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Review

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Mapping visitor experiences at museums: Research trends through bibliometric analysis

Vu Quang Nguyen*, Nguyen Nhat Anh, Lam Thi Huyen, Tran Dang Khoa, Duong Chau Ngoc, Ngo Hong Yen

ABSTRACT

In the context of rapid cultural tourism development and digital transformation, museums have evolved beyond mere exhibition spaces to become dynamic environments for experience, education, and interaction. Effective experience design not only fosters active visitor engagement but also facilitates deeper connections with exhibited content, thereby enhancing both emotional and cognitive value. However, despite Vietnam's extensive museum system, many institutions have yet to fully capitalize on experiential elements to attract visitors. Traditional, low-interaction displays with limited technological integration may diminish appeal, particularly among younger audiences. Consequently, investigating experience design solutions in museums is essential to enhancing their value in the digital era. This study employs bibliometric analysis to evaluate the body of research on museum experience design, utilizing data from Scopus and Web of Science (1998-2025). By incorporating the visualization tool VOSviewer, the study identifies key research trends, influential authors and institutions, as well as collaborative networks within the field. The research aims to clarify: (1) the primary research trends; (2) the most influential authors, institutions, and countries; (3) collaborative models among researchers; (4) the evolution of keywords related to the topic; and (5) research gaps and future development directions. In addition to mapping the current academic landscape, the study highlights the growing application of immersive technologies such as virtual and augmented reality in enhancing visitor engagement. Furthermore, it emphasizes the importance of interdisciplinary approaches and international collaboration in fostering innovation and inclusivity in museum experience design. These insights are crucial not only for advancing scholarly understanding but also for supporting museums in delivering meaningful, engaging, and sustainable experiences to diverse audiences in the digital age.

Key words: museum, experience, visitor, Bibliometric, VOSviewer

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INTRODUCTION

In the context of cultural tourism development and digital transformation, museums have evolved beyond their traditional role as mere exhibition spaces to become dynamic environments for experience, education, and interaction. Many museums worldwide are innovating their approaches to visitor engagement by integrating modern technologies such as virtual reality (VR), augmented reality (AR), mobile applications, and interactive experience design to attract and retain visitors[1–3]. Experience design in museums plays a critical role in fostering co-creation, enhancing knowledge exchange, and facilitating unique, memorable visits. Encouraging active visitor engagement transforms them from passive observers into participants, enriching their emotional and cognitive outcomes[4]. Furthermore, museum experience design promotes engagement and connection with concepts, history, and nature[5]. By addressing visitors' psychological and behavioral needs, museums can establish deeper connections between audiences and content, fostering more immersive and memorable experiences. The integration of diverse interactive and multisensory approaches can further deepen visitors' engagement with exhibitions, surpassing traditional display methods[6]. However, a comprehensive understanding of the impact of museum experiences on visitors' responses remains limited[7]. Existing literature underscores the significance of design elements such as spatial organization, interactivity, and immersive experiences; nevertheless, further empirical research is required to bridge these gaps. In Vietnam, despite its extensive museum system rich in historical and cultural content, many institutions still lack engaging experiential elements. Traditional display methods, limited interactivity, and the absence of technological applications may lead to visitor disengagement, particularly among younger audiences. Therefore, investigating and proposing experience design solutions for museum visitors is an urgent necessity to enhance the role and value of museums in the modern era. A comprehensive and systematic literature review is es-

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sential to consolidate existing knowledge, identify research gaps, and guide future studies.

To address this need, the present study employs bibliometric analysis - a quantitative analytical method first introduced by Alan Richard Pritchard [8] - to systematically assess the impact, characteristics, and developmental trends in academic literature. Specifically, the integration of bibliometric analysis with data visualization techniques using VOSviewer enables the construction of an objective, data-driven knowledge map, thereby facilitating the identification of key research foci and prominent academic trends. This method also highlights the emergence of specific keywords that reflect research priorities within the field [9]. Effective visualization plays a crucial role in research strategy planning, aiding in the identification of unexplored areas and potential research directions [10].

This study applies bibliometric analysis to examine scholarly publications retrieved from the Scopus and Web of Science databases covering the period from January 1, 1998, to February 14, 2025. To the best of the author's knowledge, no prior studies have employed bibliometric analysis to comprehensively assess research on experience design for museum visitors. Accordingly, this review aims to address the following key research questions:

1. What are the emerging themes and trends in research on museum visitor experience design?
2. Which authors, institutions, and countries have significantly influenced this field?
3. What networks and collaborative models exist among researchers in museum visitor experience design?
4. How has the development of research-related keywords evolved over time?
5. What research gaps and future opportunities remain in this field?

METHODOLOGY

Overview of the bibliometric method

Bibliometrics, also referred to as bibliometric analysis, statistical bibliography analysis, or scientometric measurement, encompasses various perspectives and methodological approaches. The term "bibliometrics" was introduced by Alan Richard in 1969 and is defined as "the application of mathematical and statistical methods to the study of books and other information carriers". At times, the term "statistical bibliography analysis" is used interchangeably [11]. Bibliometrics serves multiple purposes, including examining the historical development of specific research domains [12] and investigating the collaborative structures within and across disciplines [13]. This method is commonly employed in statistical analyses from multiple dimensions, such as quantifying, describing, and predicting written communication processes by analyzing statistical characteristics of publications, including authorship and keywords. The focus of bibliometric measurement is not on the physical attributes of documents but rather on statistical patterns across various variables, such as: Authorship characteristics; Origins of publications, including organizations, countries, and languages; Sources of dissemination, such as journals, publishers, and publication types; Content analysis, including textual components, thematic classifications, and subject categories; Citation patterns, encompassing in-text citations, citations received, and co-citations, which have been extensively studied for practical applications. As noted by Hallinger and Kovačević (2019): "The insights derived from this methodology are highly beneficial for scholars in identifying research directions" [14]. In the context of this study, bibliometric analysis serves as an invaluable tool for researchers to assess the scientific structure of academic literature, identify the most influential scholarly works, and construct a comprehensive research landscape while mitigating biases and subjective interpretations [15].

