y.-G.; Kim J.; Koos S.; Kreps D.; Kshetri N.; Kumar V.; Ooi K.-B.; Papagiannidis S.; Pappas I.O.; Polyviou A.; Park S.-M.; Pandey N.; Queiroz M.M.; Raman R.; Rauschnabel P.A.; Shirish A.; Sigala M.; Spanaki K.; Wei-Han Tan G.; Tiwari M.K.; Viglia G.; Wamba S.F.	2022	International Journal of Information Management	669

Metaverse Marketing: How the Metaverse Will Shape the Future of Consumer Research and Practice	Dwivedi Y.K.; Hughes L.; Wang Y.; Alalwan A.A.; Ahn S.J.; Balakrishnan J.; Barta S.; Belk R.; Buhalis D.; Dutot V.; Felix R.; Filieri R.; Flavián C.; Gustafsson A.; Hinsch C.; Hollensen S.; Jain V.; Kim J.; Krishen A.S.; Lartey J.O.; Pandey N.; Ribeiro-Navarrete S.; Raman R.; Rauschnabel P.A.; Sharma A.; Sigala M.; Veloutsou C.; Wirtz J.	2023	Psychology and Marketing	201
The metaverse in the hospitality and tourism industry: An overview of current trends and future research directions	Gursoy D.; Malodia S.; Dhir A.	2022	Journal of Hospitality Marketing and Management	189
Facebook and the creation of the metaverse: radical business model innovation or incremental transformation?	Kraus S.; Kanbach D.K.; Krysta P.M.; Steinhoff M.M.; Tomini N.	2022	International Journal of Entrepreneurial Behaviour and Research	171
Metaverse – the new marketing universe	Hollensen S.; Kotler P.; Opresnik M.O.	2023	Journal of Business Strategy	153
Generating real income in virtual worlds: MMORPGs and new business opportunities, challenges, and ethical considerations in	Papagiannidis S.; Bourlakis M.; Li F.	2008	Technological Forecasting and Social Change	145

metaverses.				
Metaverse as a driver for customer experience and value co-creation: implications for hospitality and tourism management and marketing	Buhalis D.; Lin M.S.; Leung D.	2023	International Journal of Contemporary Hospitality Management	143
Marketing in the Metaverse: Conceptual understanding, framework, and research agenda	Giang Barrera K.; Shah D.	2023	Journal of Business Research	140
A metaverse assessment model for sustainable transportation using ordinal priority approach and Aczel-Alsina norms	Pamucar D.; Deveci M.; Gokasar I.; Tavana M.; Köppen M.	2022	Technological Forecasting and Social Change	98
Understanding the social sustainability of the Metaverse by integrating UTAUT2 and big five personality traits: A hybrid SEM-ANN approach	Arpaci I.; Karatas K.; Kusci I.; Al-Emran M.	2022	Technology in Society	88