



Mountain tourism research: Trends and future directions through bibliometric and TCCM analysis (2001-2024)

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ABSTRACT

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Mountain tourism has expanded rapidly, driven by changing travel motivations that increasingly emphasize leisure, wellness, and nature-based experiences. This shift has positioned mountain destinations as critical spaces for advancing sustainable tourism development, strengthening local livelihood opportunities, and ensuring environmental conservation, while simultaneously contributing to socio-economic development and community well-being. In response to this interest, the present study provides a hybrid review of mountain tourism research published between 2001 and 2024. Based on 1773 peer-reviewed articles, the review uses a Theory-Context-Characteristics-Methodology (TCCM) bibliometric framework combined with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol to map and synthesize scholarly contributions. The analysis examines publication trends, keyword patterns, influential authors and journals, citation structures, and bibliographic linkages to reveal how mountain tourism scholarship has developed over time. The findings reveal the emergence of five dominant research themes: community participation, tourism resources, geotourism, climate change, and sustainable development. These themes highlight the interdisciplinary and evolving nature of mountain tourism scholarship, reflecting the integration of diverse perspectives and an increasing emphasis on sustainability, resilience, and long-term socio-environmental balance. The hybrid review further identifies key research gaps and proposes future research directions to advance sustainability-oriented theory, practice, and policymaking in mountain tourism.

Contribution/Originality: This bibliometric study examines mountain tourism research by combining the TCCM and PRISMA frameworks. It provides a comprehensive understanding of how mountain tourism research has developed and where it is heading. It also identifies future research directions to contribute to the advancement of the mountain tourism domain.

1. INTRODUCTION

Mountains occupy approximately 20% of the Earth's surface. Mountains accommodate over 1.1 billion people, many of whom are among the poorest and most isolated globally (UN Tourism, 2023). The United Nations Environment Programme (2007) defines a mountain as a naturally raised landform with an altitude surpassing 300 meters. The unique and incomparable attributes of mountains, such as serene environment, rich biodiversity (flora and Fauna), geographical landscapes, rivers, natural parks, outdoor recreational and adventurous activities, and vibrant local cultures, make mountains the second most important tourism destinations in the world, just after coastal destinations (Nepal & Chipeniuk, 2005; Shekhar, 2023). Mountain tourism represents between 9 and 16% of international tourist arrivals worldwide, translating into 195 to 375 million tourists in 2019 alone (UN Tourism,

2023). Mountain tourism has a high potential to stimulate local economic growth and social change due to its complementarity with other economic activities, contribution to GDP and job creation, and ability to disperse demand over time and across a larger territory (Nyaupane & Timothy, 2022).

Mountain-related characteristics and the sociocultural environment make mountain tourism more appealing to prospective tourists (Zeng, Li, Nuttapong, Sun, & Mao, 2022). Mountainous areas in underdeveloped nations, frequently attributed to subsistence economies, poor condition of traditional agriculture, dependence on pastoralism, poverty, weak governance, fragile natural ecosystems, and susceptibility to natural disasters, face particular obstacles in tourism development (Sood, Lynch, & Anastasiadou, 2017). Besides diversifying into other non-agricultural employment, tourism is viewed as a possible solution to the issues. Tourism growth in mountainous and distant rural locations is a problem for planners, as they must balance development with nature. While managed sustainably, mountain tourism can increase local communities' income while also helping conserve their natural resources and cultures. Because of the greater rate of tourism growth, mountain tourism gives a tremendous chance for socio-economic, cultural, and environmental development (Knowles, Scott, & Steiger, 2024; Shekhar, 2023). With growing interest in mountain tourism from policymakers, stakeholders, tourists, and locals, exploring existing literature is crucial. This review aims to explore new perspectives on previously studied data regarding tourism development in mountainous areas. The analysis of previous research using bibliometrics provides a comprehensive overview of tourism development in mountainous areas through an aggregation of knowledge, identification of trends, and an examination of potential future research avenues. Several studies have been completed analyzing bibliometrics in relation to tourism; however, they also contain limitations that are similar to one another (Ng, 2022). This study has analyzed Scopus-indexed publications related to mountain tourism from 2003 to 2021. The primary focus of this study was on the subjects of sustainable tourism development, tourism development, and mountain destinations (Chakraborty & Ghosal, 2022) completed a bibliometric analysis of 105 papers that were published between 2001 and 2019, which focused specifically on the Western Himalayan area (Zeng et al., 2022) completed an analysis of Web of Science (WOS) indexed journals from 2010 to 2020, although their study had a narrow focus. Shekhar (2023) analyzed Scopus-indexed research from 1982 to 2022, although their study used a simple methodology. While several of these bibliometric studies have shown the same or similar trends, they all lack cohesion and breadth to warrant a more inclusive and comprehensive perspective to address their limitations. As such, the present study will address these shortcomings through the inclusion of a longer timeframe (2001 – 2024) and by analyzing research on mountain tourism from developed, developing, and underdeveloped regions.

To accomplish this goal, the study employs a hybrid review that incorporates advanced bibliometric methods in addition to the Theory-Context-Characteristics-Methodology (TCCM) framework recommended by Paul and Rosado-Serrano (2019). The TCCM framework was then used to conduct the content analysis, which would systematically scan theoretical views, environments, constituents, and methods that could relate to studies of mountain tourism, as by Talawar, Suresh, and Alathur (2025). Thematic analysis helped yield the five primary themes for scientific studies. This paper now presents a compilation of recent literature findings and gives guidelines for upcoming literature discussions with a view to explaining the concepts behind mountain tourism. It attempts to enhance the understanding of mountain tourism and addresses the following questions:

Q1: To whom have the potential contributors to mountain tourism research been during the last two decades?

Q2: What are the potential thematic areas for mountain tourism throughout the years?

Q3: What are the future research directions in mountain tourism research?

2. METHODOLOGY

This study adopts a bibliometric approach to review mountain tourism research using the framework proposed by Donthu, Kumar, Mukherjee, Pandey, and Lim (2021). Unlike traditional reviews, bibliometric analysis relies on quantitative evidence to trace how the field has developed over time (Kumar, Gahlawat, Singh, Kala, & Paliwal, 2025).

The bibliometric analysis framework allows researchers to identify the state of the literature and identify the gaps in mountain tourism research and the potential future direction for the field, since mountain tourism is an interdisciplinary area of research. Bibliometrics analysis includes studies of a wide variety of disciplines. Accordingly, this study follows the structured five-step approach to bibliometric analysis outlined by Rowley and Slack (2004) and also provides a nomological network that identifies important theories, contexts, concepts, and ways that research has been conducted in the field of mountain tourism (Talawar et al., 2025).

