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# Bibliometric insight into Metaverse's role in the tourism industry

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**Abstract**
A technological revolution has been ignited by the emergence of cutting-edge technologies like AI (Artificial Intelligence), Blockchain, and the Metaverse, leaving an impact on various sectors of the global economy. These innovative technologies are revolutionizing industry operations and creating unprecedented opportunities for growth and advancement. Users can interact with each other and virtual items in the communal digital realm known as the Metaverse., is one such technology that has garnered attention due to its relevance and transformative potential in the tourism industry along with other sectors. The Metaverse's impact on tourism and hospitality is profound as it offers a unique and immersive experience for travelers and tourists which makes it an important topic of discussion in research. This research paper focuses on providing an in-depth review of the Metaverse's role in the context of tourism, offering valuable insights into its impact on the industry. By conducting a comprehensive bibliometric analysis using the Dimension database and VOSviewer application, the study identifies and analyzes relevant publications up to June 30, 2023, in the chosen field. The analysis concentrates on the most cited publications, noteworthy contributions from authors, institutions, and countries, all of which have influenced research in the area of tourism and hospitality. Through visual overviews, this study enhances understanding of the significance of the Metaverse in the tourism sector and offers essential information and recommendations to guide future research endeavors in this area.

**Keywords:** Tourism, hospitality, metaverse, bibliometric, VOSviewer, dimensions

## Introduction
Globalization has made the world more interconnected, which has substantially boosted the travel and tourism sector everywhere. Tourism and hospitality industry growth has corresponded with shifts in technological developments. Artificial intelligence, blockchain technology, and metaverse are some of the most rapidly evolving disciplines that have infiltrated every industry in the economy, including tourism and hospitality. Understanding the trends of new technologies in the tourist business is vital since using these technologies provides customers with an exciting new experience. The idea of the metaverse has recently come to light as a ground-breaking and immersive digital world where people can engage with each other and digital items in a shared virtual environment. combining aspects of the internet, augmented reality, and virtual reality, the metaverse presents a new frontier of possibilities across various sectors, including tourism.

Consumers who participate in completely immersive virtual environments where they may feel more present may feel euphoric and get more addicted to the material (Han *et al*., 2022) [11]. The metaverse is starting to show tremendous potential for altering the travel and tourism sector as technology develops., offering innovative ways to explore destinations, connect with cultures, and enhance the overall travel experience.

Tourism is an ever-evolving industry that constantly seeks new ways to attract and engage travelers. With the advent of the metaverse, tourism stakeholders have recognized the opportunities it presents to cater to the increasingly tech-savvy and adventure-seeking generation of travelers. The two ideas are well aligned with one another. The tourism industry should prepare for various co-development scenarios given that reciprocal interactions between tourism and metaverse development are plausible. These possibilities include the prospect of the Metaverse acting as a transformational force mandating a complete reinvention of the tourism paradigm and the technological capabilities of the

Metaverse potentially enhancing tourist experiences (Volchek & Brysch, 2023) [22]. The metaverse creates a whole new world of opportunities for immersive travel experiences and destination marketing by uniting the real and virtual worlds.

In this context, the linkages between the metaverse and tourism are becoming more pronounced. Virtual travel platforms, powered by metaverse technologies, are providing tourists with the chance to explore exotic destinations from the comfort of their homes. These virtual tours enable potential travelers to get a taste of different cultures, landmarks, and attractions, thus inspiring them to plan physical visits in the future. Additionally, the metaverse presents chances for tourism related companies, such as hotels, airlines, and travel agencies, to design interactive and unique customer experiences. Travelers can virtually explore hotel rooms, check out amenities, and visualize their travel itineraries, making informed decisions and having a more immersive experience even before setting foot on their chosen destination. Additionally, the metaverse facilitates collaboration between travelers and locals in a virtual setting. Tourists can engage with local communities, experience their customs, and gain insights into off-the-beaten-path locations, fostering a sense of cultural exchange and understanding. However, with these exciting possibilities come challenges. Privacy, security, and the digital divide are among the concerns that need to be addressed to ensure an inclusive and safe metaverse experience for all. Furthermore, striking a balance between virtual exploration and authentic physical travel will be crucial to avoid potential declines in real-world tourism.

The forthcoming sections of this research article will delve deeper into the detailed methodology employed for the bibliometric analysis, provide an insightful presentation and discussion of the findings, and subsequently, conclude with a comprehensive synthesis of the implications, limitations, and future research directions that emerge from the exploration of the interplay between the metaverse and the field of tourism.

## Literature Review

### What is Metaverse?

The "metaverse" is a collective virtual shared area that encompasses both the physical and digital domains (Mystakidis, 2022) [16]. The term "metaverse" is a literal combination of the prefix "meta" (which stands for transcendence) with the suffix "verse" (an acronym for universe). It alludes to a virtual setting with a constant moral code and an independent economic structure connected to the outside world (Wang *et al*., 2022) [23]. In this immersive digital environment, users can engage in real time with both other users and computer-generated environments. Authors have categorized definitions into four groups by summarizing each component of the metaverse: environment, interface, interaction, and social value (Dwivedi *et al*., 2022) [6]. The concept of the metaverse, which unifies the virtual and physical worlds, is usually associated with virtual reality, augmented reality, and the internet.

Long before the internet was invented, science fiction writers foresaw interconnected virtual worlds and cyberspaces that are where the metaverse got its start. Neal Stephenson's science fiction book "Snow Crash" from 1992 has one of the first references to the word "metaverse" (Dionisio *et al*., 2013) [5]. The metaverse is described in the book as a three-dimensional virtual reality-based replacement for the internet where users can visit different digital places and communicate with others using avatars. The popularity of virtual worlds like Second Life and online multiplayer video games has also helped to spread the idea of the metaverse. Users could create avatars, communicate, sell virtual items, and even do business in these virtual spaces. Technology improvements in the 2010s and early 2020s, such as enhanced virtual reality headsets and more potent processors, rekindled interest in the metaverse idea. Tech behemoths like Facebook (now Meta Platforms, Inc.), Microsoft, and Epic Games, among others, started making significant investments in creating metaverse-type platforms and experiences. The term "metaverse," however, gained even more traction in late 2021 after Mark Zuckerberg, the CEO of Facebook, said that the company will change its name to Meta Platforms, Inc. in order to focus on developing the metaverse (Laeeq, 2022) [14]. The concept's importance and potential social influence were further cemented by this action by one of the biggest IT corporations in the world.

