

The Role of Augmented Reality (AR) and Virtual Reality (VR) in Urban Heritage Tourism: A Study on Adoption and Communication Challenges

Winne Wardiani, Agus Rusmana, Ninis Agustini Damayani and Ute Lies Siti Khadija

Faculty of Communication Sciences, Padjadjaran University, Indonesia

Article history

Received: 05-02-2025

Revised: 12-05-2025

Accepted: 17-06-2025

Corresponding Author:

Winne Wardiani

Faculty of Communication

Sciences, Padjadjaran University,

Indonesia

Email: willyaw48@gmail.com

Abstract: Heritage tourism has become the fastest-growing segment of tourism that offers authentic value-add to homogenized experiences worldwide. This topic has drawn increasing attention from scholars and academics over the past five years. This paper aims to map research trends in urban heritage tourism, exploring the paradox between Augmented Reality (AR) and Virtual Reality (VR) in marketing communication. The study uses Vos viewer, Cite Space, and R Studio for bibliometric analysis. The method used in this research is qualitative research with a literature study approach. As for the data found, 158 documents were obtained and analyzed. This dataset was converted to CSV, Bib Tex, and RIS Format and imported into bibliophila for Bibliometrics and analysis. The main findings show that urban heritage tourism debates technology adoption in promoting urban heritage tourism. Previous scholars are looking for alternatives and adoption between AR and VR. However, there is no common ground between the two options. From the findings of this research, the author sees that there is a need to reconceptualize and propose a management find a competitive heritage and history tourism ecosystem that promotes heritage authenticity, gives the City a particular character and makes it unique. Another thing is urban heritage tourism, good governance, which involves heritage culture as a driving force for sustainable development so that it becomes economic regeneration and market tourism. Finally, various countries responding to urban heritage tourism include the as an alternative communication between AR/VR and Walking Tour Communication. Walking tour urban heritage is a form of social interaction that allows guides and tourists to share their knowledge and experiences and appreciate the cultural diversity that has shaped the City, supported through augmented reality and virtual reality promotion.

Keywords: Augmented Reality, Communication, Management, Urban Heritage Tourism, Virtual Reality

Introduction

The terms "heritage," "urban heritage," and "historic city" first appeared in the West in the 19th century and were consolidated in the early 20th century (Barrado-Timón & Hidalgo-Giralt, 2019). Since then, it has become an essential issue in theoretical and practical work on development in many cities. Heritage is understood as shared (social) memory, often represented in landscapes, cityscapes, monuments, cultural heritage, buildings, and languages.

Heritage tourism has become the fastest-growing segment of tourism that offers authentic added value to homogenized experiences worldwide (Kar *et al.*, 2020).

The expression communication paradox describes the clash of new tourism technologies and the need to present cultural heritage honestly. Augmented Reality (AR) and Virtual Reality (VR), on the one hand, deepen stories and draw users in, making distant places close. Yet, these same tools can package a legacy for sale or remove it from context as the online world drifts free from the physical world (Lak *et al.*, 2020). For example, AR can layer images during a live guided walk, but it usually requires costly safety glasses or phone apps, leaving some visitors out. VR, on the other hand, opens up fragile or remote places to everyone, but locks the viewer's headset and trades real smell, sound, and touch for simulated clues that call into question claims of

authenticity. The tension between these gains and losses forms the main issue of this article.

Heritage tourism has long been used as a development tool around the world due to its potential benefits of creating jobs (Little *et al.*, 2020), generating tax revenue, stimulating entrepreneurial activities, improving infrastructure and recreational opportunities, empowering citizens, and improving the overall quality of life of destinations and local communities.

Tourism is a rapidly growing sector that significantly contributes to national economies, of course, this issue, stakeholders, communities, and cultural heritage tourism actors are increasingly looking for new ways to engage visitors through the latest technological innovations (Tom Dieck *et al.*, 2016). One of the widely adopted concepts is their firm intention to travel.

Previous research has explored multiple themes in urban heritage tourism. This study focuses on two major themes: the role of Augmented Reality (AR) and Virtual Reality (VR) in urban heritage, as analyzed through bibliometric research. The researcher hypothesizes that there are still some areas that are often overlooked in previous studies, such as mapping the survey of urban heritage tourism studies globally (Yagi & Frenzel, 2022), as previous critical studies of cultural heritage highlight the importance of studying the production of cultural heritage that is never given but always made and remade.

We hope this study will contribute to new knowledge about urban heritage tourism. The strategic questions underlying this theme issue are as follows: the transition of Augmented Reality (AR) or Virtual Reality (VR), from what tourism solutions tourism industry stakeholders so that it can maintain the authenticity of cultural heritage while fulfilling its tourism needs and can be sustainable urban heritage tourism.

Although cultural tourism increasingly relies on Augmented Reality (AR) and Virtual Reality (VR), researchers still cannot agree on which technology better promotes authenticity, sustainability, and visitor engagement at urban heritage sites. Most existing studies treat AR and VR as interchangeable or rival media, yet they seldom isolate the unique effects each has on urban heritage communication strategies (Rajapakse, 2017). This project therefore attempts to clarify how AR and VR individually shape the promotion and onsite experience of urban heritage tourism, and to develop practical frameworks that blend both tools while safeguarding cultural integrity and enriching visitors' journeys.

This study is guided by the following research questions:

1. What are the key differences in how AR and VR affect user experience in urban heritage tourism?
2. How do AR and VR differ in terms of accessibility and adoption feasibility by heritage tourism

stakeholders?

3. In what ways do AR and VR contribute to or detract from preserving historical authenticity?
4. How can AR and VR be strategically integrated to support sustainable urban heritage tourism?

Despite the growing literature on augmented and virtual reality in heritage tourism, four critical blind spots still remain. First, few studies directly consider user experiences, perceptions of cultural authenticity, or ease of access when comparing AR and VR side-by-side. Second, researchers rarely ask whether new technologies respect the ethics of preservation, instead they tend to celebrate novelty at the expense of historical rigor (Zeng *et al.*, 2023). Thirdly, the published results are rarely based on a specific local context, so that the application patterns of one city cannot simply inform another. Finally, there is still little data to document tangible results emotional engagement, learning benefits, changes in visitor behavior, or even revenue as most of the evidence comes from self-reported impressions. To address these shortcomings, this study uses bibliometric mapping to track changing research topics, highlight stakeholder voices, and map the strategic applications of AR and VR in urban heritage communication.

The study conducts a clear bibliometric review, allowing readers to see how scholarship on AR/VR in urban heritage tourism has evolved across journals, years and authors.

By mapping citation networks, it pinpoints main themes and highlights a rising wave of articles focused on using immersive tools to market destinations and explain cultural sites.

The paper stops short of offering its own conceptual lens or model that could direct future developers or curators in choosing and shaping AR/VR projects. Neither are its bibliometric findings matched against on-the-ground evidence, such as implemented case studies, industry roll-outs or relevant policy moves.

Previous research is summarized rather than deeply critiqued, so it remains vague how the current review truly extends, challenges or otherwise converses with what scholars have already said.

Literature Review

Urban Heritage Tourism: Conceptual and Theoretical Perspectives

In recent years, urban heritage tourism has moved to the forefront of scientific debates as cities seek to share their past with paying guests without sacrificing the fabric of history. The idea is to highlight monuments, distinctive buildings and historic quarters in a way that gives visitors memorable stories while funding the renewal of public space and the formation of local identity. By its very nature Xu and Sofield (2017), this practice is seen as a dual-purpose cultural and economic

driver that allows municipalities to benefit from their unique heritage and strive for a more sustainable future.