2.1. Selection of An Appropriate Database

Scopus was selected as the primary data source because it provides wide coverage of peer-reviewed literature and offers reliable metadata for bibliometric analysis (Kumar et al., 2025). It offers access to a wide and diverse range of scholarly publications, making it well-suited for comprehensive bibliometric analysis (Shekhar, 2023). Although Web of Science (WoS) is also a well-established database, its stricter journal selection criteria can limit coverage of relevant studies. Google Scholar presents challenges for systematic analysis due to inconsistent citation records, limited metadata, and the inclusion of non-peer-reviewed documents. These issues make it less appropriate for bibliometric analysis. Therefore, we believed that the Scopus database is the most reliable and appropriate database for our analysis.

2.2. Identification of Keywords

The selection of relevant articles depends on the search string, making keyword choice crucial. This study identified search terms by reviewing prior literature on mountain tourism. Following Beck and Rygl (2015) and Kumar et al. (2025), synonyms were included. The keywords used were “mountain” OR “hill” and “tourism” to find out relevant results and optimize search outcomes.

2.3. Initial Search Results

The initial search was performed on 31 December 2024. In the initial search without any filter or restrictions, a total of 4456 documents from Scopus were collected. These documents were published in a variety of study disciplines such as business, management, and accounting, as well as social sciences and studies. PRISMA flowchart for the literature screening process (Summary of Eligibility Criteria) is shown in the following flowchart.

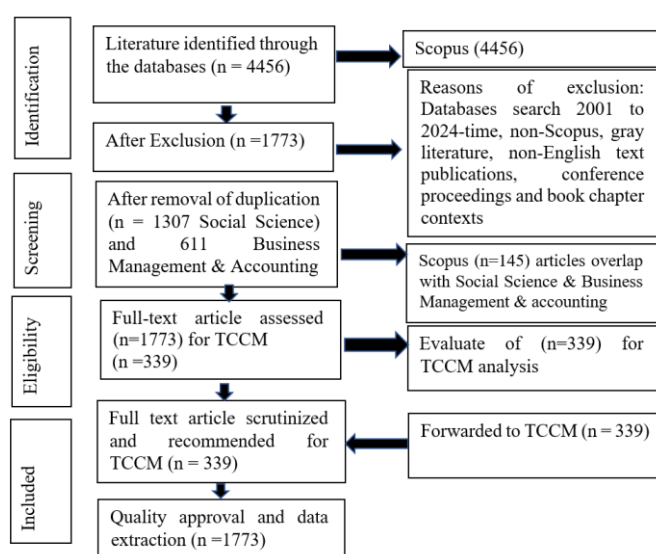


Figure 1. PRISMA framework flow chart.

Source: Paul (2025).

2.4. Inclusion and Exclusion Criteria

Filtering was essential to ensure relevant research for analysis. The selection criteria included:

- Articles published between 2001 and 2024.
- Subject areas limited to social sciences and business, management, and accounting.
- Only journal articles.
- English-language publications.

The search string was altered to TITLE-ABS-KEY (mountain OR hill AND Tourism). AND PUBYEAR > 2000 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "BUSI")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE, "j")). A total of 1773 Scopus-indexed documents met the selection criteria. In this sample, 1307 belonged to social science articles and 611 to business management and accounting. To refine the list, we manually screened articles by reviewing abstracts for relevance to mountain tourism. Figure 2 shows publication trends in tourism and mountain tourism over time. While tourism-related research exhibits a sharp and consistent rise, reflecting growing academic interest, mountain tourism publications show modest growth with limited fluctuations, indicating that it remains a relatively niche area within the broader tourism research landscape.

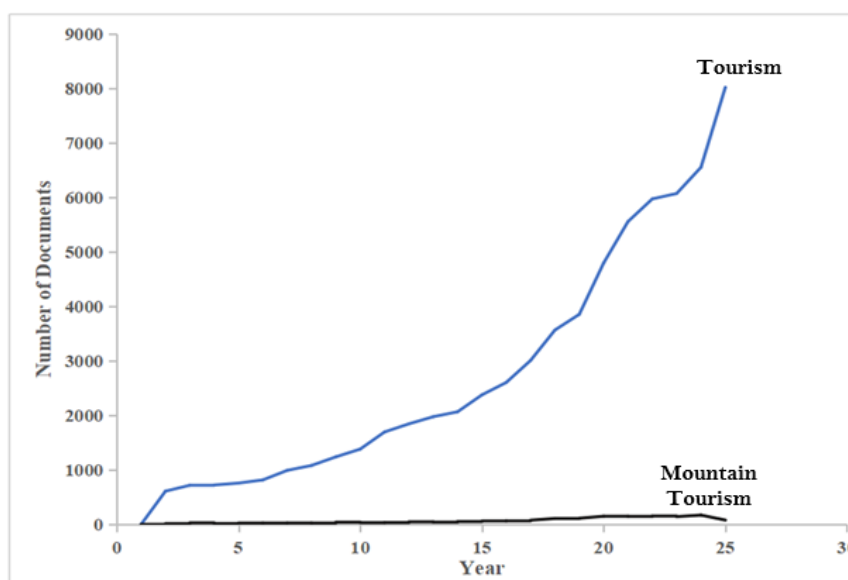


Figure 2. Comparative trend of publications in tourism and mountain tourism.

2.5. Selection of Appropriate Tools

We utilized VOSviewer and the Biblioshiny package of the R-based Bibliometrix software. These tools are widely recognized for their efficiency in conducting comprehensive bibliometric studies. For further analysis, we employed the Bibliometrix library, followed by the Biblioshiny function to launch its web interface.

3. RESULTS

3.1. Journal's Performance

Table 1 illustrates the contributions of the top 10 sources in mountain tourism research. Among all journals, Sustainability (Switzerland) leads with 154 articles, followed by Mountain Research and Development with 76 articles. Together, they contribute 41.2% of total publications. Both journals have the highest h-index (28). Based on Bradford's Law, nine journals fall in Zone 1, eleven in Zone 2, and eighteen in Zone 3.

Table 1. Top ten journals in mountain tourism by Bradford's law.

Source	Impact Factor	Rank	Number of Papers	Cumulative Numbers of Papers	Zone
Sustainability (Switzerland)	3.9	1	154	154	Zone 1
Mountain Research and Development	1.7	2	76	230	Zone 1
Journal of Mountain Science	2.3	3	71	301	Zone 1
Revue de Géographie Alpine	0.38	4	54	355	Zone 1
GeoJournal of Tourism and Geosites	1.91	5	43	398	Zone 1
Geoheritage	2.9	6	42	440	Zone 1
Journal of Outdoor Recreation and Tourism	6.7	7	38	478	Zone 1
Journal of Sustainable Tourism	6.9	8	33	511	Zone 1
Tourism Management	12.7	9	33	544	Zone 1
Tourism Geographies	4.1	10	14	558	Zone 2

3.2. Author's Influence

We applied Lotka's Law to distinguish occasional from prolific authors based on publication frequency. While the law predicts 60% of authors publish once, 15% twice, and 6.6% thrice, our data shows 86% (3,434) authored one paper, 9.4% (374) two, and 2.8% (112) three. This deviation suggests fewer prolific authors than expected (Table 2).