The American Library Association (ALA) defines bibliometrics as "the application of statistical methods in the structural analysis of scientific documents to elucidate the historical evolution of subject areas and the patterns of authorship, publication, and usage of scientific literature" [16]. Furthermore, Ana and Manuel (2021) define bibliometrics as "the application of statistical techniques to analyze publication data, including peer-reviewed journal articles, books, conference proceedings, periodicals, reviews, reports, and other relevant documents. It has been widely used to map relationships between research fields through quantitative methods" [17]. Similarly, Luís et al. describe bibliometric analysis as "a quantitative approach employed to examine the knowledge structure and development of research fields based on the analysis of related publications" [18]. Given the increasing pressure on researchers to provide quantitative evidence of their scholarly contributions, bibliometric analysis is widely adopted to enhance the objectivity of research synthesis. This method enables the systematic organization of research findings and facilitates the visualization of broader research landscapes [19]. It quantitatively identifies research trends by measuring the frequency of specific keywords in publications across reputable journals and patents. Moreover, objective

predictive analyses based on bibliometric results allow for the identification of emerging research topics in the coming years. As highlighted by Güttel and Vogel (2013): "Bibliometric analysis enables researchers to optimize data collection efforts and conduct longitudinal studies by aggregating a vast number of published articles within a defined timeframe" [20]. By analyzing the core content of published works, bibliometric analysis provides a comprehensive research overview and illustrates the interconnections between research concepts. This approach fosters new research ideas and problem formulations, supporting scholars in grasping the foundational knowledge of a research domain, its subfields, and interrelated disciplines. Consequently, research trends can be analyzed to inform the development of future research agendas and structural frameworks [21].

The application of bibliometric analysis in the tourism field has witnessed significant advancements since 2008 [22]. Several studies closely related to the research topic include "MagicMap: Enhancing Indoor Navigation Experience in VR Museums" [23], "Enhancing Cognitive Learning: The Role of Map Exhibits in Museum Education" [24], "Visitor Journey Mapping" [25], and "Cultural Communication in Museums: A Perspective of the Visitor Experience" [26]. However, to the best of the author's knowledge, no bibliometric analysis has yet been conducted to systematically assess research specifically on the development of visitor experience maps in museums. Therefore, this study aims to establish and outline a comprehensive scientific knowledge framework in this domain, serving as a foundation for further in-depth analysis to understand the methodology of constructing visitor experience maps in museum contexts.

Data and research tools

Sources and process of research data collection

To conduct bibliometric analysis, the initial step involves determining the most appropriate data sources that align with the scientific scope of the research field. Accordingly, this study focuses on examining English-language publications related to the design of visitor experiences within modern tourism marketing strategies, sourced from the Scopus and Web of Science (WoS) databases. These two platforms serve as critical gateways to accessing global academic databases. Numerous researchers have also relied on Scopus and WoS for bibliometric analysis due to their user-friendly interfaces and efficient analytical capabilities [27]. The following criteria were rigorously applied during the data search process:

1. Keywords: "*museum*", "*experience*", "*customer*".
2. Document Type: "*Journal articles, conference proceedings, and book chapters*".
3. Language: "*English*".
4. Publication Period: From "*01/01/1998*" to "*14/02/2025*".

The data extraction was carried out in January 2025, yielding a total of 144 publications from Scopus and 166 studies from the Web of Science database. Following the retrieval process, the research team undertook a meticulous selection of relevant studies, focusing on publications that enhance visitor experiences in the tourism sector. Non-relevant or duplicate records were systematically excluded using Microsoft Excel's search and filtering functions, supplemented by manual screening through a preliminary review of the content. This approach facilitated the calculation of frequency distributions and percentages of the retrieved publications, enabling the creation of relevant charts and graphs. After filtering and limiting the selection to book chapters, journal articles, and conference papers, the refined dataset comprised 91 publications from Scopus. Meanwhile, 41 relevant studies were extracted from the Web of Science database. The final dataset, after the completion of the screening process from both databases, comprised 132 studies, which were subsequently analyzed using VOSviewer to generate and visualize bibliometric networks. In summary, following the PRISMA data filtration model [28], this study adhered to a rigorous screening process, as illustrated in the diagram in Figure 1.

Research tools

The bibliometric analysis, combined with the VOSviewer tool [29] [30], facilitates a comprehensive exploration of research trends, particularly in specialized fields such as visitor experience design in museums. VOSviewer offers bibliometric mapping techniques that enable the creation and visualization of bibliometric networks while analyzing various elements, including journals, authors, and individual studies. These networks can be constructed based on citations, bibliographic coupling, co-citation analysis, or co-authorship relationships [31]. Bibliometric analysis encompasses a range of techniques, including co-citation analysis, bibliographic coupling, co-authorship analysis, co-word analysis, collaboration network analysis, and co-occurrence analysis. By integrating scientific mapping with bibliometric analysis, researchers can visualize the theoretical structure of a research topic, thereby identifying research clusters within the academic literature [32].