Several theories have been used on this topic, focused on the intersecting institutional, social, and cultural forces in China's heritage cities, while Zhang *et al.* (2023), placed sustainable resource management at the heart of conservation work, added to the debate on authenticity by analyzing how handicraft traditions can be marketed without losing their original meaning.

There is still a sore lack of comprehensive governance frameworks that align new technology with the preservation of authentic heritage. Models oriented towards creative tourism and place-based planning highlight the voice of the community and local knowledge as central values. Yet Handapangoda *et al.* (2019), they rarely accommodate the rapid pace of emerging digital tools such as Augmented Reality (AR) and Virtual Reality (VR) for heritage tourism.

The choice between AR and VR in urban heritage communication thus illustrates the broader conflict between designing engaging encounters and protecting the authenticity of the material. The augmented reality innovations noted by Jiang *et al.* (2023) enrich on-site visits by superimposing digital layers on top of real landscapes, thereby deepening visitor affection and interpretation. VR, on the other hand, allows virtual

passage to fragile or enclosed places, although it may inadvertently alienate users from the physical fabric of cultural heritage objects. Recent bibliometric reviews document a sharp upward trend in publications that focus on the AR-VR paradox in presenting legacy (Işık *et al.*, 2022). Augmented reality is often celebrated for enabling on-site collective meaning-making, while virtual reality is praised for its broad reach and system-wide scalability. Crucially, neither medium has yet succeeded in balancing authenticity with wider access, leaving the theoretical tension of the discipline unresolved.

Research Mapping and Future Directions

This article provides one of the first comprehensive bibliometric maps of urban heritage tourism, drawing on multiple data sources and analytical layers. Platforms like Vos Viewer, Cite Space, and R Studio map topic growth, keyword collaboration, and citation flows from 2019 to 2023. The results show tight clusters around sustainability, gentrification, community engagement, and smart heritage technology (Jeong *et al.*, 2023). These trends point to a pressing call for transdisciplinary frameworks that combine management, tourism promotion, and digital experimentation. The resulting dialogue favours participatory models that equip local actors, engage new digital media, and increase visitor interaction and nature conservation.

Table 1: Review of existing urban heritage tourism

Author	Theory/Model	Key Variables/Concepts	Research Method	Tourism Adoption Approach
Mandaka & Ikaputra (2021)	Urban Heritage Tourism	Building maintenance, planning, tourism development	Literature Review	Policy and planning focused
Xu & Sofield (2017)	Urban Heritage Tourism	Institutional, cultural, social, and economic factors	Literature Review	City-level policy analysis
Handapangoda <i>et al.</i> (2019)	Cultural Heritage & Tourism	Concept of authenticity, artisans	Ethnographic Research	Community/Artisan engagement
Soliman (2017)	Sustainable Heritage Tourism	Human resources, cultural assets, development strategies	Literature Review	Sustainable resource management
Setyaningsih <i>et al.</i> (2016)	Creative-Based Tourism	Local wisdom, society	Qualitative Research	Community-driven cultural tourism

From the Table 1, we can see some previous studies that have adopted urban heritage tourism. First, it explains and raises the importance of maintaining historic assets through urban heritage tourism. This Concept is designed to preserve historic buildings by planning, applying Rania and Hamza, (2023), developing, and integrating tourism on heritage principles without reducing the prevailing cultural values so that urban heritage tourism can describe the past to be presented in the present and further as an attraction of a city. The second describes the conservation and reuse of the City's built heritage with rapid modernization and progress. The issues examined are institutional, cultural, social, and economic related to the conservation of urban heritage and its utilization.

Third, it explains the relationship between cultural heritage and tourism, that cultural heritage tourism has

the potential to transform cultural traditions into commodities for tourist consumption. Through this, the Concept of authenticity becomes culturally sensitive and relies on a flexible approach to the creation and use of physical artifacts (Suciu *et al.*, 2022). Moreover, in the postmodern tourism economy, the notion of inauthenticity does not matter as the boundaries between the authentic and the fake are blurred and constantly redefined. Cultural heritage tourism has the potential to revive the past, albeit selectively and imaginatively. The past continues to be reinvented and represented in the present, reflecting the dynamic and evolving nature of cultural heritage.

Fourth, heritage-based tourism has the potential for sustainable tourism destination development. This Concept highlights the importance of cultural and natural heritage as a resource for tourism development. It

emphasizes the need for a better understanding and management of these resources to maximize the revenue potential of the heritage tourism industry. Finally, the Concept focuses on the spatial aspects of the City's heritage and creative-based tourism potential involving the active participation of local communities (Pepe *et al.*, 2021). This can be achieved through the involvement of local communities in creative-based tourism activities that highlight the local wisdom and potential of the physical characteristics of the settlement. Such tourism activities should be sustainable and serve as a means to preserve and promote heritage values.

Urban Heritage Tourism

As illustrated in Figure 1, urban heritage tourism has progressively evolved alongside advancements in technology. Urban heritage encompasses the historical, cultural, architectural, and environmental features embedded within a city that contribute to its unique identity. These elements may include heritage buildings, traditional city layouts, archaeological remains, monuments, and even intangible cultural assets such as local narratives and customs (Palamalai & Kalaivani, 2016). Preserving urban heritage is vital not only for safeguarding a city's historical and cultural legacy but also for enhancing its appeal as a tourist destination. Furthermore, urban heritage plays a pivotal role in reinforcing city identity and fostering a sense of place. However, rapid urbanization and ongoing urban development pose significant threats to these heritage assets, heightening the urgency for preservation efforts.



Fig. 1: Urban Heritage Tourism Developments Affecting the Concept (Timeline Graph 2019-2023)

The existence of urban heritage itself has a historical value that becomes the identity of a city, where urban heritage is a silent witness to the history of a town and its people. Its presence strengthens the identity of the City and enriches people's knowledge of its history (Gerbeaud *et al.*, 2024). In addition, well-maintained urban heritage can be a tourist attraction that can improve the City's economy.

Urban heritage tourism can be an effective learning medium for the younger generation or the general public to learn about the history and culture of the City. This can help increase public awareness and appreciation of the City's heritage, which needs to be preserved. In addition, well-maintained urban heritage can contribute

to environmental conservation (Husni, 2022). Appropriate urban heritage preservation policies can encourage sustainable development practices and maintain the City's ecological balance.

Sustainable Tourism

Sustainable tourism is a tourism concept that aims to minimize the negative impacts of tourism on the environment, culture, and local economy and increase the long-term positive benefits for local communities and the environment (Jiang *et al.*, 2022). In sustainable tourism, tourism is integrated into sustainable development, where tourism activities are carried out by considering their impact on the environment, culture, and economy and provide long-term positive benefits for local communities. Sustainable tourism also prioritizes local community participation in decision-making and raises awareness and sustainable tourism education for tourists (Firmansyah & Fadlilah, 2016).

