Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

JOURNAL OF TOURISM, HOSPITALITY AND ENVIRONMENT MANAGEMENT (JTHEM)
www.gaexcellence.com/jthem

IMMERSIVE TECHNOLOGIES IN CULTURAL HERITAGE AND MUSEUM TOURISM: A PRISMA-BASED BIBLIOMETRIC PERFORMANCE ANALYSIS OF SCOPUS-INDEXED LITERATURE (1992–2026)

Jianzhen Liang[1], Tse Guan Tan[2]*, Daeng Haliza Daeng Jamal[3]

[1]Faculty of Creative Technology and Heritage, Universiti Malaysia Kelantan, Malaysia; Academy of Fine Arts, Guangzhou College of Technology and Business, China
c22e018f@siswa.umk.edu.my https://orcid.org/0009-0004-5126-7925
[2]Faculty of Creative Technology and Heritage, Universiti Malaysia Kelantan, Malaysia
tan.tg@umk.edu.my https://orcid.org/0000-0002-9334-0041
[3]Faculty of Creative Technology and Heritage, Universiti Malaysia Kelantan, Malaysia
haliza.j@umk.edu.my https://orcid.org/0000-0003-1772-2512
*Corresponding Author

Article Info:

Article history:
Received date: 27.04.2026
Revised date: 26.05.2026
Accepted date: 10.06.2026
Published date: 23.06.2026

To cite this document:

Liang, J., Tan, T. G., & Jamal, D. H. D. (2026). Immersive Technologies in Cultural Heritage and Museum Tourism: A Prisma-Based Bibliometric Performance Analysis of Scopus-Indexed Literature (1992–2026). *Journal of Tourism Hospitality and Environment Management, 11* (44), 330-348.

Abstract:

This study maps the scientific production on immersive technologies in cultural heritage and museum tourism from 1992 to 2026, identifying the most productive sources, authors, affiliations, countries, subject areas and funding sponsors and tracing the field's temporal evolution. Using the Scopus database, data were extracted on 31 March 2026 through a Boolean query combining immersive-technology descriptors (virtual, augmented and mixed reality; virtual and digital museums) with heritage and museum terms, following the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) framework. After retracted items, errata, duplicates and off-topic records were removed and the corpus was filtered by document type and language, 940 English-language journal articles were retained and analysed across seven dimensions using the Scopus "Analyze results" tool. The field shows sustained growth, from a single article in 1992 to 161 in 2025, with the transformative phase from 2017 onward accounting for 81.7% of output. The Journal on Computing and Cultural Heritage was the most prolific outlet (40 articles) and Puritat, K. the most productive author (13 articles), while Kyung Hee University led the affiliation ranking (15 articles). China was the leading contributor (187 articles), ahead of the United Kingdom (102) and Italy (100), and Computer Science (530) and Social Sciences (376) were the dominant subject areas. The European Commission (20 articles) was the principal funding sponsor. Building on these patterns, the study proposes a

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

research agenda of eight thematic areas. Overall, the field has developed into a sustained, interdisciplinary domain with a dual computing-humanities identity and a geographically diverse contributor base, findings that can help early-career researchers, heritage practitioners and funding agencies identify suitable venues, partners and priority areas for immersive heritage research.

DOI:10.35631/JTHEM.1144021

Keyword:

Bibliometric Analysis, Cultural Heritage, Immersive Technologies, Museum Tourism, Scopus

Introduction

Cultural heritage and museum tourism have undergone important changes in recent years, showing increased integration of digital and immersive technologies and highlighting the growth of virtual, augmented and mixed reality applications. Since the mid-2010s, consumer-grade head-mounted displays, augmented reality (AR)-enabled mobile devices and three-dimensional reconstruction tools have gradually entered heritage sites and museum environments, supporting new forms of visitor experience, cultural interpretation and destination marketing (Bekele et al., 2018; Flavián et al., 2019; Guttentag, 2010). The shift was accelerated during the COVID-19 pandemic, when museums and memory institutions had to move from onsite to online delivery in order to sustain engagement with their audiences (Agostino et al., 2020; Samaroudi et al., 2020).

In this context, a substantial body of scholarly work on immersive technologies in cultural heritage and museum tourism has accumulated across several disciplines, including computing, tourism, archaeology, museum studies and heritage management (Jung & Dieck, 2017; tom Dieck & Jung, 2018; tom Dieck & Jung, 2017; Trunfio & Campana, 2020). Several focused reviews have addressed specific aspects of this field, such as the progress of virtual reality (VR) and AR in tourism and hospitality (Wei, 2019), the comparison of immersive realities for cultural learning in virtual heritage (Bekele & Champion, 2019), the terminology and methodological frameworks of virtual restoration and reconstruction (Pietroni & Ferdani, 2021), and the effects of immersive technologies on customer experience (Flavián et al., 2019). However, a holistic performance-based synthesis of the overall structure of this research field, across more than three decades and across all main performance dimensions simultaneously, has not been conducted.

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

The measurement and comparison of research fields is increasingly important for early-career researchers, heritage institutions and policymakers, as it allows them to identify the most productive venues, the leading contributors and the emerging thematic orientations. Every year, new articles on immersive heritage are published in computing, sustainability, tourism and heritage journals, and the Scopus database provides a curated record of this output (Baas et al., 2020; Mongeon & Paul-Hus, 2016). A method that is currently used to analyse these data is bibliometrics, which is also a promising approach to map the productivity, international distribution and funding landscape of a research field (Donthu et al., 2021; Ellegaard & Wallin, 2015). For these reasons, a bibliometric review was conducted in this work to analyse the scientific production of the research field of immersive technologies in cultural heritage and museum tourism, using the Scopus database (Moral-Muñoz et al., 2020; Passas, 2024).

The article seeks to answer the following research questions: How has the volume of research outputs on immersive technologies in cultural heritage and museum tourism evolved between 1992 and 31 March 2026? Which are the most productive sources, authors, affiliations and countries in this research field? Which subject areas and funding sponsors are most associated with this corpus? Which thematic areas should be prioritised in a forward-looking research agenda for this field?

The data collected and the results obtained in this work are relevant for the research community because this study presents data on the most productive journals, authors and institutions in the field, the subject areas with the highest production, the most influential contributors in terms of overall Scopus impact, the leading countries of origin, the main funding sponsors, and a proposed research agenda for future investigation.

Methodology

A bibliometric performance analysis was conducted using the Scopus database (see Figure 1). The methodology was organised into four sequential stages: database selection, search strategy, screening and eligibility, and data analysis and interpretation. The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) framework (Page et al., 2021; Passas, 2024) was followed throughout the review to support transparency and replicability. This use of PRISMA within a bibliometric workflow follows established procedures that integrate PRISMA screening into bibliometric reviews in the management and tourism literature (Almasri et al., 2021; Eftimov et al., 2025).

Database Selection

To collect the data, a literature search of the Scopus database was conducted on 31 March 2026. The Scopus database was used due to its broad coverage of most areas of knowledge, its curated indexing standards and its analytical functionality, including the “Analyze results” dashboard (Baas et al., 2020). Scopus has been shown to offer broader overall journal coverage than Web of Science, especially in the social sciences; both databases nonetheless under-represent the social sciences and arts and humanities relative to their share of the wider literature (Mongeon & Paul-Hus, 2016), which is relevant for a cross-disciplinary field such as immersive heritage research. Google Scholar was not used, because its indexing is less consistent and less reproducible for performance-based studies.

