

Review

Logistics and Supply Chain Management in Recreation Services: Bibliometric Analysis and Future Directions (2000-2025)

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Abstract: Logistics and supply chain management are central to the accessibility and sustainability of recreation services. However, the structure and evolution of the literature over time has not been analysed in detail. This study aims to examine the structure and evolution of the literature from the perspective of inclusive service delivery. A bibliometric profile of the global literature is presented with a focus on recreation logistics and supply chain management. Publication trends, geographical distribution, methodological approaches and interdisciplinary collaborations are assessed. Key research topics, conceptual clusters and future research directions are also identified. The literature review was conducted in the Web of Science database using PRISMA methodology. Within the scope of the analysis, 330 articles obtained from 160 different sources and published between 2000 and 2025 were analysed. The annual publication growth rate was calculated as 13.92%. After 2015, there was a significant increase. In 2024, the highest number of publications was reached with 34 articles. This shows that the subject has gained an important place in the international academic agenda. On a country basis, the USA (24.2%), China (13.9%), Spain (6.1%) and the United Kingdom (4.8%) stand out. There are strong co-operation networks between European countries (24.24% international co-operation). High-income countries dominate research production. However, the expansion of international co-operation and a more equitable distribution of resources will enable the development of globally inclusive solutions. Thematic evolution analysis reveals a shift in research focus towards management processes, impact assessments and socio-psychosocial dimensions. These findings provide a clear picture of the current situation in the field of recreation logistics and point the way for future research.

Keywords: recreation services, logistics, supply chain management, bibliometric analysis

1. Introduction

Recreation services are essential for physical health, mental well-being and social integration [1-3]. Effective delivery of these services relies on complex logistics processes, where supply chain management and multi-actor co-ordination are critical [4]. Logistics decisions in national parks, sports facilities and event venues directly impact service quality, cost efficiency, visitor satisfaction and environmental sustainability [5].

Unlike manufacturing and retail, logistics in the recreation sector faces unique challenges including seasonal demand fluctuations, weather dependence, and natural

resource conservation [6-7-8]. Quality of visitor experience and minimising environmental impacts are also critical considerations [9-10]. Capacity management requires advanced strategies such as reservation systems and visitor flow control [11-12], while transport infrastructure and accessibility are decisive for service delivery [13-14-15].

Recent global transformations have introduced new paradigms in recreation logistics. The COVID-19 pandemic significantly increased outdoor recreation demand and necessitated new logistics strategies for social distancing and capacity management [16-17-18]. Climate change has driven the adoption of green supply chain practices and sustainable transport policies [19-20-21]. Digital technologies have transformed reservation systems, dynamic pricing, real-time monitoring, and data-driven decision-making [14-22-23-24]. Growing urbanisation has also heightened concerns about equitable access to green spaces [25].

Despite the growing academic and practical interest in recreation logistics, a systematic bibliometric analysis examining the intellectual structure, thematic evolution, and collaboration patterns in this interdisciplinary field is notably absent. Existing reviews have addressed specific sub-domains such as park visitor management, tourism transport, and event logistics, yet none have provided a comprehensive mapping of logistics and supply chain management across recreation services. This gap limits the identification of research priorities, emerging themes, and opportunities for international collaboration.

There is a rich body of literature on recreation management, tourism logistics, park management and event organisation [26-27-28-29]. However, logistics and supply chain management in recreation services, which is at the intersection of these fields, has not been systematically analysed from a bibliometric perspective. Existing reviews have focused on specific sub-topics such as park visitor management, tourism transport and festival logistics. General research trends, thematic evolution, international co-operation networks and core publication bodies have not been comprehensively addressed [30]. Tourism supply chain studies have increased after COVID-19 [31-32-33]. These studies have emphasised the importance of logistics flexibility in recreation services. However, there is a lack of a comprehensive bibliometric analysis in the field. This deficiency makes it difficult to identify priority topics, common methodologies and future research opportunities. This deficiency is noteworthy.

From this point of view, the aim of this study is to present the first comprehensive bibliometric analysis of logistics and supply chain management in recreation services covering the period 2000-2025. 330 articles were retrieved from Web of Science and analysed using performance analysis and science mapping techniques. This analysis contributes to the understanding of the intellectual structure, thematic clusters and research trends in the field. The study guides academics in understanding knowledge accumulation and emerging themes, policy makers in developing evidence-based strategies, and practitioners in discovering best practices [34].

Accordingly, the research questions of the study are as follows: (1) What are the publication trends and growth rates in the field? (2) Which countries, institutions, authors and journals are the most productive? How are patterns of international co-operation shaping up? (3) What are the main thematic clusters, conceptual structures and research networks? How have these evolved over time? Bibliometric analysis, thematic mapping, common word network analysis and Bradford's Law were used to answer these questions [35-36-37-38].

The rest of the paper is structured as follows: The second section describes the data sources, search strategy, PRISMA methodology, selection criteria and analysis methods [39]. The third section presents publication trends, geographical distribution, core journals, most cited articles, thematic map and keyword networks. The fourth section discusses the findings in the context of the literature and evaluates their theoretical and practical contributions. The last section presents the main conclusions, limitations and recommendations for future research.

2. Materials and Methods

Research Questions

The primary research questions of the study are:

Three main questions were addressed in the study: (1) publication trends and growth, (2) geographical distribution and collaborations, (3) thematic structure and evolution.

Research Aim

The main purpose of the study is to examine the international literature on recreation logistics and supply chain management by bibliometric method and to identify research trends. The objectives of the study are: (1) identify thematic trends and conceptual evolution, (2) identify the most influential publications and authors, (3) assess geographical distribution, (4) analyse collaboration networks, (5) predict future research directions.