The commercial model for the Metaverse has not yet been created, and it is still in its early phases of development. Research interest in the Metaverse is at an initial Stage because of the outstanding concerns such as interface challenges, processing power demands, ethical restrictions, privacy dangers, and addiction risks in the many worlds, as well as the fact that Metaverse progress is still constrained by present technology (Ning *et al*., 2023) [17]. The idea of a seamless, linked virtual environment is continually developing and grabbing the attention of both technologists and the public at large even if the metaverse is still in its beginning stages. As technology progresses and new innovations emerge, the metaverse will likely become an increasingly integral part of our lives, shaping how we interact, socialize, work, and experience the world around us.

### Metaverse and Tourism

The subject of the virtualization of tourism is looked at through the lens of digital transformation utilizing virtual reality tourist material. The study (Lee, 2022) [20] examined the impact of back-end systems like artificial intelligence and big data analytics as well as front-end systems like virtual reality and the metaverse in the fourth industrial revolution. The study performed interdisciplinary research that widened the existing field of study by combining tourism and information systems. The metaverse poses both enormous promise and tremendous barriers for the hotel and tourism businesses, according to the article (Buhalis *et al*., 2022) [1, 3]. Tourism and hospitality organizations must deliberately leverage the Metaverse to develop hybrid virtual and real experiences that enable customers to interact with them as well as other guests before, during, and after their stay. Adoption and use of Metaverse also open up a variety of research options. Businesses and organizations in the hotel industry need to proactively embrace and plan for the Metaverse in order to remain competitive and satisfy customers' expanding demands. The goal of the study (Koo *et al*., 2022) [13] is to pique scholarly interest in the topic of metaverse tourism in the travel industry and its potential effects on the tourism industry. The multiuser virtual worlds and a quickly expanding digital area that includes social,

economic, tourist, and political activities with a connection to the real world must be met by the metaverse tourism ecosystem. In order to develop focused research questions and answers, tourism researchers need to start comprehending the metaverse tourist ecosystem and looking into various metaverse tourism experiences before, during, and after travel. The shift from real-world to metaverse tourism is speeding up the digital future of international travel. The study (Zaman *et al*., 2022) [25] fills a void in the need for interdisciplinary tourism research (e.g., social psychology, space tourism, and metaverse technologies) and provides new, intriguing data for global tourism policymakers as well as practitioners to better understand the strategic role of the metaverse in providing alternative digital or virtual tourism platforms to tech-savvy travelers and tourists. The study (Go & Kang, 2023) [9] claims that by providing distinctive and priceless resources, metaverse products and experiences may help expand the variety of tourist resources and encourage sustainable tourism. Tourist sites may be able to enhance their earnings by offering legitimate and enticing metaverse goods and experiences. The Sustainable Development Goals should be followed in this.

A foundational framework is presented in the study (Zhang, 2022) [26] that will be crucial in the development of a metaverse devoted to cultural heritage. A new multi-dimensional paradigm with five-dimensional forms is developed for the digitization of cultural artifacts. To fully understand cultural heritage, forms, meanings, and time-varying components are all examined. To further the goal of metaverse design, fundamental concepts for comprehending cultural legacies are also researched. The article's author (Wei, 2022) [24] offers Gemiverse, a blockchain-based online platform that might provide tourist and professional certification services to the general public. The study's unique virtual world framework or metaverse, known as the extensible metaverse, is a threedimensional virtual world technology that is more customizable than current platforms (Suanpang *et al*., 2022) [18]. It is difficult for developers to create and use alternative closed metaverse systems across platforms. The study's findings (Tsai, 2022) [19] demonstrate that perceptions of holistic presence, which include the subdimensions of spatial presence, social presence, and self-presence, simultaneously influence actual visit intention to a tourist destination in the metaverse as well as holistic happiness, which includes hedonia and eudaimonia.

The number of users interested in the metaverse is greatly expanding, and business professionals' interest in it is also rising. Therefore, it is crucial for people working in the hotel and tourism industries to not only be aware of this new phenomenon but to also make plans for dealing with it and taking advantage of the chance to establish a long-term competitive edge. While real-world hospitality and tourist experiences won't be replaced by the metaverse, consumer purchasing habits for these products and services will undoubtedly change. (2002) (Gursoy *et al*.) [10] The study (Buhalis *et al*., 2023) [2, 4] that conceptualizes smartness as a revolutionary and disruptive development for the global hospitality market synthesizes a sizable quantity of research on smart travel and smart lodging. The report claims that creating a flexible ecosystem that connects all of the stakeholders and integrating every component of the hospitality value chain is what it means to be smart. Although innovation and leadership are required to maximize the competitiveness of the entire networked ecosystem, technology aids in intelligence. For hotel structures, the staff who work there, and macro-level ecosystems, smart hospitality has a number of benefits. The research analyzes a range of innovations and disruptions that smart hospitality is bringing to the business and acknowledges tremendous future opportunities. The rate of technology growth is accelerating, creating customer expectations even if there are still numerous problems. Immersive virtual experiences and digital innovation can open up new avenues for investigating and advancing the study of consumer and traveller requirements, wants, and satisfaction. But even if the creation of immersive settings, products, and services is getting more complex, the Metaverse continues to provide unrealistic things that might mislead users or undermine the veracity of findings due to their diminished feeling of reality (Monaco & Sacchi, 2023) [15]. These factors need investigation into the Metaverse's potential to lessen or counteract potential bias in choice studies. The agenda should consider four perspectives, according to the study (Filimonau *et al*., 2022) [7], which represent the many people who are involved in the tourism, hospitality, and events value chain. These perspectives include those of customers, business professionals in the tourism, hospitality, and events industries, developers/suppliers, and legislators. The study also considers the wider ripple effects of adopting virtual locations, which may extend well beyond the travel, hospitality, and events industries.

