Bibliometric Analysis of Augmented Reality in the Context of Tourism-Oriented Audiovisual Production

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Abstract

The article presents a bibliometric analysis of the intersection between augmented reality, audiovisual production and tourism. The goal is to identify research trends, the most influential authors, and the geographic distribution of publications in this field. The methodology uses the Scopus database and tools such as R and VOS Viewer to manage and visualize the data. Key terms such as "augmented reality", "audiovisual production" and "tourism" were used to conduct the search, covering the period from 2001 to 2024, resulting in a total of 486 publications. The results highlight the growth of interest in augmented reality applied to tourism starting in 2014, reaching a peak in 2023, and in turn, indicating that the majority of scientific production comes from conferences (45.5%) and articles (36.0%). A concentration of production in a small group of authors is evident, with Hassan A. and Jung T. leading the field with 16 and 14 publications respectively. The analysis by country highlights the United Kingdom and India as the main producers of documents, followed by Indonesia and China. In terms of institutions, Manchester Metropolitan University and Kyung Hee University top the list. In order to further this topic, the researchers propose that future study look into novel applications and interdisciplinary partnerships.

Keywords: Augmented reality, Audiovisual production, Tourism, Bibliometrics.

1. Introduction

In recent years, augmented reality (AR) has become a novel tool that has changed the way markets are perceived and interacted with digitisation. AR has been adopted in different sectors of the economy and supply chain globally, such as retail, healthcare, entertainment and education, changing the traditional dynamics in which the activities of these sectors were developed (Villagran-Vizcarra et al., 2023). These technologies have completely changed the shopping experience of users, because they enable them to superimpose digital content on the surface of the real world in real time; this creates a different scenario for both suppliers and consumers, which can be an opportunity if a renewed interaction of consumer perceptions with their environment is achieved through AR technologies (Turner, 2022).For example, users can access AR-enhanced immersive experiences which present a hybrid environment blending virtual elements with real surroundings to facilitate better engagement and perception of

contextual information. This is how augmented reality (AR) has emerged as a powerful tool in generating unique bespoke experiences that are leading a transformation in creative & cultural industries as well as other verticals such as travel or video production (Liying et al., 2021).

Since its birth, augmented reality has increased greatly, mostly because of technological progress such as the widespread use of powerful mobile tools and the development of advanced image recognition and geolocation algorithms. Several research studies have shown that AR technology will have a significant impact on the global economy. The market value is estimated to be several billion dollars, owing in large part to massive growth in the coming years (Fan et al., 2022). The innovative effect of immersive and interactive experiences has generated an interest in various sectors of the economy to achieve a differentiating product or service in the market by providing better experiences to consumers. Audiovisual production and tourism are examples of how these two sectors have used augmented reality to improve service offerings with innovative products taking into account customer experience and appreciation (Balasubramanian et al., 2022).

Augmented reality has represented an opportunity for filmmakers, advertisers and multimedia content creators to generate more creative alternatives in the audiovisual industry. Companies are leveraging consumer interaction to create immersive and interactive narrative experiences in a way that captures the audience's attention through real and virtual elements, without relying on the limitations of physical structures (O'Meara and Szita, 2021). AR is starting to make its way into films, television programs, advertisements, and multimedia experiences to present users with very personalized and engaging content. This paper discusses the current environment where viewers are looking for more immersive and interactive content. The line between software development and audiovisual production is fading as augmented reality (AR), which is a widely available technology today, allows content creators to be real technological innovators (Cao et al., 2023).

No doubt, augmented reality is one of the emerging concepts in the travel industry. With the utilization of AR applications, tourist places and attractions could redefine themselves and offer the visitors much richer, more informative experiences than those available through a standard visit. By providing incoming tourists with supplementary information—such as historical facts or virtual depictions of important occurrences or characters, while visiting a tourist during a basic sightseeing tour—an insight into education and culture could be provided (Karacan and Akoglu, 2021); it helps assure that the lost landscape is viewed within a broader context. The other is that it has an impact on satisfaction because it increases the quality of their travel experience. For example, Augmented Reality can be used in heritage sites and museums to superimpose reconstructions onto current ruins or to place virtual characters among real people who walk around and talk to users, thus giving added value for a context-based learning experience (Paliokas et al., 2020).

AR has been demonstrated to have a favorable effect on tourist destination management in addition to enhancing the visitor experience. Through the provision of an extra layer of interactive data, this technology enables tourism administrators to tailor visits to the interests and requirements of travelers, perhaps leading to more effective distribution of visitor flows and fewer issues connected to overtourism in crowded places (Leung, 2022). In addition, AR

augmented reality has become a valuable tool for promoting tourism services. It has helped to offer virtual experiences to marketing companies and travel agencies through novel marketing strategies that attract potential customers with virtual tours of different destinations (Ghandour et al., 2021).