Table 2. Authors' productivity (Lotka's Law).

No of Publication	No. of Authors	Actual percentage of authors	Standard percentage as per Lotka's law
1	3434	86	60.0
2	374	9.4	15.0
3	112	2.8	6.6
4	36	0.9	-
5	12	0.3	-
6	13	0.3	-

3.3. Citation Analysis

This approach analyzes the popularity of a work by analyzing the frequency of citations it receives over time. Table 3 lists the most prolific and influential authors, institutions, and nations according to citation analysis. Matthias Fuchs was found to be the most important author, followed by Maria Lexhagen and Daniel Scott. Among the organizations, the University Federico (Italy), the Ev-K2-Cnr Committee (Italy), and Raja Mangala University (Thailand) are the most influential.

Further, researchers from Canada, Italy, and the United Kingdom are researching popularity determined by the number of citations received. TLS stands for the total link strength, indicating the total strength of the co-authorship links of a given researcher with other researchers (Shekhar, 2023). For instance, the TLS of 221 of Canada means it has 221 links with other countries.

Table 3. Influential authors, organizations, and nations according to citation analysis.

Author	Citation	TLS	Organization	TLS	Country	TLS
Fuchs, Matthias	507	17	University Federico (Italy)	11	Canada	221
Lexhagen, Maria	446	15	Ev-K2-cnr Committee 24126 Bergamo (Italy)	11	Italy	211
Scott, Daniel	405	5	Raja Mangala University (Thailand)	5	United Kingdom	197
Nepal, Sanjay K	402	0	Panzhihua University (China)	5	United States	194

Author	Citation	TLS	Organization	TLS	Country	TLS
Brida, Juan Gabriel	347	1	University della Valle d'aosta (Italy)	4	China	167
William, Peter W	223	0	University savoie Mont-blanc (France)	4	Spain	151
Adamov, Tabita	223	0	University of Chinese academy of science (China)	4	Australia	125
Iancu, Tiberiu	197	0	Southern Cross University Australia	2	Austria	96
Huang, Keji	190	0	Institute of geographic sciences and Natural resources research (China)	2	France	89
Duglio, Stefano	187	8	University of China. Academy of Sciences (China)	2	Switzerland	81

3.4. Co-Word Analysis

We conducted a keyword co-occurrence analysis using author-supplied and journal-indexed terms to identify key themes in mountain tourism research. Our sample included 4896 author keywords and 2699 indexed keywords. Use the VOS viewer network; keyword density reflects occurrence. Table 4 highlights the most frequent keywords in mountain tourism studies. VOS Viewer results indicate that authors focused on climate change, sustainable tourism promotion, and rural tourism in mountainous destinations.

Table 4. Most frequent author and indexed keywords.

Author keyword	TLS	Indexed keyword	TLS
Tourism	47	Tourism development	526
Climate change	38	Mountain Region	438
Sustainability	35	Tourist destination	362
Mountain tourism	28	Ecotourism	351
Sustainable development	24	Tourism management	249
Mountain	21	Sustainable development	243
Landscape	20	China	236
Rural tourism	15	Tourism	222
Sustainable tourism	14	Sustainability	202
Geotourism	10	Tourist attraction	173

Figure 3a illustrates the author keyword network visualization, highlighting the interconnections among key themes in mountain tourism research. The network reveals two major clusters, with keywords such as tourism, geotourism, sustainable tourism, and landscape forming one cluster, while mountain tourism, climate change, sustainability, and rural tourism form another. The figure shows strong linkages between sustainability-related concepts and tourism development, indicating the growing emphasis on environmental and sustainable perspectives in the literature.

Figure 3b illustrates the index keyword network visualization, depicting the broader conceptual structure of the research domain. The figure highlights key clusters centered around tourism development, ecotourism, and the mountain region, with strong connections to sustainable development, tourism management, and tourist destinations. It shows that research is increasingly integrating sustainability, destination management, and regional development perspectives within mountain tourism studies.

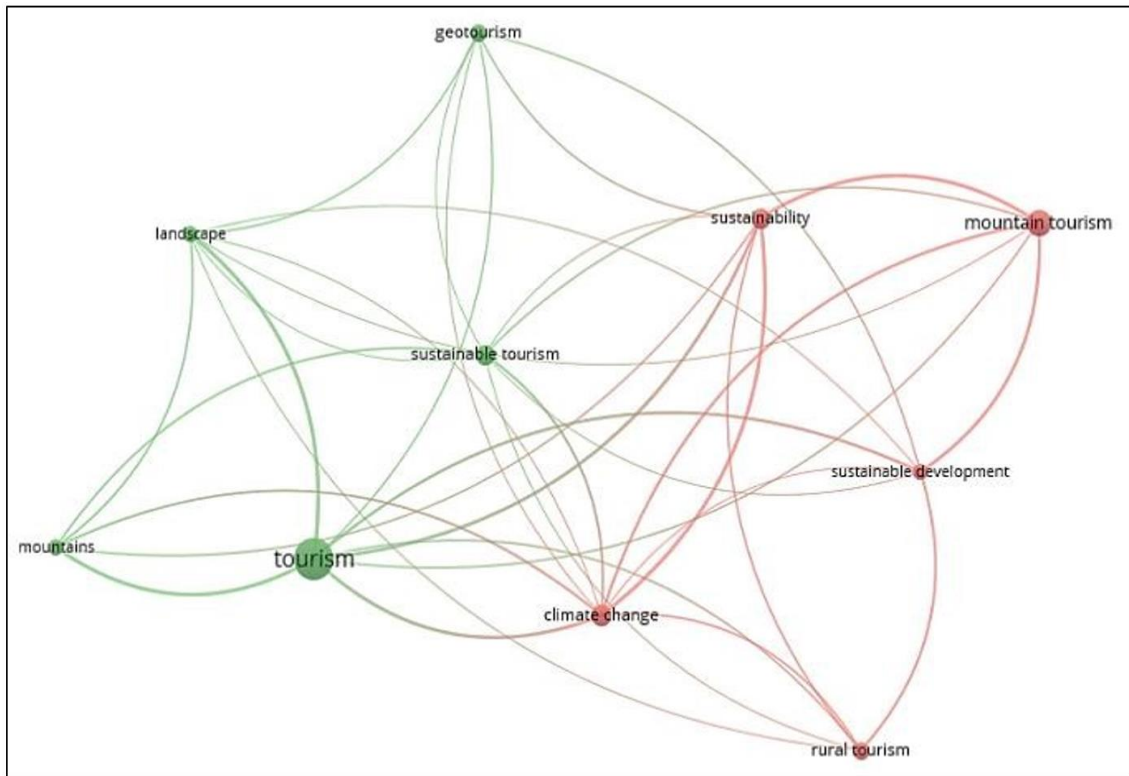


Figure 3a. Author keyword network visualization.