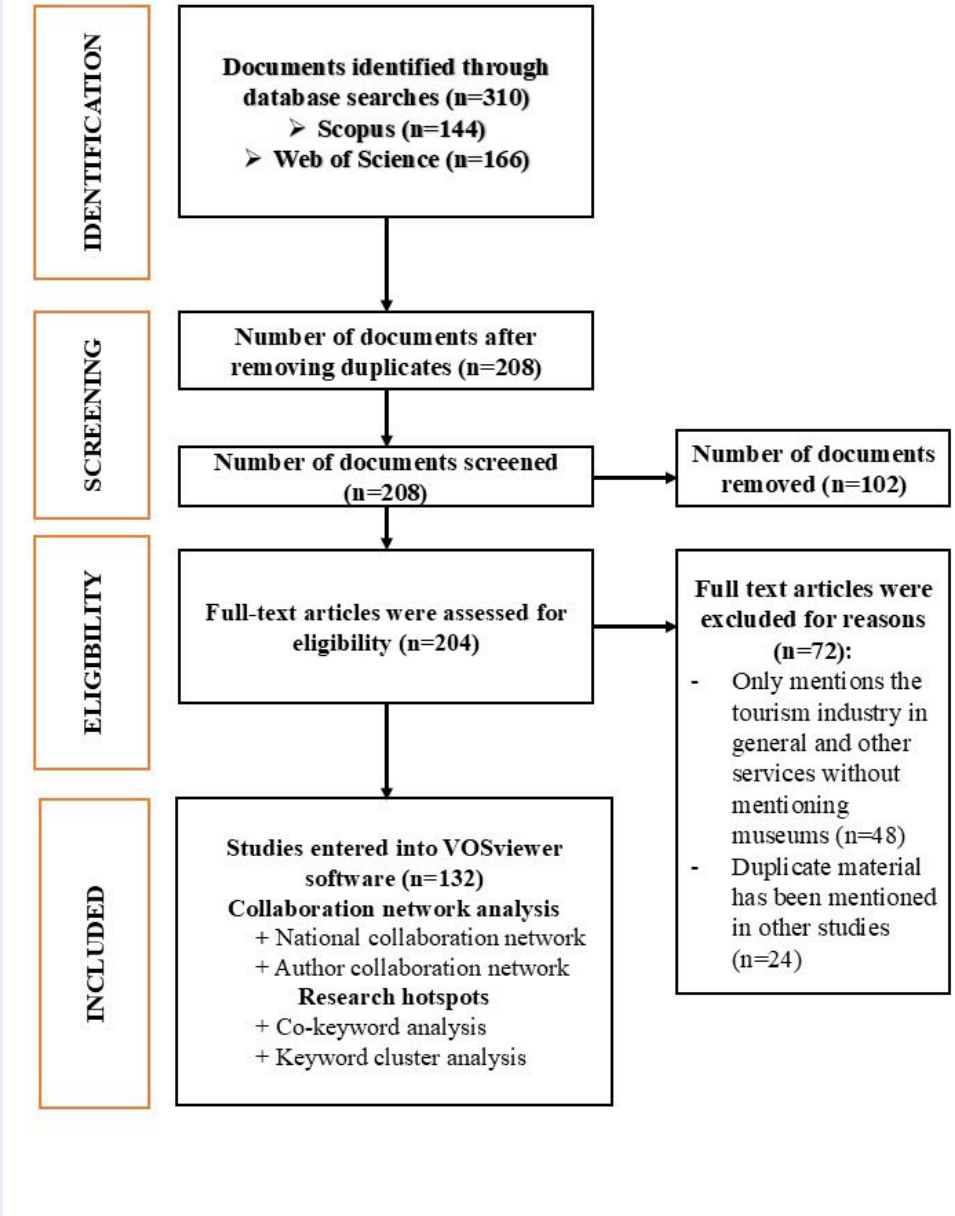

Figure 1: PRISMA diagram representing the bibliometric literature screening process. (Source: Research team, 2024)

Specifically, this study employs two primary analytical techniques: co-citation analysis and co-word analysis. Co-citation analysis helps determine the number of times an article is cited by two different articles and examines the relationships between articles that cite the same source. This method is instrumental in identifying influential works within a research domain, clarifying foundational knowledge, and highlighting key research trends. Meanwhile, co-word analysis quantifies the frequency with which specific keywords appear together in scholarly articles. This approach systematically organizes key concepts and identifies thematic clusters, enabling researchers to pinpoint research gaps and establish directions for future investigations [33 34 26]. The output of this analysis is a network known as a co-word map, which visually represents the relationships among keywords [35].

Zupic and Čater propose an approach that facilitates the processing of vast amounts of scientific knowledge within a research field while mitigating subjectivity and bias [27]. This methodology has been applied in tourism and marketing research and serves as an alternative to qualitative methods or meta-analyses [36]. Accordingly, this study adopts the research framework outlined by Zupic and Čater, which consists of study design, data collection, analysis, data visualization, and interpretation. The specific workflow is illustrated in the diagram in Figure 2.