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

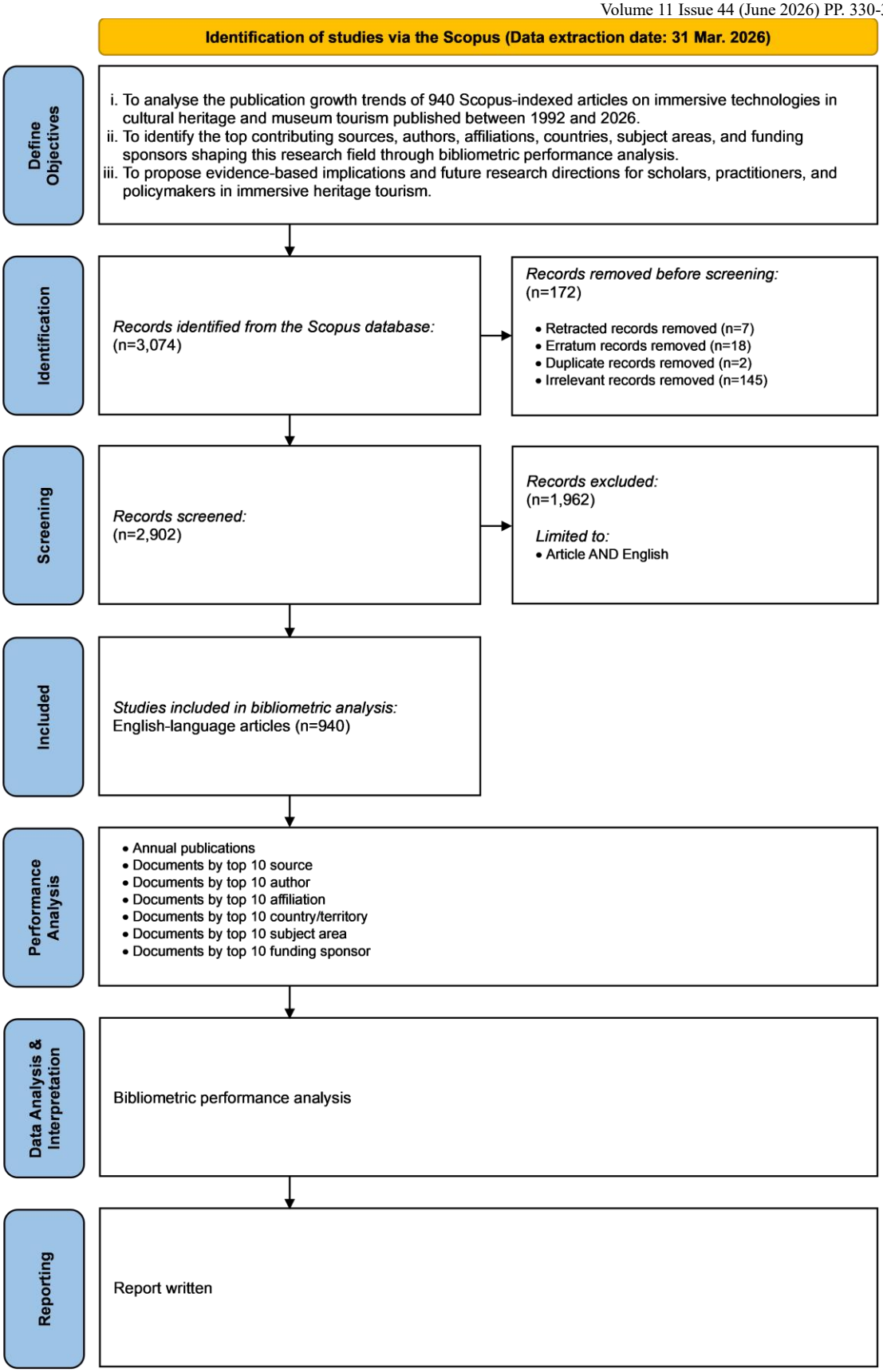

Figure 1: PRISMA-Based Bibliometric Analysis

Source: Page et al. (2021); Passas (2024)

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

Search Strategy

The search equation combined immersive-technology descriptors with heritage- and museum-related terms using the Boolean operators AND and OR, restricted to the title (TI) field so that retrieved articles would be thematically central rather than peripheral. The query was formulated as follows:

```
TITLE((“virtual tour*” OR “virtual visit*” OR “virtual heritage” OR “virtual museum*” OR “digital heritage” OR “digital museum*” OR “augmented reality” OR “virtual reality” OR “mixed reality” OR “extended reality” OR “mobile application*” OR “smartphone application*” OR “immersive technolog*”) AND (“heritage” OR “museum*” OR “cultural heritage” OR “cultural tourism” OR “historic* site*”))
```

This query returned 3,074 documents.

Screening and Eligibility

The initial 3,074 records were verified for accuracy and completeness. At this stage, 172 records were removed: 7 retracted articles, 18 errata, 2 duplicates and 145 off-topic records that matched the title terms only superficially. This left 2,902 records for eligibility filtering. Inclusion criteria were then applied: only items classified as “Article” in Scopus and written in English were retained (Irma et al., 2026; Singh, 2023). Conference proceedings, book chapters, reviews, editorials, notes, letters and non-English publications were excluded. After applying these filters, 1,962 records were excluded at the eligibility stage, and a final corpus of 940 journal articles, published between 1992 and 31 March 2026, was obtained and used in the subsequent analysis.

Data Analysis and Interpretation

The results were exported in CSV format with each document’s bibliographic fields (title, authors, source, year, affiliation, country, subject area, funding sponsor, citations and DOI). Microsoft Excel was used to organise the data and produce the tables and figures. The Scopus “Analyze results” tool was then applied across seven descriptive dimensions: annual publications and the top 10 sources, authors, affiliations, countries/territories, subject areas and funding sponsors. For the top 10 authors, career-level indicators (total citations, indexed documents and h-index) were additionally drawn from their Scopus profiles, so that productivity within the corpus could be read alongside overall scholarly impact.

Results and Discussion

This section reports and interprets the findings across the seven dimensions. The account moves from the field’s growth over time, to the concentration of output among leading sources and authors, to its disciplinary breadth, its geographical spread, and finally its funding landscape, each layer adding to a fuller picture of how the field is structured.

Annual Publications

Across 1992–2026, the field’s output is captured by the retained corpus. Its defining feature over these 35 years is the sharp acceleration observed from 2017 onward.

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

Figure 2 shows the annual publications of the research field between 1992 and 31 March 2026. The temporal distribution can be described in three phases. In the formative phase (1992–2006), the field produced 48 articles in 15 years (5.1% of the corpus), with outputs oscillating between 0 and 11 articles per year. In the transitional phase (2007–2016), the field produced 124 articles in 10 years (13.2% of the corpus), with annual outputs gradually rising from 3 articles in 2007 to 29 articles in 2016. In the transformative phase (2017–2026), the field produced 768 articles in 10 years (81.7% of the corpus), with annual outputs increasing from 30 articles in 2017 to 51 in 2018, 53 in 2019, 61 in 2020, 68 in 2021, 97 in 2022, 84 in 2023, 139 in 2024 and 161 in 2025. The figure of 24 articles reported for 2026 is a partial-year count, because the data were retrieved on 31 March 2026 and cover only the first three months of that year. This partial-year figure should not be compared directly with full-year values for preceding years.

The acceleration observed from 2017 onward coincided with several concurrent developments, including the wider availability of consumer-grade VR and AR devices, the publication of influential conceptual models of immersive heritage tourism and museum experience (Jung et al., 2016; tom Dieck & Jung, 2018; tom Dieck & Jung, 2017; Trunfio & Campana, 2020), and the rapid adoption of digital delivery during the COVID-19 pandemic (Agostino et al., 2020; Samaroudi et al., 2020). The overall trend is consistent with a shift from an early exploratory phase to a sustained period of scholarly engagement, with no clear plateau in annual output by the data cut-off.