Material

The data for the bibliometric analysis were obtained from the Web of Science Core Collection (WoS) database. The search was conducted within the scope of Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI) and Emerging Sources Citation Index (ESCI). A broad keyword strategy was developed to examine trends and collaboration networks. Data collection was carried out on 15 October 2025, and publications between 2000 and 2025 were included. The search was conducted through the "Topic" field (title, abstract and keywords) in WoS. The search string was constructed with the following Boolean query: TS= (("recreation*" OR "leisure" OR "outdoor recreation") AND ("logistics" OR "supply chain" OR "distribution")). The asterisk (*) wildcard operator was applied to the term "recreation" to capture morphological variations including "recreation," "recreational," and "recreations." Preliminary pilot searches were conducted to test alternative synonyms (e.g., "free time," "spare time," "amusement"); however, these terms yielded either irrelevant results or substantial overlap with the existing query. Therefore, the final search strategy was deemed comprehensive for capturing the relevant literature. The search resulted in 727 studies. Publications were restricted to "Article" type, between 2000-2025 and in SCI-EXPANDED, SSCI, ESCI indexes. After filtering, 330 studies were included in the analysis. The data collection and screening process was carried out in accordance with PRISMA principles and is presented in Figure 1.

Methods

A systematic bibliometric analysis framework was adopted in the study. This methodology enables a systematic review of the literature, the assessment of productivity indicators and the identification of structural patterns. The analysis was conducted at two levels: (1) performance analysis-publication numbers, author productivity, geographical distribution; (2) science mapping - keyword networks, thematic evolution, collaboration networks and citation relationships. Data analysis was performed using the bibliometrix package running in R 4.5.0 and the Biblioshiny interface [35]. The following analyses were performed with Bibliometrix: Performance analysis: number of publications, citations, country and journal productivity, Science mapping: co-authorship, common word occurrence, collaboration networks, Thematic analysis: keyword clustering, thematic mapping and evolution, Trend analysis: time series and evolving topics. Annual distribution, most cited works, prolific authors and journals, international collaborations, common word networks, Bradford's Law and citation patterns are analysed. Thematic structure and evolution were assessed using

strategic thematic mapping based on the methodology proposed by Callon et al. [41]. Centrality refers to the strength of links between a theme and other themes in the network, while density indicates the internal development of a theme. Themes were classified into four categories according to their centrality and density values: motor themes with high centrality and density, specialised themes with low centrality but high density, emerging or declining themes with low values in both dimensions, and basic themes with high centrality but low density. Emerging and declining themes were further identified through trend analysis. The literature selection was conducted systematically in accordance with the PRISMA 2020 guidelines [40]. This methodology provides a holistic assessment of the quantitative and contextual dimensions of the literature. The inclusion and exclusion criteria were determined according to a systematic framework. The criteria were applied as follows:

Scope: Recreation, logistics, supply chain and distribution management issues. Focus: Logistics processes, supply chain dynamics, distribution networks. Study type: Original research articles only. Timeframe: 2000–2025. Database: Web of Science (SCI-EXPANDED, SSCI, ESCI)

3. Results

The systematic filtering process is illustrated in the PRISMA flow diagram in Figure 1. The initial search yielded 727 records from Web of Science. During screening, 312 records were excluded due to document type (reviews, editorials, book chapters), 48 records were excluded for being outside the 2000–2025 time frame, and 37 records were excluded for not being indexed in SCI-EXPANDED, SSCI, or ESCI. After applying all inclusion criteria, 330 articles were retained for the final bibliometric analysis. This framework ensured consistent selection of studies aligned with the research questions in terms of subject coverage, publication type, and methodological appropriateness.

3.2. Figures and Tables

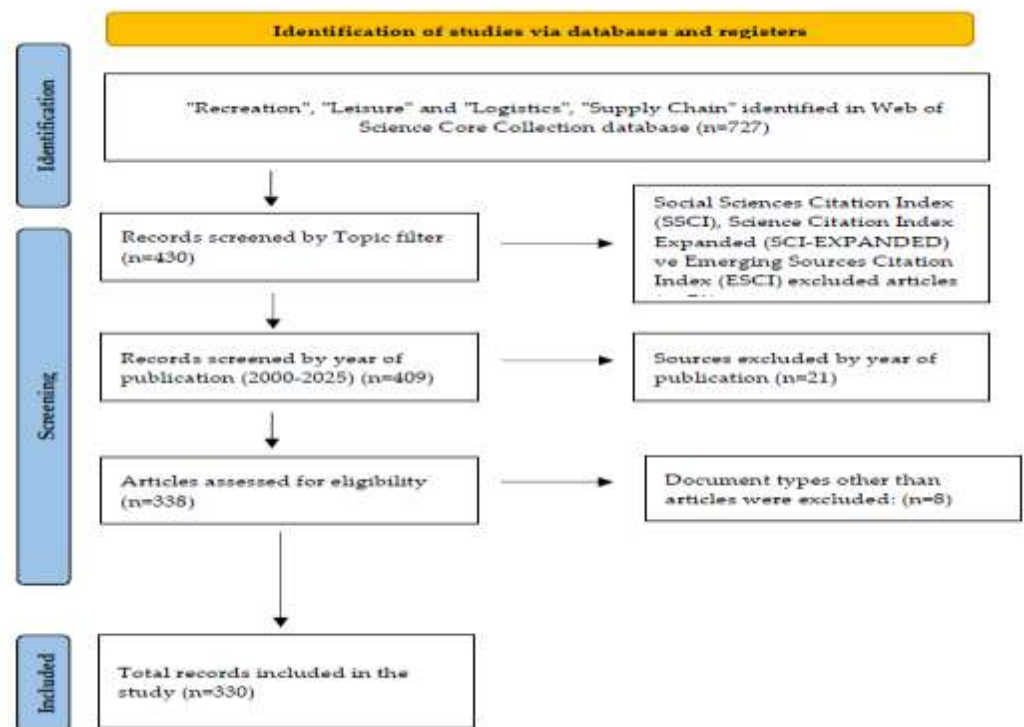


Figure 1. Design of the study according to the PRISMA flow diagram

Table 1. Characteristics of the dataset used for bibliometric analysis.

Description	Value
Publication Years	2000:2025
Publication Sources	160
Documents	330
Annual Growth Rate %	13,92
Average Document Age (Years)	7,45
Average Citations per Document	22,1
References Analyzed	15760
Keywords Plus (ID)a	893
Author's Keywords (DE)b	1405
Total Authors	1029
Single-Authored Documents	40
Average Co-Authors per Document	40
International Co-Authorships (%)	24,24
Article	313
Article; Early Access	12
Article; Proceedings Paper	5

Note. The dataset was compiled from the Web of Science Core Collection. a ID refers to "Identification" keywords indexed by the database. b DE refers to "Descriptor" keywords provided by the authors.