Numerous research have examined the relationship between tourism and the metaverse, however there are few thorough bibliometric insights in the literature at this time. By exploring the trends in tourist research that have evolved in tandem with the emergence of the metaverse, the current study seeks to close this gap in order to fill it. A gap in the literature lies in assessing the impact of metaverse-related research on the tourism industry itself. While bibliometric analyses often focus on scholarly impact within the academic community, a gap exists in examining how the knowledge generated from these studies has translated into practical applications, innovations in the tourism sector, or changes in consumer behavior. In conclusion, carrying out a bibliometric study to fill in these gaps will advance knowledge of the function of the metaverse in tourism, guide future research, and provide guidance for practitioners and policymakers in the dynamic field of tourism experiences.

**Methodology**

With a focus on publication trends throughout time and the categorization of subjects related to this discipline, the aim of this study was to identify the main themes in the fields of tourism and the metaverse. The search was conducted on June 30, 2023, using the Dimensions database. The search terms used were "Tourism" and "Metaverse" and "Hospitality" AND "Metaverse," limited to the title and abstract. The search yielded 90 publications for "Tourism" and "Metaverse" and 24 publications for "Hospitality" and "Metaverse."

By performing an extensive bibliometric investigation through the utilization of the Dimension database and the VOSviewer (VOSviewer version 1.6.19) tool, the research undertakes the task of pinpointing and evaluating pertinent publications within the selected domain until June 30, 2023.

The study is directed towards highly cited works, significant author and institutional contributions, as well as the involvement of countries, all of which have left a mark on research within the realm of tourism and hospitality. Additionally, this research also examines the co-occurrence of terms based on textual data.

**Results and Discussion**

In 2022, a significant increase in publications is observed, with 39 papers published in this year alone. The cumulative publication count jumps from 4 to 43. In 2023, the highest number of publications are observed, with 51 papers published this year. The cumulative publication count reaches 94. The table gives a clear picture of the number of articles published each year as well as the total number of papers published over time. Figure 1 shows that there has been a substantial increase in research output in the last few years (2022 and 2023), with a large number of publications appearing during those years.

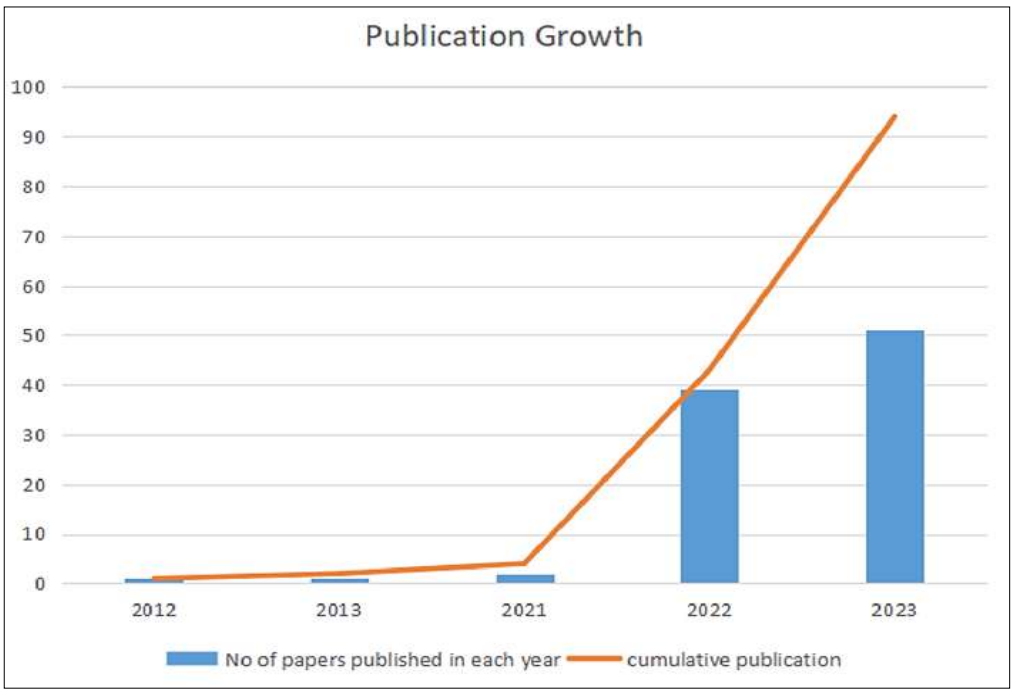


**Fig 1:** Number of publications per year

The studies in Table 1 primarily discuss how the metaverse and the tourism sector interact. Many of these papers were published in 2022, indicating a significant surge in research interest around this time. The topics covered include disruptive technology, customer experience, value cocreation, smart tourism cities, cultural heritage, and more within the context of the metaverse. The citation counts vary, with some papers having gained substantial attention, indicating their impact and influence on the field.

