

Sustainable tourism education at a crossroads: Bibliometric insights and a strategic research framework

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Abstract: This study aims to examine the evolution, intellectual architecture, and future frontiers of Sustainable Tourism Education (STE) in alignment with global sustainability agendas. A bibliometric analysis was conducted using the PRISMA framework to systematically select 1,842 peer-reviewed publications from the Scopus database spanning 1989 to early 2025. VOSviewer was employed for data visualization and network analyses, including citation, co-citation, and keyword co-occurrence. The findings reveal a significant growth trajectory in STE research, particularly since 2017, with dominant contributions from Australia, the United States, and the United Kingdom, alongside increasing research productivity from emerging economies such as Malaysia, Indonesia, and India. Four primary thematic clusters are identified: environmental education, sustainable development planning, higher education for economic development, and geotourism. However, the results indicate a strong emphasis on environmental and economic dimensions, while social and cultural aspects remain underexplored. Overall, STE has evolved into a multidisciplinary and globally expanding field, though notable thematic imbalances persist. The study offers practical implications by proposing a strategic research agenda that emphasizes interdisciplinary collaboration and greater integration of social and cultural perspectives, thereby guiding educators, researchers, and policymakers to enhance the long-term effectiveness and global impact of sustainable tourism education.

Keywords: Higher education, Sustainable tourism, Tourism education, Trends and development.

1. Introduction

As the global tourism industry continues to expand, the imperative for sustainable practices becomes increasingly critical. Sustainable tourism education is a key component in addressing the environmental, social, and economic impacts of tourism. This approach aims to equip individuals and organizations with the knowledge and skills to promote responsible, ethical, and beneficial tourism practices that benefit local communities and natural ecosystems. Sustainable tourism, as defined by the World Tourism Organization (UNWTO), seeks to "meet the needs of present tourists and host regions while protecting and enhancing opportunities for the future." [1]. This encompasses a range of practices, including minimizing environmental impacts, fostering respect for local cultures, and supporting economic development. The goal is to create a balanced approach that allows tourism to thrive while safeguarding the resources and communities on which it depends. Education plays a crucial role in advancing sustainable tourism. By integrating sustainability principles into tourism curricula, educators can prepare future professionals to tackle the industry's complex challenges. Sustainable tourism education involves not only understanding the principles of sustainability but also applying them in practical, real-world contexts [2]. This educational focus helps students develop critical thinking skills, ethical perspectives, and practical strategies to implement sustainable practices. The rise of sustainable tourism education reflects a broader trend in higher education toward incorporating sustainability across disciplines [3]. For example, universities are increasingly offering specialized programs and courses that address various aspects of sustainable tourism, from environmental management to cultural preservation [4]. These programs often emphasize interdisciplinary learning,

drawing on fields such as environmental science, economics, and social sciences to provide a comprehensive understanding of sustainability issues.

Furthermore, sustainable tourism education extends beyond formal academic settings. Industry workshops, certifications, and online courses provide additional opportunities for professionals to enhance their knowledge and skills. According to a report by the Global Sustainable Tourism Council [5], such initiatives are crucial for keeping pace with evolving sustainability standards and practices in the tourism sector. The concept of sustainable tourism has been recognized for decades [6], but its goals have not yet been achieved through the efforts of government agencies and stakeholders. This is clearly a long journey, and one of the most important tools is promoting and supporting sustainable tourism education. It is important to promote sustainable tourism in the educational system to foster a greater understanding and encourage the new generations to adopt a sustainable mindset [7]. In addition, young tourists will play a more critical role in the future of tourism development [8]. This research article focused on publications showing the teaching, learning, and education related to sustainable tourism. The current theme in global tourism is sustainable tourism, and tourism outcomes largely align with the Sustainable Development Goals (SDGs), with both developed and developing countries worldwide promoting and implementing sustainable tourism practices. This article examined research and peer-reviewed publications on sustainable tourism education to identify the evolution of topics, research collaborations, and the countries that have contributed most to this field. Past research suggests that school field trips, even for middle schoolers, can encourage individuals to care about and be concerned with sustainability and tourism activities [9].

The concept of sustainable tourism education is highly essential for sustainable tourism development and should be taught at a very young age to create a sense of sustainability and long-term prosperity of the destination [9, 10].

1.1. Research Questions

There are three research questions as follows.

RQ1: What are the characteristics of scholarly works on sustainable tourism education in the SCOPUS database from 1989 to early 2025?

RQ2: What is the intellectual structure of academic insights on sustainable tourism education?

RQ3: What are the emerging themes in recent research on sustainable tourism education?

1.2. Research objectives

The research objectives were firstly to show the development of scholarly research outputs in sustainable tourism education. Secondly, to demonstrate that the leading scholars based their research contributions on citation and co-citation analyses. Thirdly, this article presented the upcoming trends in sustainable tourism education.