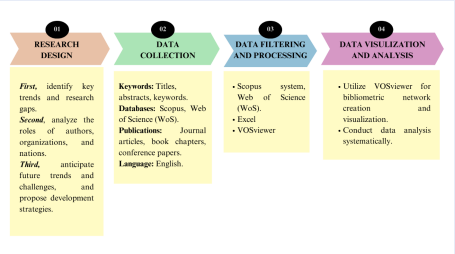

Figure 2: Document evaluation process using the bibliometric approach. (Source: Research team, 2024)

RESULTS

Analysis of national and institutional collaboration networks

The analysis of national and institutional collaboration networks aims to provide a comprehensive understanding of the degree of connectivity between different countries and geographic regions. This approach enables researchers to identify potential partners and foster the development of new collaborative networks.

Figure 3 below visualizes the collaboration network among countries and institutions in research related to visitor experience in museums. During the analysis, a minimum threshold was established to identify countries that have made significant contributions to the collaboration network. Specifically, only countries with at least two collaborative studies were included in the analytical model. The initial findings identified 28 countries that met this criterion. However, after filtering out countries with low connectivity levels or insufficient data, the number of countries and institutions within the network was reduced to 17.

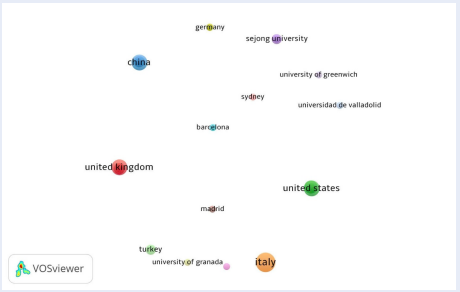

Figure 3: 3: Collaboration network of countries and institutions. (Source: Compiled from VOSviewer software by research team, March 2025)

The United Kingdom and the United States are among the most influential countries in research on visitor experience in museums, with notable academic institutions such as the University of Greenwich playing a significant role. Meanwhile, China has developed a relatively independent research network with limited collaboration with Western institutions, a pattern also observed in South Korea and Turkey, which tend to conduct research autonomously. Italy has made substantial contributions to this field, particularly in cultural heritage studies, while Spain has also been actively involved through institutions such as Universidad de Valladolid and the University of Granada. Overall, European countries exhibit strong collaborative networks, facilitating the expansion of research in this domain. However, global research collaboration remains fragmented, with most partnerships occurring within regional clusters, leading to a lack of cross-regional academic exchange.

Notably, Vietnam does not appear in the collaboration network of countries and institutions on this subject. This absence highlights the current limitations of research on visitor experience design in museums within Vietnam, as well as the lack of strong international partnerships in this area. In the context of

increasing global scientific integration, strengthening international research collaboration would enable Vietnam to access advanced methodologies, enhance research quality, and improve practical applications in the fields of tourism and museology [37].

Analysis of author collaboration networks

The analysis of collaboration networks in bibliometric studies reveals strong cooperation patterns among authors, as shown in Table 1 a collection of bibliometric indicators for 10 authors with related research topics, highlighting both highly concentrated research clusters and individual scholarly efforts. This analysis facilitates the identification of influential scholars, fosters academic connections, and enhances knowledge dissemination, ultimately contributing to the advancement of research in specific fields [38]. There is no universally established threshold for co-authorship analysis. In this study, a threshold of at least two related publications was set in VOSviewer to visualize the relationships among co-authors.

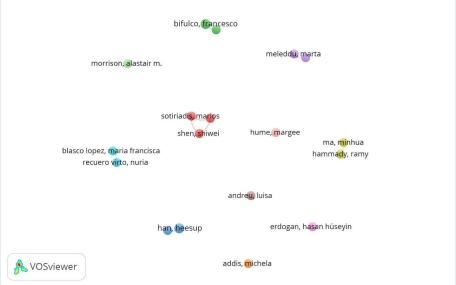

Figure 4: Author collaboration network (1998-2025). (Source: Compiled from VOSviewer software by research team, March 2025)

Based on Figure 4 generated from the VOSviewer software, 18 authors are categorized into 11 primary clusters, with one cluster exhibiting the strongest interconnections, reflecting a high level of research collaboration. However, despite the presence of multiple author clusters, the network remains relatively fragmented and lacks strong interlinkages, with numerous research groups operating independently without extensive cross-cluster collaboration.

Cluster 1 (Red) represents the most prominent group in the network, featuring authors such as Sotiriadis, M., Shen, S., and Zhang, Y., who focus on the application of smart technologies in tourist attractions, including museums [39] [40]. Cluster 2 (Light Blue) includes Blasco Lopez, Maria Francisca, and Recuero Virto, Nuria, whose research revolves around museum sustainability [41] and visitors' willingness to pay premium prices for museum experiences [42]. Cluster 3 (Dark Yellow) consists of Ma, M., and Hammady, R., who specialize in applying mixed reality (MR) technology to enhance visitor experiences in museums [43] [44]. Cluster 4 (Dark Green) includes Bifulco, F., and Amitrano, C.C., who focus on customer experience design in cultural heritage contexts by integrating multidimensional aspects of both digital and physical environments [45] and exploring how digital communication tools can stimulate visitor engagement in heritage settings [46].

Cluster 5 (Purple), comprising Meleddu, M., and Pulina, M., investigates visitor experiences in museums [47] and factors influencing visitor satisfaction [48]. Cluster 6 (Dark Blue) includes Han, H., and Hyun, S. S., who examine the impact of the museum environment on visitor loyalty [49] and post-visit behavioral responses in art museums [50]. The remaining research groups demonstrate weaker interconnections, indicating a relatively low level of collaborative research among authors.