**Table 1:** Top 15 most cited research articles

| Title | Times cited |
|---|---|
| "Metaverse as a disruptive technology revolutionising tourism management and marketing" (Buhalis *et al.*, 2023) [2, 4] | 32 |
| "Shaping the Metaverse into Reality: A Holistic Multidisciplinary Understanding of Opportunities, Challenges, and Avenues for Future Investigation" (Koohang, 2023) [12] | 24 |
| "The Metaverse in the hospitality and tourism industry: An overview of current trends and future research directions" (Gursoy *et al.*, 2022) [10] | 73 |
| "Mixed Reality (MR) for Generation Z in Cultural Heritage Tourism Towards Metaverse" (Buhalis & Karatay, 2022) [1, 3] | 58 |
| "Metaverse as a driver for customer experience and value co-creation: implications for hospitality and tourism management and marketing" (Buhalis *et al.*, 2022) [1, 3] | 51 |
| "Gemiverse: The blockchain-based professional certification and tourism platform with its own ecosystem in the metaverse" (Wei, 2022) [24] | 21 |
| "Smart hospitality: from smart cities and smart tourism towards agile business ecosystems in networked destinations" (Buhalis *et al.*, 2023) [2, 4] | 20 |
| "Meet Your Digital Twin in Space? Profiling International Expat's Readiness for Metaverse Space Travel, Tech-Savviness, COVID-19 Travel Anxiety, and Travel Fear of Missing Out" (Zaman *et al.*, 2022) [25] | 18 |
| "Metaverse Tourism: conceptual framework and research propositions" (Koo *et al.*, 2022) [13] | 18 |
| "Travel Incheon as a Metaverse: Smart Tourism Cities Development Case in Korea" (Um *et al.*, 2022) [20] | 16 |
| "Metaverse tourism for sustainable tourism development: Tourism Agenda 2030" (Go & Kang, 2023) [9] | 15 |
| "Extensible Metaverse Implication for a Smart Tourism City" (Suanpang *et al.*, 2022) [18] | 10 |
| "Metaverse for Cultural Heritages" (Zhang *et al.*, 2022) [26] | 8 |
| "Investigating metaverse marketing for travel and tourism" (Tsai, 2022) [19] | 8 |
| "The reality of virtual worlds: pros and cons of their application to foreign language teaching" (Garrido-Iñigo & Rodríguez-Moreno, 2015) [8] | 28 |

**Citation Analysis**

Citation analysis is a bibliometric method used to assess the impact and influence of scholarly articles, authors, journals, or research domains by analyzing the patterns of citations among academic publications. The association between items is established by the frequency of their mutual citations.

For each country, a minimum threshold of three documents and three citations per country was set for Citation analysis with Countire as unit of analysis. The total number of citations for a country is equal to the cumulative citations received by all the documents affiliated with that country in Dimensions. Out of 34 countries, 9 meet the threshold.

**Table 2:** Citation analysis with Countire as unit of analysis

| Country | Documents | Citations | Total link strength |
|---|---|---|---|
| United Kingdom | 7 | 191 | 68 |
| China | 14 | 169 | 77 |
| United States | 5 | 113 | 44 |
| South Korea | 7 | 44 | 22 |
| Malaysia | 3 | 31 | 14 |
| India | 7 | 30 | 25 |
| Taiwan | 4 | 30 | 15 |
| Singapore | 3 | 10 | 1 |
| Turkey | 5 | 4 | 0 |

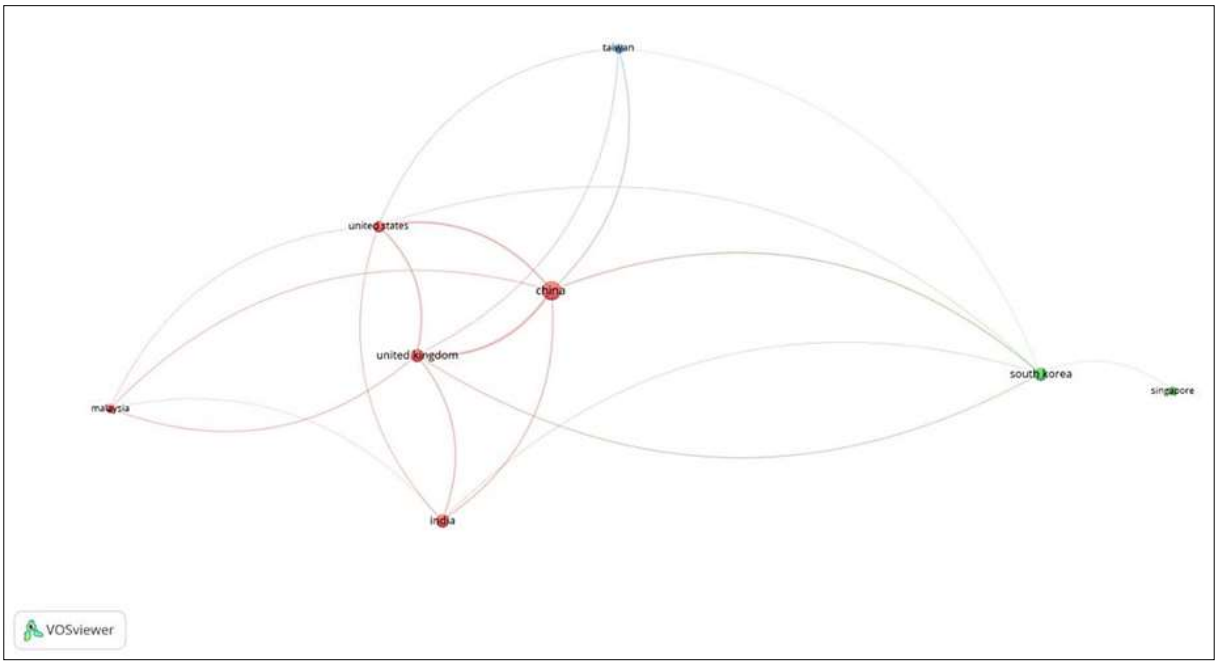


**Fig 2:** Citation analysis map with Countire as unit of analysis

The dataset's total number of documents for each country is displayed in table 2 below. For instance, China has the most documents (14), while Singapore and Malaysia have significantly less documents (3) than other nations. The total number of citations that all of the texts from each nation have received are shown in the citations column. The United States (113), China (169), and the United Kingdom (191) are the countries with the most citations. The total link strength is a metric that likely relates to the strength of connections between documents from a particular country. It appears that it's calculated based on the citations among the documents within each country. For instance, China has the highest total link strength (77), indicating relatively stronger interconnectivity between the documents from China.

From the table 2, In terms of the quantity of documents and citations, we can see that the United States, the United Kingdom, and China are the most prominent., suggesting strong research output and influence in the field. South Korea also has a reasonable number of citations despite having fewer documents. On the other hand, countries like Singapore, Malaysia, and Turkey have lower citation counts, indicating relatively lesser impact in this specific dataset. It's essential to consider that these numbers represent a specific dataset and may not reflect the overall research output or impact of these countries in the field of interest. Additionally, the criteria for selecting documents and calculating link strength might influence the results.