The integration of augmented reality, audiovisual production and tourism has enabled the development of innovation and the amalgamation of these three factors has generated progress in the supply of services. Travel agencies and content creators have a technological platform that integrates augmented reality and audiovisual material to offer attractive, fascinating and personalised experiences (Çeltek, 2021). An example of this is the use of augmented reality (AR) through mobile applications that serve as a guide for tourists or locals in any city. These apps let users to experience a location at their own speed and get relevant content instantly by overlaying audiovisual content over the actual surroundings. In addition to improving the traveler experience, this opens up new possibilities for the creation of personalized audiovisual content that visitors can view while on tour (Ponsignon and Derbaix, 2020).

Augmented Reality has generated opportunities for audiovisual content producers; experiences can be created through multimedia tools that can reach any screen of daily use, connecting the viewer with interactive experiences in an audiovisual world, thanks to technical advances in the digital industry. In the tourism sector, companies have managed to present their service offerings through audiovisual platforms, making it easier for consumers to digitally connect with the reality of landscapes or tourist destinations and with them arouse interest in a captivating and dynamic way. For example, some travel or tourism agencies can combine augmented reality with audiovisual creation to show small parts of museums, landscapes or tourist attractions within a city.

The integration of Augmented Reality technology with audiovisual production not only favours the tourism offer in this sector, but also allows the creation of digital media for entertainment and learning, constituting an opportunity for variation in tourism services. However, there are challenges to overcome for the creative and tourism industries, among which are the increased dependence on mobile devices, technological barriers associated with internet connection, economic barriers due to the difficulty of accessing innovative technological resources and cultural barriers linked to the different conceptions they may have of new technologies (Zabel and Telkmann, 2021). Notwithstanding these challenges, the expansion of augmented reality (AR) in the tourist and audiovisual industries indicates that these sectors will keep researching and creating new applications that will transform these sectors of the economy in the near future (Boboc et al., 2022).

It is critical to comprehend the present status of scientific study on the convergence of augmented reality, audiovisual production, and tourism given the growing significance of AR in these domains. While many studies have already been done on the use of augmented reality (AR) in audiovisual production or tourism (Cibilić et al., 2021), very few have looked at the effects and relationships throughout these three fields as a whole. By using a bibliometric study to assess the existing level of scientific knowledge on augmented reality in conjunction with audiovisual production and tourism, this paper seeks to close this gap in the scientific literature. This analysis

will identify the most significant authors and organizations, as well as the subjects that require additional research in the future, along with the most prevalent research trends (Hanaa and Abdul, 2024).

The main objective of the article is to analyze scientific papers that were retrieved from the Scopus database, which is among the most extensive and reliable global sources of academic research. This study aims to provide a thorough overview of the current state of knowledge in this new subject by using bibliometric methodologies to provide a complete view of the evolution of augmented reality in the context of tourism and audiovisual production.

2. MATERIALS AND METHODS

The bibliometric analysis was conducted using the Scopus database, which has gained international recognition as one of the most comprehensive and dependable sources for scientific research. By covering a wide range of high-quality research papers in many different areas, Scopus ensures that large volumes of current relevant literature are accessible. Stringent indexing also ensures the inclusion of high-quality papers that further enhance the results' accuracy and reliability (Borre et al., 2023). The following search terms were applied: a combination already fitting for the subject matter of this study in August 2024, "Augmented Reality with Audiovisual Production and Tourism." The initial search words were "Tourism," "Audiovisual production," and "Augmented reality". Then “Augmented reality”, “Information systems”, “Tourism”, “Immersive”, “Tourism sector” and “Human behavior" were added to this thesis in order to have a broader vision from the subject.

For this research, the following search equation has been used: (TITLE (“Augmented reality") OR TITLE ("audiovisual production") AND TITLE-ABS-KEY ("tourism")) AND PUBYEAR > 2000 AND PUBYEAR < 2025 AND PUBYEAR > 2000 AND PUBYEAR < 2025. To manage and analyze the bibliometric data obtained from Scopus, the R and VOS VIEWER software tools were used (Ramírez-Durán et al., 2024).

Just like this, a descriptive documentary technique was used. It brought out the very important writers, organizations, and nations in the specific field and enabled research trends to be observed and the impact of scientific publications to be evaluated (Carmona-Serrano et al., 2020). It gives a wide-angle view of the subject to show its evolution and future research possibilities.