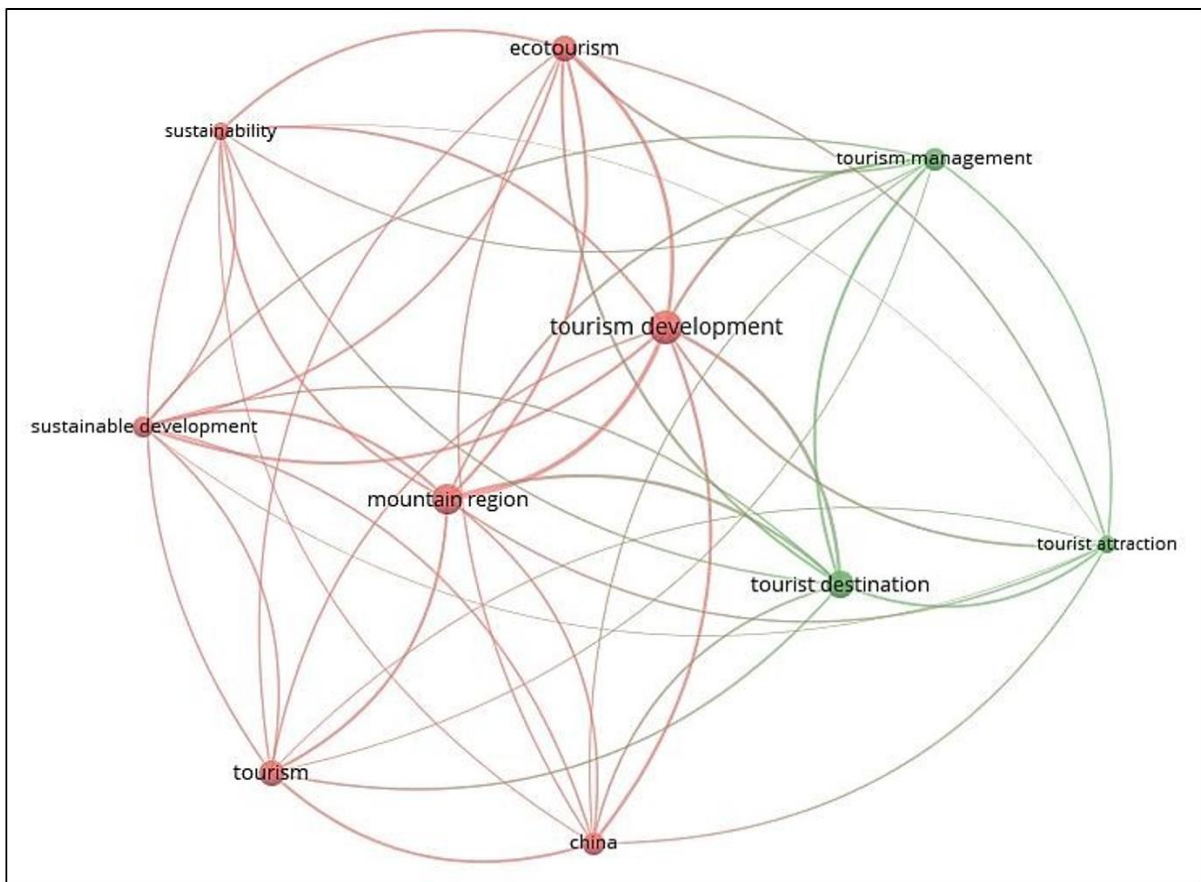


Figure 3b. Index keyword network visualization.

3.5. Country Scientific Production

We applied the Human Development Index classification to assess country-wise research output. Developed countries produced the highest number of publications, led by the United States (79) and Italy (50). Developing countries published 400 articles (96 publications from China). The research output from underdeveloped countries was just 51 articles (Table 5).

Table 5. Country scientific production.

Indicator	Countries		
	Developed	Developing	Underdeveloped
Number of papers	434	400	51
Number of countries	22	40	19
Top 5 countries	United States	China	Nepal
	Italy	Romania	Indonesia
	France	Poland	Ethiopia
	Australia	Serbia	Pakistan
	United Kingdom	India	Algeria

4. BIBLIOGRAPHIC COUPLING ANALYSIS

In the bibliographic coupling map, nodes represent key topics, with larger nodes indicating higher prominence in the literature. The analysis identifies five major clusters (color-coded) in mountain tourism research. Each cluster reflects a distinct area of research focus. Overall, these clusters address the breadth of mountain tourism research and show up the connected nature of the field (Figure 4).

4.1. Cluster 1: Community Participation

The red coloured cluster 1 focuses on locals' participation in tourism development in mountainous areas. The indigenous and rural local communities are the centre of this cluster. The role of tourism in the mountain plays a significant role in the local economy, and engaging in sustainable local community tourism helps in developing local knowledge, skills, and cultural exchange (Jeelani, Shah, Dar, & Rashid, 2023).

The local involvement in mountain areas makes sure that the process of developing tourism not only works for the betterment of the environment and economic outcomes but also helps in developing the local community and working for sustainable natural resource management. Community-based tourism in Nepal, Bhutan, and India (Ladakh and Thenmala), and other emerging destinations like Malaysia, Iran, South Africa, Botswana, and Poland are the best examples of such initiatives.

Most of the literature proves that the process of community-based tourism has been working as a sustainable factor for sustainable development. Teshome, Shita, and Abebe (2021); Sitikarn, Kankaew, Sawangdee, and Pathan (2022) and Wani, Batool, Dada, and Shah (2024) explained how the native local communities are engaged in developing tourism for the sustainable progress of tourism and how tourism in local areas provides economic development to develop the models of local tourism.

Several studies have appreciated the effectiveness of community-based tourist models by maintaining a balance between tourism, conservation, and local native developments (Harris-Smith & Palmer, 2022; Sood et al., 2017; Zou, Huang, & Ding, 2014). This cluster makes sure that the local communities are not just focused on developing sustainable tourism models in the environment and are maintaining a balance between economic and environmental outcomes.