The final dataset, whose descriptive statistics are presented in Table 1, includes 330 articles published between 2000 and 2025. The publications were obtained from 160 different sources (mostly peer-reviewed journals). The annual growth rate is 13.92%. This shows the increasing academic interest in the topic. The average age of the articles is 7.45 years. This indicates that the literature includes both historical and current contributions. The average number of citations per publication is 22.1. 15,760 references in the dataset proves the interdisciplinary richness. 893 Keywords Plus and 1,405 author keywords show the conceptual diversity of the literature. In the dataset of 1,029 authors, only 40 articles are single authored. This shows the multi-author and collaborative nature of the field. An average of 3.27 authors per article supports this finding. 24.24% of the studies include international co-operation. This shows that the topic is of global interest. Article types: 313 articles, 12 early access, 5 proceedings.

Figure 2 shows the annual publication trend. Although the first studies date back to 2000, the number of publications remained limited in the 2010s. After 2015, a significant increase started and accelerated between 2020-2024. It peaked in 2024 with 34 articles. This increase can be attributed to sustainable management, digital transformation and the effects of COVID-19. Data for 2025 is partial as the year is incomplete.

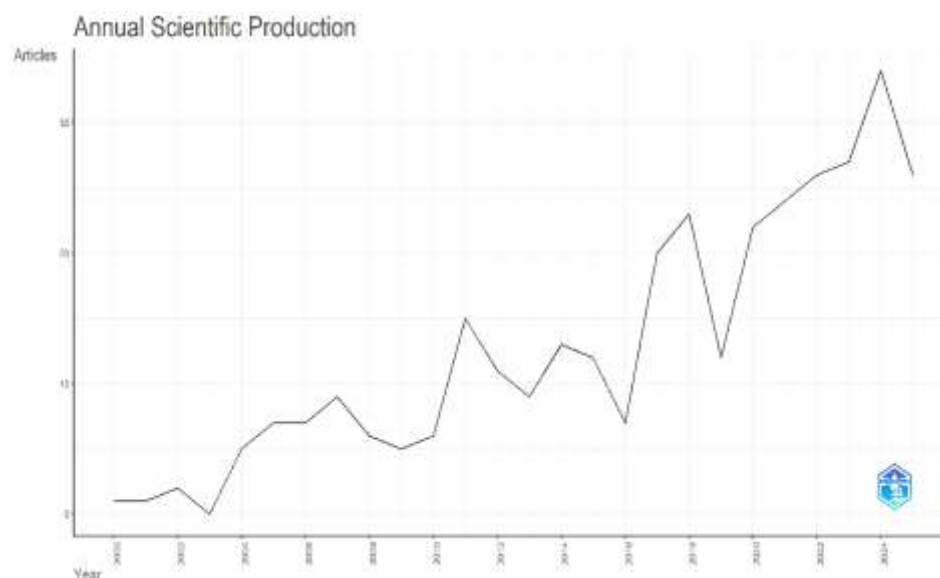


Figure 2. Annual scientific publication output on logistics and supply chain management in recreation services (2000-2025).

Figure 3 shows the country distribution of authors and single-country (SCP) and multi-country (MCP) collaborations. The USA is the most prolific country with 80 publications (24.2%). It is followed by China (46, 13.9%), Spain (20, 6.1%), the United Kingdom (16, 4.8%) and Australia (15, 4.5%). Academic interest is driven by high-income countries. The USA has 13.8% (11/80) of its publications involving international collaboration. South Korea (45.5%), China (30.4%), Austria (28.6%), Canada (27.3%) and Spain (25.0%) have higher collaboration rates. 5 of South Korea's 11 articles are multi-country collaborations. Brazil's 12 articles are completely single-country and exhibit a more isolated structure.

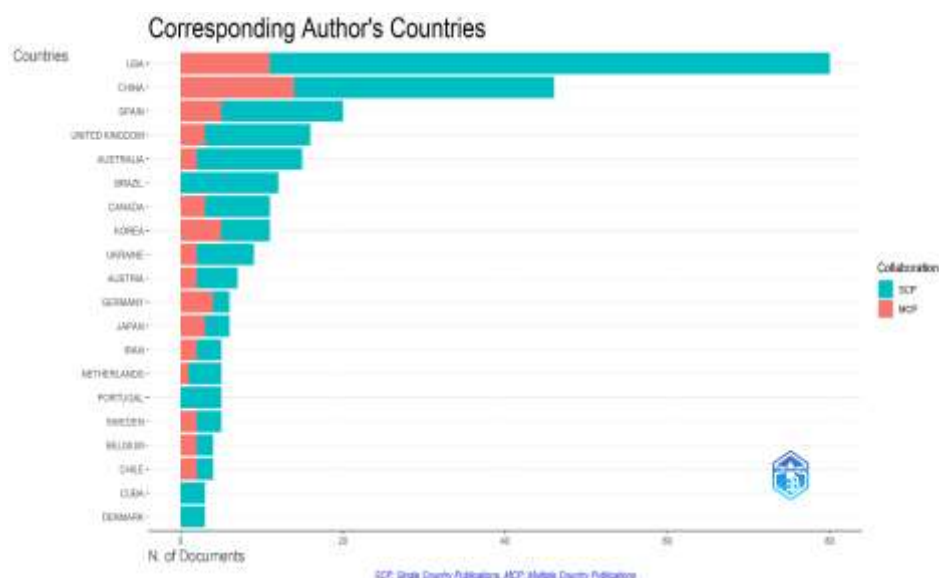


Figure 3. Distribution of corresponding authors by country and types of international collaboration (SCP vs. MCP).

Table 2 shows the frequency of co-publications across countries. Australia's collaborations with Canada (98), Thailand (101) and Norway (15) indicate a broad global network. Austria's partnerships with Poland (19), Italy (12) and Switzerland (8) show intra-European integration. Belgium-Estonia co-operation is noteworthy with 25 co-publications. Canada-New Zealand co-operation constitutes the most intense relationship with 171 co-publications. Canada also has collaborations with Germany (10) and Algeria (2). These collaboration patterns can be linked to several factors. The strong connection between Canada and New Zealand likely stems from similarities in national park management systems and outdoor recreation traditions. Australia's

links with Thailand may reflect shared research interest in nature-based tourism across the Asia-Pacific region. European collaborations, particularly Austria's partnerships with Poland, Italy and Switzerland, follow geographic proximity and common policy frameworks within the European Union. The Belgium-Estonia connection may relate to joint projects in sustainable tourism or EU-funded research programmes. Geographic, linguistic, cultural and institutional factors appear to shape these collaboration networks.