Table 1 List of terms used in bibliometric analysis

Key term	Description
Augmented reality	Technology that superimposes virtual elements, such as images or information, on the real environment, improving user perception.
Audiovisual production	Process of creating video and audio content, which includes stages such as scripting, recording, editing and post-production.
Tourism	Activity of traveling and visiting places of interest for leisure, culture, business or recreation.
Information systems	Sets of interrelated components that collect, process, store, and distribute information to support decision making and operations.
Immersive	An experience or environment that immerses the user in virtual or augmented reality, providing a sense of presence or complete involvement.

Human-computer interaction	Discipline that studies how humans interact with computers and how to design efficient and effective user interfaces.

Source: author using R software based on information from Scopus (2024).

The 23-year timeframe covered by the bibliometric search was 2001–2024. Since no publications published in Scopus on the same topic could be located prior to 2001, this time frame was selected. As a result, the analysis concentrated on works that came out on these dates.

The investigation encompassed 486 publications that were found in the database and were associated with the subject matter. Of the distribution of documents by kind, conference documents accounted for 45.5%, or 221 publications in total. 175 publications, or 36.0% of the total, were articles. Book chapters came in third position with a total of 60 documents, or 12.3% of the publications. 6.2% is split among various document kinds.

R Studio was used to organize and handle all of this data in preparation for further study. Analyses of the documents were done by financial sponsor, country/territorial, author, year, and affiliation.

3. RESULTS

Law of bibliometric productivity

Lotka's Law describes why the activity in writing is not equally distributed over the number of writers. This theory suggests that the vast majority of writers write only one or a few papers on any specific topic, while a small number of authors (often themselves) copy elements from others' work to spin out research. This law, explains Lotka, is useful to analyze the productivity distribution in science and even inform which authors are more productive relative to other ones within a given disciplinary field (Ramírez et al., 2023).

Table 2 shows that 16 documents were written and published by one author, 14 documents by another, and 12 and 9 documents by two other authors, respectively. Additionally, five authors have five papers registered in Scopus, two authors have written and published six papers apiece, and eleven authors have published four papers each. This implies that while the bulk of scholars contribute a substantially smaller number of papers, a small group of authors concentrates a big number of articles.

Table 2 Lotka's Law

Documents written	N. of Authors	Proportion of Authors
16	1	0.629
14	1	0.629
12	1	0.629
9	1	0.629
6	2	1.26
5	5	3.14
4	11	6.92
3	32	20.1
2	102	64.2
1	3	1.89

Source: author using R software based on information from Scopus (2024).

Bibliometric indicators

A distinct hierarchy in the creation of science worldwide is revealed by the bibliometric study, as shown in Figure 1. On the list, the UK and India are at the top with a much higher quantity of papers published. China and Indonesia are keeping the Asian presence in this industry stronger. The five nations with the most documents are rounded out by the United States. Even though they produce at a lesser level than South Korea, Taiwan, and Spain, these other nations are nonetheless significant producers.

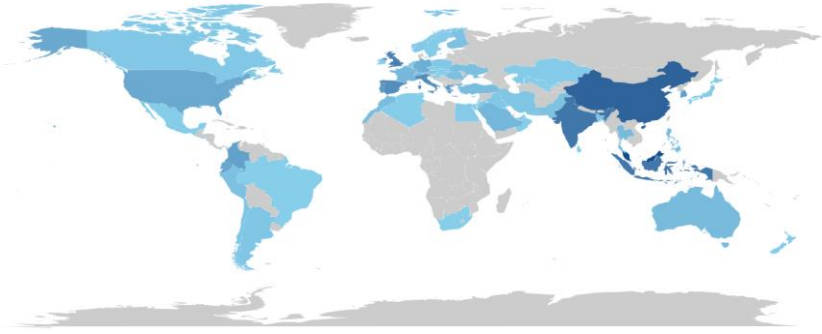

Figure 1. Scientific production by country, source: author based on information from Scopus (2024).

This distribution shows that scientific output is concentrated in a small number of nations, with the UK emerging as the primary producer. But it's important to remember that this graph only provides a portion of the world's scientific output, and that the interpretation of the data might be affected by other elements like the field of study or the significance of publications.

In keeping with this line of reasoning, Figure 2 lists the universities that are most productive in the field of study.