In the context of Persuasive Communication Walking Tour Urban Heritage in Bandung City carried out by walking tour organizers in this study, of course, is related to sustainable tourism Gomaa, 2023, where the existence of a walking tour organizer in urban areas takes a role in conducting tourism education to the community, through activity by walking through the City to historical places in the City (Rosilawati *et al.*, 2019). It is possible to increase the positive impact that occurs in the long term. Through the urban heritage walking tour activity, knowledge sharing that happens can be a first step for tour participants to have a sense of love for the environment they visit that has historical value so that later they can inspire this sense to participate in preserving the cultural and historical heritage that exists in urban areas (urban heritage).

Methods

This study blends qualitative bibliometric analysis with a structured literature review to examine scholarship on urban-heritage tourism and its technology-related strands, especially those involving Augmented Reality (AR) and Virtual Reality (VR). Such bibliometric tools are now widely acknowledged as a rigorous way to chart the growth of research themes and observe how knowledge develops through time.

Data Source and Selection Criteria

The bibliometric data were sourced from the Scopus database, known for indexing high-quality peer-reviewed journals across disciplines. The keyword search included "Urban" AND "Heritage" AND "Tourism" or "Urban Heritage Tourism" applied to titles, abstracts, and keywords. The search was refined with the following filters:

- Document type: Journal articles
- Publication years: 2019 to 2023

- Language: English
- Publication status: Final (published)
- Subject areas: Social Sciences, Arts and Humanities, Environmental Sciences, and Business

This process initially returned 614 articles. To ensure relevance, a manual screening process was conducted using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol. After reviewing abstracts and full texts, articles were included if they (a) explicitly addressed urban heritage tourism and (b) discussed the application or implications of AR or VR within the tourism or cultural heritage context. This led to the selection of 158 relevant articles.

Exclusion Criteria

The following exclusion criteria were applied to ensure focus and quality:

- Articles unrelated to tourism or urban heritage.
- Studies that mentioned AR/VR outside of tourism or cultural contexts.
- Non-peer-reviewed literature such as editorials, opinion pieces, or grey literature.
- Duplicated, incomplete, or inaccessible publications.
- Conference proceedings, book series, or trade journals.

Analytical Tools

Three specialized bibliometric tools were employed in this study:

- Vos Viewer was used to perform keyword co-occurrence analysis, overlay visualizations, and density mapping. This helped identify the core thematic evolution in urban heritage tourism literature.
- CiteSpace enabled the detection of citation bursts, country-level collaboration, and co-citation patterns, revealing influential authors, journals, and trends.
- R Studio (Bibliometric package) facilitated statistical analysis of author productivity, keyword growth, and thematic evolution over time.

These tools were chosen due to their complementary strengths. Vos Viewer provided an intuitive graphical interface for theme clustering, Cite Space offered robust temporal analysis and citation mapping, and R Studio supported quantitative exploration of topic dynamics.

To maintain scholarly rigor and guarantee that the dataset represented only validated, high-quality work, non-peer-reviewed materials-conference abstracts, editorials, trade publications, and other forms of grey literature-were set aside at the outset. The surviving articles were then manually examined and further narrowed by publication status (final), language (English), and direct relevance to augmented or virtual reality as well as urban heritage tourism.

Based on Figure 2, and Table 2 the author uses Vosviewer, CiteSpce, and R Studio tools. These three tools are widely used in bibliometric analysis studies. This integrated method is the latest adoption and has yet to be widely adopted in several previous studies by combining several bibliometric tools, especially in the study of urban heritage tourism. This integrated method is used to analyze the portrait of the development of urban heritage tourism studies in the past (Past, Present, and Future Research). Portrait of the development of Urban heritage tourism studies and visualization by country using CiteSpace tools, then a picture of development with study trends and study density (often referred to as Overlay and density Visualization) using Vosviewer tools, and the last is R Studio tools used to see thematic studies of urban heritage tourism.

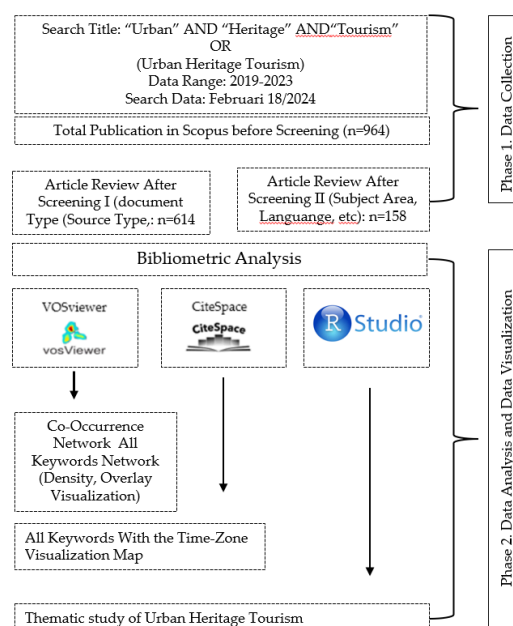


Fig. 2: The prisma flow diagram is used to identify, screen and include papers for our bibliometric review (adopted from and flowchart of data collection, data analysis, and data visualization, Kemeç & Altınay, 2023)

Table 2: PRISMA-Based Summary of Article Identification, Screening, and Inclusion Process for Bibliometric Analysis (2019–2023)

Stage	Description	Count
Records identified	From Scopus Database	614
Records screened	After filtering duplicates	614
Records excluded	Irrelevant or not focused on AR/VR & 456 tourism	456
Full-text articles assessed	For eligibility	158
Articles included	In bibliometric analysis	158

Limitations and Future Research

Although bibliometric analysis effectively reveals publication trends and prevailing knowledge frameworks, it falls short when asked to measure real-

world results, including visitor satisfaction, on-the-ground hurdles, or the cost-effectiveness of AR/VR in heritage tourism. For this reason, citation statistics by themselves can only sketch an outline of the much messier story behind technology uptake at historic sites.

Future work should therefore blend quantitative citation mapping with qualitative methods such as interviews with industry practitioners, detailed case studies of technology roll-outs in the field, and direct assessments of visitor interactions. By comparing evidence from these different sources, researchers can gain a fuller and more nuanced picture of how digital tools are reshaping site management and urban heritage experiences.

Results

Figure 3 shows the number of publications per year from 2019 to 2023 for the first set of 158 publications. The number of publications continues to increase significantly, with a sharp rate of increase in recent years. This underlines the increasing relevance of the theme of urban heritage tourism. The following visualization shows the development of urban heritage tourism studies in the last five years.

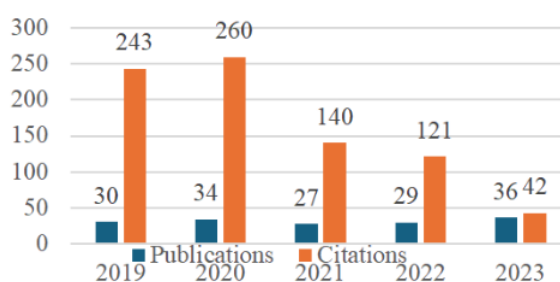


Fig. 3: Number of publications per year in the primary set of publications on urban heritage tourism

The data above shows that 2023 is the year when scholars have studied a lot about urban heritage tourism. The attention is in terms of stakeholder attitudes towards sustainable tourism tools in historic cities (Szromek *et al.*, 2023). Culturalization for Sustainable Tourism Development, how urban culture regenerates as a strategy for place-making and sustainable development and contributes to environmental, economic, and social sustainability (Madandola & Boussaa, 2023), identity in the new architectural design process in transforming historic city centers and the last is about innovative heritage and the last one is about Smart Heritage (Geng *et al.*, 2023).

