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Research article

Unveiling the intellectual structure of adventure tourism

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ABSTRACT

Adventure tourism has increasingly gained academic attention over the past two decades, yet its intellectual foundations and thematic evolution remain insufficiently explored. Existing bibliometric studies have primarily adopted descriptive approaches, limiting the understanding of the field's conceptual structure. This study addresses this gap by mapping the intellectual structure and development of adventure tourism research, identifying its core themes, influential works, and emerging trends. A co-citation bibliometric analysis was conducted using CiteSpace software on 426 documents extracted from the Web of Science database covering the period between 2006 and 2023. The results revealed major thematic clusters corresponding to Structural Foundation, Adventure Tourism Experiences, Risk Management, Leisure Motivation, Social Well-Being, Framework for Injury and Safety Practices, Family Tourism, Adventure Education, and Responsible Tourism. Burst papers represent the publications trending in the field. The study also identifies intellectual turning points connecting distinct clusters and traces the evolution of methodological approaches within adventure tourism research. By revealing the conceptual interconnections and methodological evolution of the field, this article contributes to theoretical consolidation and provides an empirically grounded research agenda for scholars seeking to guide the future development of adventure tourism studies.

1. Introduction

Adventure tourism remains a popular and rapidly growing segment of nature-based tourism [1,2]. According to the United Nation World Tourism Organization (UNWTO) [3], rapid urbanisation and digitalisation are key drivers of its increasing demand. Despite its expansion, adventure tourism research lacks a comprehensive assessment of its intellectual development and emerging research trajectories.

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The field of adventure tourism has long figured in outdoor recreation and sports literature [4,5]. While it shares certain features with nature tourism, outdoor recreation, and mountain tourism, it also has distinct characteristics that set it apart [6]. Early research primarily focused on understanding the motivations and experiences of tourists engaging in such activities. Despite its evolution and growing academic interest, several underexamined aspects remain. These include the need for a clearer distinction between adventure tourism and related concepts, ongoing debates surrounding its definition, and the scarcity of bibliometric analyses assessing the field's intellectual structure and development. This paper specifically addresses the third issue.

While bibliometric analyses of adventure tourism have been undertaken by several scholars [1,7], their approaches have remained largely descriptive in nature, focusing on publication trends or thematic classifications. This methodological limitation leaves a clear gap in understanding the intellectual structure, thematic evolution, and key drivers shaping the discipline. The present study addresses this gap by applying a co-citation bibliometric analysis that enables the identification of major research clusters, burst papers, and intellectual turning points. By uncovering the underlying conceptual relationships among studies, this approach goes beyond prior work and allows for a systematic reconstruction of the theoretical foundations and evolution of adventure tourism research, providing a more robust basis for theory development and a future research agenda. This provides a clear advancement beyond prior descriptive reviews and offers novel theoretical insights into the field's development.

This study is structured as follows: Section 2 features the literature review, while Section 3 outlines the methodology along with the bibliometric concepts and approaches applied. Section 4 presents and discusses the results. Section 5 introduces the research agenda, and Section 6 provides the conclusions.

2. Literature review

This Literature Review Section explores the complex and contested nature of adventure tourism, focusing on three key aspects: (2.1) its diverse definitions and classification frameworks, (2.2) insights from bibliometric and systematic reviews, and (2.3) the identification of research gaps.

2.1. Theoretical foundation: definition and categorisation

The theoretical foundation of adventure tourism has evolved over time, shaped by diverse conceptual frameworks and categorisations. Early definitions primarily emphasised adventure tourism as an activity-based phenomenon, with researchers distinguishing between “hard” and “soft” adventure tourism based on risk levels, required skills, and accessibility. Risk tourism, representing the extreme end of the spectrum, further differentiates those seeking high-adrenaline experiences. Over time, scholars have broadened these perspectives, integrating psychological, cultural, and experiential dimensions to better capture the complexity of adventure tourism. Today, it is understood as a multidimensional phenomenon that combines structured activities, personal experiences, and psychological engagement, with risk serving as a key ingredient in participation.

In this context, a broad definition of adventure tourism is any domestic or international trip that includes at least two of the following three aspects: physical activity, interaction with nature and cultural learning or exchange [8]. The term “adventure” is not consistently used and is often substituted for terms like extreme, trend, active, and outdoor [8]. The definition of adventure tourism has been extensively debated among researchers. The literature remains heterogeneous in the criteria used to define adventure tourism. Some of the essential characteristics identified in the literature include interaction with the natural environment [8–10], risk [9–11], physical activity [8,10], learning [8,11], experience [10,11], motivation [10], social orientation [9] and performance [10].

According to Rantala et al. [12], adventure tourism is not an analytical idea, but rather a category studied by scholars with diverse backgrounds. Researchers broadly categorise adventure tourism into two dominant areas: people- and product-oriented [7,13]. According to Buckley [6], adventure tourism as a product-oriented approach consists of arranging commercial tours, outdoor activities in natural environment, special sporting equipment, and delivering excitement to tourists. Extensive research acknowledges the importance of a product-oriented approach given the structure and composition of adventure tours described by Musa and Dimmock [14] for diving, Arnould and Price [15] for rafting, Davis et al. [16] for whale–shark watching, Beedie [17] for mountaineering, and Shackley [18] for wildlife tours and family tourism [5,19]. These studies emphasise the tangible, product-driven elements that define the adventure tourism range. However, Buckley [20] analysed commercial tours by price, duration, and size of group [21], Callander and Page [22] by injury management and accident compensation for tourist safety, while Bentley & Page [23] by codes of conduct, safety briefings, and equipment checks.

Sung et al. [10] and Swarbrooke et al. [4], meanwhile, explore people-oriented adventure tourism with its emphasis on risk, thrill-seeking, and the psychological experience. Most people-oriented themes revolve around risk and uncertainty [9,13]. Moreover, risk is subjective and based on past experiences [24]. Perception of risk varies depending on situation, personality, lifestyle, and skill level [25,26]. Academic attention has expanded to include forms of adventure tourism situated in cold or polar environments.

Examples include winter adventure tourism [27], which encompasses snow-based activities such as snowshoeing [28] and polar tourism, involving expeditions to the Arctic and Antarctic regions [29]. These modalities not only align with traditional adventure tourism characteristics such as remoteness, risk, and physical challenge, but also add new dimensions related to extreme weather conditions, environmental fragility, and climate change awareness. Incorporating these dimensions expands the conceptual framework of adventure tourism not as peripheral variants, but as central nodes within a dynamic and interdisciplinary knowledge network.

Recent studies suggest that adventure tourism now encompasses both "hard" and "soft" adventures, reflecting a spectrum from high-risk, highly-skilled activities to those accessible to a wider audience seeking personal growth and unique experiences [30]. Risk tourism is the extreme form of adventure tourism, including thrill-seeking, exertion, and taking risk to high levels of danger, which are the core reasons for adventure participation [31,32].