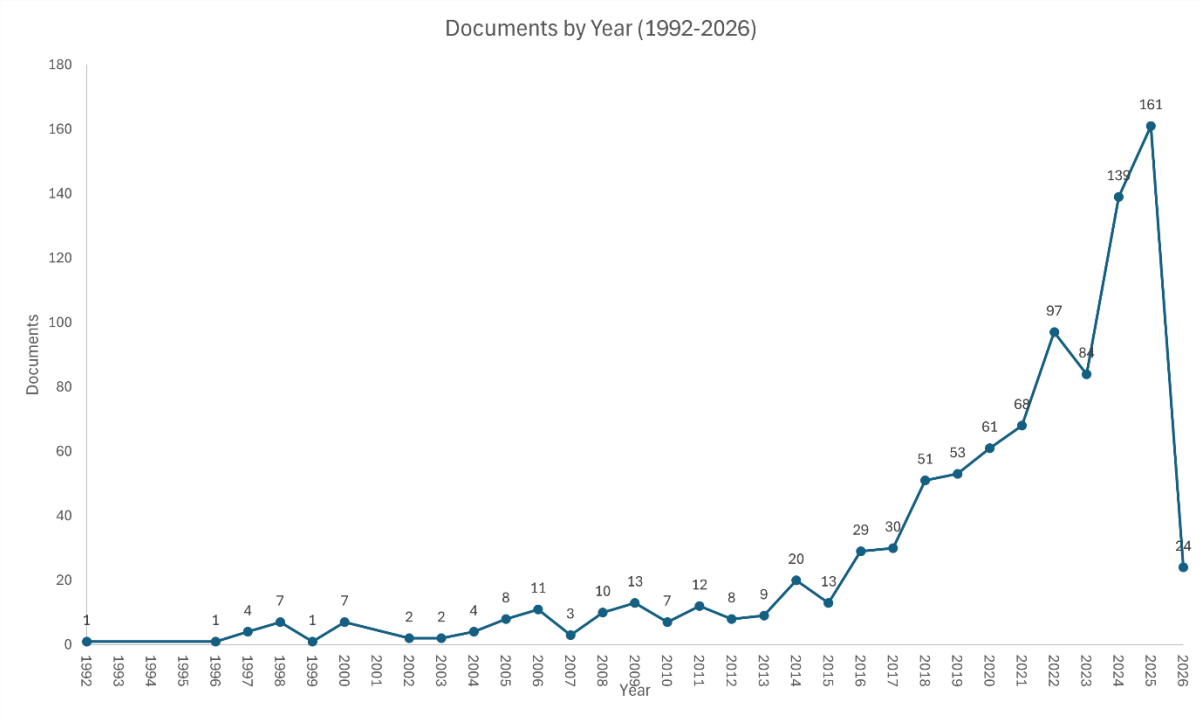

Figure 2: Documents By Year (1992-2026)

Source: Scopus Database (extracted 31 March 2026)

Documents by Top 10 Source

The research field is distributed across a relatively concentrated set of publication venues. Figure 3 shows the top 10 sources, which together account for 202 articles (21.5% of the

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

corpus). In this analysis, the Journal on Computing and Cultural Heritage ranked first in production (40 articles, 4.3% of the corpus). Applied Sciences Switzerland ranked second in production (26 articles, 2.8%), and Heritage ranked third in production (24 articles, 2.6%). The remaining outlets in the top 10 were Sustainability Switzerland (21 articles), Digital Applications in Archaeology and Cultural Heritage (20 articles), the International Journal of Human-Computer Interaction (17 articles), the Journal of Cultural Heritage (16 articles), Virtual Archaeology Review (15 articles), Virtual Reality (12 articles) and Current Issues in Tourism (11 articles).

The distribution reflects a dual orientation of the research field. On one side, computing- and engineering-oriented outlets such as the Journal on Computing and Cultural Heritage, Applied Sciences Switzerland, Digital Applications in Archaeology and Cultural Heritage, Virtual Archaeology Review and Virtual Reality publish contributions focused on the design, development and evaluation of immersive heritage applications. On the other side, heritage-, sustainability- and tourism-oriented outlets such as Heritage, Sustainability Switzerland, the Journal of Cultural Heritage, the International Journal of Human-Computer Interaction and Current Issues in Tourism publish contributions focused on the conceptual, experiential and managerial dimensions of immersive heritage engagement. Three MDPI open-access journals (Applied Sciences Switzerland, Heritage and Sustainability Switzerland) together contribute 71 articles (7.6% of the corpus), which is consistent with the broader dissemination advantage associated with open access (Tennant et al., 2016).

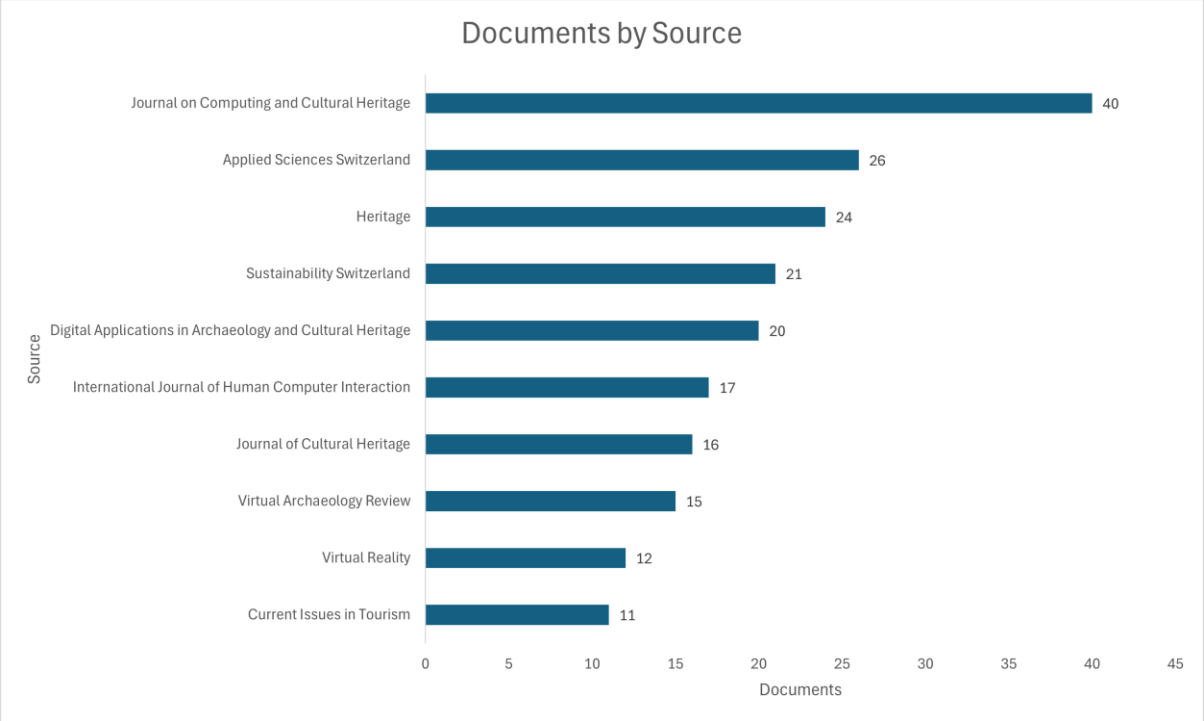

Figure 3: Documents By Top 10 Source

Source: Scopus Database (extracted 31 March 2026)

Documents by Top 10 Author

Figure 4 shows the top 10 authors, who together contributed 78 articles (8.3% of the corpus). In this analysis, Puritat, K. ranked first in production (13 articles, 1.4% of the corpus). Three

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

authors ranked jointly second in production, each with 10 articles (1.1% each): Intawong, K., Jung, T. and tom Dieck, M. C. Zhu, Z. ranked fifth (7 articles), followed by a three-way tie for sixth position between Barrile, V., Champion, E. and Fotia, A., each with 6 articles. Bruno, F. and Fong, L. H. N. ranked jointly ninth, each with 5 articles. The distribution shows two productive research dyads: Puritat, K. and Intawong, K. at Chiang Mai University, Thailand; and Jung, T. and tom Dieck, M. C. at Manchester Metropolitan University, United Kingdom. A third geographic concentration is observed in Italy, where Barrile, V. and Fotia, A. are based at Università degli Studi di Reggio Calabria and Bruno, F. at Università della Calabria.