Interpretation of Trends (2019-2023)

The steady increase in research output on urban heritage tourism from 2019 to 2023 reflects a growing commitment among scholars and policymakers to

integrate cultural preservation with smart technology. This growth highlights an expanding appreciation for digital assets, particularly Augmented Reality (AR) and Virtual Reality (VR), in enhancing narratives, deepening visitor engagement, and promoting sustainable practices in the sector. The notable spike in 2023 likely stems from post-COVID-19 experimentation, where virtual tours became essential during physical mobility restrictions. Scholars began exploring urban heritage studies more intensely in 2020, focusing on leveraging technology to develop real-time urban heritage tours while maintaining social and commercial sustainability (Henche *et al.*, 2020). This trend underscores the sector's adaptability and innovation in response to challenges, paving the way for more immersive and sustainable tourism experiences.

This is like the findings of Katahenggam, (2020), who often facing problems in balancing the need to maintain authenticity while meeting the needs of tourism, (2020). Stressed the importance of collaboration of cultural organizations, the hospitality industry, and retail to promote an artistic, creative, and sustainable management model of historic urban centers, often understood as the integration of urban heritage tourism by promoting cultural authenticity. Although some years between 2019, 2021, 2022, decreased but not significantly. From various scholars who have studied, the author also found that multiple countries have responded to urban heritage tourism.

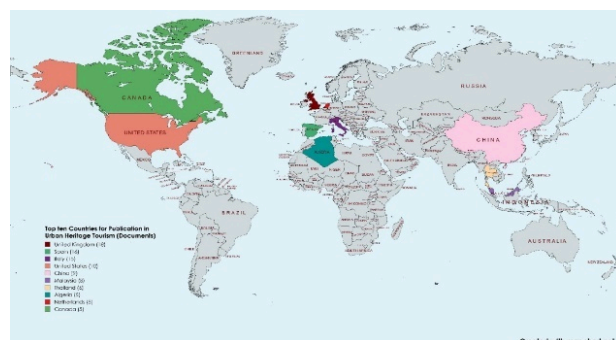


Fig. 4: Academic production by country, from 2019–2023

The data highlights several countries actively engaged in urban heritage tourism, including, the United Kingdom (18), Spain (16), Italy (15), the United States (10), China (9), Malaysia (8), Thailand (6), Algeria (5), Netherlands (5), Canada (5). The United Kingdom alone has a diverse range of Historical cultural heritage, including Big Ben, St Paul's Cathedral, Buckingham Palace, the British Museum, Edinburgh Festival Fringe heritage, and several other Historical cultural heritages. Similarly, Spain offers an exciting combination of rich history, beautiful architecture, and vibrant city life, as seen in Barcelona's Sagrada Família, Casa Batlló, and Park Güell. A tourism scholarship focusing on augmented and virtual reality (AR/VR) clusters in countries like China, the United States, Australia, and the United Kingdom due to several factors. These countries

have strong technological infrastructure and innovation networks, dynamic tourism sectors rich in cultural heritage, access to research funding, and interdisciplinary networks, as well as institutional incentives for digital innovation in tourism planning. For instance, China's "Smart City" and "Digital China" initiatives have driven research and practical projects in AR/VR, while the United States has benefited from partnerships between universities, tech giants, and museums.

However, it's essential to acknowledge the potential bias towards English-taught scholarship in bibliometric databases, which may amplify the visibility of works from English-speaking countries and obscure significant advances in AR/VR from non-English-speaking countries. The top countries for urban heritage tourism research include the United Kingdom, Spain, Italy, the United States, and China, each with unique characteristics and strengths in their tourism sectors.

Table 3: Top ten article

Document Title	Authors/Year	Source	Citations	H-Index
The historic City, its transmission and perception via augmented reality and virtual reality and the use of the past as a resource for the present: A new era for urban cultural heritage and tourism?	(Barrado-Timón & Hidalgo-Giralt, 2019)	Sustainability	32	Q1
Towards smarter management of overtourism in historic centres through visitor-flow monitoring	(Zubiaga <i>et al.</i> , 2019)	Sustainability	27	Q1
Assessing impacts of implementing low-carbon tourism program for sustainable tourism in a world heritage city	(Thongdejsri & Nitivattananon, 2019)	Tourism Review	26	Q1
A sustainable management model for cultural creative tourism ecosystems	(Henche <i>et al.</i> , 2020)	Sustainability	23	Q1
Assessing community attitudes toward industrial heritage tourism development	(Xie <i>et al.</i> , 2020)	Journal of Tourism and Cultural Change	23	Q1
Urban heritage and cultural tourism development: a case study of Valletta's role in Malta's tourism	(Ebejer, 2019)	Journal of Tourism and Cultural Change	22	Q1
Environmentally responsible behavior and Knowledge-Belief-Norm in the tourism context: The moderating role of types of destinations	(Fenitra <i>et al.</i> , 2022)	International Journal of Geoheritage and Parks	21	Q1
Tourist perceptions and preferences of authenticity in heritage tourism: visual comparative study of George Town and Singapore	(Katahenggam, 2020)	Journal of Tourism and Cultural Change	19	Q1
Overtourism management competencies in Asian urban heritage areas	(Jamieson, 2019)	International Journal of Tourism Cities	19	Q1
Mapping our heritage: Towards a sustainable future for digital spatial information and technologies in European archaeological heritage management	(McKeague <i>et al.</i> , 2019)	Journal of Computer Applications in Archaeology	16	Q1

Table 3 presents the top ten articles on urban heritage tourism, including author, year, source/publisher, citations, and H-index, providing valuable insights into the current state of research in this field.

The H-index serves as a bibliometric yardstick that gauges how much a researcher, journal, or group of works both produces new ideas and attracts readers attention through citations. An individuals index is said to equal h when h publications appear in the record, each receiving citations that meet or exceed the same number, h. So, an H-index of ten simply tells us that ten separate papers have been cited at least ten times each. Because it weighs sheer output against earned respect, the metric offers a practical tool for tracing academic influence as it grows through the years.

Geographical Concentration and AR/VR uptake

Figure 4 illustrates the geographic distribution of research across countries. Exploration of augmented and virtual reality in cultural tourism clusters, which are noticeable in the United Kingdom, Spain, Italy and the United States; These countries have well-developed tourism markets and invest heavily in digital tools to protect heritage. In practice, Barcelona and London have

common apps that layer AR content on top of historical sites, while many museums in the US and Europe have hosted extensive VR pilots that allow visitors to explore exhibits from afar. The pattern thus shows that the volume of publications follows the maturity of the use of AR/VR: the countries that produce the most research are usually the same ones that integrate these technologies locally. In contrast, researchers in Southeast Asia and North Africa have begun to publish on the subject, although the local infrastructure for widespread deployment is still emerging, highlighting the research and implementation gap that future policy initiatives and capacity-building programmes will have to fill.

The first category addresses urban heritage spaces with the theme of Augmented Reality (AR) and Virtual Reality (VR). The theme explored the concern of augmented reality separating from material space, especially in terms of socio-economic aspects and affecting entry to tourism. Another problem is that user groups need help accessing the technology. The second category is still related to virtual reality, with the theme of managing urban heritage tourism by monitoring the flow of visitors using technology. The third category is urban heritage tourism for development, with indicators

through critical stakeholder participation and dimensions of sustainability and carbon emissions. The next category is developing creative tourism ecosystems, management, and development through sustainability. The following is a classification and debate on the study of urban heritage tourism.