2.2. Literature review of bibliometric and systematic reviews

Literature reviews are essential for synthesising the expanding body of adventure tourism research, consolidating scientific findings, providing a comprehensive overview of the field, and identifying research gaps. Rantala et al. [12] conducted a comprehensive systematic review of 1257 studies between 1981 and 2014 to analyse the idea of "adventure tourism" coherence. The study found scattered research across disciplines, emphasising its use as an umbrella term for a wide range of activities, from high-risk expeditions to commercialised nature excursions. The research revealed inconsistencies in definitions and a lack of analytical depth, stressing its role as a broad category rather than a specific notion. Gross and Sand [33] conducted a state-of-art literature review to analyse the previous development and future trajectory of adventure tourism. This study highlights the demographic shifting of tourists engaged in soft tourism towards emerging trends in micro-adventures and health-focused experiences. The research study also identified future directions like space tourism, the role of social-media and virtual reality. Beames et al. [34] provided a systematic review to evaluate sustainability guidance for adventure tourism operators, aiming to identify types of guidance, their benefits, and limitations. This study analyses only 30 research articles using Scopus and Web of Science (WoS) to extract related content. The research found three categories of sustainability guidance for tour operators like paid memberships, criteria frameworks and pledges. This study closes academic and commercial gaps by analysing existing methods and offering paths for genuine sustainability integration. However, Janowski et al. [35] adopted a systematic review approach on adventure tourism literature to articulate conceptualisations. The study first categorised the adventure tourism domain into three main pillars: consumer oriented, product oriented, and hybrid. Each of these pillars were further classified into thrill and excitement (Consumer), natural environment, and physical activity (Product), while risk, danger, and challenges (Hybrid) are core dimensions of adventure tourism.

While systematic literature reviews, content analysis, and meta-analyses offer valuable qualitative insights, bibliometric analysis provides a distinct quantitative approach that enhances assessment of the field. Systematic literature reviews follow a structured methodology to synthesise findings from selected studies, ensuring rigour but often relying on subjective inclusion criteria. In contrast, bibliometric analysis objectively maps the development of research over time, identifying influential publications and trends through citation network patterns [36]. Content analysis interprets themes and patterns within texts, offering a deep contextual understanding, whereas bibliometric analysis quantitatively examines the intellectual, conceptual and social structures of a research domain. Meta-analysis statistically aggregates data from multiple empirical studies to measure effect sizes, yet it is limited to studies with comparable methodologies, whereas bibliometric analysis captures broader research landscapes and highlights knowledge gaps across diverse approaches [37]. By leveraging large-scale publication data, bibliometric methods provide an objective, comprehensive and holistic overview of research, complementing qualitative review methods and fostering innovation in the field.

Bibliometric analysis studies on adventure tourism have assessed the scope, content, and organisation of the field. Cheng et al. [1] conducted a comprehensive analysis using EBSCO Host, Science Direct, and Google Scholar to gather research data on adventure tourism from 1996 to 2014. Their study identifies three major areas within the field, visualised through a conceptual map: destination planning, adventure tourism experiences, and development and operators. This framework places greater emphasis on the experiences and processes surrounding adventure tourism, rather than strictly focusing on product-oriented elements. Similarly, Deb et al. [7] performed a literature search from 2002 to 2022, using WoS and Scopus. Their intellectual mapping revealed four distinct clusters: adventure tourism motivation, adventure tourism products, adventure tourism experiences, and risk in adventure tourism, further underscoring the experience-driven nature of adventure tourism research in recent years.

2.3. Research gaps detection

Table 1 summarises key studies on adventure tourism that use systematic reviews or bibliometric analyses, comparing their objectives, methods, and contributions to this research area.

Table 1
Systematic reviews and bibliometric analyses on adventure tourism.

References	Main study objectives	Research method	Paper co-citation analysis	Research area analysis	Trending topic analysis	Intellectual turning points	Research agenda
Beams et al. [34]	Examine the main types of sustainability guidance for adventure operators and assess their respective benefits and limitations.	Systematic review	No	Yes	No	No	Yes
Cheng et al. [1]	Analyse the structure and content of the adventure tourism field.	Descriptive bibliometric analysis, co-citation analysis, content analysis and quantitative systematic literature review	Yes	Partial (identified but not analysed via co-citation; analysed via content)	No	No (descriptive analysis identifying most cited papers but lacks in-depth turning point analysis)	No
Deb et al. [7]	Analyse adventure tourism's performance and map its knowledge structure.	Performance and science mapping analysis	Yes (only for mapping purposes)	Yes (four clusters with a total of 23 papers)	No	No (descriptive analysis identifying most cited papers but lacks in-depth turning point analysis)	Yes
Doran [38]	Explore how women overcome barriers to fully experience and benefit from adventure tourism.	Content analysis	No	No	No	No	No
Gross & Sand [33]	Highlight the significance of adventure tourism in the industry and research.	State of the art	No	No	No	No	Yes
Janowski et al. [35]	Propose a refined conceptualisation of adventure tourism.	Text mining and systematic review	No	No	No	No	No
Rantala et al. [12]	Review the scope of adventure tourism research.	Systematic review	No	No	No	No	No
This study	Aim to map the intellectual framework of adventure tourism by identifying major research themes, pivotal studies, and emerging trends. Outline future research avenues to address existing gaps in the literature and highlights potential areas for further exploration.	Bibliometric co-citation analysis, using clustering, betweenness centrality analysis and burst paper detection	Yes	Yes (nine clusters with a total of 378 papers)	Yes (using burst paper detection)	Yes (using betweenness centrality analysis)	Yes

In contrast to previous studies, the approach adopted in this research is more integrative. While earlier bibliometric analyses of adventure tourism (e.g., Cheng et al. [1]; Deb et al. [7]) primarily focus on partial dimensions—such as cluster identification or descriptive citation analysis—this study simultaneously examines clustering, intellectual turning points, and trending topics, thereby offering a more holistic understanding of the field.

Moreover, this integrative approach is supported by the application of algorithm-based methods, which enhance the analytical rigour and objectivity of the results. Regarding clustering, and following Chen et al. [39], this study applies the silhouette-based clustering algorithm to ensure both cohesion and differentiation across clusters, thereby allowing the exclusion of non-homogeneous groupings and strengthening the structural validity of the results. This represents a methodological improvement over previous studies, where cluster selection is not explicitly validated through such criteria. In addition, this research incorporates burst detection based on Kleinberg's [40] algorithm to identify trending topics over time—an aspect that has not been systematically addressed in prior bibliometric analyses of adventure tourism. Furthermore, while earlier works rely primarily on citation counts to identify influential studies, this paper applies the betweenness centrality algorithm, following Chen et al. [41], to detect intellectual turning points, that is, publications that act as bridges between different research clusters and contribute to knowledge integration.

As a result of this methodological design, the study provides a more robust and comprehensive mapping of the field. Specifically, while Deb et al. [7] identify four clusters comprising 23 papers, this research identifies nine well-defined thematic clusters encompassing 378 papers, offering a deeper and more systematic representation of the intellectual structure of adventure tourism. Therefore, the first research question of this study is.

- RQ1: What are the most relevant research topics in adventure tourism?

To the best of our knowledge, no previous study has chronologically analysed trending topics in adventure tourism research. Identifying these papers and their corresponding clusters through burst paper detection (see Section 4) constitutes the second research question of this study.

- RQ2: Which papers have shaped the key trends in adventure tourism research?

Cheng et al. [1] and Deb et al. [7] provide a descriptive analysis of the most cited papers in the adventure tourism field. Nevertheless, turning points in research are not solely determined by citation counts; they must also contribute to knowledge creation by bridging different domains. This study identifies turning points in adventure tourism research through an analysis of betweenness centrality (see Section 4), addressing the third research question.

- RQ3: How and when have adventure tourism topics been interconnected?

To further strengthen the analytical depth of this study, particularly in response to the role of methodology in shaping the field, the fourth research question focuses explicitly on this dimension. By examining the papers identified through high betweenness centrality—those considered intellectual turning points and forming the backbone of adventure tourism research—we aim to uncover the methodological frameworks that have enabled their influential role.

- RQ4: What are the methodologies used by the papers that represent the intellectual turning points of adventure tourism research?