Table 1 presents the overall Scopus-indexed scholarly impact of the 10 most productive authors, retrieved from their respective author profiles. This allows the raw productivity within the present corpus to be interpreted alongside career-level citations, document counts and h-index values. This table shows that raw productivity in the present corpus does not always correspond to overall scholarly impact. For example, Puritat, K. ranks first in the corpus (13 articles) but has 478 career-level citations and an h-index of 12 across 74 indexed documents. By contrast, Jung, T. and tom Dieck, M. C. each contribute 10 articles to the corpus, but their overall profiles show considerably higher citation counts (8,265 and 6,235, respectively) and h-indices (40 and 32). Bruno, F. and Fong, L. H. N., with 5 articles each in the corpus, report 3,376 and 2,756 career-level citations, respectively. This suggests that corpus-level productivity and overall scholarly impact should be interpreted jointly, as neither indicator captures the full profile of a contributor.

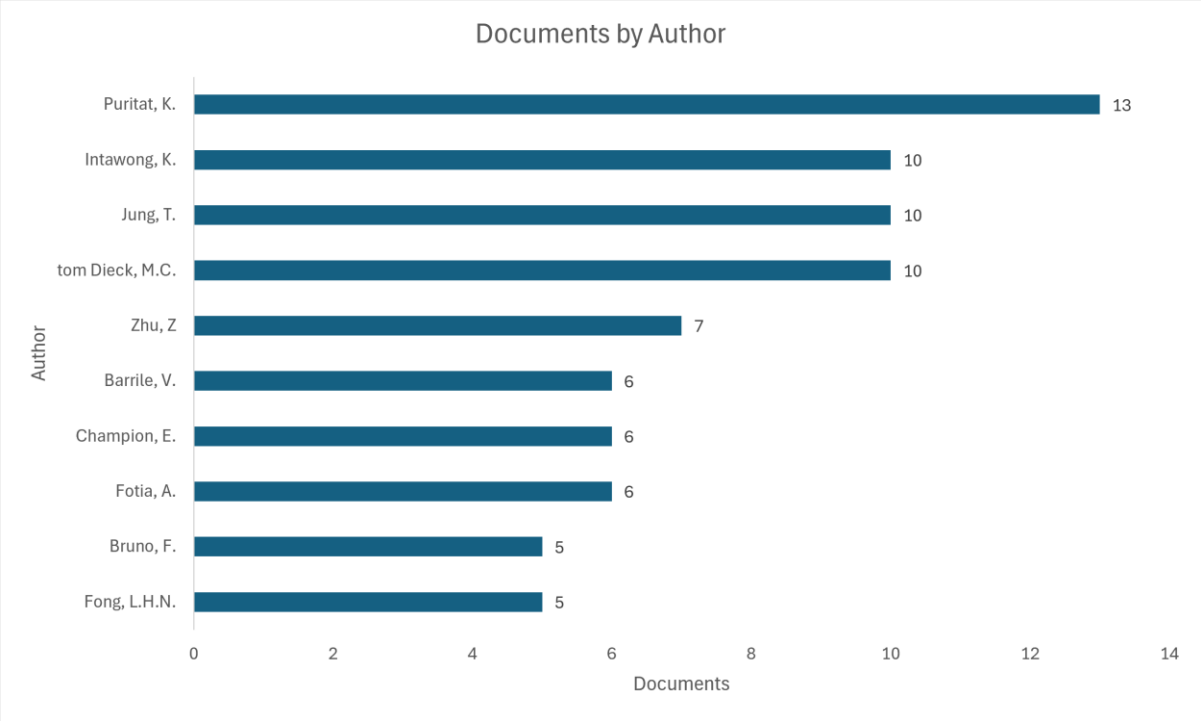

Figure 4: Documents By Top 10 Author

Source: Scopus Database (extracted 31 March 2026)

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

Table 1: Overall Scopus-Indexed Scholarly Impact of the Top 10 Authors

No.	Author	Primary Affiliation	Documents In Corpus	Total Scopus Citations	H-Index
1	Puritat, Kitti	Chiang Mai University, Thailand	**13**	478	12
2	Intawong, Kannikar	Chiang Mai University, Thailand	**10**	476	14
3	Jung, Timothy Hyungsoo	Manchester Metropolitan University, UK	**10**	8,265	40
4	tom Dieck, M. Claudia	Manchester Metropolitan University, UK	**10**	6,235	32
5	Zhu, Zhengan	Shanghai Normal University, China	**7**	717	17
6	Barrile, Vincenzo	Università degli Studi di Reggio Calabria, Italy	**6**	1,289	22
7	Champion, Erik Malcolm	University of South Australia, Australia	**6**	1,231	18
8	Fotia, Antonino	Università degli Studi di Reggio Calabria, Italy	**6**	606	17
9	Bruno, Fabio	Università della Calabria, Italy	**5**	3,376	31
10	Fong, Lawrence Hoc Nang	University of Macau, Macao	**5**	2,756	27

Source: Scopus Database (extracted 31 March 2026)

Documents by Top 10 Affiliation

Figure 5 shows the top 10 affiliations, which together account for 121 articles (12.9% of the corpus). In this analysis, Kyung Hee University (South Korea) ranked first in production (15 articles, 1.6% of the corpus), followed by Manchester Metropolitan University (United Kingdom) with 14 articles (1.5%), Chiang Mai University (Thailand) with 13 articles (1.4%), Zhejiang University (China) with 13 articles (1.4%), Universiti Utara Malaysia (Malaysia) with 12 articles (1.3%), the University of the Aegean (Greece) with 12 articles (1.3%), Consiglio Nazionale delle Ricerche (Italy) with 12 articles (1.3%), Kookmin University (South Korea) with 10 articles (1.1%), Jiangnan University (China) with 10 articles (1.1%), and Curtin University (Australia) with 10 articles (1.1%).

The distribution is geographically diversified. Six of the ten institutions are based in Asia (Kyung Hee University, Chiang Mai University, Zhejiang University, Universiti Utara Malaysia, Kookmin University and Jiangnan University), three in Europe (Manchester Metropolitan University, the University of the Aegean and Consiglio Nazionale delle Ricerche), and one in Oceania (Curtin University). The institutional ranking is consistent with the author ranking: Manchester Metropolitan University corresponds to the Jung–tom Dieck

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

dyad, and Chiang Mai University corresponds to the Puritat–Intawong dyad. The presence of Consiglio Nazionale delle Ricerche, the national research council of Italy, reflects the established national tradition of heritage and archaeological research. The presence of two South Korean universities may reflect concentrated institutional activity in this area, although the drivers of this concentration lie beyond what the present performance data can establish.