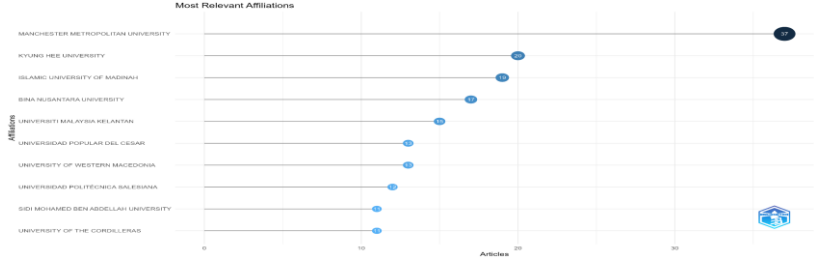

Figure 2. Most relevant affiliations, source: author based on information from Scopus (2024).

The displayed graph indicates a significant discrepancy in the number of scientific publications produced by the institutions on the list. With an output of 37 documents, Manchester Metropolitan University demonstrates its leadership position in comparison to other universities. This implies a high level of research activity and increased academic awareness for this institution on a global scale. Kyung Hee University ranks second in prominence with 20 documents. With just 11 participants, the University of the Cordilleras had the lowest participation rate among the most productive institutions discovered.

The following graph, which displays the number of documents produced per year, was created in order to continue examining the evolution of scientific production over the examined period.

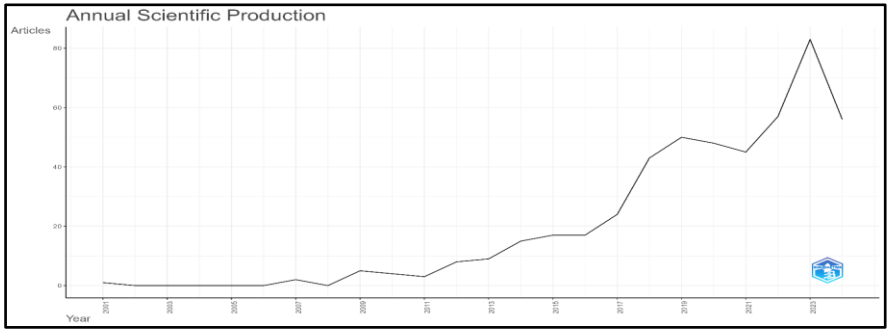

Figure 3. Documents by year, source: author based on information from Scopus (2024).

An examination of the yearly scientific output in the domains of augmented reality, audiovisual production, and tourism reveals that no publications were produced in these areas in 2002, 2003, 2004, 2005, or 2006. Scientific output was seen to be trending upward as of 2014 and was expected to peak in 2023.

Accordingly, the top 10 writers with the most published documents are shown in Table 3. The authors who have contributed the most to the publication of works on augmented reality, audiovisual production, and tourism are 16, 14, and 16 respectively. With 16 published papers to his credit, Hassan A is the group leader. The top ten authors working in this field of study are listed below.

Table 3 Documents by author

Author	N° of documents
Hassan A.	16
Jung T.	14
Tom M.C.	12
Chung N.	9
Arshad H.	6
Zhu C.	6
Azough A.	5
Jung T.H.	5
Lee H.	5
Ngan H.F.B.	5

Source: author using R software based on information from Scopus (2024).

Lastly, Table 4 lists the top ten articles that have been cited in relation to the research topic.

The most cited article is "New realities: a systematic review of the literature on virtual reality and augmented reality in tourism research" by Yung et al. (2019), which has 545 citations. The study "Tourists' Intention to Visit a Destination: The Role of Augmented Reality (AR) Application for a Heritage Site" by Chung et al. (2015), which has got 394 citations, comes next. Lastly, 344 citations have been made to the work of Loureiro et al. (2020), titled "20 years of research on virtual reality and augmented reality in the tourism context: a text mining approach".

Table 4 Documentos más citados

Autor	Título	Citas
Yung et al. (2019)	New realities: a systematic literature review on virtual reality and augmented reality in tourism research	545
Chung et al. (2015)	Tourists' intention to visit a destination: The role of augmented reality (AR) application for a heritage site	398
Loureiro et al. (2020)	20 years of research on virtual reality and augmented reality in tourism context: A text-mining approach	344
Jung et al. (2015)	The determinants of recommendations to use augmented reality technologies: The case of a Korean theme park	326
Kounavis et al. (2012)	Enhancing the tourism experience through mobile augmented reality: Challenges and prospects	303
Tom Dieck et al. (2018)	A theoretical model of mobile augmented reality acceptance in urban heritage tourism	292
He et al. (2018)	When art meets tech: The role of augmented reality in enhancing museum experiences and purchase intentions	270
Chung et al. (2018)	The role of augmented reality for experience-influenced environments: The case of cultural heritage tourism in Korea	236
Tussyadiah et al. (2018)	Embodiment of wearable augmented reality technology in tourism experiences	212
Tom Dieck et al. (2017)	Value of augmented reality at cultural heritage sites: A stakeholder approach	208

Source: author using R software based on information from Scopus (2024).