The first four research questions are designed to complement each other, providing a comprehensive understanding of the intellectual structure of adventure tourism research. RQ1 identifies the clusters that represent the main thematic areas defining the field; RQ2 detects the burst papers, which indicate the trending topics within the discipline; RQ3 identifies the intellectual turning points, meaning, the papers that have interconnected different clusters; and RQ4 examines the methodological approaches employed by these intellectual turning points. Based on these findings, a research agenda is proposed, addressing the fifth research question.

- RQ5: What are the key topics for the future adventure tourism research agenda?

3. Methods

The aim of bibliometric methodology is to use a quantitative approach to incorporate large volumes of bibliometric data in order to present the intellectual structure of a research domain [42,43]. In contrast to most previous bibliometric articles on adventure tourism

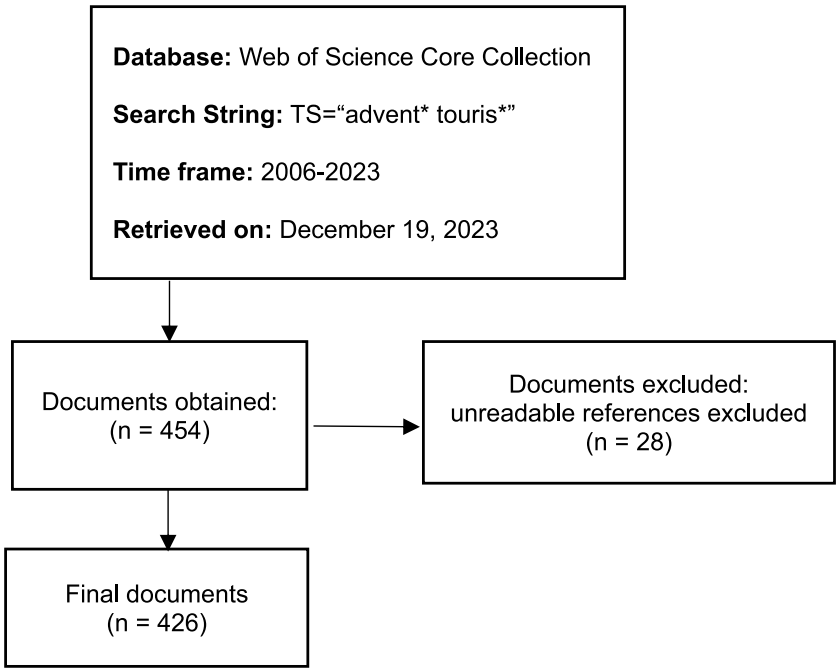


Fig. 1. Research diagram.

[7,12], this study uses scientific mapping, which is based on co-citation analysis with CiteSpace. Science mapping is a helpful method for examining the relationships between study components. It provides a well-organised visual presentation of the characteristics and connections between various research findings in a given field of science [44]. Science mapping is an approach to data analysis that is more focused and efficient than conventional qualitative and quantitative analysis [44,45].

Co-citation, a science mapping tool [44,46], analyses how often research articles 'X' and 'Y' are simultaneously cited by a third researcher, 'Z' [47]. The fundamental concept behind a co-citation study is that both papers are cited together because they likely share similar concepts, themes, ideas, approaches and theories. The most common and widely used tool to conduct bibliometric analyses in social science is co-citation analysis [36]. From a long-term perspective, co-citation analysis focuses on detecting the paradigm shifts, rises and falls in trends, and schools of thought by highlighting networks among various studies [48]. This study uses burstness and betweenness centrality, two network metrics [42] to enhance the evaluation of the bibliometric analysis. These indicators offer more insightful data about the network. To mitigate the risk of incidental grouping of documents due to their co-citation, our procedure includes a complementary analysis of the identified clusters, based on the experience and expertise of the researchers, ensuring that they reflect coherent research streams rather than simply incidental groupings.

The co-citation analysis was carried out using CiteSpace software, which was based on reviews of bibliometric software methodologies and well-known scientific academics [49]. CiteSpace is a Java-based scientific detection and visualisation tool that assesses the advancement of a field of study by means of a bibliometric co-citation [39]. This programme was used in earlier studies to comprehend the conceptual organisation of a corpus of knowledge [50–52].

The study gathers bibliometric data related to the research on adventure tourism for its review. To that end, the study follows the methodological instruments used by academics and scholars in various areas of research [53,54]. The citing papers were obtained from Web of Science Core Collection documents with "advent* touris*" in the Topic search (which includes Article Title, Abstract, and Keywords).

In total, 454 citing documents were returned from the search. The only filter applied was the publication period (2006–2023). No additional filters or exclusion criteria were applied. The final dataset comprised 426 citing documents. The reduction of 28 documents is due to records whose reference data could not be processed by CiteSpace due to incomplete or incompatible metadata in the Web of Science export files (e.g., corrupted records or unrecognised reference formats), rather than to any additional selection criterion.

The period was selected based on the significant increase in adventure tourism research starting in 2006, with more than 10 papers published in WoS, which marked a shift towards more specialised and theoretical studies in the field. Fig. 1 illustrates the selection criteria and the steps followed to obtain the final set of documents analysed in this study.

Finally, it is important to clarify a potential source of confusion regarding the scope of the bibliometric data. The search string used to retrieve the citing documents—"advent touris*"—was deliberately focused in order to target publications explicitly addressing adventure tourism. However, the object of our co-citation analysis is not these citing documents per se, but rather the intellectual structure derived from the references they contain. Consequently, although the initial dataset may appear thematically narrow, the resulting co-citation network encompasses a much broader academic landscape. This includes references from adjacent fields, insofar as they are cited within adventure tourism literature. This characteristic is intrinsic to co-citation analysis and allows the method to capture cross-disciplinary influences, even if they are not directly reflected in the initial search query.

4. Results

This section presents the results of the study, addressing three of the four Research Questions. The first sub-section outlines the main areas of research within adventure tourism (RQ1). In addition, the sub-section identifies the most influential research articles, highlighting those that have attracted significant academic attention and represent trending themes in the field (RQ2). The second sub-section explores the evolution of adventure tourism research, providing a structured view of its development over time (RQ3), and the methodologies applied by the papers that represent the intellectual turning points (RQ4).

Table 2
Main lines of research and number of trending topics.

ClusterID	Size	Silhouette	Mean (Year)	Label	Number of Trending Topic		
					2006-2011	2012-2016	2017-2023
1	82	0.9	2018	Structural Foundation	0	2	12
2	68	0.905	2014	Adventure Tourism Experiences	0	2	1
3	51	0.958	2008	Risk Management	4	0	0
4	50	0.968	2010	Leisure Motivation	3	1	0
5	42	0.914	2016	Social Well-Being	0	1	0
6	40	0.985	2003	Framework for Injury and Safety Practices	1[a]		
7	16	0.986	2015	Family Tourism	0	0	0
8	15	0.996	2016	Adventure Education	0	1	0
9	14	0.988	2014	Responsible Tourism	0	1	0

[a] The burst paper corresponds to **Swarbrooke** [4], which predates the analysed timeframe.

4.1. Main lines of research

The broader area of research in the field of adventure tourism literature is shown in Table 2 (RQ1). The study found nine significant clusters distributed from 1 to 9. Each co-citation line of research (cluster) is generated by CiteSpace using a specific theme. The silhouette value assigned to each cluster in the network determines its strength. According to Chen et al. [39], the silhouette value must be between 0.7 and 1.0 to determine the appropriate number of clusters. According to the results shown in Table 2, all clusters generated have a silhouette value greater than 0.9, above the recommended standard (0.7). This confirms that all clusters have strong homogeneity in terms of cohesion and differentiation. To measure network quality, a Modularity Q value between 0 and 1 was used [41,55]. A significant Modularity Q value (0.7495) indicates the network's capability to be decomposed into multiple clusters [41,55]. The Modularity Q value range is between 0 and 1; higher values indicate that each cluster has clear boundaries and the network is well structured.