Co-citation analysis

Co-citation analysis enables the identification of instances where a given article is cited simultaneously by two separate publications, as well as the relationships between articles that reference a common source. This analytical approach facilitates the recognition of the scientific foundation of a research topic by mapping citation networks among scholarly documents.

At present, there is no universally established threshold for co-citation analysis. In this study, a threshold of eight citations was set within the VOSviewer software to visualize the relationships among co-cited authors. This approach helps to identify highly influential author groups and provides a comprehensive visualization of the evolution of the research domain.

The results of the VOSviewer analysis in Figure 5 indicate that 44 authors are categorized into distinct author clusters, some of which exhibit strong interconnections. However, a number of independent research groups persist, suggesting that a fully integrated research network has yet to be established.

Cluster 1 (Red): This cluster comprises authors such as Sarstedt M., Hair J.F., Pine B.J., Gilmore J.H., Thyne M., Schmitt B., Packer J., and Prentice R. It exhibits a high level of connectivity and focuses on customer experience research, experiential marketing, and behavioral assessment models in tourism [2] [51] [52]. Studies within this cluster frequently explore strategies for creating unique tourism experiences and the perceived value of travelers [53] [54].

Table 1: Bibliometric indicators of the 10 authors with relevant research topics

Rank	Author	Organization	H-index	Document	Citation
1	**Marios Sotiriadis**	Ningbo University	15	44	1,203
2	**Francesco Bifulco**	Università degli Studi di Napoli Federico II	9	46	551
3	**Heesup Han**	Sejong University	86	616	32,064
4	**María Francisca Blasco López**	Universidad Complutense de Madrid, Department of Management and Marketing	15	34	571
5	**Luisa Andreu**	Universitat de València	32	84	3,900
6	**Nuria Recuero Virto**	Universidad Complutense de Madrid	12	30	393
7	**Minhua Ma**	Falmouth University	22	78	1559
8	**Ramy Hammady**	Solent University	7	13	362
9	**Marta Meleddu**	Università degli Studi di Sassari	18	45	914
10	**Margee Hume**	Torrens University Australia	14	44	955

(Source: Compiled from VOSviewer software by research team, March 2025)

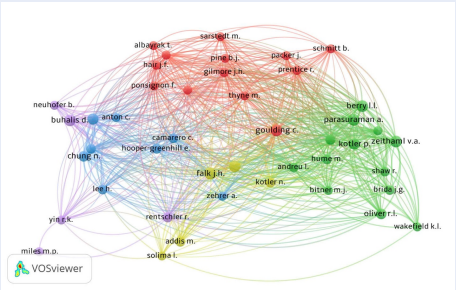

Figure 5: Co-citation analysis (1998-2025). (Source: Compiled from VOSviewer software by research team, March 2025)

Cluster 2 (Green): This group includes Berry L.L., Parasuraman A., Kotler P., Zeithaml V.A., Hume M., Shaw R., Bitner M.J., Brida J.G., Oliver R.L., and Wakefield K.L. The cluster primarily investigates service quality, consumer behavior, and tourism marketing. Notably, Kotler P. and Zeithaml V.A. have significantly influenced service marketing theories and customer experience frameworks[55 56 57], while Berry L.L. and Parasuraman A. have contributed to the development of service quality measurement models such as SERVQUAL[58 59].

Cluster 3 (Blue): Consisting of Anton C., Chung N., Lee H., and Hooper-Greenhill E., this cluster specializes in digital technologies in tourism, digital marketing, and smart tourism experiences[46 60]. Research from this group frequently examines the role of technology in enhancing visitor experiences, the development of digital tourism platforms, and the application of virtual reality in the tourism sector.

Cluster 4 (Yellow): This cluster comprises Falk J.H., Addis M., Kotler N., and Solima L., with a primary focus on cultural tourism, museums, and the arts. Their research particularly investigates how tourists interact with cultural spaces and the influence of artistic elements on travel experiences[61 62 63].

Cluster 5 (Purple): Including Neuhofer B., Yin R.K., Rentschler R., and Miles M.P., this group focuses on innovation in the tourism industry[64 65]. This cluster exhibits weaker connections with the others, suggesting that research on tourism innovation remains somewhat disconnected from core topics such as service marketing and experience quality.

The citation mapping highlights strong interconnections among researchers in service marketing and tourism, particularly within the clusters focused on tourism experiences (red), service quality (green), and tourism technology (blue). However, fragmentation persists, particularly in the cluster dedicated to tourism innovation (purple), underscoring a lack of integration among experts in this field. This disconnect may stem from differences in research approaches or the specific application domains of each author group.

Co-word analysis

Co-word analysis, or keyword co-occurrence analysis, is a methodological approach employed to examine

research trends and conceptual relationships by analyzing the frequency with which keywords appear together in scholarly literature. This technique provides insights into specific research themes and enhances the quality of literature reviews [66].

For this study, data were collected from the Scopus and Web of Science databases (February 2025), comprising 132 documents related to "visitor experience design in museums" and recording a total of 849 keywords. By setting a minimum occurrence threshold of three, 80 keywords met the criteria and were subjected to co-occurrence analysis using VOSviewer software. The results are visualized as a network Figure 6, where each node represents a keyword, the node size reflects its occurrence frequency, the node color indicates the cluster to which it belongs, and the thickness/number of links represents the degree of co-occurrence. Although the keyword network is extensive, it remains relatively dispersed, indicating that "visitor experience design in museums" has yet to be comprehensively explored from multiple perspectives. This finding highlights several research gaps that warrant further investigation.