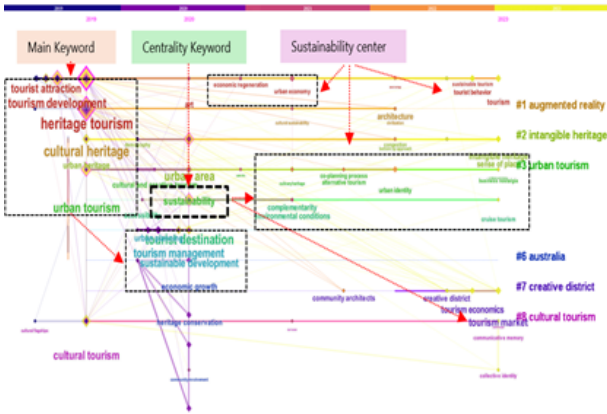


Fig. 5: Keyword network in urban heritage tourism over time

As visualized in Figure 5, the keyword co-occurrence network in urban heritage tourism studies (2019–2023), generated using VOS viewer, highlights the thematic intersections between technology and heritage preservation. The colors in the visualization represent distinct keyword clusters, each indicating a thematic focus within the research landscape:

- Red cluster: Core concepts in heritage tourism and tourism development
- Green cluster: Urban-focused themes such as urban area, identity, and urban tourism
- Blue cluster: Emerging digital themes including augmented reality, intangible heritage, and tourism experience
- Purple cluster: Cultural and creative tourism themes
- Orange cluster: Topics around

Sustainability and Resilience

As shown in Table 4, several keyword relationships such as heritage-centric integration, sustainability goals, and community identity strongly influence how AR and VR are adopted in urban heritage tourism settings. This highlights the essential role that keyword networks play in shaping research on urban heritage tourism. Core themes in this field include heritage tourism, cultural tourism, urban tourism, tourism development, and, centrally, sustainability (Bhaskara & Sugiarti, 2019). Based on these findings, the following themes are proposed as critical areas of focus in transitioning from unsustainable to sustainable models of urban heritage tourism: sustainable development through good governance (with cultural heritage as a driving force for regeneration), economic revitalization through market-oriented tourism, and the integration of emerging technologies to support sustainable practices. These

factors collectively facilitate the advancement of urban heritage tourism.

Table 4: How Keyword Relationships Influence AR/VR Adoption

Influence Factor	Description
Heritage-Centric Integration	AR/VR tools are adopted to enrich cultural storytelling and preserve heritage.
Urban Tourism Synergy	Strong ties to urban tourism suggest AR/VR fits into smart city tourism models.
Sustainability Goals	Adoption is driven by goals like reducing site pressure and enhancing learning.
Innovative Contexts	Linked to creative districts and pilot regions, showing innovation-led adoption.
Community & Identity Focus	Keywords show AR/VR supports local narratives and inclusive tourism experiences.

Discussion

Urban heritage tourism is a great way to describe and implement city marketing. Based on the results of the mapping above, it can be analyzed that the current research responds to the call to reimagine and propose a management model that can help the city center find a competitive heritage and historical tourism ecosystem by prioritizing the authenticity of the City's heritage as well as giving the town a particular character and making it unique (Hincapié *et al.*, 2021). The cultural heritage tourism industry is currently required to be continuously creative in finding new strategies to attract active tourists who enjoy this type of tourism. One way to gain a competitive advantage is by applying Augmented Reality (AR) technology.

However, the previous debate confirmed that in the process of managing and developing urban heritage tourism between Augmented Reality (AR) and Virtual Reality (VR). These two concepts are a dilemma in the process of developing urban heritage tourism (Lin *et al.*, 2020). The debate between Augmented Reality (AR) and Virtual Reality (VR) in urban heritage tourism spans several critical dimensions. First, in terms of user experience, AR enhances real-world interactions by layering digital information, while VR offers full immersion in recreated environments. Second, accessibility is a major consideration AR typically requires only a mobile device, whereas VR demands more specialized and costly equipment, limiting broader usage (Scianna *et al.*, 2019). Third, there are economic implications, as the development and maintenance costs of VR systems often exceed those of AR solutions. Finally, the debate includes historical authenticity, with AR being favored for in-situ learning that preserves physical context, while VR raises concerns about detachment from real-world heritage sites. This study seeks to map these dimensions in order to better understand how each technology aligns with sustainable and authentic heritage tourism goals.

A detailed comparison of AR and VR across dimensions such as user engagement, historical

authenticity, accessibility, and cost is provided in Table 5, highlighting how each technology aligns with the goals of sustainable heritage tourism (Paliokas *et al.*, 2020). While AR enables visitors to create on-site information layers, VR transports them to immersive, story-driven worlds from anywhere. The adoption of these technologies varies by location, with AR-enabled tour apps gaining popularity in Europe and Southeast Asia.

Table 5: Comparative Analysis of AR and VR in Urban Heritage Tourism

Dimension	Augmented Reality (AR)	Virtual Reality (VR)
User Engagement	Enhances real-world interaction with digital overlays; high context relevance	Fully immersive but disconnected from real location; strong emotional appeal
Historical Authenticity	Maintains spatial integrity of heritage sites	Simulates spaces; may weaken sense of physical authenticity
Accessibility	Requires only mobile device; user-friendly	Requires VR headsets or kiosks; less accessible
Cost	Lower development and implementation costs	Higher development and hardware costs
Adoption Rate	More widely adopted in Europe and Southeast Asia	More commonly used in museums and pilot initiatives in North America
Application Context	On-site guided tours, AR signage, live storytelling	Virtual museums, remote exploration, educational applications

Research supports the use of AR in urban heritage tourism management and development Yin *et al.*, 2021). Studies have shown that AR enhances tourists' emotional connection to sites and heritage attractions, providing an expert emotional connection that increases the attractiveness of tourist destinations. The user experience is shaped by the correlation of product features and perceptions, as well as sites, making AR a valuable tool for tourism.

To better understand the adoption and impact of AR and VR in tourism, researchers need to collect new data on usage patterns, including how, where, and why each technology is used in practice (Graziano & Privitera, 2020). A comparative analysis of AR and VR effectiveness in different contexts would also provide valuable insights, helping to inform future developments and applications in the tourism industry. Furthermore, Virtual Reality (VR) by some scholars (Selmanović *et al.*, 2020) shows that VR is a handy tool to encourage tourists to travel more slowly and intensely of observation, thus significantly evoking their sense of nostalgia and leading to a solid intention to travel for tourism. Through the development of a web portal, which is integrated into the analyzed objects, panoramic images, audio support, photos, and accompanying text needed to create and render Virtual Reality (VR). So that it can bridge potential visitors to vulnerable tourist attractions.

The findings drawn from this analysis provide appropriate and helpful destination actors and marketers to promote destinations and, therefore, encourage entrepreneurs to innovate in the tourism sector to meet tourists' desire for a memorable travel experience. .

The dilemma between Augmented Reality (AR) and Virtual Reality (VR) has been mentioned (González-Rodríguez *et al.*, 2020). Although concerns around these critical aspects are still very limited, who understands the possible dangers of underestimating cultural heritage, the creation of a virtual tourism world separate from the material space of socio-economic relationships, and the negative impact on inbound travel? Augmented Reality (AR) and Virtual Reality (VR) are a debate to this day. Is Augmented Reality (AR) the most positive and significant way to promote Urban Heritage Tourism, or vice versa, Virtual Reality (VR)? This debate can be seen brought here.