While the clusters represent stable thematic structures within the adventure tourism literature, the research trends emerging from these themes are revealed through the burst detection analysis (RQ2) shown in Table 2. A technique known as "burst detection" uses algorithms to find variations in one variable over time relative to other variables in a population. The burst algorithm that Kleinberg [40] introduced was executed in the study using CiteSpace software. A burst paper is a document that has received a large number of citations within specific periods of time, indicating a sudden surge of academic attention [41]. According to the Kleinberg [40] algorithm, the study found 29 papers with trending topics in adventure tourism. All papers were published within the analysed timeframe, except Swarbrooke [4], which predates it but remained a burst paper throughout the study period. Structural foundation (Cluster 1) is the subject area with the largest number of burst citation papers. Fourteen papers belonging to the Structural Foundation cluster show a strong citation burst. Adventure Tourism Experiences (Cluster 2) have three citation bursts, whereas Risk Management (Cluster 3) and Leisure Motivation (Cluster 4) each have four citation bursts. Moreover, Clusters 5, 6, 8 and 9 have only one citation burst.

The following is a summary of the main study areas in the discipline of adventure tourism. The magnitude of each theme determines the order in which each cluster's description is presented. The documents that are part of each cluster are identified in Appendix 2 - supplemental material. The primary sources for knowledge about adventure tourism are these documents.

Cluster 1—the **Structural Foundation**—is a strong area of research in the discipline of adventure tourism literature. This cluster contains the largest number of research papers, about 82 documents. It discusses the major areas, background boundaries and theoretical concepts in line with the research. The Cluster begins with the definition of basic terminologies, understanding its various dimensions and categories of activities [12], strength and nature of the environment [56,57], personality traits and emotions under tourist safety behaviour [58]. In addition, some researchers have investigated the tourist motivational factor and tourist behaviour outcomes [59], motivation and destination loyalty [30], and tourist experiences under soft adventure [60]. While motivation and experience are explored in-depth in Clusters 4 and 2, respectively, their brief mention here provides essential context for foundational discussions on the theoretical scope of adventure tourism. This cluster also examines the relevance of adventure tourism in the context of health and family tourism [33] and subjective well-being with risk perception [61]. Specifically, these papers analyse the skills and competencies required to take part [13], but due to the increase in commercialisation, tour operators and tourists require little to no skill to participate in the adventure market [57]. In this cluster, researchers performed a literature review to obtain in-depth knowledge about characteristics and motivational decisions [5] in addition to a new conceptualisation of adventure tourism and its dimensions [35]. Research also addresses special and emerging issues like eco/sustainable adventure tourism, fat bikes, and family tourism [62]. This area of research has been one of the top research trends in adventure tourism since 2017. It includes a total of 14 burst documents, two between 2012 and 2016, and the remaining 12 illustrate trending issues in the research field from 2017 to 2023. Additionally, 2018 was the mean year of publication and the source of knowledge in Cluster 1. This cluster aligns with broader debates on the conceptualisation and boundary definition of tourism fields, contributing to the ongoing discussion on the theoretical delimitation and legitimacy of emerging domains within tourism research.

Cluster 2—**Adventure Tourism Experience**—is the second most frequent line of research with 68 articles. In this cluster, academics focus on the adventure experience when they engage with various categories of adventure activities. A notable contribution to the field from 2017 to 2023 is the work of Cheng et al. [1], who applied a Tri-Method Analysis (bibliometric analysis, content analysis, and a quantitative systematic literature review) to examine adventure tourism research. Their findings highlight that most studies emphasise the adventure experience itself, while relatively fewer address adventure tourism operators, destination development, and planning. Beyond this, other key studies within the cluster provide deeper insights into adventure tourism experiences. For instance, Buckley [63] investigated the psychological relationship between fear and thrill in adventure settings, revealing that thrills can exist independent of fear at lower levels, but disappear entirely when fear becomes overwhelming. Similarly, Tsaur et al. [64] examined how transcendent experiences during mountaineering influence flow and overall happiness, emphasising the transformative potential of adventure tourism. This cluster has a mean year of 2014 as a focused area of investigation. This area of thematic research became one of the main research trends in 2012-2016 with two burst papers in that period. This cluster connects with the "experiential turn" in tourism studies, emphasising the centrality of subjective experience, emotions, and transformation in value creation.

Cluster 3 deals with **Risk Management** in the various adventure tourism activities for tourists. Risk management is mandatory for adventure sports operators and such practices are recognised internationally [65]. Several phases of adventure tourism risk management, as seen from the operators' point of view, are crucial preventative steps [66]. In this context, scholarly analysis of the level of risk experienced by tourists in various adventurous activities is contingent upon group size, duration, prior skill required and the remoteness/inhospitableness of the area [20]. Cater [67] argues that participation in adventure activities inherently involves an attraction to risk, requiring a "balancing act" between acknowledging the actual dangers and achieving an optimal level of thrill. For

example, structural frameworks of training and certification maintain standards to mitigate foreseeable risk and standardisation of risk management frameworks as defined by the Adventure Tourism Process [68]. However, in New Zealand, risk management includes a strong record of evidence against injury. The country ranks the degree of risk alongside safety factors, ensures advanced surveillance in outdoor recreation, and operates within a legal framework shaped by a no-fault accident compensation culture, which reduces the emphasis on negligence [21]. The area of research in this particular cluster was the most trending theme between 2006 and 2011 (4 burst papers). In Cluster 3, the mean year for publication of the source of knowledge was 2008. This line of research is closely related to risk theory and the sociology of risk, where risk is not only managed but also socially constructed and actively sought as part of the tourism experience.

Cluster 4–**Leisure Motivation**–deals with research papers focused on factors such as fear, thrill, flow, skill development and rush, which are the major motives encouraging tourists to take part in mountaineering and other outdoor activities. Participants involved in highly skilled adventure sports accept and acknowledge the risk of danger as a necessary element and an unavoidable factor. For example, attempting to harness the power of nature with a small specialised tool strapped to one's body has inherent dangers. Researchers argue that customers of commercial adventure tours, which provide risk/recreational activities, are primarily driven by the need for an enhanced rush [69]. Moreover, skill development and mountaineering experience are major motivational factors for tourists on mountaineering package holidays [70]. Others focus on finding insight into the perception of fear as a fundamental emotion during nature-based outdoor recreation [71]. During the period of 2006–2011, this cluster experienced the highest number of burst papers, totalling three, with an additional burst occurring between 2012 and 2016; the average publication year for this cluster is 2010. This cluster contributes to motivational theory in tourism, particularly in relation to intrinsic motivation, flow theory, and sensation-seeking behaviour.

Cluster 5**–Social Well-Being**–shows a wide area of research interest, with 42 research articles. The cluster's viewpoint is significant because it raises the possibility that outdoor sports should be considered when creating interventions for people's health and well-being, as well as nature. For example, adventurous nature sports generate both hedonic and eudaimonic concepts, which foster mental and physical well-being across the whole population [72]. Researchers used a framework under specific well-being principles to elevate the public's opinion of adventure recreation's importance to quality of life. This framework gives public health, education, and recreation professionals access to a wider variety of techniques to improve well-being [73]. The study explores the adventure guides' emotional connection to storytelling during tours, which in turn enhances well-being, reduces stress, and increases involvement with tourists [74]. In other situations, adventure tourism is designed to boost women's empowerment; advantages, disadvantages, and



Fig. 2. Description of clusters.

negotiating techniques of adventure travel are itemised to identify and compile categories that substantiate the potential for women's empowerment [38]. For this cluster, 2016 is the mean year across the research papers examined. This cluster generated only one paper as a burst article from 2012 to 2016. This area is strongly linked to well-being theory and the shift towards eudaimonic perspectives in tourism, highlighting the role of tourism in enhancing quality of life and human flourishing.