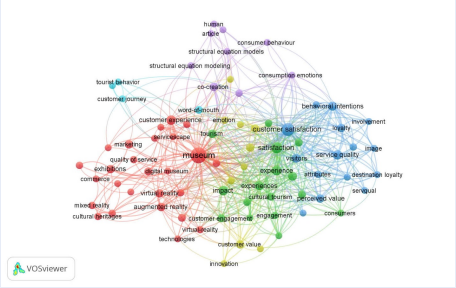

Figure 6: Keyword co-occurrence map of evaluative literature. (Source: Compiled from VOSviewer software by research team, March 2025)

The keyword network illustrated in Figure 6, along with the keyword strength of the ten most prominent terms summarized in Table 2, reveals several central keywords characterized by larger node sizes and numerous connections. Notably, "museum" is a key term connected to "customer experience", "marketing", "virtual reality", "augmented reality", and "digital technology", among others, underscoring the significance of experience design and technology applications in contemporary marketing strategies. "Customer satisfaction" emerges with high frequency, serving as an intermediary between keywords related to visitor experience and service quality. Similarly, "behavioral intentions" and "service quality" emphasize the role of behavioral intent and service quality in determining visitor satisfaction in museum settings.

Based on the VOSviewer analysis, the keywords are categorized into six main clusters:

Red Cluster: Keywords include "museum", "customer experience", "marketing", "exhibitions", "user experience", "virtual reality", "augmented reality", "mixed reality", and "digital", among others. This cluster highlights the role of digital technology and exhibition design in enhancing the visitor experience in museums. The central keywords "museum" and "customer experience" reflect a focus on optimizing visitor experiences through marketing, exhibitions, and user experience design. Technologies such as virtual reality (VR), augmented reality (AR), and mixed reality (MR) are employed to create immersive experiences, allowing visitors to engage more interactively with content [67, 2, 46]. Additionally, "digital" plays a supportive role in artifact digitization and improving visitor access to information, thereby enhancing satisfaction and increasing public interest [68].

Blue Cluster: Keywords include "customer satisfaction", "service quality", "loyalty", "behavioral intentions", and "perceived value". This cluster focuses on service quality and visitor satisfaction. "Customer satisfaction" reflects interest in evaluating visitors' post-visit experiences, while "service quality" is a crucial factor influencing satisfaction, encompassing staff service, facilities, and accompanying amenities [69]. When experiences meet or exceed expectations, visitors are more likely to return (loyalty). Museum visitor loyalty significantly affects behavioral intentions and revisit rates [70]. "Perceived value" refers to visitors' assessment of their museum experience [71].

Green Cluster: Keywords include "satisfaction", "experience", "cultural tourism", "impact", "customer engagement", "emotion", "antecedents", and "consumers". This cluster underscores the influence of cultural tourism and visitor engagement. "Satisfaction" and "experience" illustrate the relationship between visitor satisfaction and the quality of museum experiences. "Cultural tourism" highlights museums' role in cultural preservation and promotion, making them attractive destinations for tourists [72]. "Customer engagement" emphasizes visitor participation in museum activities [73].

Yellow Cluster: Keywords include "customer value", "innovation", and "emotion", focusing on the value visitors derive from museums. "Customer value" reflects how visitors assess their experience based on exhibit content, interaction levels, and cultural significance [74]. "Innovation" underscores the role of

Table 2: Keyword strength of the 10 most prominent keywords

Rank		Cluster	Link	Total Link Strength	Occurrences
1	museum	1 - Red	77	194	55
2	customer satisfaction	3 - Blue	51	127	26
3	service quality	3 - Blue	25	55	10
4	experience	2 - Green	38	68	11
5	behavioral intentions	3 - Blue	29	57	8
6	loyalty	3 - Blue	24	39	6
7	marketing	1 - Red	17	19	6
8	virtual reality	1 - Red	22	27	7
9	augmented reality	1 - Red	21	27	7
10	visitors	3 - Blue	32	54	8

(Source: Compiled from VOSviewer software by reasearch team, March 2025)

creativity in transforming content delivery and enhancing visitor experiences [75]. "Emotion" highlights the impact of affective responses on overall experience quality [76].

Purple Cluster: Keywords include "co-creation", "motivation", "structural equation modeling", "human", "article", and "consumer behavior". This cluster addresses visitor behavior research and the role of co-creation in museums. "Co-creation" signifies the trend of visitors actively participating in content creation rather than passively receiving information [77]. "Structural equation modeling" is a research method used to analyze relationships among factors influencing visitor experiences [78]. "Consumer behavior" pertains to visitor behavior models that help museums understand visitor needs and expectations to refine experience design [79].

Light Blue Cluster: Keywords include "tourist behavior", "customer journey", and "word-of-mouth", reflecting how visitors experience, evaluate, and share their museum visits. The customer journey extends beyond the museum visit itself, encompassing pre- and post-visit stages, where positive experiences contribute to increased word-of-mouth recommendations. This trend highlights the importance of enhancing visitor satisfaction to promote favorable discussions about museums [80].