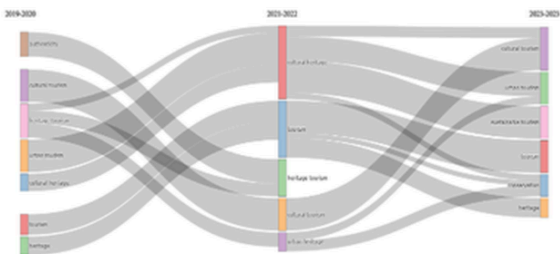


Fig. 6: The main key used in scholarly debates in studying urban heritage tourism

Figure 6 outlines the core keywords shaping current scholarly debates. Over the past 5 years, the debate about urban heritage tourism has continued. From 2019 to 2023, the primary keys are urban tourism, cultural heritage, sustainability, and conservation. Urban tourism and cultural heritage are closely related to the tourism industry and the experience in the City but with different emphases.

Urban Tourism refers to travel for leisure, business, or other purposes. It involves experiencing the unique characteristics of urban areas, as well as architecture, history, culture, entertainment, and shopping opportunities. Heritage Tourism, on the other hand, explicitly emphasizes the cultural aspects of the travel experience (Caciora *et al.*, 2021). It involves visiting destinations primarily to experience the culture and heritage of a place, including art, music, dance, folklore, traditions, and ways of life. While urban tourism encompasses a broader range of activities and experiences within the City, cultural tourism focuses more on the artistic aspects of the experience. However, the two concepts are closely related, as cities are often rich in cultural attractions and experiences that attract tourists to explore and experience different cultures.

Finally, the debate about urban heritage tourism through reality (AR) and Virtual Reality (VR), namely the discussion related to the promotion of tourism marketing communication. This process is a management process carried out by tourism organizations and the tourism industry to identify tourists who already have a desire to travel.

Theoretical and Practical Implication

Based on the results of the research and the findings that have been stated above, some implications must be considered, including theoretical implications and practical.

Theoretical Implication

The results of this project will add to ongoing discussions about digital heritage communication and its rapidly changing landscape. By producing a detailed bibliometric map of the use of Augmented Reality (AR) and Virtual Reality (VR) in urban heritage tourism, the comparison in this study provides a roughly balanced view of both technologies.

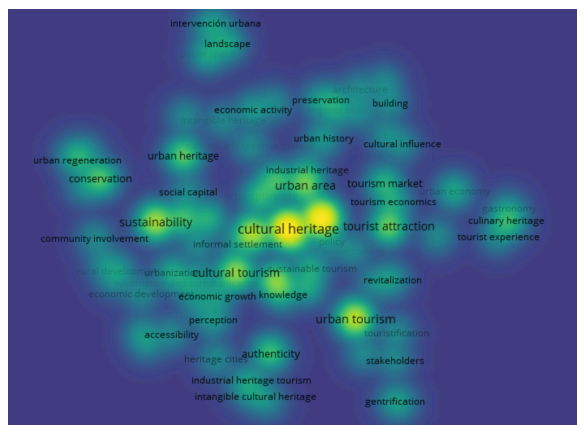


Fig. 7: Jejaring kajian urban heritage tourism (2019-2023)

Rather than examining Augmented Reality (AR) and Virtual Reality (VR) in isolation, this approach foregrounds their multifaceted influence on user experience, perceived historical authenticity, accessibility for diverse audiences, and the long-term sustainability of heritage initiatives. By visualizing keyword frequency and research clusters across this five-year span, Figure 7 highlights emerging scientific inquiries and persistent scholarly debates, particularly the communication paradox, wherein the engaging novelty of technology may inadvertently eclipse the cultural value it aims to preserve.

This thematic network reframes AR and VR not as standalone technological tools but as context-sensitive mediums for conveying heritage narratives (Chaligha, 2025). In doing so, the literature is pushed toward a more strategic rather than purely instrumental perspective on digital heritage interventions. The insights gleaned from this analysis also provide a roadmap for future research,

signaling critical areas such as gentrification, community participation, urban regeneration, infrastructure accessibility, and environmental sustainability. Focusing on these dimensions will deepen our understanding of the dynamic interface between technology, local culture, and heritage tourism, ultimately fostering a more holistic and socially embedded discourse within the field.

Practical Implications

This study highlights that cities need to keep up with new technology if they want to make their historic sites vibrant and long-lasting tourist attractions. When digital tools are embedded in visitors' daily routines, tourists enjoy smoother tours, items receive better care, and the wider urban economy remains greener. By contrast, ignoring technological changes leaves municipalities grappling with overcrowding, loss of details of stories told, and rising maintenance costs. Decision-makers – police, site managers and resource groups – need clear tips on how to incorporate Augmented Reality (AR) and Virtual Reality (VR) into their plans. AR shines in open, accessible spaces, adding real-time text, routes, and playful tasks directly into visitors' view. However, VR works best in fragile, hidden, or remote locations, allowing people to explore the site without touching the actual objects. Mixing both systems greatly expands who sees what. Tourists can trigger AR while standing in the square and unlock a VR headset at home or before their trip to take a peek. Therefore, cities should support shared networks, free apps, and public VR booths so that access is not limited to those with private equipment. In addition, the content must be written with local voices so that the stories remain true and no episode is missed. Following such steps can make heritage tourism more cost-effective for visitors, more respectful of residents and easier on the environment.

Conclusion

This study concludes that the study of urban heritage tourism is a debate related to the adoption of technology in promoting urban heritage tourism. Previous scholars have sought alternatives and adoptions between Augmented Reality (AR) and Virtual Reality (VR), but there has yet to be common ground between the two options. From this research, the author sees that there is a need for a call to reimagine and propose a management model that can help the city center find a competitive heritage and historical tourism ecosystem by prioritizing the authenticity of heritage and giving special character to the City and making it unique. Another thing, urban heritage tourism, through good governance, involves heritage culture as a driving force for sustainable development so that it becomes an economic regeneration and market tourism, then the latest trends in technology for sustainable development and other factors that can facilitate the development of urban heritage tourism by integrating tourism on heritage principles without reducing the prevailing cultural values.

Various countries that have responded to urban heritage tourism include the United Kingdom, Spain, Italy, the United States, China, Malaysia, Thailand, Algeria, the Netherlands, and Canada. The top 10 countries that contribute to urban heritage tourism also have different characteristics in each country. Finally, in this study, the author looks apart from the debate about the promotion of urban heritage tourism.

The author sees a problem in urban heritage tourism marketing communication. Walking tour urban heritage is a form of social interaction that allows guides and tourists to share their knowledge and experience and appreciate the cultural diversity that has shaped the City by being supported through promotions, both in the form of Augmented Reality (AR) and Virtual Reality (VR). Walking tour urban heritage is an alternative communication between walking tour urban heritage with reality (AR) and Virtual Reality (VR). Therefore, tourists can confirm the consequences of heritage tourism. Previous findings confirm that the user experience in tour guide interactions involving aspects such as usability and emotional impact has a positive influence on tourists who are traveling to urban heritage tourism. For this reason, it is necessary to collaborate with stakeholders, stakeholders, and, most importantly, work together with tourism actors.