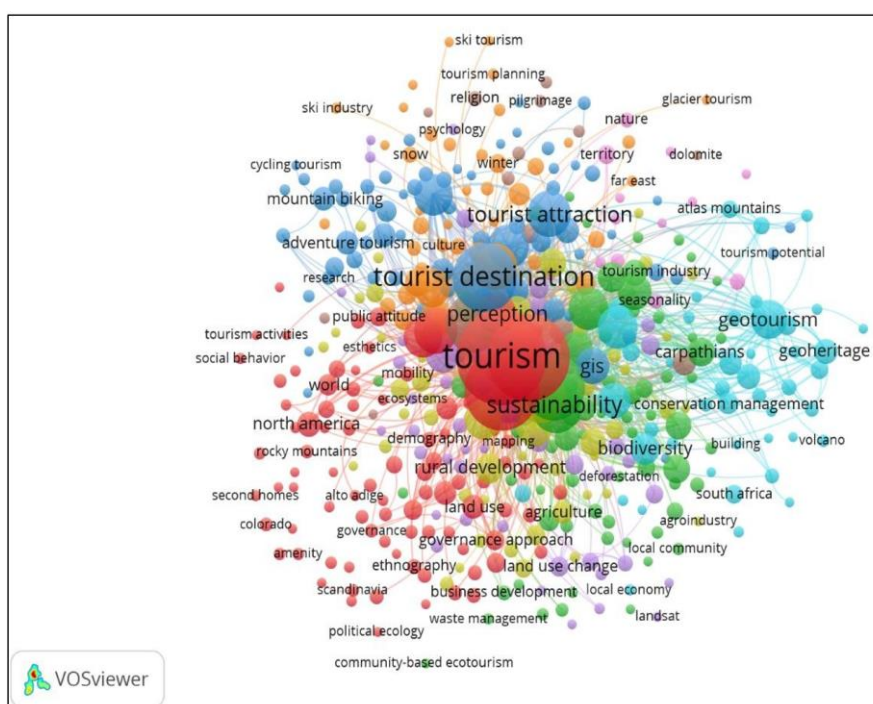


Figure 4. Keyword occurrence visualization.

4.2. Cluster 2: Tourism Resources

Orange colored cluster (Cluster 2) highlights points pertaining to the attraction and resources available in mountain regions, and sustainable development for these resources. Mountain regions are defined by a wide array of resources available for tourist use, and this includes natural and man-made resources. Changing tourists' demand, saturated urban centres, and alternative tourism promotion have acted as catalysts for competitive growth opportunities in nature and adventure tourism (Neumann & Mason, 2023). In addition, scholarly publications also highlight that the sustainability of the environment and natural resources is the top priority in mountain destinations (Kala & Chaubey, 2024; Rice, Cohen, & Scott, 2024). Since there is a great demand for such mountainous resources during peak periods, several studies of this cluster highlighted the relevance of appropriate management and conservation of mountain tourist resources (Opačić & Banda, 2018). Researchers have acknowledged that community involvement, raising awareness, innovative resource management, conservation efforts, and active local government play crucial roles in preserving the sustainability and longevity of these resources and consequently of mountainous destinations (Colasante, D'Adamo, De Massis, & Italiano, 2024; Kuščer, Mihalič, & Pechlaner, 2017; Seraphin, 2020).

4.3. Cluster 3: Geotourism

The 'Geotourism' cluster (light Sky Blue coloured) emphasizes the intersection of geology, tourism, and sustainable development, particularly in mountainous regions. This cluster aims to promote Geoheritage conservation and achieve sustainable economic development in local regions. Notable research shows that Geotourism can use natural sites for sustainable tourism destination purposes (Dolon, Ferdous, & Hossain, 2025). Studies of Geoheritage conservation carried out on Aït Bouguemaz and Zaouiat Ahnsal-Taghia valleys in Morocco (Elkaichi, Errami, & Patel, 2024), M'Goun Geopark and Tuwaiq Mountain in Saudi Arabia (Rais, Barakat, Louz, & Ait Barka, 2021), Asir Mountains (Elassal, 2020), and the Swiss Alps Jungfrau-Aletsch UNESCO site (Bussard & Reynard, 2022) show that there is a need for Geoheritage conservation promotion and community engagement for mountainous landscapes (Sen, Almusabeh, & Abouelresh, 2023). Similarly, the Bucegi Mountains from Romania, the Mid-Bosnian Schist Mountains of Bosnia and Herzegovina, and Leh-Ladakh from India demonstrate integration of Geoheritage conservation and cultural processes to form a wider tourist perspective (Mir, Dar, & Ahmad, 2023; Necheş & Erdeli, 2015). This particular cluster draws attention towards promotion, conservation strategies and

education that need to focus on sustaining uniqueness of Geoheritage resources and increase overall tourist stakeholders (communities and visitors alike) awareness of Geoheritage resources (Rais et al., 2021). This cluster is responsible for local sustainable economies or local sustainable development processes and is actively working towards Geoheritage site preservation for future uses as well. This cluster is heavily emphasizing Geoethics-Geotourism processes that can act as decisive factors for conservation of natural as well as cultural landscapes on a whole planet scale.

4.4. Cluster 4: Climate Change

The 'Climate Change' cluster (purple colored) in the bibliometric analysis highlights the profound impact of climate change on mountain tourism, with a focus on challenges faced by winter sports, agriculture, and regional development. This cluster discusses how climate change affects observations of mountain tourism and natural resources of tourism, and local populations in mountain regions around the globe. There are a number of scientists who have clarified that climate change affects mountain sports and related tourist activities (Cholakova & Dogramadjieva, 2023; Knowles et al., 2024; Steiger & Scott, 2020). Steiger and Scott (2020), Cholakova and Dogramadjieva (2023), and Knowles et al. (2024) emphasized that rising temperatures and erratic snowfall hamper mountain sports and related tourist activities of skiing on a sustainable scale. Even though there are adaptive measures related to snowmaking systems, scientists clarified that there is a limit to such temporary measures (Moser & Baulcomb, 2020).

However, it is necessary to preserve equilibrium regarding snow and water when managing climate change situations, and there should be a focus on local opinions regarding sustainable adaptation strategies for the Swiss Alps (Steiger, Demiroglu, Pons, & Salim, 2024). Besides mountain sports and related tourist activities, climate change affects a number of activities related to agriculture and ecosystem services of mountain regions. Similarly, Lavorel et al. (2019) clarified how ecosystem resources should be tapped for managing mountain regions sustainably from a climate change perspective. This cluster indicates an upswing regarding alarm on how to relate governance needs to address concerns related to climate change (Colasante et al., 2024).