The figure 2 depicts the presence of three distinct clusters. Cluster 1 encompasses China, India, Malaysia, the United Kingdom, and the United States. Cluster 2 comprises Singapore and South Korea. Cluster 3 exclusively features Taiwan. Notably, Turkey is not affiliated with any of the aforementioned clusters.

For citation analysis using organizations as the unit of analysis, a minimum threshold of two documents and two citations per organization was taken into account. The total amount of citations for an organization comes from all of its Dimensions papers. Out of the 98 organizations analyzed, only seven organizations meet these criteria

**Table 3:** Citation analysis with Organizations as unit of analysis

| Organization | Documents | Citations | Total link strength |
|---|---|---|---|
| Bournemouth University | 5 | 189 | 30 |
| Hong Kong Polytechnic University | 3 | 105 | 20 |
| Kyung Hee University | 4 | 40 | 15 |
| Nanyang Technological University | 3 | 10 | 1 |
| University of Macau | 3 | 5 | 18 |
| Chitkara University | 2 | 4 | 3 |
| Institute for Tourism Studies | 2 | 4 | 11 |

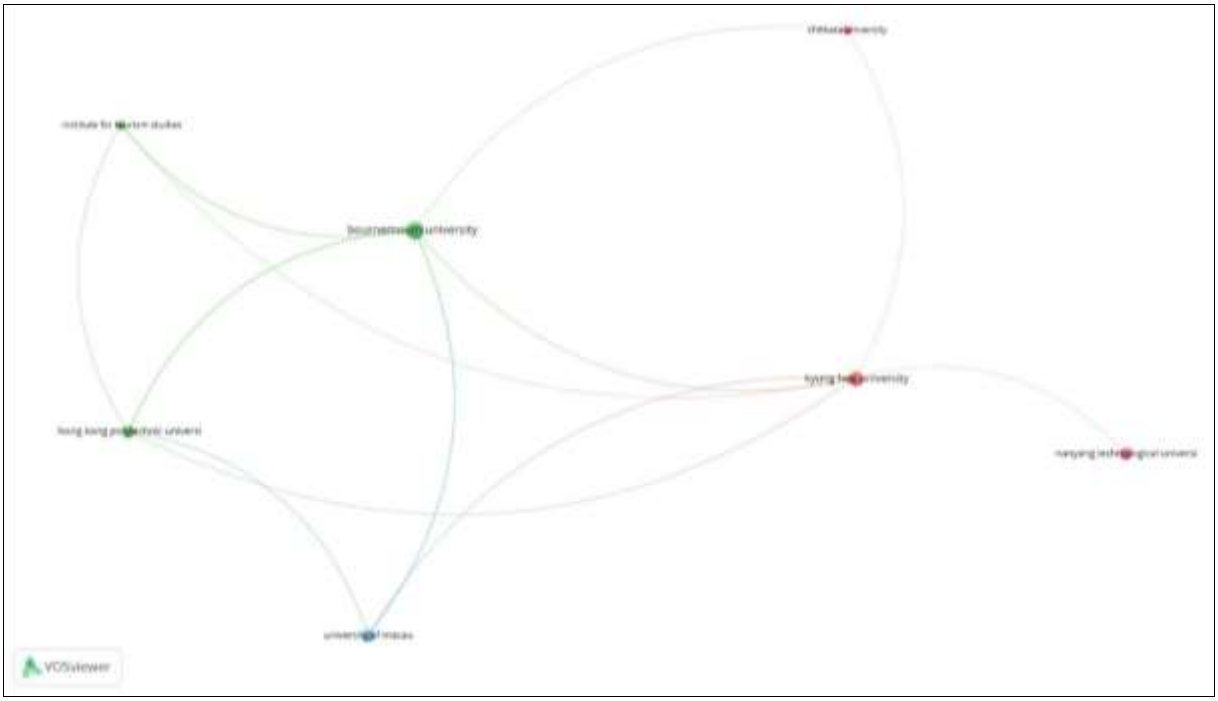

**Fig 3:** Citation analysis map with Organizations as unit of analysis

Bournemouth University has the highest number of documents (5) and citations (189) among all the listed organizations. It also has a moderate total link strength (30), indicating notable interconnectivity among its published papers. With 3 documents and 105 citations, Hong Kong Polytechnic University has a large citation effect. However, the total link strength (20) suggests less interconnectedness between its documents compared to Bournemouth University. Kyung Hee University has 4 documents and 40 citations, indicating a decent research output and citation count. However, the total link strength (15) is relatively low compared to the number of citations, indicating limited connections between its papers. Nanyang Technological University with 3 documents and 10 citations, this organization has fewer publications and citations compared to others. The low total link strength (1) suggests minimal citation connections among its documents. The University of Macau has 3 documents and 5 citations, indicating a lower citation impact. However, the total link strength (18) is relatively higher, suggesting more interconnectedness between its papers than some other institutions with higher citations. Chitkara University with 2 documents and 4 citations, this organization has a smaller research output and citation count compared to others in the list. The total link strength (3) is also relatively low. Institute for Tourism Studies has 2 documents and 4 citations, the total link strength for the institute is 11, which suggests that there are several interconnections or citations between the two documents published. Figure 3 illustrates the existence of three clusters.

A threshold of at least two documents per author and a minimum of ten citations per author were established for Citation analysis with Authors as unit of analysis. Among the pool of 260 authors, seven authors satisfy these criteria. The total number of citations received by all of a given author's works stored in the Dimensions database is the number of citations assigned to that author.