Table 2. Frequency distribution of inter-country collaborations.

From	To	Frequency
Australia	Canada	98
Australia	Norway	15
Australia	Thailand	101
Austria	Italy	12
Austria	Poland	19
Austria	Switzerland	8
Belgium	Estonia	25
Canada	Algeria	2
Canada	Germany	10
Canada	New Zealand	171

According to Figure 4, publications are concentrated in specialised journals. Journal of Outdoor Recreation and Tourism-Research (17) and Journal of Park and Recreation Administration (15) are the most productive journals. Tourism Management (12) stands out in tourism literature. Leisure Sciences (10) is an important source in leisure sciences. Travel Behaviour and Society (9) and Journal of Transport Geography (8) are active in transport. Transportation Research Part A (6) is involved in policy studies. Research is multidisciplinary and concentrated in recreation, tourism and transport journals.

The Keywords Plus analysis in Figure 5 reveals the main research trends. Terms such as management, recreation and model indicate a strategic focus, while tourism, leisure and travel reflect the connection with tourism studies. Health-related terms including physical-activity, health and behaviour demonstrate growing research interest in this dimension. Sustainability concerns are evident through terms like impact, conservation and protected areas. The presence of transport, mobility and accessibility highlights the logistic dimension of the field. Overall, this keyword distribution reflects the interdisciplinary character of recreation logistics research.

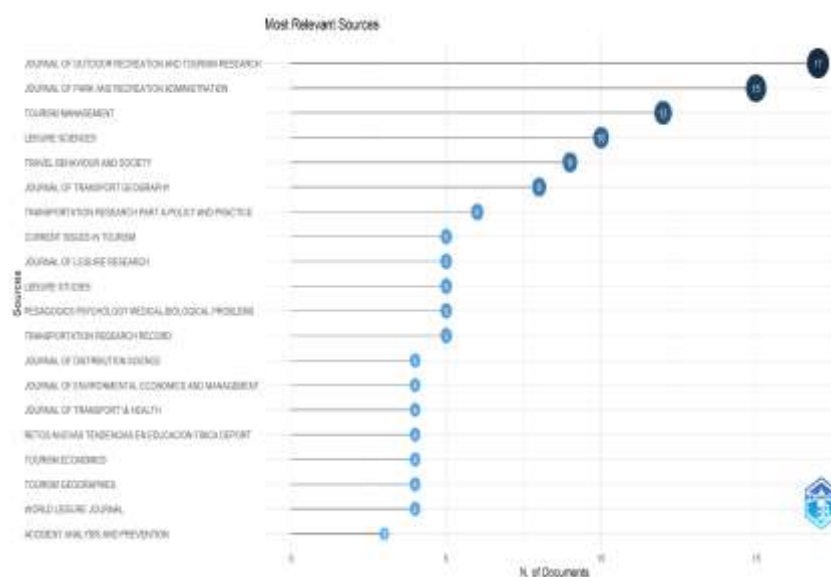


Figure 4. Distribution of the most prolific journals in the field of logistics and supply chain management in recreation services.



Figure 5. Word cloud based on keywords plus data.

The concepts point to sociodemographic and methodological diversity. This structure shows the multidimensional nature of research in the field. The studies cover a wide range of topics from governance to social inequalities. These findings provide a conceptual framework for future research.

The three-domain flow diagram presented in Figure 6 depicts the intellectual architecture of the literature on logistics and supply chain management in recreation services. Gosling, Brown, Liu, Gutierrez, Lee, Beeco and Hallo are the dominant authors. Their work focuses on the themes of "Recreation", "impact", "management", "Tourism" and "behaviour". Publications appear in journals such as *Tourism Management*, *Leisure Sciences* and *Transportation Research*.

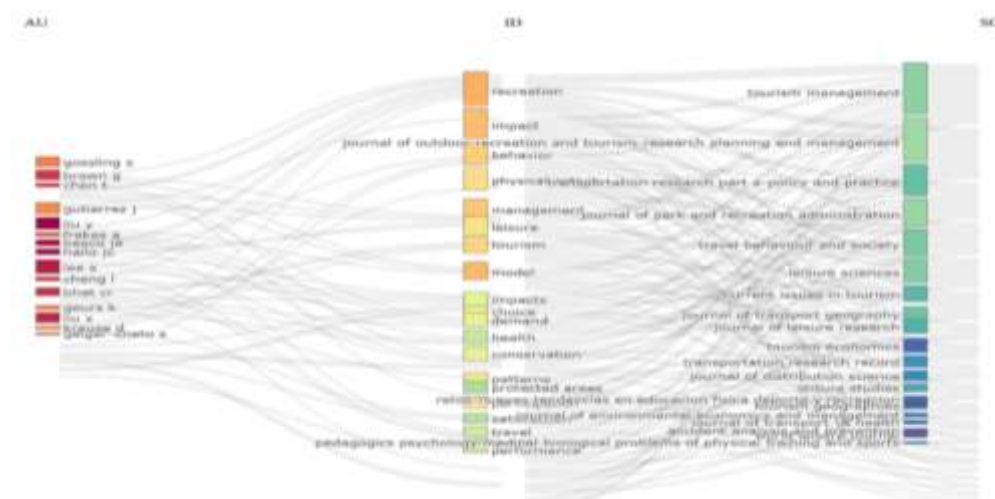


Figure 6. Structural dynamics of research on logistics and supply chain management in recreation services: A three-fields analysis of authors, keywords, and journals.

The distribution of keywords shows the connection of methodological ("model", "management") and practice ("tourism", "recreation", "leisure") dimensions. "Physical activity", "health" and "behaviour" reflect the health emphasis. The themes "impact", "conservation" and "sustainability" show the diverse nature. Authors publish in journals appropriate to their areas of expertise. These findings reveal that the literature on logistics and supply chain management in recreation services has developed between field knowledge and social needs. As seen in Figure 6, prolific authors tend to publish in specialised journals and focus on management, behaviour and tourism themes. This pattern provides insight into the second research question regarding productive authors and collaboration structures.