The trends of keywords from 2017 to 2022, as depicted in Figure 7, reflect the evolution of different research directions over distinct periods:

Purple Cluster - 2017-2018: Research in this phase focused on factors influencing visitor satisfaction (customer satisfaction), service quality (service quality), tourist behavior (tourist behavior), and consumption

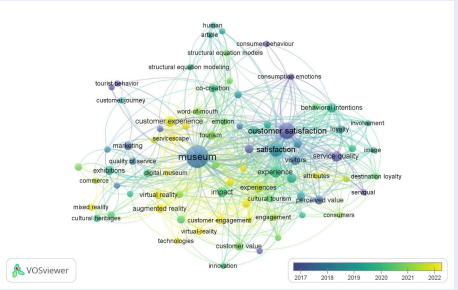

Figure 7: 7: Keyword trends from 2017 to 2022. (Source: Compiled from VOSviewer software by research team, March 2025)

emotions (consumption emotions). This period indicates an initial interest in measuring visitor satisfaction and assessing experience quality, with studies primarily examining the relationship between service quality, emotions, and visitor loyalty.

Blue Cluster - 2018-2019 Research expanded to factors influencing visitor engagement and loyalty, with growing interest in concepts such as loyalty, perceived value, customer journey, and involvement. This trend reflects a shift towards not only attracting visitors but also retaining them through enhanced experiences and brand value.

Dark Green Cluster - 2019-2020: Studies increasingly focused on visitor experience (experience), museum impact (impact), and cultural tourism (cultural tourism). Notably, the emergence of "co-creation" emphasized the role of visitors in co-creating value with museums. Additionally, the keyword "exhibition" highlights interest in how exhibit design influences visitor perceptions and satisfaction.

Light Green Cluster - 2020-2021: Research during this period concentrated on customer value (customer value), consumer behavior (consumers), and word-of-mouth (word-of-mouth). The use of structural equation modeling indicates a trend towards advanced data analysis to better understand factors affecting visitor experiences. The inclusion of "commerce" reflects an interest in museums' commercial aspects, such as ticket sales, souvenirs, and auxiliary services.

Yellow Cluster - 2021-2022: The most recent phase witnessed a substantial shift towards technological applications in museum experiences. Research focused on customer experience, virtual reality (virtual reality), augmented reality (augmented reality), and mixed reality (mixed reality). Additionally, terms such as "technologies", "servicescape", and "attributes" suggest a transition from traditional research to optimizing museum spaces through technology, enriching visitor experiences. This trend underscores the growing need for digital transformation in tourism and museums to align with evolving consumer behavior.

Overall, the keyword network analysis demonstrates that visitor experience design in museums is a multifaceted domain integrating technology, service quality, cultural tourism, and visitor behavior. The strong interconnections between keyword clusters suggest that museum experience design extends beyond exhibition optimization, requiring a holistic approach that incorporates technology, interaction, visitor emotions, behavioral research models, and sustainable development. This reflects modern trends in museology, where visitor experience lies at the core of development and innovation strategies.

DISCUSSION AND RECOMMENDATIONS

Research on visitor experience design in museums, based on an analysis of relevant literature, reveals three distinct developmental phases. From 1998 to 2017, studies on museum experience design remained relatively limited, primarily due to underdeveloped technology and the lack of foundational theoretical frameworks. Between 2017 and 2021, research activity increased steadily, focusing on spatial organization, interactivity, and immersive elements to enhance visitor engagement. Since 2022, the number of academic publications has surged, driven by the integration of digital technologies, the personalization of experiences, and an increased emphasis on emotional connections within museum spaces. The majority of scholarly discussions center on visitor satisfaction and engagement, reflecting a shift from traditional exhibition models toward a more holistic, experience-centered approach.

However, the analysis also highlights the fragmented nature of the research network, with clusters predominantly concentrated in Europe, North America, and Asia, yet exhibiting minimal interregional collaboration. Notably, Vietnam remains absent from the landscape of national and institutional research collaborations, underscoring the need for greater international engagement in this field. While contemporary studies emphasize interactivity, immersion, and emotional impact, there is still no comprehensive theoretical framework to systematically and consistently evaluate the effectiveness of museum experience design. Keyword analysis reveals the frequent occurrence of terms such as "virtual reality", "augmented reality", and "digital museum". However, these discussions have yet to fully integrate emerging challenges, including accessibility for diverse visitor groups and the long-term implications of digital transformation in museums. Despite the growing interest in enhancing visitor experiences, most existing studies remain case-specific, lacking generalizability and a comprehensive theoretical synthesis.

To advance this field, strengthening international research collaborations is essential to facilitate knowledge exchange and the establishment of standardized experience design frameworks. Interdisciplinary studies that bridge technology, psychology, and cultural studies will provide deeper insights into visitor engagement mechanisms. Large-scale experimental research is needed to assess the impact of interactive and immersive experiences on visitor return rates and the educational effectiveness of museums. The development of comprehensive design principles will be crucial in ensuring accessibility for all demographic groups, including individuals with disabilities. Additionally, future studies should explore the potential of AI-driven personalization and augmented reality to further enhance visitor experiences. Strengthening cooperation among museum professionals, technology developers, and policymakers will foster best practices, improve resource-sharing, and ensure the sustainability of innovative museum experiences. Publishing research in specialized academic journals will diversify perspectives and support the long-term development of visitor experience design within the museum context.

CONCLUSION

Based on an analysis of scholarly literature on visitor experience design in museums, this study provides a comprehensive overview of the evolution of this field, tracing its development from early, limited research to the recent surge in studies that integrate technology and emphasize personalized experiences. The findings highlight a paradigm shift from traditional exhibition models to an experience-centered approach, underscoring the active role of visitors in shaping the value of their museum experience.