**Table 4:** Citation analysis with Authors as unit of analysis

| Author | Documents | Citations | Total link strength |
|---|---|---|---|
| Buhalis, Dimitrios | 5 | 189 | 20 |
| Chung, Namho | 3 | 37 | 6 |
| Gursoy, Dogan | 2 | 73 | 7 |
| Koo, Chulmo | 3 | 37 | 6 |
| Leung, Daniel | 2 | 85 | 15 |
| Raza, Syed Hassan | 2 | 20 | 7 |
| Zaman, Umer | 2 | 20 | 7 |

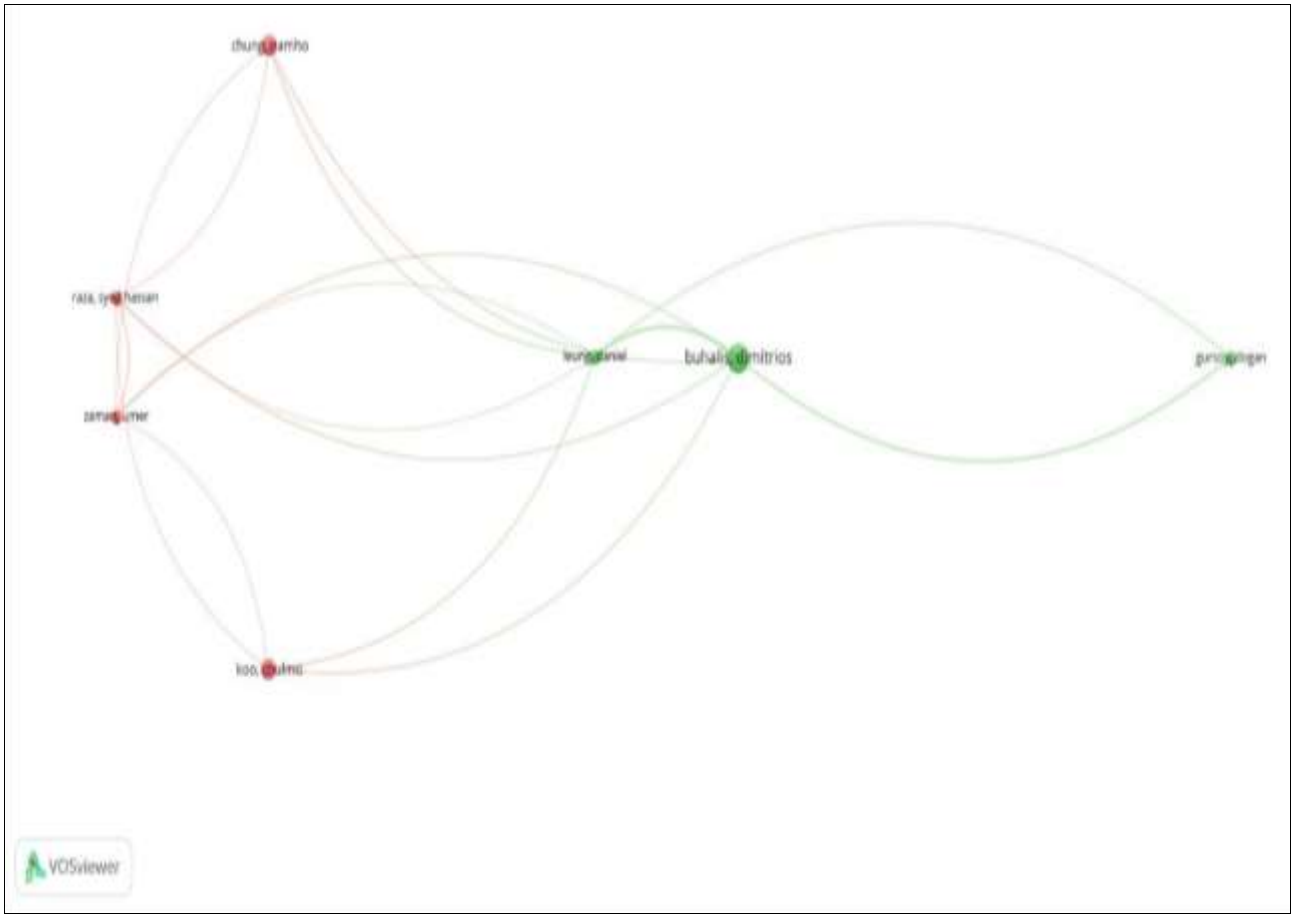


**Fig 4:** Citation analysis map with Authors as unit of analysis

With five documents and 189 citations, Buhalis stands out as a prolific and highly cited author. The total link strength of 20 suggests significant interconnectivity among his works. Chung and Koo have similar publication patterns with three documents each and 37 citations each. Their total link strength of 6 indicates a moderate degree of interconnections. Gursoy has only two documents but a substantial citation count of 73, signifying impactful contributions. The total link strength of 7 implies notable connections between his works. With two documents and 85 citations, Leung showcases a significant citation impact. The total link strength of 15 suggests notable interrelations among his works. Raza and Zaman, both authors have two documents and 20 citations each. Their total link strength of 7 indicates some degree of interconnectedness.

Overall, the table 4 highlights a range of authors with varying research outputs and citation impacts. While some authors have a higher number of citations despite a relatively lower document count, others demonstrate both prolific output and substantial citations. The total link strength provides insights into the interconnectedness of their works, indicating potential collaborations or thematic similarities. Figure 4 illustrates the existence of two clusters. A criterion was established with a minimum requirement of two documents per source and at least ten citations per source for Citation analysis with Sources as unit of analysis. Among the total of 75 sources, five satisfy this criterion. The total citations for a source are equivalent to the cumulative citations received by all the documents associated with that specific source within the Dimensions database.