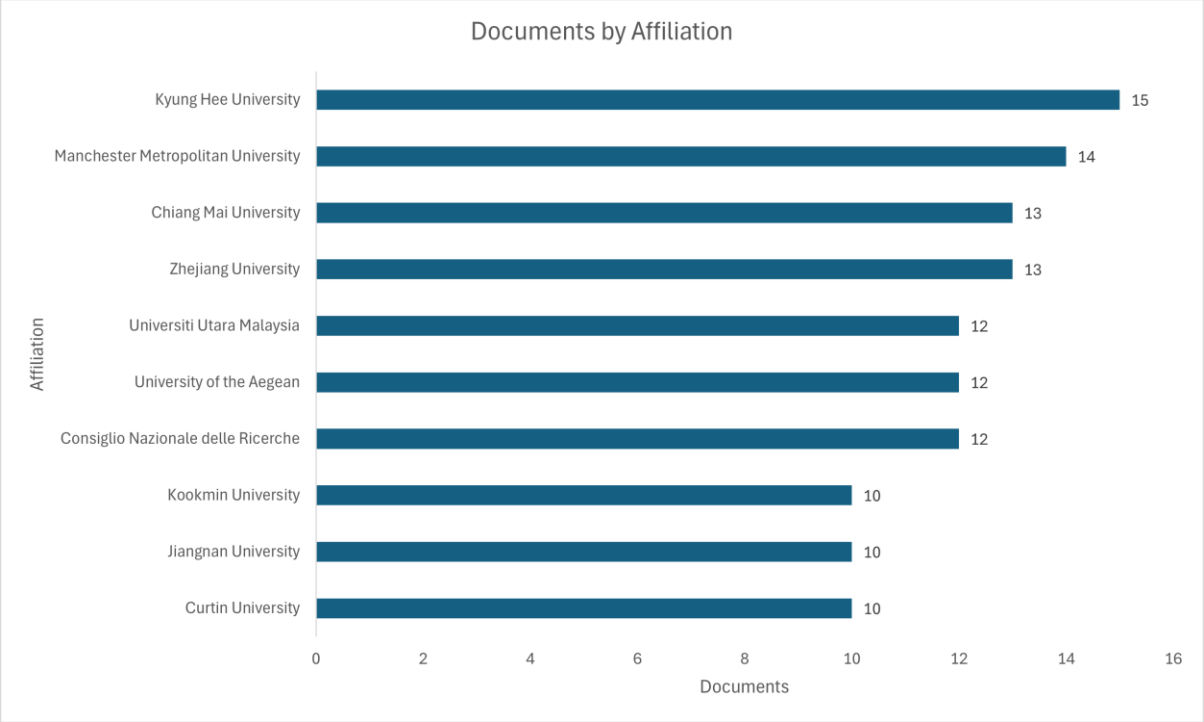

Figure 5: Documents By Top 10 Affiliation

Source: Scopus Database (extracted 31 March 2026)

Documents by Top 10 Country/Territory

Figure 6 shows the top 10 countries/territories by number of articles, which together account for 741 articles (78.8% of the corpus). In this analysis, China ranked first in production (187 articles, 19.9% of the corpus), followed by the United Kingdom (102 articles, 10.9%), Italy (100 articles, 10.6%), the United States (62 articles, 6.6%), Spain (61 articles, 6.5%), Malaysia (59 articles, 6.3%), South Korea (59 articles, 6.3%), Greece (47 articles, 5.0%), Australia (34 articles, 3.6%) and Indonesia (30 articles, 3.2%). China's contribution is almost twice that of the second-ranked country. Within the limits of the Scopus-indexed corpus, this concentration appears consistent with the strong presence of Chinese institutions and funders in the dataset, although the present performance data cannot establish its underlying causes. This observation is consistent with the presence of Zhejiang University and Jiangnan University in the top 10 affiliations and with the contributions of the National Natural Science Foundation of China and the Ministry of Education of the People's Republic of China among the top 10 funding sponsors (see Documents by Top 10 Funding Sponsor section).

The comparable contributions of the United Kingdom (102 articles) and Italy (100 articles) are consistent with the long-established research traditions in heritage interpretation, archaeology and visitor experience in these countries, reinforced by the presence of Manchester Metropolitan University and Consiglio Nazionale delle Ricerche in the top 10 affiliations. The

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

representation of Malaysia (59 articles) and Indonesia (30 articles) points to an emerging Southeast Asian contribution to the field, consistent with the productivity of Universiti Utara Malaysia; the determinants of this contribution warrant dedicated study. The contributions of Greece (47 articles) and Spain (61 articles) are also consistent with the sustained engagement of Mediterranean countries with archaeological and cultural tourism research.

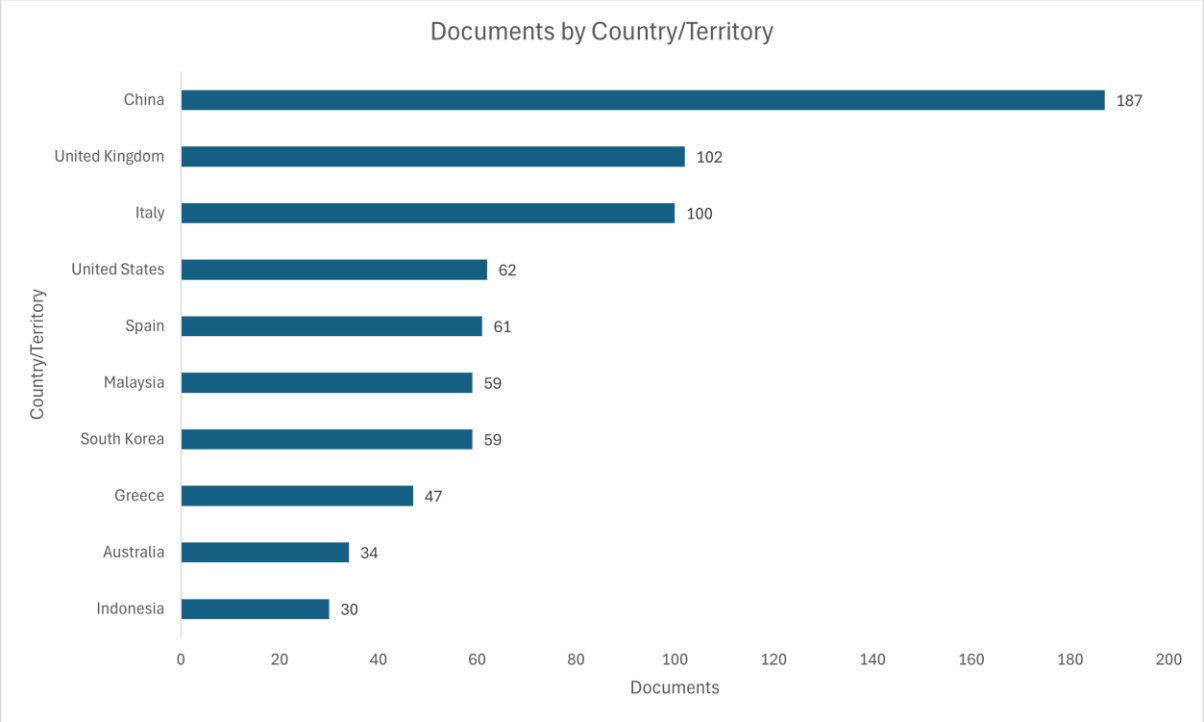

Figure 6: Documents By Top 10 Country/Territory
Source: Scopus Database (extracted 31 March 2026)

Documents by Top 10 Subject Area

Figure 7 shows the top 10 Scopus subject areas by number of articles. The cumulative assignment for the top 10 categories amounts to 1,825 records, which exceeds the 940-article corpus size because Scopus typically classifies each article under several All-Science Journal Classification (ASJC) subject areas. In this analysis, Computer Science ranked first in production (530 articles, 56.4% of the corpus), followed by Social Sciences (376 articles, 40.0%), Arts and Humanities (306 articles, 32.6%), Engineering (207 articles, 22.0%) and Business, Management and Accounting (137 articles, 14.6%). Materials Science (91 articles, 9.7%), Environmental Science (55 articles, 5.9%), Mathematics (53 articles, 5.6%), Physics and Astronomy (38 articles, 4.0%) and Chemistry (32 articles, 3.4%) followed with more specialised contributions.

The distribution reveals the dual identity of the research field. On one side, Computer Science is the dominant subject area, reflecting the technology-driven nature of immersive systems, 3D reconstruction and AR/VR development. On the other side, Social Sciences and Arts and Humanities together account for 682 subject-area assignments, which reflects the humanistic and visitor-experience dimensions of heritage and museum scholarship. Engineering and Business, Management and Accounting add a third layer, corresponding to the technical

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

implementation of immersive applications and to the managerial and marketing aspects of heritage tourism (Flavián et al., 2019; tom Dieck & Jung, 2018) The presence of Materials Science, Environmental Science and the physical sciences is consistent with specialised contributions on conservation science, 3D scanning and reconstruction, and sustainability-oriented heritage management (Scopigno et al., 2011).