Table 3 shows the most cited papers. The most cited studies are as follows: Sipahi (2010) ranks first with 379 citations in Management Decision. Buhalis' (2002) Tourism Management study received 303 citations. Stokowski (2002) is third with 271 citations in Journal of Leisure Research. Guiot (2010) received 261 citations in the Journal of Retailing. Other important studies include Gallagher et al. (2011) 241, Glover (2004) 180, Cheng (2019) 177, Delmelle et al. (2012) 175, Laa (2020) 170 and Hess (2005) 168 citations. These articles contribute to the themes of logistics, tourism, demand analysis and transport. Both classical and current studies show high impact. The literature exhibits an interdisciplinary structure fed from multiple sources.

Table 3. The 10 most-cited articles on logistics and supply chain management in recreation services.

Cited Article	DOI	Total Citations	Citations per Year	Normalized Citations
SIPAHI S, 2010, MANAG DECIS	10.1108/00251741011043920	379	23,69	2,77
BUHALIS D, 2002, TOURISM MANAGE	10.1016/S0261 5177(01)00085-1	303	12,63	1,06
STOKOWSKI PA, 2002, J LEIS RES	10.1080/00222216.2002.11949977	271	11,29	0,94
GUIOT D, 2010, J RETAIL	10.1016/j.jretai.2010.08.002	261	16,31	1,91
GALLAGHER AJ, 2011, CURR ISSUES TOUR	10.1080/13683500.2011.585227	241	16,07	7,61
GLOVER TD, 2004, LEIS SCI	10.1080/01490400490432064	180	8,18	2,45
CHENG L, 2019, J TRANSP GEOGR	10.1016/j.jtrangeo.2019.03.010	177	25,29	3,85
DELMELLE EC, 2012, TRANSP POLICY	10.1016/j.tranpol.2011.12.001	175	12,50	2,79
LAA B, 2020, J TRANSP GEOGR	10.1016/j.jtrangeo.2020.102874	170	28,33	7,49
HESS S, 2005, J AIR TRANSP MANAG	10.1016/j.jairtra-man.2004.09.001	168	8,00	3,55

Note: Data retrieved from Web of Science on October 15, 2025. Normalized citations refer to the total citations of an article normalized by the total citations of the journal in the same year.

Figure 7 is generated from the Keywords Plus common word analysis. The analysis covers 330 articles and 893 keywords between 2000 and 2025. The map positions the themes according to their centrality and intensity levels according to Callon et al. [41] method. Centrality indicates the degree of interaction and intensity indicates the development of the theme. The map is structured with four categories: motor themes, specialised themes, emerging areas and core themes.

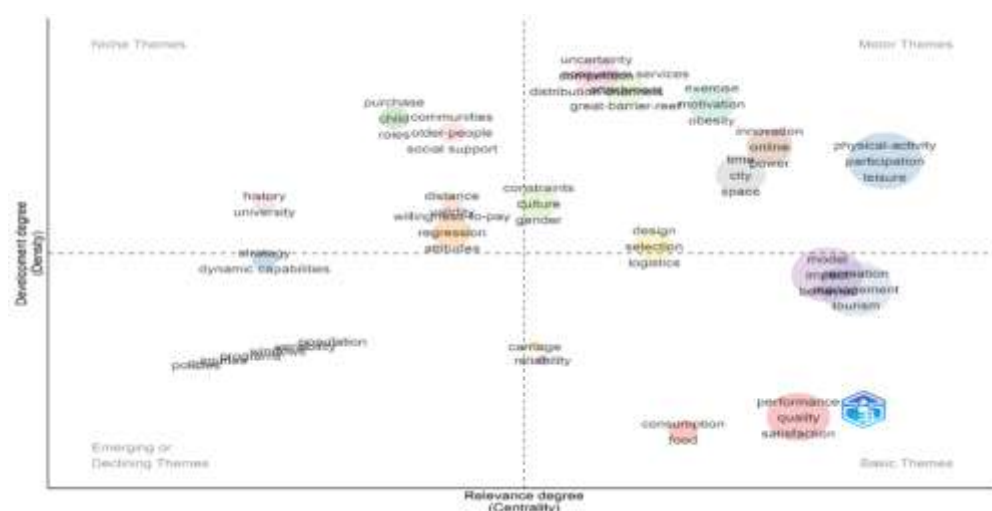


Figure 7. Thematic analysis.

In the category of motor themes "physical-activity", "leisure", "participation", "recreation", "management", "behaviour" and "tourism" show high centrality and intensity. These themes are

both developed and highly interactive. "Physical-activity", "leisure" and "participation" are mature research areas. The specialised themes "ecosystem services", "neighbourhood", "distribution channels", "ecotourism" and "walking" have high intensity but low centrality. These themes have developed but limited interaction in their specialised areas. "Ecosystem services" is a developed area but with limited central contribution.

The emerging themes including history, strategy, dynamic capabilities, policies and programmes show low centrality and intensity, indicating either new research areas or declining interest. Strategy and dynamic capabilities stand out among these underdeveloped themes. In the context of recreation services, dynamic capabilities become important when organisations need to adapt their resources to seasonal demand changes, climate uncertainties or unexpected events like the COVID-19 pandemic. Strategic planning has received limited attention despite its role in ensuring long-term service quality and sustainability. Research on policy dimensions is similarly scarce, even though recreation logistics is frequently influenced by public regulations, funding decisions and land-use planning. Addressing these gaps would help bridge academic knowledge and practical needs in recreation management.

In the core themes "model", "impact", "logistics", "selection", "design", "performance" and "quality" have high centrality but low intensity. These themes form the methodological and theoretical basis of the literature. "Logistics", "model" and "impact" form the main axis. In the upper right quadrant, "physical-activity", "leisure" and "participation" are positioned as strong motor themes. "Ecosystem services" and "neighbourhood" are specialised areas with limited interaction. "Strategy" and "policies" are immature or declining areas. "Model", "logistics" and "impact" need more in-depth research despite their high centrality.