For Cluster 6—**Framework for Injury and Safety Management**—researchers focused on the operational performance of tour operators in the context of rules designed to rationalise the risks and dangers, accident compensation legislation, and patterns and trends in injury claims [17,22,75]. According to these cluster's papers, injuries during outdoor activities, in a few cases, are caused by not hiring proper guides (tourist and mountain guides), according to the tourists participating in the event [17]. Researchers also found that some countries offer tour operators no-fault accident compensation legislation in case of injury during the activities [22]. Commercial adventure tour operators also place less emphasis on safety standards meeting the Occupational Health and Safety requirements. Key risk characteristics and risk management strategies for locations and industries with high levels of activity are examined by Bentley et al. [75]. Moreover, poor reporting standards, inconsistent safety management practices [75], and tourists' connections in accidents while participating in adventure activities are not satisfactorily documented [76]. This cluster also includes a book chapter that discusses risk management and the operating environment [77]. Safety management alerts need to be designed for sole (individual) and independent adventurers [78]; they must adopt a goal-oriented approach for interpreting risky behaviour [79], and ensure the individual's subjective experience of adventure [80]. This cluster represents one of the most longstanding research areas in adventure tourism, with only one burst paper from 2003 [4]. This cluster connects with institutional and regulatory perspectives in

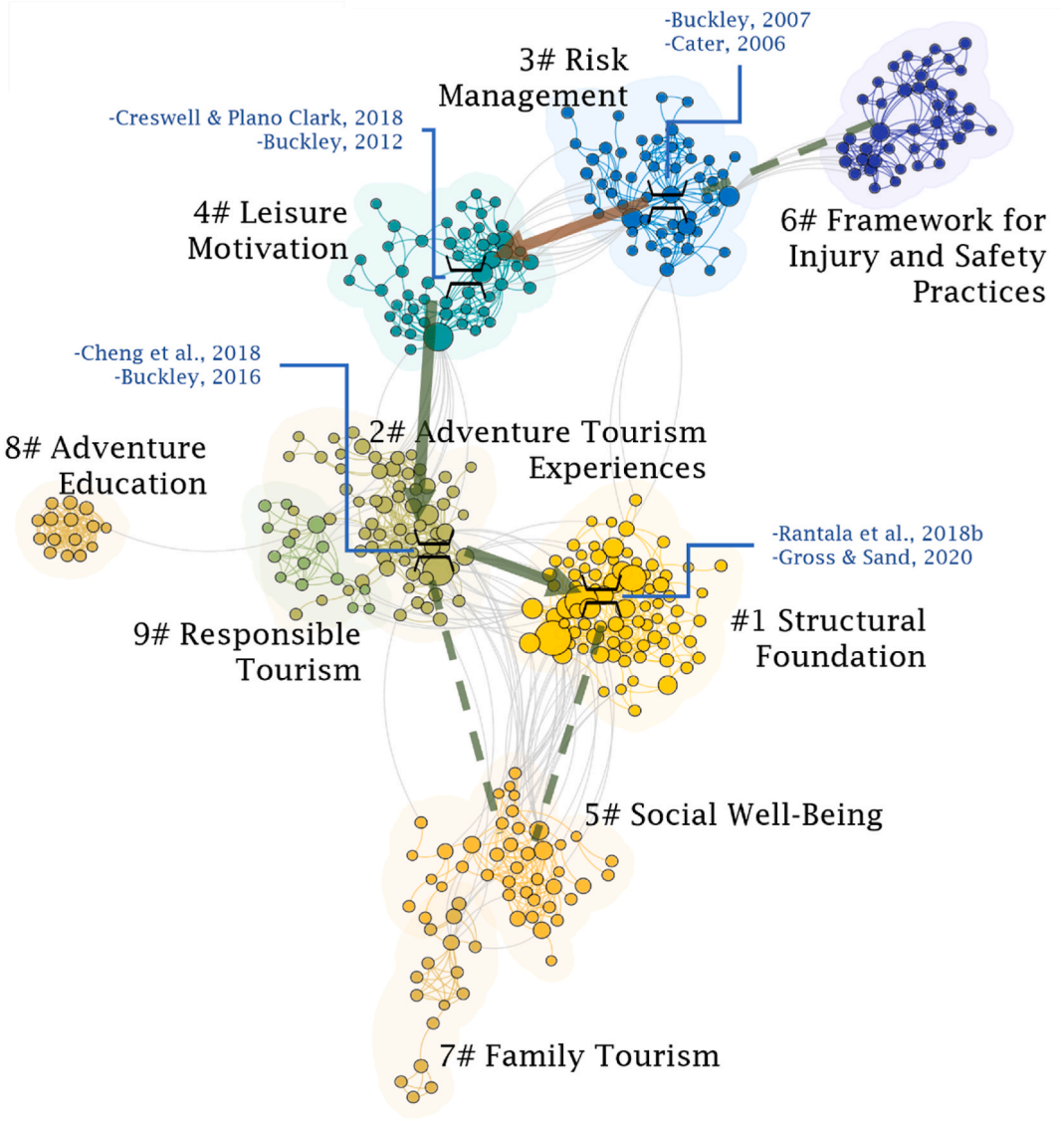


Fig. 3. Research network on adventure tourism literature (2006–2023).

tourism management, particularly regarding standardisation, governance, and safety systems.

Cluster 7—**Family Tourism**—covers adventure tourism's only sub-sector for trends in family tourism. Humans have strong and deep emotional bonds to their families and children. The family is considered a core human activity because of this relationship, which motivates mankind and society [81]. This cluster emphasises promoting family unity, creating family memories [19], and strengthening the three-dimensional (father, mother and children) framework inclusive of group perspectives of family functioning [82]. Researchers examine trends when shaping and understanding the concepts of family tourism, where people travel to reconnect with each other; therefore, families travelling and visiting friends and relatives (VFR) are more robust than others [19]. Researchers discussed the group perspective, family holiday experiences that seek socialisation through group, generational (kinship) and gender (roles) dynamics. Such factors influencing the internal dynamics between family time and alone time are the result of a conceptual approach that focuses on group aspects within families [82]. This cluster, with a mean publication year of 2016, includes only 16 articles with no burst papers. This line of research relates to social and relational perspectives in tourism, emphasising group dynamics, identity, and family as a unit of consumption and experience.

Cluster 8 addresses the subject of **Adventure Education** in the adventure tourism discipline. This cluster details academic courses for undergraduate and master students, in addition to relevant literature. For example, in the chapter entitled "Challenge course programming on the rise or in compromise?", Humberstone [83] asserts that a goal orientation continuum with three categories—recreational, educational, and therapeutic—tends to encompass all course-related challenge programmes. This educational perspective is also reflected in Leask [84], who recognises education and interpretation as core functions of visitor experiences. According to Wagstaff [85], a recreational challenge course curriculum may yield results beyond just enjoyment and thrills. This cluster represents a small area of interest within adventure tourism research, encompassing only 15 articles. The average publication year for these sources is 2016, and the cluster includes just one burst article. This cluster is linked to experiential learning theory, where adventure contexts are used as environments for personal development and skill acquisition.