**Table 5:** Citation analysis with Sources as unit of analysis

| Source | Documents | Citations | Total link strength |
|---|---|---|---|
| "Information and Communication Technologies in Tourism 2022" | 2 | 76 | 11 |
| "International Journal of Contemporary Hospitality Management" | 2 | 72 | 7 |
| "Journal of Hospitality Marketing & Management" | 2 | 73 | 8 |
| "Springer Proceedings in Business and Economics" | 4 | 11 | 4 |
| "Sustainability" | 5 | 35 | 8 |

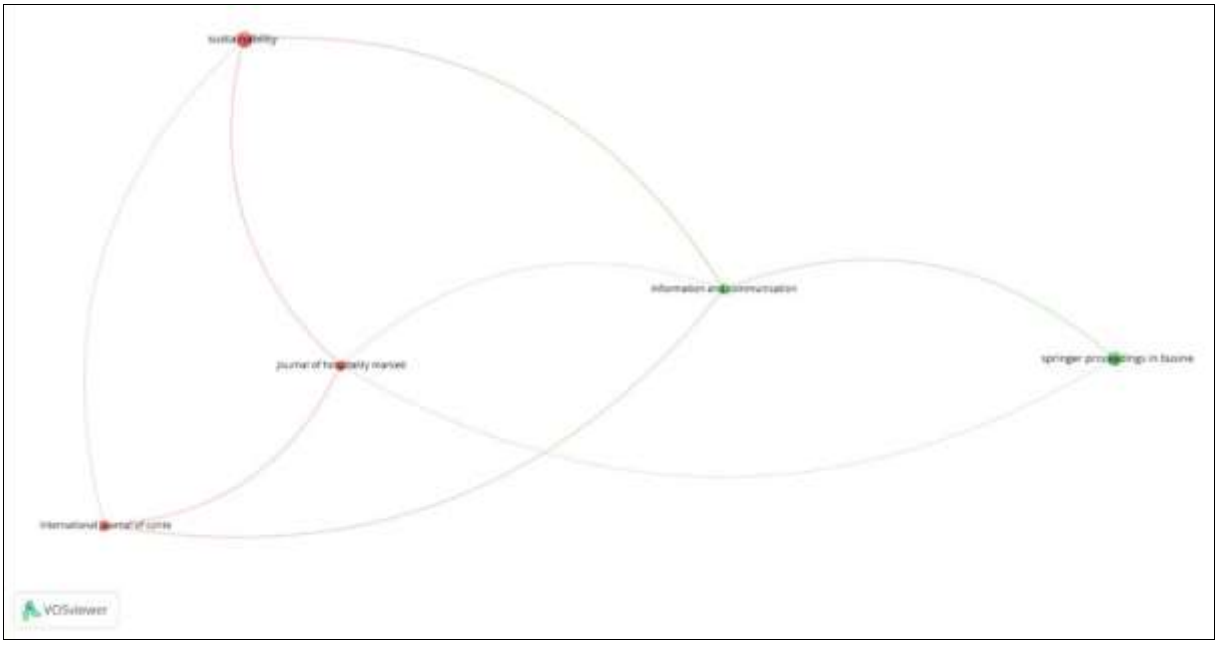

**Fig 5:** Citation analysis with Sources as unit of analysis

The two documents in Information and Communication Technologies in Tourism 2022 have a noteworthy citation total of 76. The total link strength of 11 suggests a substantial level of interconnections among its documents. With two documents and 72 citations, International Journal of Contemporary Hospitality Management demonstrates a strong citation impact. The total link strength of 7 indicates some degree of interrelatedness between its contents.

Similar to the previous journal, Journal of Hospitality Marketing & Management also has two documents and a high citation count of 73. The total link strength of 8 suggests a significant level of connectedness among its articles. Despite having four documents, Springer Proceedings in Business and Economics has a relatively lower citation count of 11. The total link strength of 4 suggests a moderate level of interconnectedness among its papers. With five documents and 35 citations, Sustainability showcases a respectable citation impact. The total link strength of 8 indicates a notable level of interconnections among its documents. Overall, the table 5 underscores the varied citation impacts and interconnectedness among different sources. Figure 5 demonstrates the presence of two clusters.

**Keyword Analysis**

The clusters suggest groups of related terms based on their occurrences and relevance scores. The relevance score represents the importance or significance of each term within its respective cluster. This analysis provides insights into the thematic relationships among the terms and can help identify key concepts or focus areas in the analyzed dataset.

**Table 6:** Number of terms by occurrence

| Term | Occurrences | Relevance Score |
|---|---|---|
| **Cluster 1 (12 items)** | | |
| metaverse | 81 | 2.6898 |
| tourism | 66 | 1.7425 |
| study | 54 | 1.4151 |
| concept | 23 | 1.3057 |
| technology | 48 | 1.0266 |
| experience | 46 | 0.9926 |
| opportunity | 20 | 0.9897 |
| hospitality | 17 | 0.8486 |
| tourism industry | 24 | 0.7943 |
| development | 35 | 0.7871 |
| future | 21 | 0.6628 |
| application | 26 | 0.5319 |
| **Cluster 2 (9 items)** | | |
| paper | 32 | 1.0665 |
| research | 36 | 1.0501 |
| field | 17 | 1.0284 |
| reality | 24 | 1.0213 |
| challenge | 22 | 0.8017 |
| virtual reality | 25 | 0.6485 |
| use | 17 | 0.5515 |
| impact | 25 | 0.5246 |
| internet | 17 | 0.5205 |

Cluster 1 contains 12 terms, and the term "metaverse" has the highest number of occurrences (81) and the highest relevance score (2.6898), indicating its significant presence and importance in this cluster. Other notable terms in this cluster include "tourism" (66 occurrences, relevance score: 1.7425) and "study" (54 occurrences, relevance score: 1.4151). suggesting their relevance and association with the metaverse concept. Other terms, such as "concept," "technology," and "experience," also have moderate relevance scores, highlighting their connection to the primary theme. Cluster 2 contains 9 terms, with "paper" having the highest number of occurrences (32) and a relevance score of 1.0665. The term "research" (36 occurrences, relevance score: 1.0501) is also significant in this cluster. Terms like "field," "reality," and "virtual reality" have relevance scores around 1, indicating their connection to research and academic domains. Other terms, such as "challenge," "use," "impact," and "internet," have relatively lower relevance scores but are still part of this cluster.