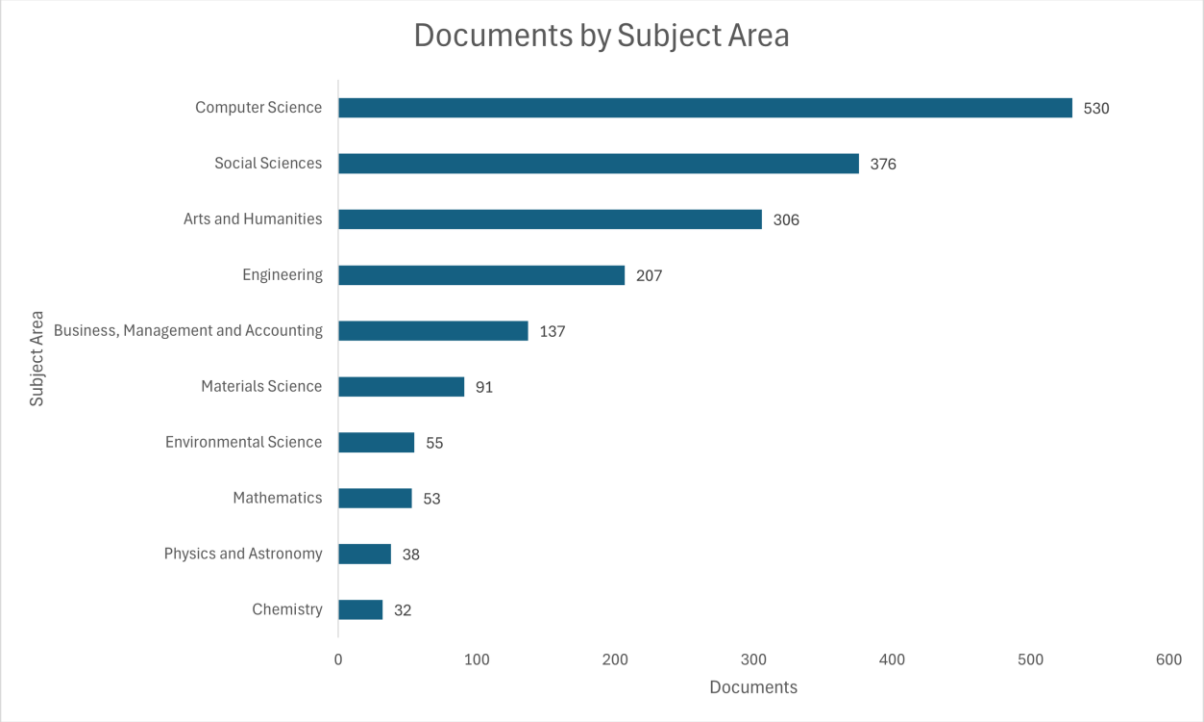

Figure 7: Documents By Top 10 Subject Area

Source: Scopus Database (extracted 31 March 2026)

Documents by Top 10 Funding Sponsor

Figure 8 shows the top 10 funding sponsors by number of articles, which together are associated with 127 articles (13.5% of the corpus). In this analysis, the European Commission ranked first in funding support (20 articles, 2.1% of the corpus), followed by the European Regional Development Fund (18 articles, 1.9%), the National Natural Science Foundation of China (16 articles, 1.7%), the Horizon 2020 Framework Programme (15 articles, 1.6%), the National Science Foundation of the United States (11 articles, 1.2%), the Ministry of Science and Technology of Taiwan (10 articles, 1.1%), the National Research Foundation of Korea (10 articles, 1.1%), Chiang Mai University (9 articles, 1.0%), Fundação para a Ciência e a Tecnologia of Portugal (9 articles, 1.0%), and the Ministry of Education of the People's Republic of China (9 articles, 1.0%).

Two funding clusters can be observed within the analysed dataset. First, European sources (European Commission, European Regional Development Fund and Horizon 2020) together support 53 articles (5.6% of the corpus), which is consistent with the presence of pan-European funding programmes for cultural-heritage digitisation (Scopigno et al., 2011). Second, Chinese national sources (National Natural Science Foundation of China and Ministry of Education of the People's Republic of China) together support 25 articles (2.7% of the corpus). The relatively low top 10 cumulative share of 13.5%, against a corpus of 940 articles, may indicate that a

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

substantial portion of research in this field is conducted without dedicated funding; alternatively, it may reflect incomplete funding metadata in Scopus. These explanations cannot be distinguished using the present data and should be interpreted cautiously.

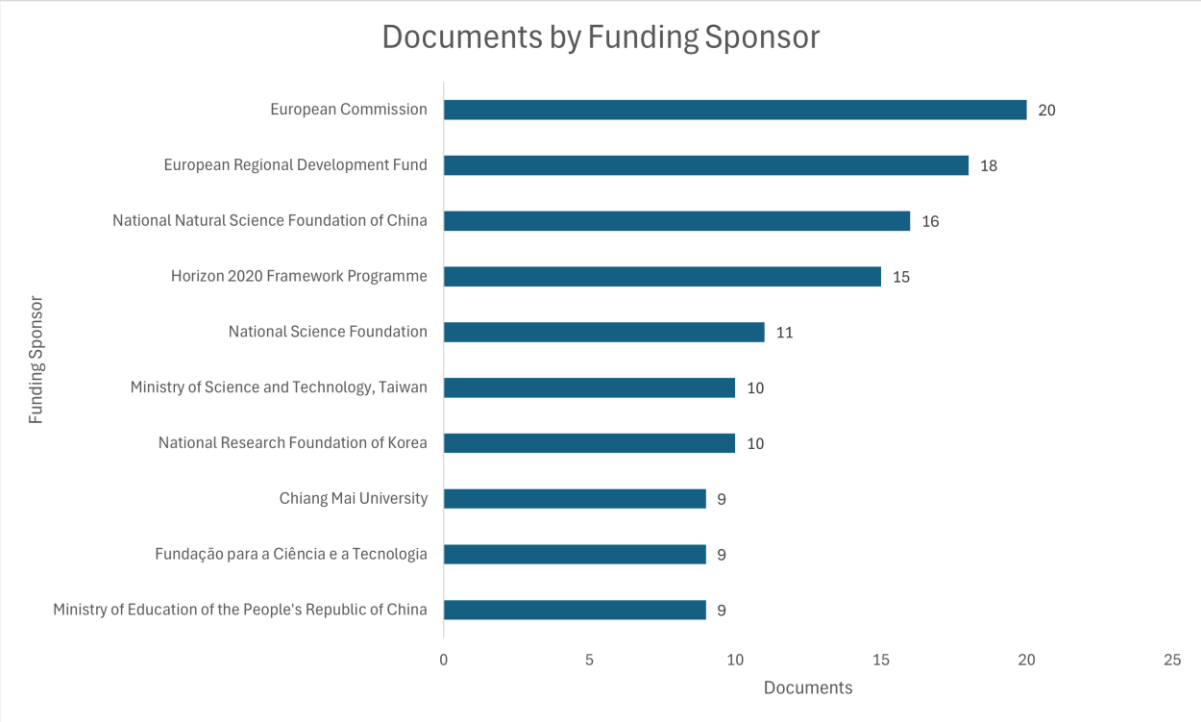

Figure 8: Documents By Top 10 Funding Sponsor

Source: Scopus Database (extracted 31 March 2026)

Research Agenda

Building on the performance patterns above, this section proposes a research agenda for immersive technologies in cultural heritage and museum tourism. Table 2 sets out eight focus areas, each with a short justification grounded in the present findings and one guiding research question. The areas were selected for their current relevance and for what the corpus reveals about the field's structure, and together they mark where further work could most strengthen the links between technology development, heritage scholarship and practice.

Table 2: Proposed Research Agenda

Focus Area	Justification	Possible Research Question
Temporal dynamics of the field	The field grew from 1 article in 1992 to 161 in 2025, with 81.7% of the corpus published from 2017 onward.	What specific factors explain the acceleration of immersive heritage research from 2017 onward, and how stable is this trajectory?
Computing–humanities interdisciplinarity	Computer Science (530 articles) and Social Sciences + Arts and Humanities (682 assignments) are the most prominent subject clusters.	How are computing-driven and humanities-driven contributions integrated within individual immersive heritage projects, and with what outcomes?