Despite the growing interest in enhancing visitor experiences in museums, several critical research gaps remain. First, the research network remains fragmented, lacking strong interregional collaboration, particularly among scholars from Europe, North America, and Asia. Second, while existing studies predominantly focus on interactivity, immersion, and emotional impact, a comprehensive theoretical framework for systematically measuring and evaluating the effectiveness of museum experience design has yet to be established. Finally, the application of emerging technologies, such as artificial intelligence, augmented reality, and mixed reality, in museum experiences remain underexplored, while challenges related to accessibility for diverse visitor groups and the long-term implications of digital transformation have not been thoroughly examined.

To ensure the sustainable development of this field, it is essential to strengthen international research collaboration to facilitate knowledge exchange and establish broadly applicable experience design models. Interdisciplinary research that integrates technology, psychology, and museology can contribute to a deeper understanding of how to optimize visitor experiences. Additionally, large-scale experimental studies are needed to assess the impact of immersive experiences on visitor retention and the educational effectiveness of museum exhibitions. The development of comprehensive design principles that ensure accessibility for all visitor demographics will play a crucial role in enhancing the overall quality of museum experiences. Finally, fostering collaboration among museum professionals, technology developers, and policymakers will help optimize the integration of technological advancements into museum spaces while ensuring the long-term sustainability of visitor experience design.

COMPETING INTERESTS

The authors declare that they have no conflicts of interest.

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Author 2: Nguyen Nhat Anh

Responsible for: Filtering data from Scopus and Web of Science; running VOSviewer software; conducting detailed analysis of research results; writing the Discussion, Recommendations, and Conclusion sections; revising the Abstract and Introduction; designing the PRISMA diagram; and preparing detailed responses to the reviewers' comments.

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Responsible for: Writing the Methodology section; designing Figure 2; assisting in sourcing and organizing references; and supporting content editing.

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Responsible for: Overseeing the English content; serving as the lead editor for the entire manuscript; managing the References section; and formatting the paper according to journal requirements.

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TÓM TẮT

Trong bối cảnh du lịch văn hóa phát triển mạnh mẽ và chuyển đổi số diễn ra nhanh chóng, bảo tàng đã vượt ra khỏi vai trò truyền thống là không gian trưng bày đơn thuần, trở thành môi trường năng động phục vụ cho trải nghiệm, giáo dục và tương tác. Thiết kế trải nghiệm hiệu quả không chỉ thúc đẩy sự tham gia chủ động của khách tham quan mà còn giúp họ tạo dựng mối liên kết sâu sắc hơn với nội dung trưng bày, từ đó gia tăng cả giá trị cảm xúc lẫn nhận thức. Tuy nhiên, mặc dù Việt Nam sở hữu hệ thống bảo tàng phong phú, nhiều cơ sở vẫn chưa khai thác triệt để yếu tố trải nghiệm như một công cụ thu hút khách tham quan. Cách trưng bày theo lối truyền thống, ít tương tác và hạn chế tích hợp công nghệ có thể làm giảm sức hấp dẫn, đặc biệt đối với nhóm du khách trẻ tuổi. Do đó, việc nghiên cứu các giải pháp thiết kế trải nghiệm trong bảo tàng là cần thiết nhằm nâng cao giá trị của bảo tàng trong thời đại số. Nghiên cứu này sử dụng phương pháp phân tích trắc lượng thư mục (bibliometric) để đánh giá tổng quan các công trình nghiên cứu về thiết kế trải nghiệm trong bảo tàng, dựa trên dữ liệu từ hai cơ sở dữ liệu quốc tế Scopus và Web of Science (giai đoạn 1998 - 2025). Thông qua công cụ trực quan hóa VOSviewer, nghiên cứu xác định các xu hướng nghiên cứu chủ đạo, các tác giả và tổ chức có ảnh hưởng, cũng như mạng lưới hợp tác trong lĩnh vực này. Mục tiêu nghiên cứu nhằm làm rõ: (1) các xu hướng nghiên cứu chính; (2) những tác giả, tổ chức và quốc gia có ảnh hưởng nhất; (3) mô hình hợp tác giữa các nhà nghiên cứu; (4) sự phát triển của các từ khóa liên quan đến chủ đề; và (5) khoảng trống nghiên cứu cùng định hướng phát triển trong tương lai. Bên cạnh việc phác họa bức tranh học thuật hiện tại, nghiên cứu cũng làm nổi bật xu hướng gia tăng ứng dụng các công nghệ nhập vai như thực tế ảo (VR) và thực tế tăng cường (AR) nhằm nâng cao mức độ tương tác của khách tham quan. Đồng thời, nghiên cứu nhấn mạnh vai trò của các phương pháp tiếp cận liên ngành và hợp tác quốc tế trong việc thúc đẩy đổi mới sáng tạo và tăng cường tính bao trùm trong thiết kế trải nghiệm bảo tàng. Những phát hiện này không chỉ có ý nghĩa học thuật mà còn hỗ trợ các bảo tàng trong việc cung cấp trải nghiệm ý nghĩa, hấp dẫn và bền vững cho đa dạng đối tượng du khách trong thời đại số.

Từ khoá: bảo tàng, trải nghiệm, khách tham quan, phân tích trắc lượng thư mục, VOSviewer

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