In Figure 8, it is seen that the terms "transport", "life", "benefits" and "time" among the current concepts have increased after 2020. This shows that monitoring-based research is gaining importance. After 2015, there has been a significant increase in the terms "impact", "leisure", "patterns" and "behaviour". This shows an increased interest in behavioural studies. In 2010–2020, "model", "physical-activity", "choice" and "management" showed stable usage. Especially the intensification of the "management" theme around 2019 reveals that studies focusing on management and logistics processes gained momentum in this period. In 2011–2017, "conservation", "ecotourism", "community" and "recreation" came to the fore. This concentration shows early priorities. "Tourism", "protected areas", "preferences" and "participation" emerged in 2016–2018. This shows an increasing interest in user preferences and participation dynamics. In general, the more intense terms (indicated by larger circles) moving towards the right-hand side of the graph reveal that the current research agenda is focused on transport, quality of life and utility assessments such as "transport", "life", "benefits", "time". The terms on the left-hand side, which are concentrated at earlier dates, indicate that the conceptual and theoretical foundations of the field have been shaped by issues such as sustainability, conservation and community engagement.

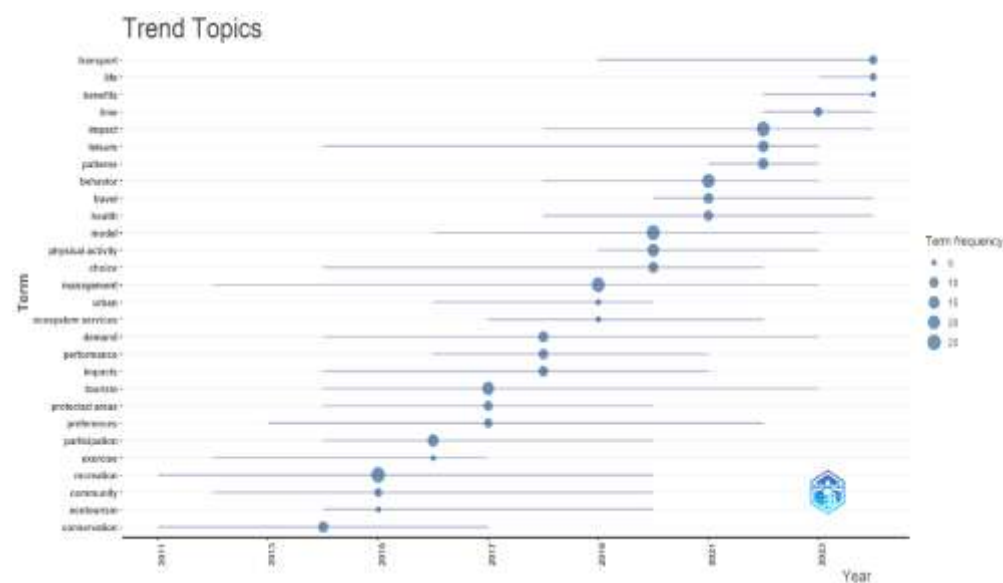


Figure 8. Topic trends.

After 2020, the increase in "transport", "life" and "benefits" shows that transport logistics and quality of life are gaining importance. The stable use of "impact", "leisure" and "patterns" proves that behavioural studies are fundamental. "behaviour", "travel" and "health" have increased in the last five years. The term "recreation" decreased after 2015, while "management" and "pattern" have been used consistently for many years. The low frequency of "satisfaction", "quality" and "performance" points to a literature gap in these areas.



Figure 9. Thematic evolution analysis.

The time periods for thematic evolution analysis were determined based on the publication trend observed in Figure 2. The year 2015 was selected as the cut-off point because the literature showed limited growth before this date, followed by a notable increase in publications after 2015. This division also aligns with major global developments such as the adoption of the UN Sustainable Development Goals in 2015 and the subsequent rise in sustainability-focused research. Alternative periodizations were tested, but the 2015 threshold provided the most meaningful thematic differentiation. Figure 9 shows the thematic evolution between the periods 2000-2015 and 2016-2025. In 2000-2015, "Access", "community", "exercise", "physical-activity", "recreation", "model" and "performance" are the dominant themes. Access inequalities, community participation and physical activity are prioritised. Information systems and willingness to pay reflect economic aspects. In the period from 2016 to 2025, a significant transformation in research focus is observed. "Impact", "management", "determinants", "benefits", "obesity" and "walking" have come to the fore. "Obesity" and "walking" reflect the emphasis on health after the pandemic. Overall, the thematic analysis reveals that the literature on logistics and supply chain management in recreation services has undergone a significant transformation in about 25 years. Initially focussed on access and participation, the literature now includes impact assessment, management and health determinants. Studies focussing on obesity, power dynamics and walking show a paradigm shift from the individual to the community.

Figure 10 shows the relationships and clusters between keywords. Different colours represent sub-thematic areas. "Recreation", "management", "behaviour", "model", "impact" and "physical-activity" are central concepts. In the network graph on the left, the node size shows the frequency of use of the word and the lines between the nodes show the frequency of co-occurrence. The density map shows the most intense themes in red-orange tones. The clusters include the following themes:

- Blue: tourism, conservation, ecosystem services
- Orange: health, leisure, participation
- Brown: behaviour, modelling, travel
- Grey: physical activity, accessibility
- Pink: community engagement, user experience
- Green: urban planning, transport
- Mother: analysis, models.

The network and density map confirm that recreation, management, behaviour and model are central concepts, with visible connections between thematic clusters.