Author collaboration dyads	Two productive dyads (Puritat–Intawong at Chiang Mai University; Jung–tom Dieck at Manchester Metropolitan University) anchor the top 10 authors.	How do this collaboration dyads shape thematic focus, methodological choices and citation patterns in the field?
Leading Asian contribution	China leads country production (187 articles), with Zhejiang University and Jiangnan University in the top 10 affiliations.	Which national policies and institutional mechanisms underlie China's leading share of immersive heritage research?
Emerging Southeast Asian contribution	Malaysia (59) and Indonesia (30) rank within the top 10 countries, with Universiti Utara Malaysia in the top 10 affiliations.	How are Southeast Asian cultural contexts shaping the implementation and reception of immersive heritage applications?
Open-access publishing dynamics	Three MDPI outlets (Applied Sciences, Heritage, Sustainability) contribute 71 articles (7.6% of the corpus).	What is the effect of open-access venues on citation patterns and practitioner uptake of immersive heritage research?
Funding landscape and reporting completeness	The top 10 funding sponsors together cover only 13.5% of the corpus, which may reflect limited dedicated funding or incomplete funding metadata.	To what extent is funding for immersive heritage research under-reported in Scopus metadata, and how can reporting practices be improved?
Science-mapping extensions	The present study adopted a performance-only approach; science-mapping was not performed.	What intellectual structures and thematic clusters emerge when co-citation, bibliographic coupling and keyword co-occurrence analyses are applied to this 940-article corpus?

Implications

Read together, these seven dimensions do more than describe the field; they carry concrete consequences for how research is produced, funded and applied. The following subsections develop these consequences for theory and for practice across academia, heritage institutions, tourism management and policy.

Theoretical Implications

The findings of this study contribute to a better understanding of the structure and evolution of the research field of immersive technologies in cultural heritage and museum tourism. First, the three-phase temporal pattern (formative 1992–2006 with 48 articles; transitional 2007–2016 with 124 articles; transformative 2017–2026 with 768 articles) supports the view that the field has transitioned from an exploratory subdomain of computing research to a sustained interdisciplinary area of scholarly investigation. This pattern extends earlier reflections on the diffusion of VR and AR in tourism and hospitality research (Wei, 2019).

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

Second, the co-dominance of Computer Science (530 articles) together with Social Sciences (376 articles) and Arts and Humanities (306 articles) supports the characterisation of immersive heritage research as a genuinely cross-disciplinary field rather than a single-discipline endeavour. The significant presence of Engineering (207 articles) and Business, Management and Accounting (137 articles) further reinforce this interdisciplinary character. Theoretical development in this field should therefore combine insights from information systems, tourism marketing, heritage studies and museum studies (Bekele et al., 2018; Flavián et al., 2019).

Third, the joint interpretation of corpus-level productivity and overall Scopus impact in Table 1 shows that different authors occupy complementary positions in the research field. Authors with high corpus productivity but moderate overall impact (Puritat, K., Intawong, K.) coexist with authors of lower corpus productivity but substantially higher career-level impact (Jung, T., tom Dieck, M. C., Bruno, F., Fong, L. H. N.). This observation contributes to the theoretical discussion of how bibliometric indicators capture different dimensions of scholarly contribution (Donthu et al., 2021).

Practical Implications

The results also have several practical implications. For early-career researchers entering the field, the concentration of outputs in a relatively small set of sources and institutions (top 10 sources account for 21.5%, top 10 affiliations account for 12.9% of the corpus) identifies target venues and potential collaborators. Engagement with the Journal on Computing and Cultural Heritage, Applied Sciences Switzerland, Heritage, Sustainability Switzerland, Digital Applications in Archaeology and Cultural Heritage, the International Journal of Human-Computer Interaction, the Journal of Cultural Heritage, Virtual Archaeology Review, Virtual Reality and Current Issues in Tourism may be particularly useful for submitting new work.

For heritage tourism practitioners and museum managers, the country-level prominence of China (187 articles), the United Kingdom (102) and Italy (100), together with the contributions of Southeast Asian countries (Malaysia with 59 articles, Indonesia with 30), suggests that practical insights on implementing immersive experiences may be drawn from a geographically diverse set of national contexts. Practitioners may benefit from consulting outputs from these countries when designing immersive programmes suited to their own cultural and visitor contexts.

For policymakers and funding agencies, the evidence of two funding pillars (European programmes with 53 articles; Chinese national agencies with 25 articles) may inform strategic partnership decisions and future funding calls. The relatively small cumulative share of the top 10 funding sponsors (13.5%) also points to an opportunity to strengthen dedicated funding pipelines and funding-reporting practices for immersive heritage research, particularly outside Europe and East Asia.

Limitations

The main limitation of this research is that only scientific production indexed in Scopus was evaluated. Relevant contributions may exist in other databases, including Web of Science, Google Scholar and field-specific repositories, which were not reviewed (Mongeon & Paul-Hus, 2016). A second limitation is that only English-language articles were retained. Articles published in other languages, which may offer alternative theoretical perspectives or regionally

specific implementation strategies, were excluded from the analysis. A third limitation is that the search equation was restricted to the TITLE field to maximise precision. This may have excluded articles that discuss immersive heritage technologies in their abstract or keywords but not in the title. A fourth limitation is that the document type filter retained only Articles, so that conference proceedings, book chapters, reviews and other document types were not considered, even though they may contain influential contributions in technology-oriented research communities. A fifth limitation is that the study adopted a performance analysis approach based on the Scopus "Analyze results" functionality, and did not incorporate science-mapping techniques such as co-citation analysis, bibliographic coupling or keyword co-occurrence networks (Donthu et al., 2021). Finally, the data cut-off date of 31 March 2026 means that the figure of 24 articles reported for 2026 reflects only the first quarter of that year and is not directly comparable with full-year values for preceding years.

The main strengths of this study are that Scopus is a curated, high-quality bibliometric database with broad disciplinary coverage (Baas et al., 2020), and that the PRISMA framework was followed to support transparency and replicability (Page et al., 2021). Therefore, the results can help the research community to continue building knowledge on immersive technologies in cultural heritage and museum tourism. It is recommended that future work complements the present findings with analyses of other indexed databases, such as Web of Science and regional repositories, to broaden the evidence base.

Conclusion

This study examined 35 years of scientific production on immersive technologies in cultural heritage and museum tourism (1992–2026) indexed in the Scopus database. A total of 940 English-language journal articles, prepared by a globally distributed network of contributors and published across 10 principal journals, were analysed using a PRISMA-based bibliometric performance method across seven dimensions.

The contribution of this work is threefold. Strategically, it offers a decision-useful map of the field, giving early-career researchers, heritage institutions and funding agencies a concrete basis for choosing where to publish, whom to partner with and where to direct investment. For interdisciplinary scholarship, it characterises the computing–humanities profile as a structural feature rather than an incidental one — Computer Science (530 articles) alongside Social Sciences (376) and Arts and Humanities (306) — suggesting that theory and method in this field benefit from drawing on both traditions. Looking forward, the eight-area research agenda turns these patterns into actionable directions: from the post-2017 acceleration (81.7% of output), the field's internationally distributed base (China, 187 articles; the United Kingdom, 102; Italy, 100) and its dual funding pillars (European programmes, 53 articles; Chinese national agencies, 25) to open-access dynamics, funding-reporting practices and the science-mapping analyses still to be undertaken.

The objective of this research was to determine the most productive sources, authors, affiliations, countries, subject areas and funding sponsors, and to describe the temporal evolution of the research field. The results section showed the temporal trend of publications, the most relevant authors and institutions, the countries of origin, the subject areas and the main funding sponsors. A research agenda of eight focus areas was proposed to orient further investigation, covering temporal dynamics, interdisciplinarity, collaboration dyads, leading and

emerging country contributions, open-access dynamics, funding reporting and science-mapping extensions.