2. Conceptual background

2.1. Conceptualizing Sustainable Tourism Education

The concepts focus on tourism education and sustainability, emphasizing the implementation of an educational system to conceptualize and provide for tourism and sustainability. The central concept of this study stems from recognizing the critical role of education in informing and supporting students and others who learn more about sustainable tourism and its goals. In fact, this study highlights key components and details for creating effective, sustainable tourism education. Moreover, this study provides additional insights to help tourism indicators and government agencies promote and support sustainable tourism in the long run. Figure 1 summarizes the components of sustainable tourism education, including vision, structure, and resources for each institution offering courses or degrees in sustainable tourism. In addition, the dynamic nature of the tourism and hospitality industry, along with the Sustainable Development Goals, directly influences the course designs. These courses should be the

foundation for the quality of teaching and learning, and the experiences of learners to achieve the final goals of sustainable tourism education [11-16].

Additionally, Figure 1 is proposed to present a dynamic process that aligns institutional capabilities with the evolving, globally dynamic tourism industry. Firstly, the Internal Context, encompassing the vision, structural hierarchy, and resource allocation of educational institutions, acts as the foundational gatekeeper for academic development. This internal capacity must be related to the External Context, specifically the dynamic nature of the tourism and hospitality industry. By applying Stakeholder Theory [17, 18], this framework suggests that educational institutions must act as mediators, balancing the professional requirements of industry practitioners with the university's academic standards and society's broader needs.

The normative direction of this alignment is guided by the Sustainable Development Goals (SDGs), which serve as an ethical compass for curriculum development. In this model, the SDGs are not merely peripheral topics but are integrated as the primary orientation for Institutional Course Design and Development. This phase of the framework can be viewed through the lens of Dynamic Capabilities Theory [19], which posits that for an organization to remain relevant in a changing environment, it must possess the agility to reconfigure its internal competencies. In the context of STE, this means universities must continuously evolve their course architecture to reflect emerging sustainability challenges, ensuring that "Institutional Design" remains responsive to global crises and industry shifts.

Furthermore, the framework emphasizes that the transition from a conceptual syllabus to an actual educational outcome requires the integration of teaching and learning experiences. This stage moves beyond a traditional learning approach to also include Experiential Learning Theory (ELT) [20], suggesting that sustainability is best mastered through reflective practice and active engagement with real-world complexities. By bridging the gap between institutional design and the student's lived experience, the model ensures that the "learning experience" is holistic and transformative. The outcome of this process, sustainable tourism education, is thus characterized not just by the dissemination of knowledge but by the cultivation of critical thinking and ethical leadership. This comprehensive approach provides a roadmap for producing a new generation of tourism professionals equipped to navigate the socio-economic and environmental tensions of the 21st-century tourism landscape.