4.5. Cluster 5: Sustainable Development

The 'Sustainable Development' cluster (green coloured) explores how tourism, especially in mountainous regions, can be harmonized with environmental preservation, local community well-being, and economic growth. Major emphasis has been put on sustainable tourist practices and their positive long-run impacts on locals, tourist infrastructure, landscapes, and flora-faunal biodiversity (Musa, Hall, & Higham, 2004). Several scholars have proved the importance of tourist activity as a stimulus to economic development and environmental conservation. Idziak, Majewski, and Zmyślony (2015) from Poland and Gazzola, Vățămănescu, Andrei, and Marrapodi (2019), Chandra and Kumar (2021), and Ali, Akhtar, and Ali (2023) from India and Pakistan, respectively, confirmed that sustainable tourist practices help to sustain local economies and encourage local people to engage actively in sustainable tourist development processes in rural destinations worldwide.

Hussain, Chen, and Nurunnabi (2019) from Pakistan, pointed out that a substantial contribution to sustainable mountain tourist development can and should be made using innovative approaches to technology and web-based communication tools such as social networks. Krishnan, Gangwani, Papi Reddy, and Kiran (2023) raised the issue of sustainable management of natural resources and cautioned about the growing concerns for sustainable waste management practices in mountainous destinations. Researchers also expressed the role and measurement of tourism stakeholders' engagement and governance practices for promoting responsible and sustainable tourism in mountainous destinations (Colasante et al., 2024; Jeelani et al., 2023; Lavorel et al., 2019; Mutana & Mukwada, 2020; Streimikiene, 2023).

5. THEORIES, CONTEXTS, CHARACTERISTICS, AND METHODOLOGIES IN MOUNTAIN TOURISM (TCCM)

5.1. Theory (T)

The theoretical framework helps researchers answer research questions in a way that advances our understanding of a particular field (Donthu et al., 2021). *The literature summary of eligibility criteria for the TCCM framework is shown in Figure 1.* Most of the publications were based on theoretical frameworks, illustrating the developing character of Mountain tourism research. The study leverages the TCCM framework to illustrate the theoretical basis of the investigation. Figure 5 highlights significant theories regarding mountain tourism. These include popular behavioural theories like Theory of Planned Behaviour (TPB), Stimulus-Organism-Response (S-O-R), Place Attachment Theory (PAT), Technology Acceptance Model (TAM), Cognitive Behaviour Theory (CBT), and Tourism Area Life Cycle (TALC). Utilizing the S-O-R theory to explain memorable tourism experiences and customer-based destination brand equity, which are related to destination attachment, overall satisfaction, and the formation of customer-based destination brand equity in urban hill stations (Guleria, Joshi, & Adil, 2024). The Cognitive Behaviour Theory (CBT) explains that the mountain affinity directly raises residents' awareness of environmental implications (Zhang et al., 2017). TPB explained tourist revisit intention with the inclusion of perceived service quality (Abbasi, Kumaravelu, Goh, & Dara Singh, 2021).

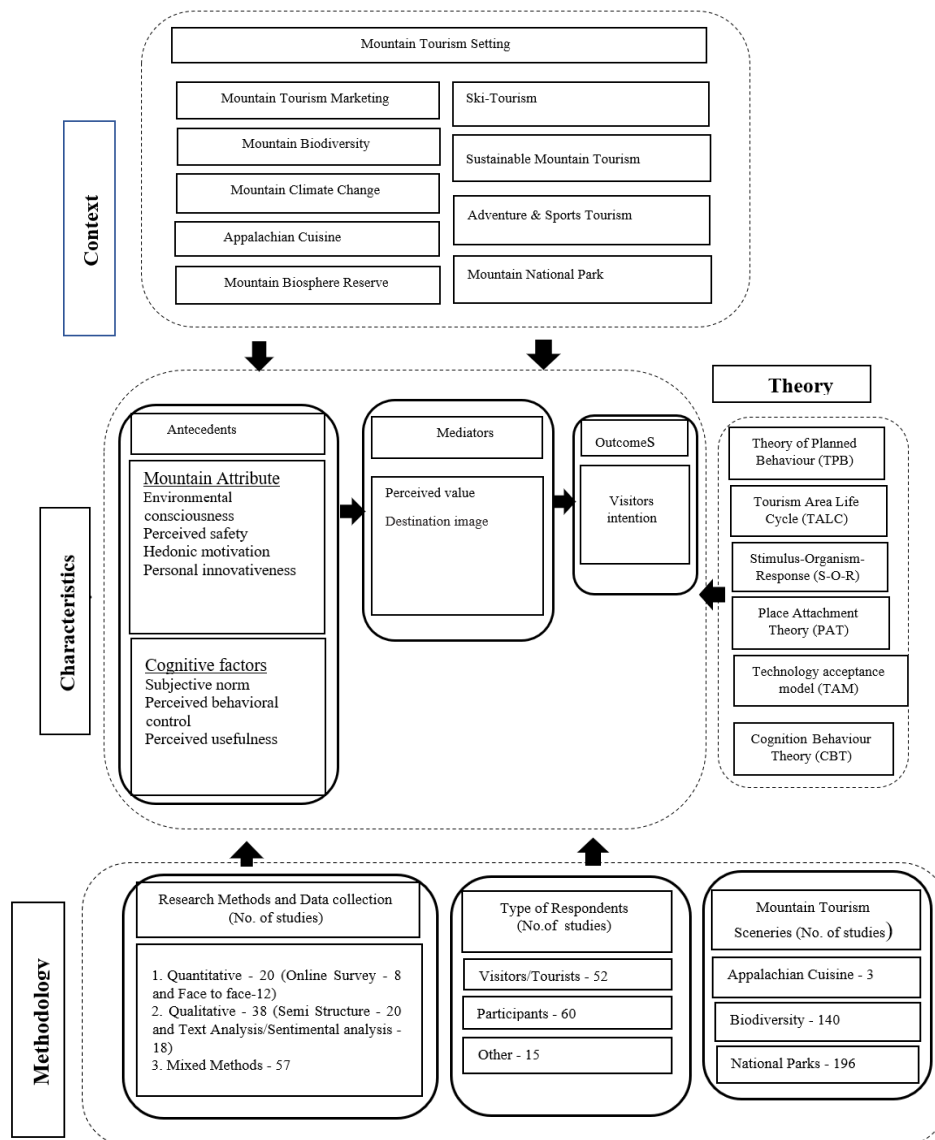


Figure 5. Conceptual model and nomological network.

Table 6. Potential future directions in mountain tourism research using TCCM.