It is recommended that the results be complemented by future research on other indexed databases, including Web of Science, by studies covering non-English publications, and by science-mapping analyses that can reveal the intellectual structures and thematic clusters of the field beyond the performance patterns documented here.

Acknowledgements: This work was supported by the Science, Technology, Engineering, and Mathematics (STEM) Research Group at the Faculty of Creative Technology and Heritage, Universiti Malaysia Kelantan (UMK).

Funding Statement: No Funding

Conflict of Interest Statement: The authors declare that there is no conflict of interest regarding the publication of this paper. All authors have contributed to this work and approved the final version of the manuscript for submission to the Journal of Tourism, Hospitality and Environment Management (JTHEM).

Ethics Statement: This study did not involve any human participants, animals, or sensitive data requiring ethical approval. The authors confirm that the research was conducted in accordance with accepted academic integrity and ethical publishing standards.

Author Contribution Statement: All authors contributed significantly to the development of this manuscript. Tse Guan Tan and Daeng Haliza Daeng Jamal jointly conceptualized the study, designed the methodology, and provided overall supervision throughout the research process. Jianzhen Liang was responsible for the data collection, formal analysis, and interpretation of the results, as well as drafting the original manuscript. Tse Guan Tan and Daeng Haliza Daeng Jamal further contributed to the critical revision of the manuscript for important intellectual content and provided continuous guidance during the literature review and writing stages. All authors have read and approved the final version of the manuscript prior to submission.

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 11 Issue 44 (June 2026) PP. 330-348

References

Agostino, D., Arnaboldi, M., & Lampis, A. (2020). Italian state museums during the COVID-19 crisis: from onsite closure to online openness. *Museum Management and Curatorship*, *35*(4), 362-372. https://doi.org/10.1080/09647775.2020.1790029

Almasri, H., Zakuan, N., Amer, M., & Majid, M. (2021). A Developed Systematic Literature Review Procedure with Application in the Field of Digital Transformation. *Studies of Applied Economics*, *39*. https://doi.org/10.25115/eea.v39i4.4559

Baas, J., Schotten, M., Plume, A., Côté, G., & Karimi, R. (2020). Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies. *Quantitative Science Studies*, *1*(1), 377-386. https://doi.org/10.1162/qss_a_00019

Bekele, M. K., & Champion, E. (2019). A Comparison of Immersive Realities and Interaction Methods: Cultural Learning in Virtual Heritage [Review]. *Frontiers in Robotics and AI*, *Volume 6 - 2019*. https://doi.org/10.3389/frobt.2019.00091

Bekele, M. K., Pierdicca, R., Frontoni, E., Malinverni, E. S., & Gain, J. (2018). A Survey of Augmented, Virtual, and Mixed Reality for Cultural Heritage. *J. Comput. Cult. Herit.*, *11*(2), Article 7. https://doi.org/10.1145/3145534

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285-296. https://doi.org/10.1016/j.jbusres.2021.04.070

Eftimov, L., Barišić, P., Cvetkoska, V., & Kitanovikj, B. (2025). Charting the trajectory of performance management in tourism: A prisma-compliant systematic review and visualization of bibliographic data. *Tourism and hospitality management*, *31*. https://doi.org/10.20867/thm.31.1.10

Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact? *Scientometrics*, *105*(3), 1809-1831. https://doi.org/10.1007/s11192-015-1645-z

Flavián, C., Ibáñez-Sánchez, S., & Orús, C. (2019). The impact of virtual, augmented and mixed reality technologies on the customer experience. *Journal of Business Research*, *100*, 547-560. https://doi.org/10.1016/j.jbusres.2018.10.050

Guttentag, D. A. (2010). Virtual reality: Applications and implications for tourism. *Tourism Management*, *31*(5), 637-651. https://doi.org/10.1016/j.tourman.2009.07.003

Irma, J., Rizki, S. A., Kartasasmita, A. S., Kartiwa, A., & Irfani, I. (2026). Exploring Trends in Endoscopic Dacryocystorhinostomy Research in Asia: A Bibliometric Analysis. *Surgeries*, *7*(1), 32. https://www.mdpi.com/2673-4095/7/1/32

Jung, T., tom Dieck, M. C., Lee, H., & Chung, N. (2016). Effects of Virtual Reality and Augmented Reality on Visitor Experiences in Museum. Information and Communication Technologies in Tourism 2016, Cham.

Jung, T. H., & Dieck, M. C. T. (2017). Augmented reality, virtual reality and 3D printing for the co-creation of value for the visitor experience at cultural heritage places [Article]. *Journal of Place Management and Development*, *10*(2), 140-151. https://doi.org/10.1108/jpmd-07-2016-0045

Mongeon, P., & Paul-Hus, A. (2016). The journal coverage of Web of Science and Scopus: a comparative analysis. *Scientometrics*, *106*(1), 213-228. https://doi.org/10.1007/s11192-015-1765-5

Moral-Muñoz, J. A., Herrera-Viedma, E., Santisteban-Espejo, A., & Cobo, M. J. (2020). Software tools for conducting bibliometric analysis in science: An up-to-date review. *Profesional de la información*, *29*(1), Article e290103. https://doi.org/10.3145/epi.2020.ene.03

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., . . . Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, *372*, n71. https://doi.org/10.1136/bmj.n71

Passas, I. (2024). Bibliometric Analysis: The Main Steps [Article]. *Encyclopedia*, *4*(2), 1014-1025. https://doi.org/10.3390/encyclopedia4020065

Pietroni, E., & Ferdani, D. (2021). Virtual Restoration and Virtual Reconstruction in Cultural Heritage: Terminology, Methodologies, Visual Representation Techniques and Cognitive Models. *Information*, *12*(4), 167. https://www.mdpi.com/2078-2489/12/4/167

Samaroudi, M., Echavarria, K. R., & Perry, L. (2020). Heritage in lockdown: digital provision of memory institutions in the UK and US of America during the COVID-19 pandemic. *Museum Management and Curatorship*, *35*(4), 337-361. https://doi.org/10.1080/09647775.2020.1810483

Scopigno, R., Callieri, M., Cignoni, P., Corsini, M., Dellepiane, M., Ponchio, F., & Ranzuglia, G. (2011). 3D Models for Cultural Heritage: Beyond Plain Visualization. *Computer*, *44*(7), 48-55. https://doi.org/10.1109/MC.2011.196

Singh, R. (2023). A bibliometric analysis and visualisation of research trends in Carbon Reinforced Plastics. *Materials Today: Proceedings*, *81*, 899-903. https://doi.org/10.1016/j.matpr.2021.04.284

Tennant, J., Waldner, F., Jacques, D., Masuzzo, P., Collister, L., & Hartgerink, C. (2016). The academic, economic and societal impacts of Open Access: an evidence-based review [version 3; peer review: 4 approved, 1 approved with reservations]. *F1000Research*, *5*(632). https://doi.org/10.12688/f1000research.8460.3

tom Dieck, M. C., & Jung, T. (2018). A theoretical model of mobile augmented reality acceptance in urban heritage tourism. *Current Issues in Tourism*, *21*(2), 154-174. https://doi.org/10.1080/13683500.2015.1070801

tom Dieck, M. C., & Jung, T. H. (2017). Value of augmented reality at cultural heritage sites: A stakeholder approach. *Journal of Destination Marketing & Management*, *6*(2), 110-117. https://doi.org/10.1016/j.jdmm.2017.03.002

Trunfio, M., & Campana, S. (2020). A visitors' experience model for mixed reality in the museum. *Current Issues in Tourism*, *23*(9), 1053-1058. https://doi.org/10.1080/13683500.2019.1586847

Wei, W. (2019). Research progress on virtual reality (VR) and augmented reality (AR) in tourism and hospitality: A critical review of publications from 2000 to 2018. *Journal of Hospitality and Tourism Technology*, *10*(4), 539-570. https://doi.org/10.1108/jhtt-04-2018-0030