Cluster 9–**Responsible Tourism Practices**, researchers investigate the importance of market segmentation in recreational activities, the sustainability of protected areas, and the creation of memorable tourist experiences [86]. Several studies focus on adventure tourism/recreational activities, responsible tourism practices and their implications, for example: corporate social responsibility, tourism accreditation codes of ethics [87], and risk reduction strategies [88]. Similarly, investigations cover environmental attitudes and green consumer behaviours, willingness to pay during outdoor activities [89], and wilderness in ecotourism [90]. Moreover, the *Global Report on Adventure Tourism* highlights public-private sector collaboration initiatives, global trends, and the growth in supply and demand for adventure tourism. This report also emphasises the role of government to ensure policies and practices are in place to create the right environment for adventure tourism, ensuring that commercial tour operators follow operational standards, obtain the necessary certifications and practice proper risk management [3]. This cluster represents the most limited research area within adventure tourism, with only 14 articles, including one burst paper. The mean publication year of the papers included in this cluster is 2014. This cluster aligns with sustainability and responsible tourism debates, particularly in relation to ethical governance, environmental attitudes, and stakeholder responsibility.

Fig. 2 provides a synthesis of the nine clusters that form the intellectual structure of adventure tourism research.

Taken together, the formation of these nine thematic clusters reflects a clear maturation of the field, evolving from a fragmented collection of activity-based studies into a cohesive and multidimensional knowledge structure. This evolution is associated with a "humanistic turn" in tourism research, where the focus has shifted from the mechanics of the activity (e.g., equipment and safety) to the psychological and social outcomes of the experience. The high levels of homogeneity and modularity observed across these clusters (Table 2) indicate that adventure tourism has developed distinct theoretical boundaries, differentiating itself from general outdoor recreation by integrating concepts such as subjective risk perception and eudaimonic well-being.

4.2. Connection between lines of research: Key clusters and turning points

The next section illustrates the evolution of adventure tourism research within the broader tourism literature (Fig. 3). The study explores the structural development of this field (RQ3), highlighting key connections between major research domains from 2006 to 2023. Each individual research article is represented by a node in the network, linking various research fields. The influence of each connected node is determined using "betweenness centrality" [41], which quantifies the extent to which a node acts as a bridge across different research clusters. The analysis identified eight intellectual turning-point papers, distributed across four clusters: Cluster 1 [12,33], Cluster 2 [1,63], Cluster 3 [20,67], and Cluster 4 [69,91].

To track the intellectual progression of the field, Fig. 3 should be interpreted by following the main connections from the upper clusters toward the lower and peripheral clusters, revealing how research themes have evolved over time. Early studies (2006) predominantly focus on risk management in adventure tourism, gradually expanding into broader themes, such as adventure tourism experiences, social well-being, and destination development.

In the early 21st century, research focused on assessing risk perception, pull and push factors influencing participation in adventure tourism, and market-related aspects, such as pricing and prior skill requirements (Cluster 3). These studies provided foundational insights into how adventure tourism was conceptualised, particularly in commercial settings where participants sought thrills and fear. Seminal works, such as those by Buckley [20] and Cater [67], served as intellectual bridges, linking risk management with emerging research on adventure tourism motivations.

Entering the second decade of the 21st century, the field's focus shifted downward from motivational research toward experience-centred and structural themes, reflecting a broader reconceptualisation of adventure tourism as a theoretical construct. Cluster 4, centred on leisure motivation, gave way to Cluster 2, which examined the adventure tourism experience itself, including how operators

manage risk and deliver thrills to participants. From this experiential core, the field then diverged into two distinct trajectories: one moving toward Cluster 1, addressing the structural foundations of adventure tourism, and another extending toward Cluster 5, which explores the social well-being dimensions of adventure participation, and subsequently toward Cluster 7, focused on family tourism. Within this same period, related but comparatively peripheral themes also emerged, including Cluster 8 (adventure education) and Cluster 9 (responsible tourism), positioned adjacent to Cluster 2.

Cluster 3, rooted in early risk management studies, remains a pivotal source of knowledge, with its foundational theories still shaping contemporary discourse. Notably, the research field remains heavily influenced by Cater [67] (Bc = 0.14), who argues that adventure tourists and commercial operators perceive risk differently—an insight with crucial managerial implications for risk communication and group briefings. This underscores the need for a balancing act between safety and maintaining the adventure experience.

Meanwhile, Cluster 1 has gained prominence in recent years, reflecting an interdisciplinary shift in adventure tourism studies. Gross' and Sand's [33] work is pivotal within this cluster (Bc = 0.11), examining novel themes such as family tourism, micro-adventures, and the link between adventure tourism and well-being. These emerging areas highlight the growing need for interdisciplinary collaborations to explore the motivations, implications, and theoretical frameworks underlying modern adventure tourism.

Through this network analysis, we identify how the evolution of adventure tourism research has been shaped by distinct yet interconnected research trajectories. The key turning points represent paradigm shifts that have influenced the direction of the field, from risk management and market structure to experience design and well-being.

Addressing RQ4, the methodological approaches adopted by the intellectual turning points are examined following the intellectual progression illustrated in Fig. 3. Although no single methodological paradigm predominates across the entire field, each stage of this progression exhibits characteristic methodological patterns that reflect the evolution of adventure tourism research.

The intellectual turning points associated with Cluster 3 (Risk Management) are characterised by empirical research based on primary data collection. Buckley [20] adopts a quantitative descriptive approach based on participant observation of 75 commercial tours, whereas Cater [67] employs qualitative research to explore participants' perceptions through field-based investigation. Despite their methodological differences, both studies illustrate an initial emphasis on generating empirical evidence from real-world settings.

One of the two intellectual turning points associated with Cluster 4 (Leisure Motivation) is also characterised by qualitative methodologies. This paper is Buckley [69], which employs ethnographic and autoethnographic approaches to investigate the motivations underlying adventure tourism. The second intellectual turning point is Creswell [91], which is not an empirical study but a methodological reference work. Its presence among the papers with the highest betweenness centrality reflects the increasing methodological maturity of the field and the growing importance of rigorous research design.

The intellectual turning points associated with Cluster 2 (Adventure Tourism Experiences) show a movement towards methodological triangulation, combining complementary methods to obtain a more comprehensive understanding of increasingly complex research questions. Buckley [63] adopts methodological triangulation by integrating participant observation, practitioner interviews, retrospective autoethnography, and experimental autoethnography. Similarly, Cheng et al. [1] combines bibliometric analysis, systematic literature review, and content analysis to provide a comprehensive overview of the evolution and intellectual structure of adventure tourism research.

Finally, building on the integrative perspective introduced by Cheng et al. [1] in Cluster 2, the intellectual turning points associated with Cluster 1 (Structural Foundation) consolidate this knowledge-synthesis approach by reviewing the existing knowledge, thereby strengthening the theoretical foundations of the field. Rantala et al. [12] conduct a systematic literature review to examine the conceptual coherence of adventure tourism, while Gross and Sand [33] develop a perspective paper based on a narrative literature review to identify future research directions. Rather than generating new empirical evidence, these studies review, synthesise, and reinterpret the accumulated knowledge, contributing to the consolidation of the conceptual and theoretical foundations of adventure tourism research.

Taken together, these intellectual turning points suggest that the methodological evolution of adventure tourism research has not followed a single methodological paradigm. Instead, it has progressively incorporated a wider range of complementary approaches—from empirical qualitative and descriptive studies, through methodological triangulation, to literature-based knowledge synthesis—reflecting the increasing complexity and maturity of the field.