Analysis of relationships and co-occurrences

Lastly, Figure 4's cluster analysis, which was done using VOS VIEWER, groups the most pertinent phrases based on how frequently they occur. The following keywords are highlighted: Augmented reality, Tourism, Information systems, Immersive, Tourism industry, and Human-computer interaction, among others.

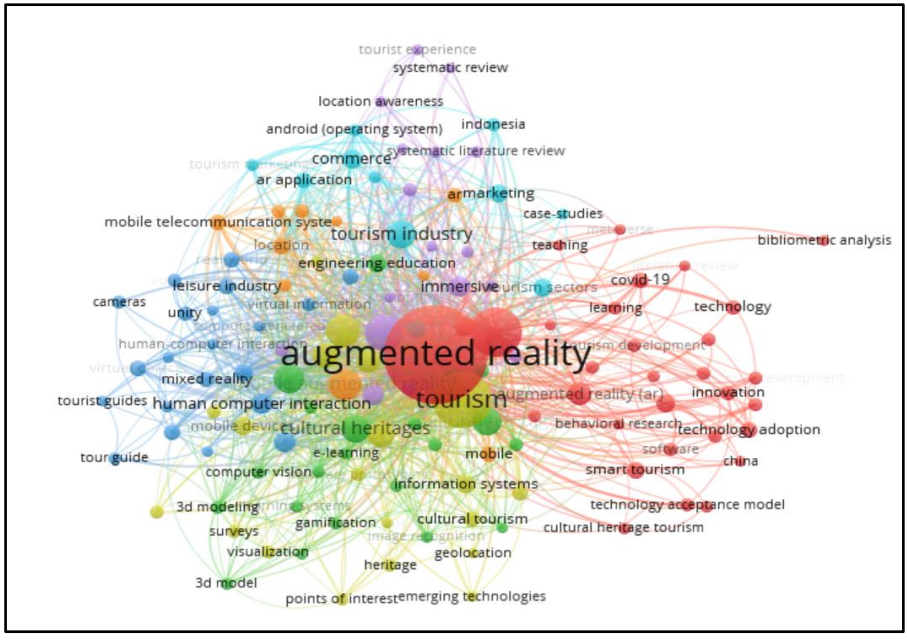

Figure 4. Terms associated with the study topic, source: author based on information from Scopus (2024).

4. CONCLUSIONS

In order to identify emerging trends, highly influential authors, productive institutions, and leading nations in this field, a bibliometric analysis of scientific production pertaining to augmented reality, audiovisual production, and tourism has been conducted in this study. The analysis offers a clear picture of the development of research in this area from 2001 to 2024 and is based on data that was extracted from the Scopus database and processed using R software and VOS Viewer.

The first noteworthy finding, which is consistent with Lotka's Law, is the concentration of scientific productivity within a limited number of writers. The bulk of studies in this topic have been created by a small group of scholars; Hassan A. and Jung T., with 16 and 14 papers, respectively, have produced the most. This pattern implies that a small number of publications are contributed by most authors, whereas a scientific elite is devoted to studying augmented reality, audiovisual creation, and tourism.

In terms of the number of publications, the United Kingdom and India are leading countries in the geographical distribution of scientific production. This emphasizes how important these nations are for studying cutting-edge tourism-related technology. Furthermore, a trend toward

greater geographic diversity in scientific research is shown in the growing prominence of nations like China and Indonesia in this sector.

The significant difference in production between the institutions is another noteworthy observation. With 37 published papers, Manchester Metropolitan University stands out as the most productive. The aforementioned data underscores the significance of specific universities as focal points for augmented reality and tourism research, underscoring their ability to produce insights and draw pertinent global initiatives.

Additionally noteworthy has been the evolution of scientific production over time. According to the analysis, the number of articles increased steadily beginning in 2014 and peaked in 2023. This indicates that, in keeping with technological innovation and the growing need for immersive experiences in the tourism business, the convergence of augmented reality, audiovisual production, and tourism has garnered more attention in the previous ten years.

In conclusion, this bibliometric analysis provides a thorough picture of the current level of research in the fields of tourism, audiovisual production, and augmented reality. Scientific productivity is clearly concentrated in a small number of authors and organizations, and there is a tendency for production to develop steadily over time and expand geographically. These findings offer a strong basis for comprehending how this field of inquiry has evolved and offer fresh ideas for future investigations, particularly in relation to the use of these technologies in creative tourism settings.

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