TCCM	Representative research questions
Theory	• What are the alternative theories for understanding the mountain tourism stakeholders' behavior? • How can the TPB model be integrated with context-specific variables to explore the Mountain tourism mechanisms? • What are the relevant theories for examining the mountain community's perception of sustainable tourism practices? • How can the TALC model be integrated with the theoretical variables to explore the mountain stakeholders' mechanisms of tourism experiences?
Context	• How can tourist experiences be enhanced across different types of tourism in mountainous destinations? • What are the major constraints in local community participation in mountain destinations? • In what ways do mountain environments influence tourists' pro-environmental attitudes?
Characteristics	• How do environmental concerns influence tourists' support for sustainable mountain tourism practices? • What factors influence the success of tourism in alpine ski destinations and geoparks? • How do risk perceptions and threats impact tourist experiences in mountainous destinations?
Methodologies	• How can advanced analytical methods, such as multi-group analysis, multi-criteria decision-making, etc., improve understanding of tourist responses to mountain tourism strategies? • What additional insights can qualitative and mixed-method studies provide into the role of mountains in tourism research? • How do different mountain landscapes shape tourist experiences and related behavioral outcomes across tourism contexts?

5.2. Contexts (C)

The selected articles portray a vast and varied range of environments in which mountain tourism is conducted, applied, and researched. These settings extend from city-influenced concepts to far ecological zones. Mountain biodiversity is an essential natural setting, and landscape and historical resources are major draws for eco-tourists (Carrión-Mero et al., 2021; Kim, Ma, Kim, Yu, & Ri, 2023; Krieger, 2023). The context of climate change, and the corresponding level of resilience required, might differ in strength for each different stakeholder group within the local tourism industry, based on their unique attributes, level of dependence on climate-sensitive resources, and individual adaptive capacities.

The mountain biosphere reserves, representing areas of high ecological zones that are protected, are facing an unprecedented level of socio-economic and environmental changes as a result of conservation and tourism activities transitions (Baydoun et al., 2024; Byers et al., 2024). The context of ski tourism brings to light mountain destinations as multifunctional landscapes, which combine different values from diverse stakeholders, attachment to place, and interdependence are implicated toward climate-resilient and sustainable futures (Knowles et al., 2024; Satir, Tosun, Coskun Ozyol, Ozdemir, & Berberoglu, 2024). For instance, sustainable mountain tourism has been investigated within eco-social contexts by Bonanomi, Gherardelli, Spigno, and Idbella (2024), pinpointing the relationship between the preservation of the environment and local community development (Ali, 2023; Chakraborty & Ghosal, 2024; Colasante et al., 2024). Moreover, mountain adventure and sports tourism also appear as a prominent kind of active tourism in economically marginalized but resource-rich upland areas, providing opportunities for socio-economic development (Galiakbarov, Mazbayev, Mutaliyeva, Filimonau, & Sezerel, 2024). Finally, mountain national parks, especially world natural heritage sites, offer a conservation-minded approach context where responsible tourism can contribute to environmentally sustainable practices (Carr, 2004).

5.3. Characteristics (C)

The study employs the Antecedent-Decisions-Outcomes (ADO) framework to develop a conceptual model through construct-wise synthesis based on antecedents and mediators in mountain tourism (Talawar et al., 2025). This approach is consistent with the review methodology employed by Jebarajakirthy et al. (2021) from earlier studies. The construct-wise synthesis indicates the mediators (i.e., perceived value, destination image) and outcomes (i.e., intention) of mountain tourism experiences influenced by two primary categories of antecedents, i.e., core - attributes of mountain tourism (Environmental consciousness, Perceived safety, Hedonic motivation, Personal innovativeness) and perceived factors (subjective norm, perceived behavioral control, perceived usefulness) (Table 7).

Table 7. Key construct of mountain tourism research.

Studies	Antecedents									Mediators		Outcomes
	AT	SN	PCB	MA	PR	PI	PSQ	SAT	RI	PV	DI	INT
Serenari, Leung, Attarian, and Franck (2012)	√	√	√							√	√	√
Juschten, Jiricka-Pürner, Unbehaun, and Hössinger (2019)	√	√	√									
Abbasi et al. (2021)	√	√	√		√		√	√	√	√	√	√
Zarei, Ehsani, Moghimehfar, and Aroufzad (2021)	√	√	√									√
Suo, Li, Tang, and Huang (2024)		√	√									√
Guleria et al. (2024)								√				
Zhang et al. (2017)				√								
Hu, Tuou, and Liu (2019)						√						
Total	4	5	5	1	1	1	1	2	1	2	2	4

Note: AT-Attitude; SN-Subjective Norm; PCB-Perceived Behaviour Control; MA-Mountain Attachment; PR-Perceived Risk; PI-Place Identity; PSQ-Perceived Service Quality; SAT-Satisfaction; RI-Revisit Intention; PV-Perceived Value; DI-Destination Image; INT-Intention.

5.4. Methods (M)

Regarding the research methods usage, mixed methods have been mainly used in mountain tourism publications (Abbasi et al., 2021; Zarei et al., 2021). Tourism research generally involves multifaceted issues related to social, economic, cultural, and environmental factors, which cannot be fully captured by quantitative data alone. Mixed methods integrate the strengths of both quantitative and qualitative approaches to understanding tourism phenomena effectively. Quantitative methods have been used to understand tourists and community perspectives (Hu et al., 2019; Zhang et al., 2017). Of late, tourism researchers have started employing advanced statistical tools like structural equation modelling and multi-group analysis to improve the model predictions (Kala & Chaubey, 2024; Suo et al., 2024).

6. DISCUSSION AND FUTURE DIRECTIONS

This paper explores the current status and development of mountain tourism using bibliometric tools. The area of mountain tourism has emphasized its position as a new and heterogeneous research direction in tourism research studies, substantiating a definitive percentage (2.70%) of academic publications. It is indicative of its realization as a new, specific research area. Theoretical models such as The Theory of Planned Behaviour, The Tourism Area Life Cycle, The Stimulus-Organism-Response, among others, comprise many conceptual approaches which present the most commonly used models in the research area of mountain studies. From a methodological perspective, Structural Equation Modeling, SWOT Analysis, and Interviews tend to appear together quite commonly, although quantitative