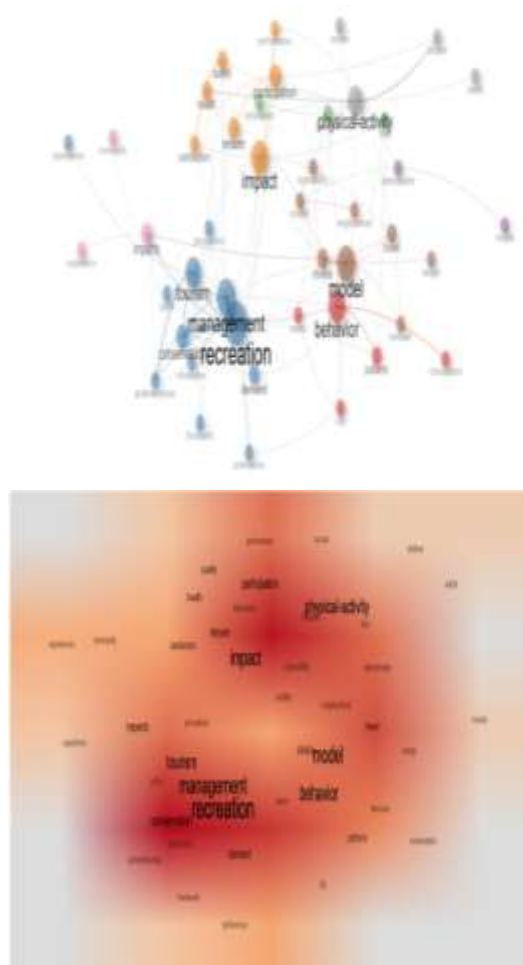


Figure 10. Keyword co-occurrence network (a) and density map (b) in logistics and supply chain management literature in recreation services.

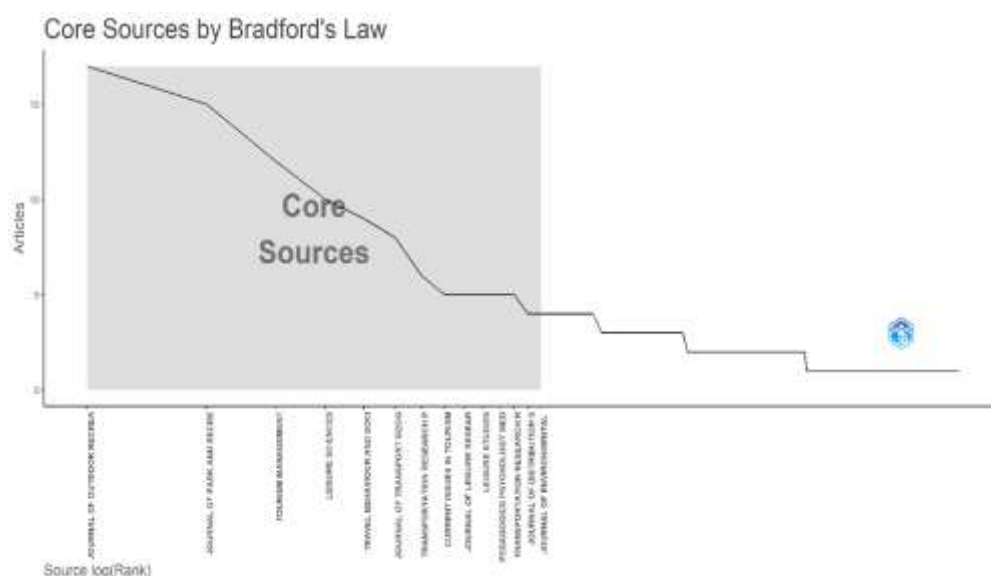


Figure 11. Core sources analysis according to Bradford's Law.

Figure 11 shows the distribution of journals according to Bradford's Law. Bradford's Law divides journals into three categories: core, second region and scattered region. The core resources region, marked as the grey area in the graph, represents the most productive and influential journals in the field. The journals in this region contain a significant portion of the total publications and constitute the intellectual foundation of the field. Core journals: Journal of Outdoor Recreation and Tourism-Research, Tourism Management, Leisure Sciences and Travel

Behaviour and Society. The number of articles starts to decrease in the journals in the middle of the graph and this region represents the second generation of journals that make regular contributions to the field but are not as dense as the core. Journals such as *Transportation Research Part A-Policy and Practice*, *Current Issues in Tourism*, *Journal of Leisure Research* and *Journal of Transport Geography* are in this category. On the right-hand side of the graph is the disorganised region, where the number of articles is low and unstable. Journals in this region include those that make occasional contributions to the field but do not specialise in recreation logistics. Journals such as *Pedagogics Psychology Medical-Biological Problems*, *Transportation Research Record*, *Journal of Distribution Science* and *Journal of Environmental Economics and Management* are in this category.

Bradford's Law analysis reveals that the logistics and supply chain management literature in recreation services is concentrated around a certain core of journals. This finding emphasises the strategic importance of core journals for researchers planning to publish in the field and shows in which journals the literature is accumulated. Moreover, the fact that most of the core journals are specialised in the fields of recreation, tourism and transportation confirms the interdisciplinary nature of the field and its position at the intersection of these disciplines.



Figure 12. Country collaboration map in logistics and supply chain management in recreation services.

Figure 12 shows the geographical distribution of international cooperation networks. In the map, the frequency of cross-country collaborations is represented by the thickness of the lines, while the publication productivity of countries is indicated by the shades of colour. Dark blue colours indicate high productivity, while light blue and grey tones indicate low productivity. The intense collaborative links between the USA and China show that these two countries are leaders in the field and form the centre of the global research network. In particular, the dominant position of the USA, indicated by the dark blue shade, reveals that this country plays a central role in terms of both the number of publications and international collaborations. China is similarly shown in dark blue, reflecting its leadership in the Asian region and its importance in the global network. There are dense networks of co-operation between European countries, especially between the United Kingdom, Germany, Spain, France, Italy, the United Kingdom, Germany, Spain, France, Italy, Italy and the Nordic countries. The lines between these countries on the map indicate that Europe's regional research integration is strong. European Union funds and joint research programmes can be considered to be effective in this intensive cooperation. Australia and New Zealand are shown in medium-dark blue tones and the links between these two countries indicate the existence of strong regional co-operation in the Asia-Pacific region. Canada's extensive cooperation with the USA reflects integration in the North American region, while the links between Australia and Canada reveal academic bridges between English-speaking countries. The fact that South America, Africa and the Middle East countries appear in lighter blue or grey tones on the map reveals that research productivity and international collaborations in these regions are relatively limited. This situation shows that recreation logistics research is concentrated in developed countries and has not yet been sufficiently addressed in developing regions. The extensive network of co-operation that the USA has established with countries in Europe, Asia, Australia and Latin America is evident from the links shown in bold lines. This confirms the US as one of the global research centres. China's extensive links with Asian countries reflect its regional leadership, while the bridges with Europe and North America show the intercontinental dimension of research.