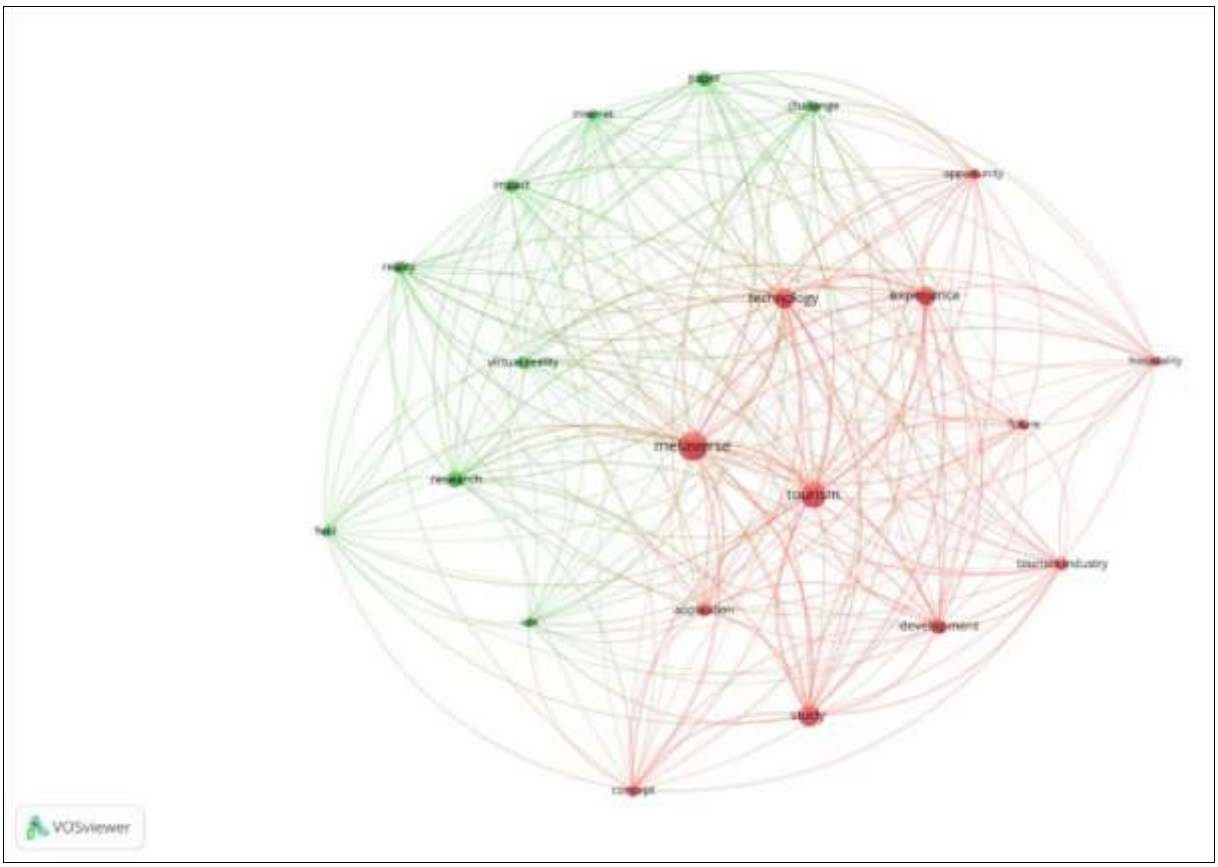


**Fig 6:** Term co-occurrence map

The two clusters in Figure 6 represent a well-structured division of terms based on their thematic relevance, with Cluster 1 focusing on core concepts of metaverse and tourism, and Cluster 2 delving into research-related and specific elements of this interaction.

**Conclusion**

In conclusion, the provided analysis encompasses several key aspects of research trends, citation analysis, organizational contributions, and thematic clustering within the context of metaverse in tourism. Regarding research publication trends, a substantial increase in the number of publications is observed in recent years, particularly in 2022 and 2023, indicating a growing interest in the subject. This surge underscores the evolving significance of the metaverse in the tourism industry, as evidenced by the cumulative publication count. Citation analysis serves as a pivotal bibliometric tool for assessing scholarly impact. It aids in evaluating the influence of research articles, authors, and institutions by examining the patterns of citations. Furthermore, the application of a defined threshold for both documents and citations provides valuable insights into the research influence of countries and organizations. The country analysis reveals varying levels of research activity and impact. With higher document counts and citations, nations like the United States, China, and the United Kingdom stand out as significant contributors. Meanwhile, the link strength metric hints at the interconnectivity between documents within each country, suggesting the degree of scholarly cohesion. Similarly, the organizational analysis elucidates the research output and impact of different institutions. With a high number of documents and citations, Bournemouth University stands out, closely followed by other universities like Hong Kong Polytechnic University and Kyung Hee University. The overall link strength measure sheds light on how these businesses' papers interact and collaborate with one another. The thematic clustering analysis unveils two distinct clusters of terms, each reflecting the semantic coherence and relevance within their respective domains. The prominence of terms like "metaverse," "tourism," and "study" in Cluster 1 underscores their central role in the discourse, while Cluster 2 features terms like "paper," "research," and "reality" indicative of the scholarly focus on academic dimensions. These findings collectively shed light on the metaverse's dynamic terrain in tourist research. The increasing

publications, diverse global contributions, and thematic insights presented in the clusters collectively underscore the multidimensional nature of this evolving field. However, it is essential to acknowledge the specificity of the analyzed dataset and to interpret these findings within that context. This comprehensive assessment lays the groundwork for continued exploration and advancement in the domain of metaverse in tourism.

**Limitations and Further Scope**

While shedding light on the metaverse-tourism nexus, this study's limitations include search term specificity and database selection. The analysis captures publication trends and thematic patterns, yet nuanced insights, sentiment analysis, and contextual understanding could enhance findings. The surge in metaverse-related publications warrants exploration of underlying drivers. Qualitative aspects of country and organizational contributions remain unexplored. Despite these limitations, the study offers valuable insights into an evolving field, suggesting opportunities for further research in sentiment analysis, interdisciplinary exploration, and qualitative investigations.

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