5. Research agenda

5.1. Understanding stakeholder perspectives and collaboration

The proposed research agenda on stakeholder perspectives and collaboration draws directly from the themes identified in Cluster 5 (Social Well-Being), which emphasises the role of adventure tourism in enhancing individual and community well-being. This cluster highlights the multifaceted social impact of adventure activities, including contributions to public health, quality of life, and empowerment—particularly among marginalised groups. These insights underscore the importance of engaging a diverse range of stakeholders in co-creating sustainable and socially responsive adventure tourism strategies. As such, future research should further explore the dynamics of stakeholder collaboration to ensure equitable benefits and long-term social value across the sector.

Stakeholder involvement is fundamental to the sustainable development of adventure tourism, yet research on specific niches within the industry remains limited [92]. In recent years, studies have emphasised the importance of multi-stakeholder collaboration in ensuring environmental conservation, community engagement, and economic viability in adventure tourism [34]. Given adventure

tourism's growth potential and its alignment with sustainable development goals, it is essential to examine the evolving roles of stakeholders in planning and managing this sector. This includes identifying key actors across private, public, and community sectors and establishing mechanisms to enhance collaboration for responsible adventure tourism. However, studies focusing on the precise mechanisms that drive effective collaboration remain scarce. Stakeholder collaboration, particularly through resource-sharing, is a key driver of industry success [93]. Recent studies in tourism highlight that collaboration is increasingly driven not only by resource dependence, but also by shared knowledge and organisational learning that helps achieve a sustainable tourism sector [94]. Prior studies assert that the motivation for collaboration often stems from access to shared resources, the exchange of knowledge, and competitive advantages [95,96].

Destination management literature further underscores the role of strategic partnerships in enhancing tourism sustainability [97, 98]. Additionally, knowledge management has emerged as a critical enabler of cooperation, strengthening the competitive advantage of destinations and organisations alike [99]. By applying social exchange theory and stakeholder theory, this study explores the factors that encourage collaboration and how these alliances contribute to long-term industry resilience.

Based on these considerations, future research should focus on the following areas.

- Mapping stakeholder roles, values, and collaboration strategies by investigating diverse groups—local communities, tour operators, government bodies, and tourists—to understand their social priorities, foster effective cooperation, ensure equitable distribution of social benefits, and minimise negative impacts in adventure tourism.
- Developing sustainable business models, identifying innovative business strategies that balance economic profitability with the preservation of stakeholders' social values.
- Anticipating future trends, examining emerging trends and innovations in adventure tourism that can enhance stakeholder engagement and ensure long-term sustainability.

5.2. Impact assessment

The following research agenda on impact assessment is based on insights derived from Cluster 9 (Responsible Tourism Practices), which, despite being one of the smallest clusters, addresses critical issues surrounding the sustainability and accountability of adventure tourism. This cluster explores themes such as market segmentation, codes of ethics, environmental attitudes, and the role of accreditation and certification in promoting responsible practices. It also highlights the importance of public-private collaboration and regulatory frameworks in managing tourism impacts. These findings emphasise the need for more rigorous and standardised approaches to evaluating the environmental, social, and cultural consequences of adventure tourism. Consequently, the proposed research agenda focuses on advancing methodologies and frameworks for comprehensive impact assessment.

There have been concerns about adventure tourism's potential effects on the environment and surrounding communities worldwide [100]. Furthermore, despite the apparent rise in interest in the effects of adventure tourism on the environment over the past five years, a large portion of research is focused on determining a destination's potential for adventure tourism development [1]. The effects of adventure tourism on the environment, the economy and society seem to need more study [101]. For example, waste deposited in the mountains at high altitude causes environmental degradation, loss of biodiversity, and creates a challenging situation for achieving the sustainable development goals [102]. Although indicators for sustainability exist, they are often applied inconsistently across different adventure tourism settings. Future research should aim to establish standardised metrics for evaluating tourism impact and explore frameworks that integrate local stakeholder perspectives into the impact assessment. Therefore, this study proposes the following research agenda for future pursuit.

- Analysing the cultural, social, and environmental impact of adventure tourism on local communities and indigenous populations.
- Assessing the extent to which adventure tourism can contribute to the creation of social value and community development.
- Developing standardised methodologies for impact assessment, incorporating both qualitative and quantitative approaches.

5.3. Monetisation strategies

The research agenda on monetisation strategies emerges at the intersection of Cluster 5 (Social Well-Being) and Cluster 9 (Responsible Tourism Practices), both of which highlight the evolving social role of adventure tourism. Cluster 5 underscores the contribution of adventure activities to mental health, empowerment, and overall quality of life, while Cluster 9 addresses ethical responsibility, sustainability, and stakeholder expectations. These clusters collectively reveal a growing need to recognise, evaluate, and communicate the broader social and environmental value generated by adventure tourism enterprises. As such, this agenda proposes the exploration of monetisation models that go beyond traditional financial metrics to account for the socio-economic and ethical dimensions of adventure tourism.

In recent decades, a more holistic view has replaced the notion of enterprises as mere economic value producers, recognising them as socio-economic systems interacting within a broader social framework [103]. This causes the financial accounting model to give way to social accounting in information systems. To be more specific, social accounting is “the process of communicating the social and environmental effects of organisations' economic actions to particular interest groups within societies and to societies at large” [74]. A more comprehensive understanding of organisations’ performance from a multi-stakeholder point of view is provided by the monetisation of social value, which makes it possible to demonstrate clearly and directly the general value contribution of a sports club to the various agents who place value on its operations [104]. The polyhedral model makes it possible to monetise the specific social

value of the stakeholders by combining qualitative and quantitative approaches [105–109]. The quantitative approach used to monetise the perceived value involves using indicators and proxy variables. Traditional financial metrics often fall short in capturing the full spectrum of value generated by adventure tourism enterprises. Alternative models provide a more comprehensive framework for assessing the broader economic, social, and environmental benefits of tourism initiatives. Therefore, this research paper proposes the following research agenda for future pursuit.

- Identifying and evaluating methods to monetise the social values created by adventure tourism.
- Examining the potential to integrate the social accounting matrix into financial reporting and business performance evaluations.
- Addressing ethical challenges related to the monetisation of social values in adventure tourism, including issues of cultural appropriation, fair compensation and respect for indigenous knowledge and traditions.

5.4. Technology integration

The infusion of technology into the realm of adventure tourism represents a dynamic and rapidly evolving field that demands scholarly scrutiny. While technological advancements were not a central focus of our findings, they emerge as a relevant area for future research, particularly with regard to stakeholder collaboration and sustainable business models (Cluster 9). Despite its exponential growth, the role of technology in adventure tourism continues to unfold, prompting Chalkidou and Skourtis [110] to delve into how the sector integrates and navigates technological advancements. Their exploration aims to comprehend the transformative impact of technology and uncover opportunities within the industry. They advocate for a paradigm shift from goods-dominant to service-dominant logic, drawing on the service-dominant logic and ecosystem perspective proposed by Vargo and Lusch [111]. This innovative approach perceives technology as a crucial resource for collaborative value creation, challenging traditional adventure management literature.

In tandem with the increasing interconnectedness and technological orientation of modern society, the adventure tourism industry has wholeheartedly embraced innovations to elevate the overall experience (Cluster 2) for both travellers and destinations. This intersection of technology and adventure tourism investigates how technological advancements contribute not only to enhancing visitor experiences (Cluster 2), but also to promoting sustainability (Cluster 9) within the industry. The research agenda encompasses.

- Scrutinising the role of technology in minimising the ecological footprint of adventure tourism activities.
- Assessing the potential of virtual and augmented reality in providing immersive yet sustainable adventure experiences.
- Exploring the use of data analytics and artificial intelligence to optimise resource management, thereby enhancing the overall sustainability of adventure tourism operations.
- Evaluating how technology can facilitate more effective collaboration between stakeholders, including operators, local communities, and regulatory bodies.