The map shows that research cooperation concentrates in North America, Europe, East Asia and Australia, while developing regions remain underrepresented. Table 2 provides the numerical basis for this geographical distribution.

4. Discussion

This study presents a comprehensive bibliometric analysis of recreation logistics and supply chain management. The literature has shown a significant growth in the period 2000-2025. The annual growth rate is 13.92%, with a significant increase after 2015, indicating an intensification of academic interest. These findings are consistent with the tourism and recreation literature. González-Torres et al. found a similar increase in tourism supply chain studies after COVID-19. The post-2020 increase in our study also supports this trend [31].

According to our country-based analyses, the USA, China, Spain and the UK are dominant in research production. Donthu et al. similarly emphasised that the infrastructure advantage in developed countries shapes scientific productivity [34]. Intensive collaborations between European countries show the strength of regional networks. EU Horizon programmes support these collaborations [30]. The Canada-New Zealand collaboration (171) demonstrates the importance of common language and similar parking systems. This is in line with the findings of Eagles et al. on international knowledge transfer in protected area management [28].

Keyword analysis shows that publications are clustered around "management", "Recreation", "behaviour", "model" and "impact". This is in line with the mature research areas identified by Aria and Cuccurullo (2017). The axis of "impact", "tourism" and "physical-activity" is in line with the work of Rosenberger et al. who examined the relationship between recreation supply and Health [2]. The authors emphasise the increasing importance of recreation services in health policies. This thematic breakdown provides a valuable resource for policy makers in identifying priority areas.

The thematic map shows that motor themes such as "physical-activity", "leisure" and "participation" have high density and centrality. This is in line with Manning et al. assessment that physical activity and participation are key issues in recreation management [5]. The specialised themes "ecosystem services" and "neighbourhood" show high intensity but low centrality. This is consistent with Buckley's observation that sustainable recreation research is concentrated in niche areas [8]. The high centrality of key themes such as "logistics", "model" and "impact" are characteristic of the motor themes identified by Cobo et al. [36]. These themes constitute the methodological backbone of the field.

The thematic evolution analysis reveals that the literature has undergone a significant transformation. "Access", "community" and "recreation" are dominant in 2000-2015. This reflects the work of Burns et al. on accessibility and social inclusion [15]. In 2016-2025, "impact", "management", "determinants" and "obesity" are prominent. The field has evolved from reactive to proactive and strategic. This transformation is parallel to Spenceley et al. paradigm shift after COVID-19 [18]. The rise of the themes of "obesity", "walking" and "health" reflects the integration of recreation services with public health policies. The emphasis on recreational spaces in the WHO physical activity guidelines supports this trend [1].

The most cited papers show that the intellectual base in the field is drawn from a variety of disciplines. Highly cited papers come from tourism management, transport planning and behavioural science. This is in line with the work of Van Eck and Waltman who examine the structure of citation networks in interdisciplinary fields [37]. The authors note that mature interdisciplinary fields are enriched from multiple sources. The Bradford's Law analysis identified 17 core journals. This is consistent with the classical journal distribution pattern described by Bradford [38].

The impact of COVID-19 is evident in our findings. The post-2020 increase in publications and the concentration of "Health" and "behaviour" overlap with the study by Derks et al. documenting the dramatic increase in demand for outdoor recreation during the pandemic period [16]. Rice et al. also analysed recreational behavioural changes during the pandemic and highlighted the need for new logistical strategies [17]. Our findings show that this transformation is reflected in the academic literature.

These results have practical value for different stakeholders. Park managers and recreation facility operators may find the thematic clusters useful when reviewing their current approaches, especially given the growing research attention to transport, accessibility and visitor behaviour. Policymakers should consider that recent studies increasingly link recreation services with public health, which strengthens the case for investing in outdoor recreation infrastructure alongside health promotion programmes. The low representation of developing countries in the literature suggests that local authorities and researchers in these regions have room to contribute their own experiences and solutions. For institutions interested in research collaboration, the partnership patterns identified here may help identify potential partners, particularly within active networks in Europe and the Asia-Pacific.

Several limitations and potential biases should be acknowledged. The dominance of high-income countries in research production, particularly the USA, China and the United Kingdom, likely reflects inequalities in academic infrastructure and funding rather than a genuine concentration of expertise. Recreation logistics challenges in developing regions remain underrepresented despite their practical significance. The restriction to English-language publications presents another concern, as valuable research from Latin America, Eastern Europe and parts of Asia may have been excluded. Regarding data sources, only Web of Science was used, which means relevant studies in Scopus, PubMed or regional databases were not captured. Single-database reliance is a recognised limitation in systematic reviews [39]. The exclusion of books, conference papers and grey literature may also have omitted practical insights from industry and policy sources. It should also be noted that citation counts were used as the main indicator of impact, yet high citation numbers do not always reflect methodological quality. Some frequently cited works may even be referenced for critical purposes rather than endorsement.

From a methodological perspective, future bibliometric studies in recreation logistics could explore alternative approaches. Altmetric indicators that track social media attention, news coverage and policy documents would complement traditional citation analysis. Topic modelling techniques such as Latent Dirichlet Allocation may uncover thematic structures that keyword analysis cannot detect. Machine learning methods for clustering and classification could also help researchers work with larger datasets and identify emerging research fronts more efficiently.

5. Conclusions

This study mapped the bibliometric landscape of logistics and supply chain management in recreation services between 2000 and 2025. The analysis covered 330 articles from 160 sources, showing 13.92% annual growth and increasing scholarly attention particularly after 2015. Research output is concentrated in high-income countries, with the USA, China and the United Kingdom leading productivity. Thematic patterns have shifted over time from access and community participation toward impact assessment, health determinants and management approaches.

The field would benefit from greater methodological diversity. Qualitative and mixed-method designs could complement the existing quantitative focus and provide richer understanding of user experiences. Comparative research across different country contexts would support policymakers in developing locally appropriate strategies. Themes such as dynamic capabilities, strategy and policy remain underdeveloped and warrant further investigation. Future bibliometric work could expand on the present study by using multiple databases, incorporating altmetric data

and applying computational techniques for thematic analysis. These efforts would strengthen both the academic foundations and practical applications of recreation logistics research.

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