Authors Contributions

Winne Wardiani: Conceived and designed the study, coordinated the literature search and bibliometric analysis, interpreted the findings, and drafted and revised the manuscript.

Agus Rusmana: Contributed to the study design, supervised the methodology, guided the analysis, and critically reviewed the manuscript.

Ninis Agustini Damayani: Assisted in the literature review, data acquisition, and analysis, and also participated in editing the manuscript.

Ute Lies Siti Khadijah: Provided the theoretical framework, contributed to the development of the discussion, and revised the manuscript for clarity and coherence.

Ethics Statement

This study did not involve human or animal participants. Ethical review and approval were not required for this type of research.

Acknowledgment

The authors thank the reviewers for their insightful feedback and acknowledge the support from the Faculty of Communication Science, Padjadjaran University.

Conflict of Interest

The authors have no conflicts of interests to declare.

Funding Information

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

- Barrado-Timón, D. A., & Hidalgo-Giralt, C. (2019). The Historic City, Its Transmission and Perception via Augmented Reality and Virtual Reality and the Use of the Past as a Resource for the Present: A New Era for Urban Cultural Heritage and Tourism? *Sustainability*, 11(10), 2835. <https://doi.org/10.3390/su11102835>
- Bhaskara, G. I., & Sugiarti, D. P. (2019). Enhancing Cultural Heritage Tourism Experience with Augmented Reality Technology in Bali. *E-Journal of Tourism*, 6(1), 102–341. <https://doi.org/10.24922/eot.v6i1.47483>
- Caciora, T., Herman, G. V., Ilieș, A., Baias, ștefan, Ilieș, D. C., Josan, I., & Hodor, N. (2021). The Use of Virtual Reality to Promote Sustainable Tourism: A Case Study of Wooden Churches Historical Monuments from Romania. *Remote Sensing*, 13(9), 1758–1789. <https://doi.org/10.3390/rs13091758>
- Chaligha, A. (2025). Augmented reality and cultural storytelling in urban heritage tourism: A contextual analysis of user experience and authenticity. *Journal of Urban Tourism and Digital Culture*, 12(1), 45–62.
- Ebejer, J. (2019). Urban heritage and cultural tourism development: a case study of Valletta's role in Malta's tourism. *Journal of Tourism and Cultural Change*, 17(3), 306–320. <https://doi.org/10.1080/14766825.2018.1447950>
- Fenitra, R. M., Premananto, G. C., Sedera, R. M. H., Abbas, A., & Laila, N. (2022). Environmentally responsible behavior and Knowledge-Belief-Norm in the tourism context: The moderating role of types of destinations. *International Journal of Geoheritage and Parks*, 10(2), 273–288. <https://doi.org/10.1016/j.ijgeop.2022.05.001>
- Firmansyah, F., & Fadlilah, K. U. (2016). Improvement of Involvement Society in the Context of Smart Community for Cultural Heritage Preservation in Singosari. *Procedia - Social and Behavioral Sciences*, 227, 503–506. <https://doi.org/10.1016/j.sbspro.2016.06.107>
- Geng, S., Chau, H.-W., Jamei, E., & Vrcelj, Z. (2023). Understanding place identity in urban scale Smart Heritage using a cross-case analysis method. *International Journal of Tourism Cities*, 9(3), 729–750. <https://doi.org/10.1108/ijtc-10-2022-0244>
- Gerbeaud, F., Barlet, A., & Mazel, C. (2024). 5. Tackling Sustainability in Bordeaux: Bridging Modern and Traditional Neighbourhoods. In P. Newson & R. M. Stone (Eds.), *Urban Heritage and Sustainability in the Age of Globalisation* (1st ed., pp. 101–124). Open Book Publishers. <https://doi.org/10.11647/obp.0412.05>

- González-Rodríguez, M. R., Díaz-Fernández, M. C., & Pino-Mejías, M. á. (2020). The impact of virtual reality technology on tourists' experience: a textual data analysis. *Soft Computing*, 24(18), 13879–13892. <https://doi.org/10.1007/s00500-020-04883-y>
- Graziano, T., & Privitera, D. (2020). Cultural heritage, tourist attractiveness and augmented reality: insights from Italy. *Journal of Heritage Tourism*, 15(6), 666–679. <https://doi.org/10.1080/1743873x.2020.1719116>
- Handapangoda, W. S., Madduma Bandara, Y. M. H., & Kumara, U. A. (2019). Exploring tradition in heritage tourism: The experience of Sri Lanka's traditional mask art. *International Journal of Heritage Studies*, 25(4), 415–436. <https://doi.org/10.1080/13527258.2018.1481132>
- Henche, B. G., Salvaj, E., & Cuesta-Valiño, P. (2020). A Sustainable Management Model for Cultural Creative Tourism Ecosystems. *Sustainability*, 12(22), 9554. <https://doi.org/10.3390/su12229554>
- Hincapié, M., Díaz, C., Zapata-Cárdenas, M.-I., Rios, H. de J. T., Valencia, D., & Güemes-Castorena, D. (2021). Augmented reality mobile apps for cultural heritage reactivation. *Computers & Electrical Engineering*, 93(October), 107281. <https://doi.org/10.1016/j.compeleceng.2021.107281>
- Husni el Hajj, M. (2022). The process of urban heritage (Case study: Baalbek). *Arts and Architecture Journal*, 3(1), 99–125. <https://doi.org/10.21608/aaj.2022.242303>
- Işık, C., Aydın, E., Dogru, T., Rehman, A., Sirakaya-Turk, E., & Karagöz, D. (2022). Innovation Research in Tourism and Hospitality Field: A Bibliometric and Visualization Analysis. *Sustainability*, 14(13), 7889. <https://doi.org/10.3390/su14137889>
- Jamieson, W., & Jamieson, M. (2019). Overtourism management competencies in Asian urban heritage areas. *International Journal of Tourism Cities*, 5(4), 581–597. <https://doi.org/10.1108/ijtc-08-2019-0143>
- Jeong, J. Y., Karimov, M., Sobirov, Y., Saidmamatov, O., & Marty, P. (2023). Evaluating Culturalization Strategies for Sustainable Tourism Development in Uzbekistan. *Sustainability*, 15(9), 7727. <https://doi.org/10.3390/su15097727>
- Jiang, A., Cai, J., Chen, F., Zhang, B., Wang, Z., Xie, Q., & Yu, S. (2022). Sustainability Assessment of Cultural Heritage in Shandong Province. *Sustainability*, 14(21), 13961. <https://doi.org/10.3390/su142113961>
- Jiang, S., Moyle, B., Yung, R., Tao, L., & Scott, N. (2023). Augmented reality and the enhancement of memorable tourism experiences at heritage sites. *Current Issues in Tourism*, 26(2), 242–257. <https://doi.org/10.1080/13683500.2022.2026303>
- Kar, N. S., Basu, A., Kundu, M., & Giri, A. (2022). Urban heritage tourism in Chandernagore, India: revival of shared Indo-French Legacy. *GeoJournal*, 87(3), 1575–1591. <https://doi.org/10.1007/s10708-020-10328-8>
- Katahenggam, N. (2020). Tourist perceptions and preferences of authenticity in heritage tourism: visual comparative study of George Town and Singapore. *Journal of Tourism and Cultural Change*, 18(4), 371–385. <https://doi.org/10.1080/14766825.2019.1659282>
- Lak, A., Gheitasi, M., & Timothy, D. J. (2020). Urban regeneration through heritage tourism: cultural policies and strategic management. *Journal of Tourism and Cultural Change*, 18(4), 386–403. <https://doi.org/10.1080/14766825.2019.1668002>
- Lin, L.-P. (Lynn), Huang, S.-C. (Lucy), & Ho, Y.-C. (2020). Could virtual reality effectively market slow travel in a heritage destination? *Tourism Management*, 78, 104027. <https://doi.org/10.1016/j.tourman.2019.104027>
- Little, C., Bec, A., Moyle, B. D., & Patterson, D. (2020). Innovative methods for heritage tourism experiences: creating windows into the past. *Journal of Heritage Tourism*, 15(1), 1–13. <https://doi.org/10.1080/1743873x.2018.1536709>
- Mandaka, M., & Ikaputra, I. (2021). Urban Heritage Tourism Sebuah Konsep Pelestarian Melalui Pendekatan Pariwisata. *Jurnal Arsitektur Kolaborasi*, 1(2), 67–75. <https://doi.org/10.54325/kolaborasi.v1i2.13>
- Mansour Gomaa, M. (2023). Beyond Culture and Civilization: Community-Based Approaches to Strengthening Architecture and Urban Heritage Conservation in Southern Egypt. *International Journal of Multidisciplinary Studies in Architecture and Cultural Heritage*, 6(1), 1–24. <https://doi.org/10.21608/ijmsac.2023.284385>
- McKeague, P., van't Veer, R., Huvila, I., Moreau, A., Verhagen, P., Bernard, L., Cooper, A., Green, C., & van Manen, N. (2019). Mapping Our Heritage: Towards a Sustainable Future for Digital Spatial Information and Technologies in European Archaeological Heritage Management. *Journal of Computer Applications in Archaeology*, 2(1), 89–104. <https://doi.org/10.5334/jcaa.23>
- Palamalai, Srinivasan, & Kalaivani, M. (2016). Tourism expansion, urbanization and economic growth in India: An empirical analysis. *Tourismos*, 13(4), 361–343. <https://doi.org/10.13432517611>
- Paliokas, I., Patenidis, A. T., Mitsopoulou, E. E., Tsita, C., Pehlivanides, G., Karyati, E., Tsafaras, S., Stathopoulos, E. A., Kokkalas, A., Diplaris, S., Meditskos, G., Vrochidis, S., Tasiopoulou, E., Riggas, C., Votis, K., Kompatsiaris, I., & Tzovaras, D. (2020). A Gamified Augmented Reality Application for Digital Heritage and Tourism. *Applied Sciences*, 10(21), 7868. <https://doi.org/10.3390/app10217868>
- Pepe, M., Costantino, D., Alfio, V. S., Restuccia, A. G., & Papalino, N. M. (2021). Scan to BIM for the digital management and representation in 3D GIS environment of cultural heritage site. *Journal of Cultural Heritage*, 50(4), 115–125. <https://doi.org/10.1016/j.culher.2021.05.006>