5.5. Bridging theoretical gaps

To reduce fragmentation in adventure tourism research, future studies should adopt theoretical approaches to address three key gaps: the Value Co-creation gap (Clusters 2 and 3), by applying Service-Dominant Logic to explore how guides and participants co-create well-being; the Conceptual Boundary gap (Cluster 1), by using Social Representation Theory to redefine “adventure” beyond the hard/soft binary, particularly for emerging segments such as Generation Z; and the Stakeholder Synergy gap (Clusters 8 and 9), by developing empirical models that link Corporate Social Responsibility to long-term environmental action. This would help move the field of adventure tourism from descriptive analysis towards a more theory-driven and conceptually robust scientific domain.

6. Conclusions

This study provides several key contributions based on a co-citation bibliometric analysis of adventure tourism research, offering an objective and data-driven mapping of the intellectual structure, thematic evolution, and key knowledge dynamics within the field.

First, it offers a comprehensive mapping of the intellectual structure of adventure tourism through the identification of nine cohesive clusters (RQ1), namely Structural Foundation, Adventure Tourism Experiences, Risk Management, Motivation and Leisure, Social Well-Being, Frameworks for Injury and Safety Practices, Family Tourism, Adventure Education, and Responsible Tourism.

Second, it identifies emerging research trends using burst detection analysis, detecting 29 burst papers (RQ2) that have significantly shaped the evolution of the field (see Appendix 1 – Supplementary Material).

Third, it uncovers intellectual turning points [1,12,20,33,63,67,69,91] through betweenness centrality analysis, revealing how and when different research streams are interconnected (RQ3), and further examines the methodological approaches employed by these pivotal contributions (RQ4).

Fourth, it proposes a research agenda (RQ5) grounded in empirical findings, contributing to the theoretical consolidation and future development of adventure tourism research.

6.1. Theoretical implications for academia

Concerning theoretical implications, based on this study's findings, we propose a precise definition of adventure tourism, drawing

from our bibliometric analysis and emerging perspectives to establish a clear conceptual framework for academic research: adventure tourism is a form of travel that involves engaging in recreational activities with perceived or actual elements of risk, physical exertion, and exposure to natural or exotic environments. It encompasses both soft and hard adventure experiences, ranging from guided, low-risk activities (e.g., hiking, wildlife safaris) to high-intensity, physically demanding pursuits (e.g., mountaineering, white-water rafting, polar tourism). Beyond its risk-oriented dimension, adventure tourism also emphasises experiential learning, personal transformation, cultural immersion, and sustainability.

This definition acknowledges the traditional focus on risk and physical challenge, while incorporating broader perspectives such as experience design, personal growth, and environmental stewardship. It differs from previous definitions by shifting the focus from the product (commercial logistics) to an experience-centric process, where risk is understood as a subjective psychological perception. By incorporating emerging dimensions such as Social Well-Being (Cluster 5) and Sustainability (Cluster 9), this framework establishes a modern conceptual boundary that distinguishes adventure tourism from general nature-based recreation through its focus on personal growth and global responsibility. By doing so, it captures both the essence and the evolving trends of adventure tourism, consistent with recent scholarly efforts to frame it as a distinct category, while also addressing its operationalisation in empirical research, encompassing typologies, measurement scales, and cross-contextual comparative studies.

Concerning the fourth research question (RQ4), the methodological analysis of the intellectual turning points demonstrates that the development of adventure tourism research has been supported by methodological complementarity rather than by convergence towards a single research paradigm. Across the intellectual progression of the field, empirical field-based studies, qualitative approaches, methodological triangulation, bibliometric analyses, and systematic knowledge synthesis have each contributed to different stages of knowledge development. This methodological diversity has facilitated not only the generation of empirical evidence but also the consolidation and refinement of the theoretical foundations of adventure tourism field.

6.2. Practical implications

The results of this study have several practical implications for industry stakeholders, destination managers, and policy-makers involved in the planning, promotion, and regulation of adventure tourism. Overall, the thematic clusters provide clear guidance for practice. Businesses can draw on trends identified in “Family Tourism” (Cluster 7) and “Social Well-Being” (Cluster 5) to design inclusive, low-risk offerings that promote both mental and physical health. Policymakers, in turn, can utilise insights from the “Risk Management” (Cluster 3) and “Frameworks for Injury and Safety Practices” (Cluster 6) clusters to develop certification systems and health programmes that integrate adventure tourism into broader public well-being initiatives. These insights contribute to aligning marketing strategies and policy decisions with the evolving needs of adventure tourists.

First, in terms of experience design and product development, understanding that adventure tourism encompasses both risk-oriented and transformative elements encourages operators to create experiences that balance excitement with meaning. Activities should cater not only to thrill-seekers, but also to travellers seeking learning, self-discovery, and connection with local cultures and environments.

Second, from a marketing and communication standpoint, the nuanced definition of adventure tourism supports more targeted promotional strategies. Destinations can position themselves according to the types of adventure experiences they offer—whether soft, hard, cultural, or ecological—thus appealing to a broader range of tourists with diverse motivations and comfort levels.

Third, in relation to sustainability and risk management, the emphasis on cultural immersion and responsible practices underscores the need for clear environmental guidelines and community-based approaches. These measures help minimise negative impacts while enhancing benefits for local populations.

Fourth, when it comes to policy and certification standards, the multifaceted nature of adventure tourism highlights the importance of integrated policy frameworks and certification systems that take into account safety, sustainability, and cultural sensitivity. Such systems contribute to standardising quality and building trust among increasingly conscious consumers.

Lastly, in the area of training and capacity building, tourism professionals must be equipped not only with technical expertise, but also with cultural and environmental skills to meet the complex demands of adventure travellers. This calls for revising training curricula and encouraging interdisciplinary collaborations.

6.3. Limitations and future research

This study has several limitations. First, although co-citation analysis is a robust and widely accepted technique for identifying the intellectual structure of a field, it does not distinguish between positive and negative citations. As a result, highly cited works may appear as central nodes in the network regardless of whether they are being supported or critically debated. This limitation should be considered when interpreting co-citation patterns as indicators of consensus or paradigm development within the field.

Second, we acknowledge the limitation associated with relying exclusively on the Web of Science database. While Scopus includes a larger number of publications, prior research has shown that in the fields of business and social sciences, the proportion of unique and overlapping citations across both databases is very similar [112]. Moreover, although there is no clear consensus among scientometric scholars regarding the superiority of one database over another [113], Web of Science remains one of the most established and widely recognised sources, providing a consistent and high-quality citation framework with extensive historical coverage.

Third, as with most bibliometric approaches, the methodology may underrepresent recent publications that have not yet accumulated sufficient citations, potentially limiting the detection of very recent emerging topics.

With regard to future bibliometric research in this field, several avenues can be identified. First, future studies could expand the

scope of data sources by incorporating additional databases, such as Scopus, in order to enhance the robustness and generalisability of the findings. Second, further research may incorporate complementary bibliometric techniques, such as bibliographic coupling or keyword co-occurrence analysis, to provide a more comprehensive and nuanced understanding of the field. Third, in areas where the number of available publications is insufficient to support bibliometric analysis, future research could adopt alternative approaches, such as literature reviews focused on specific and narrowly defined subfields within adventure tourism, including topics such as accommodation or tourist transportation.

CRediT authorship contribution statement

Ali Faiz: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Javier De Esteban Curiel:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Investigation, Formal analysis, Conceptualization. **Ana Cruz-Suárez:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Jose Torres-Pruñonosa:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Data availability statement

Data will be made available on request. For requesting data, please write to the corresponding author.

Ethical statement

Ethics approval was not required because the study does not involve people and animals.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

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