approaches are far more common than others. However, it is pertinent to note that since 2015, research on mountain tourism has attracted a substantial number of academicians to this area of study. From a bibliometric study perspective, using Bradford's law of scatteration, the top journals on mountain studies include "Sustainability (Switzerland)", "Mountain Research and Development", and "Journal of Mountain Science". Lotka's law on productivity indicated that 86% of contributors tend to produce a single document (as against 60%), 9.4% of contributors produced two documents (as against 15%), and 2.6% produced three documents (as against 6.6%). These leading research contributors include Matthias Fuchs, Maria Lexhagen, Daniel Scott, and Sanjay K Nepal, respectively. Analysis of co-occurring terms shows that leading research contributors' author terms include Tourism, Climate Change, Sustainability, and Mountain Tourism, respectively. Indexed authors include Tourism Development and Ecotourism. Top countries that produce research on this subject include Canada, Italy, the United Kingdom, the United States of America, and China. For RO2, bibliometric analysis was undertaken, and five thematic clusters were identified: community participation, tourism resources, geotourism, climate change, and sustainable development. The TCCM framework outlines potential research questions by considering theory, context, characters, and methods that emphasize the socio-ecological nature of mountain environments and issues related to accessibility, seasonality, sustainability, and community engagement in mountain tourism. The techniques mentioned above indicate the typical research approach used to explore these properties and relevant theories. Together, these components offer a structured approach to understanding current trends and guiding future research in mountain tourism. The third research objective (RO3) is the identification of research gaps and designing innovative ways of furthering the concept of sustainable mountain tourism development. Rapid growth within the domain of mountain tourism indicates that there are numerous avenues to be explored. A close study of the selected publications has allowed some of the avenues of future research to be explored, which is discussed below (Table 8).

Table 8. Theme-wise future research directions.

Themes	Future Research Directions	Source(s)
Community Participation	- Resilience strategies of mountain communities in adapting to tourism-related disruptions and fostering locally driven sustainable tourism development. - Impacts of return migration on sustainable livelihoods in mountain communities and governance frameworks. - Socio-economic vulnerabilities of tourism workers in mountain regions and strategies to improve job security, social justice, and fair labor policies. - Participatory tourism models to enhance local ownership, reduce economic leakages, and promote community-driven initiatives. - Develop frameworks for community-led governance models that ensure equitable tourism benefits. - Digital literacy on locals' ability to participate in and benefit from tourism economies.	Ali et al. (2023); Wilson and Dashper (2023); Banerjee and George (2025); Chaitanya and Swain (2024) Robertico, Parsa, and Paraskevas (2024); Sgroi and Modica (2024) and Stotten (2024)
Tourism Resources	- Strategies to mitigate over-tourism in mountain ecosystems. - Socio-Ecological System framework and ecological balance in mountain regions. - Sports tourism and virtual reality applications for enhancing visitor engagement. - Human-nature relationships and environmental values. - Underutilized tourism resources in mountain regions and sustainable tourism diversification. - Design eco-friendly infrastructure models for remote mountain regions. - AI-driven predictive models for dynamic visitor management and conservation monitoring. - Sustainable financing models for maintaining and improving tourism infrastructure in mountain regions. - Cultural heritage sites in mountain tourism experiences and inter-generational knowledge transfer. - Wellness, meditation, and slow tourism in mountain environments.	Chandra (2024); Kala and Chaubey (2024); Rice et al. (2024); Peters and Fuchs (2025) Rogowski (2025) and Siddik, Forid, Yong, Du, and Goodell (2025)

Themes	Future Research Directions	Source(s)
Geotourism	• Geoheritage and cultural tourism to enhance conservation and public engagement. • Tourist activity on geo-heritage sites and design sustainable mitigation strategies. • Economic viability with environmental conservation in mature and marginal mountain Geotourism destinations. • Geological mapping in improving interpretation, conservation, and educational outreach in mountain tourism. • Geoheritage value of geo-sites through community participation and conservation planning. • Institutional and community readiness for establishing a geopark integrating national regulations with international frameworks. • Augmented reality and digital storytelling for immersive geo-heritage experiences.	Danzi and Figini (2023); Mir et al. (2023); Reinhart et al. (2023); Elkaichi et al. (2024); Sen et al. (2023) and Wu and Peng (2025)
Climate Change	• Climate-resilient tourism models to reduce carbon footprints. • Predictive models and diagnostic tools for monitoring climate variability and its effects on tourism patterns. • Tourists' and residents' perceptions of climate change. • Local ecological knowledge and adaptive strategies in building climate resilience within mountain tourism economies. • Management and sustainability of Winter Sports • Climate-induced biodiversity loss on visitor experiences and destination attractiveness. • Regenerative tourism models to promote environmental restoration. • Remote sensing and AI-powered climate models in forecasting climate risks for mountain tourism infrastructure.	Dannevig and Rusdal (2023); Nigrelli and Chiarle (2023); Rastegar and Ruhanen (2023) Salim, Mourey, Crépeau, and Raveland (2023) and Steiger et al. (2024)
Sustainable Development	• Policy gaps and best practices in balancing economic growth with sustainable tourism in mountain regions. • Value of tourism certification schemes for operators and tourists. • Green and sustainable digital transformation in tourism • Landscape aesthetics and spatial planning in shaping visitor perceptions and tourism sustainability. • Social capital formation in agritourism and developing frameworks to support sustainable community-based tourism. • Mountain tourism sustainability by balancing traditional practices with modern innovations to enhance economic resilience. • Effectiveness of government incentives for sustainable tourism investments. • Waste management and sustainable development (using circular economy principles) in mountain tourism operations.	Streimikiene (2023); Iversen, Grimsrud, Lindhjem, and Navrud (2024); Neupane, Pinto, and Pintassilgo (2025); Riva, Kienast, and Grêt-Regamey (2024) and Tomassini et al. (2025)

7. CONCLUSION

This study provides a comprehensive overview of mountain tourism research and upcoming research directions. This review reveals a major change toward sustainability, community participation, and climate resilience in mountainous destinations. This hybrid review (Bibliometric and TCCM) highlights interconnected dimensions of mountain tourism research. Furthermore, this review has a few limitations that warrant attention. First, the Scopus database was used for this bibliometric review. There may be publications that are not within Scopus but are otherwise useful. Second, only articles published in the English language were considered for this review. Third, articles published up to the year 2024 were included in this review. Finally, bibliometric insights are time-sensitive as trends evolve. Overall, the research insights can support more informed research directions and guide policymakers for sustainable mountain tourism development.

8. RESEARCH IMPLICATIONS

This bibliometric review highlights several directions for future research in the mountain tourism domain. Future research should address the resilience of local communities in mountainous regions and community-centric development. Research should also examine comprehensive models for participatory tourism to improve local

participation and minimize economic leakages. Over-tourism and environmental sustainability are additional research dimensions to explore. Future studies should propose and validate models to effectively combine environmental conservation with destination management. The potential for alternative tourism forms, such as wellness tourism, slow tourism, sports tourism, etc., should be assessed. The role of advanced digital tools and technologies to enhance the tourist experience is another potential area of focus. Climate change and environmental threats are critical research areas for mountain tourism. Finally, policy initiatives promoting community-centric and sustainable mountain tourism development will be an interesting area to explore.

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