- Rajapakse, A. (2017). Exploring the Living Heritage of Galle Fort: Residents' Views on Heritage Values and Cultural Significance. *Journal of Heritage Management*, 2(2), 95–111.
<https://doi.org/10.1177/2455929617743583>
- Rania, M., & Hamza, Z. (2023). Search for identity in the process of new architectural design in changing historical city Centre of Setif, Algeria. *Journal of Cultural Heritage Management and Sustainable Development*, 13(4), 728–742.
<https://doi.org/10.1108/jchmsd-09-2020-0143>
- Rosilawati, Y., Mulawarman, K., & Mulyantari, E. (2019). Heritage and The Local Community Engagement: The Case of Kotagede, Yogyakarta-Indonesia. *Proceedings of the Third International Conference on Sustainable Innovation 2019 – Humanity, Education and Social Sciences (IcoSIHESS 2019)*, 506–512.
<https://doi.org/10.2991/icosihess-19.2019.88>
- Scianna, A., Gaglio, G. F., & La Guardia, M. (2019). Augmented reality for cultural heritage: The rebirth of a historical square. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLII-2/W17, 303–308.
<https://doi.org/10.5194/isprs-archives-xlii-2-w17-303-2019>
- Selmanović, E., Rizvic, S., Harvey, C., Boskovic, D., Hulusic, V., Chahin, M., & Sljivo, S. (2020). Improving Accessibility to Intangible Cultural Heritage Preservation Using Virtual Reality. *Journal on Computing and Cultural Heritage*, 13(2), 1–19.
<https://doi.org/10.1145/3377143>
- Suciu, M.-C., Savastano, M., Stativă, G.-A., & Gorelova, I. (2022). Educational Tourism and Local Development. *Cactus*, 4(1), 9–17.
<https://doi.org/10.24818/cts/4/2022/1.02>
- Szromek, A. R., Kruczek, Z., & Walas, B. (2023). Stakeholders' attitudes towards tools for sustainable tourism in historical cities. *Tourism Recreation Research*, 48(3), 419–431.
<https://doi.org/10.1080/02508281.2021.1931774>
- Thongdejsri, M., & Nitivattananon, V. (2019). Assessing impacts of implementing low-carbon tourism program for sustainable tourism in a world heritage city. *Tourism Review*, 74(2), 216–234.
<https://doi.org/10.1108/tr-04-2017-0082>
- Tom Dieck, M. C., Jung, T., & Han, D.-I. (2016). Mapping requirements for the wearable smart glasses augmented reality museum application. *Journal of Hospitality and Tourism Technology*, 7(3), 230–253.
<https://doi.org/10.1108/jhtt-09-2015-0036>
- Xie, P. F., Lee, M. Y., & Wong, J. W.-C. (2020). Assessing community attitudes toward industrial heritage tourism development. *Journal of Tourism and Cultural Change*, 18(3), 237–251.
<https://doi.org/10.1080/14766825.2019.1588899>
- Xu, H., & Sofield, T. (2017). New interests of urban heritage and tourism research in Chinese cities. *Journal of Heritage Tourism*, 12(3), 223–226.
<https://doi.org/10.1080/1743873x.2016.1244539>
- Yagi, T., & Frenzel, F. (2022). Tourism and urban heritage in Kibera. *Annals of Tourism Research*, 92, 103325.
<https://doi.org/10.1016/j.annals.2021.103325>
- Yin, C. Z. Y., Jung, T., tom Dieck, M. C., & Lee, M. Y. (2021). Mobile Augmented Reality Heritage Applications: Meeting the Needs of Heritage Tourists. *Sustainability*, 13(5), 2523.
<https://doi.org/10.3390/su13052523>
- Zeng, J.-Y., Xing, Y., & Jin, C.-H. (2023). The Impact of VR/AR-Based Consumers' Brand Experience on Consumer–Brand Relationships. *Sustainability*, 15(9), 7278.
<https://doi.org/10.3390/su15097278>
- Zhang, Y., Jing, Z., Huang, Q., Wang, X., Sun, W., Zhang, C., Wang, J., Zhong, Y., Wang, J., Tan, L., Zheng, L., Wang, B., Wang, L., Sun, X., Zhai, J., Wang, W., Wu, Y., & Candeias, A. (2023). On conservation of world heritage Beijing-Hangzhou grand canal for enhancing cultural ecosystem services. *Heritage Science*, 11(1), 1–17.
<https://doi.org/10.1186/s40494-023-01101-4>