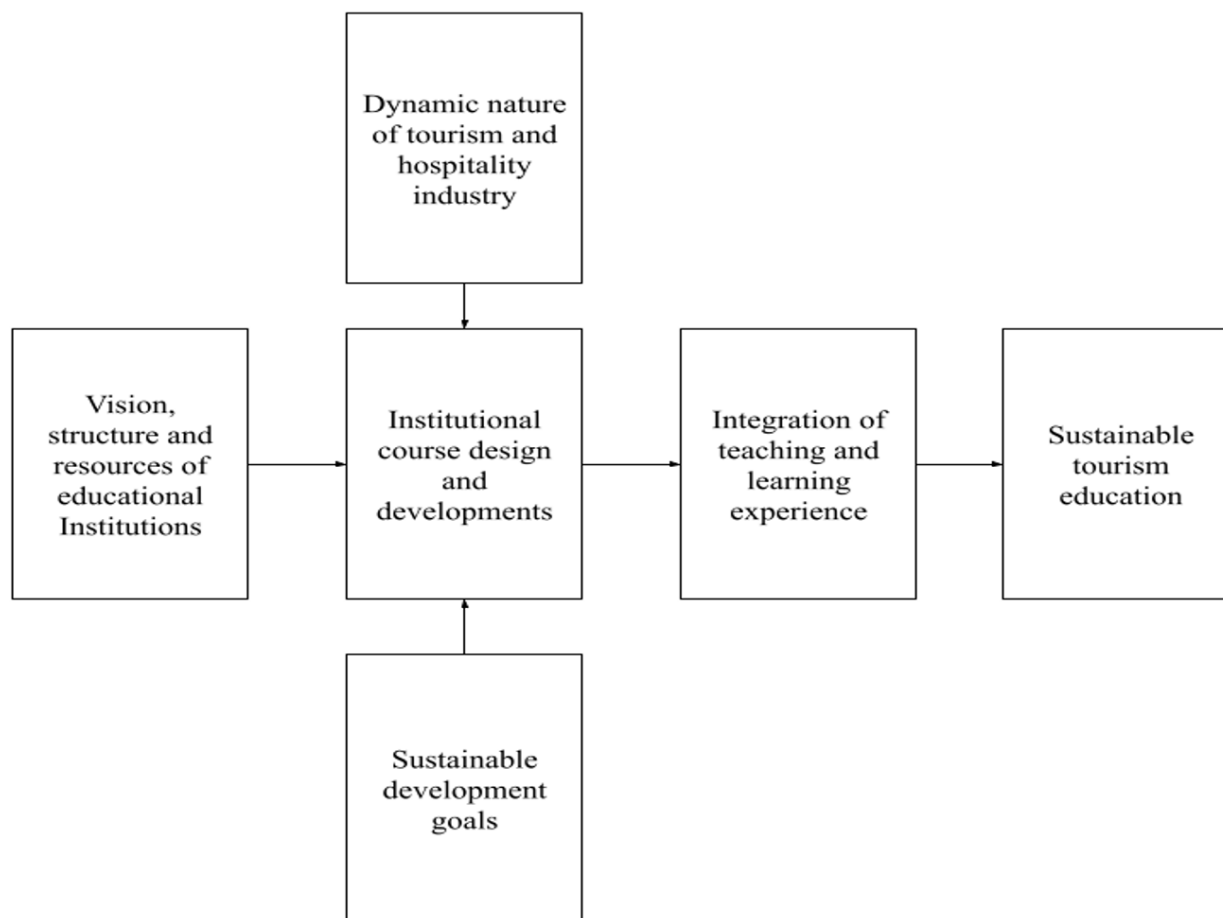


Figure 1.
Sustainable Tourism Education Framework.

3. Methodology and Materials

3.1. Criteria for Data Search and Sources of Information

The author adopted the PRISMA approach to conduct a bibliometric analysis to select the most suitable sources, subject areas, and keywords. The Vosviewer software was used to summarize tables and figures for data visualization. With the large volume of databases, sustainable tourism education has become a well-established research area. Moreover, this study's findings presented the evolution and shift in both research areas and topics. The article showed the top-cited authors and international collaborations among researchers worldwide. Bibliometric analysis is applied to provide insights into the stages of development of research areas.

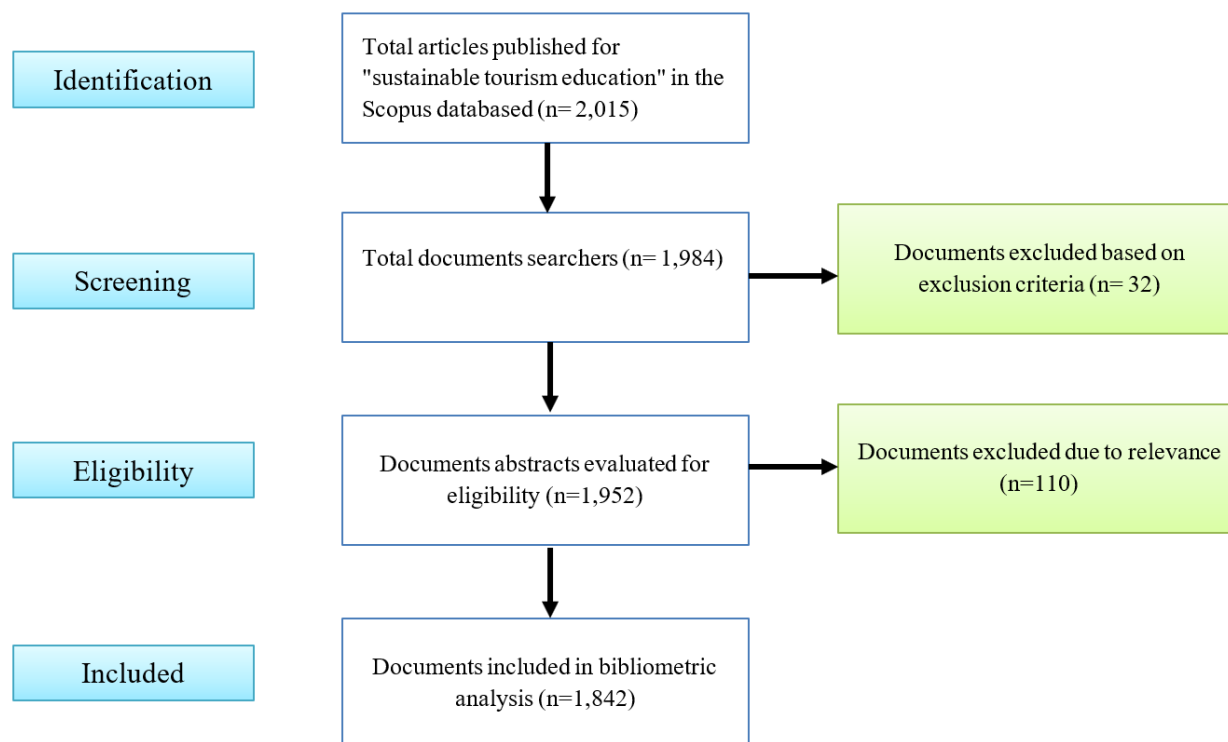


Figure 2.
PRISMA Flow.

From 2,015 documents to 1,984, the author removed editorials, notes, and letters from the list. Next, documents in unrelated fields such as mathematics, materials science, chemical engineering, and chemistry will be removed (as shown in Figure 2). Publications on the topic indexed in the Scopus database were carefully selected and included. 1,842 academic outputs, including journal articles published between 1989 and early 2025, were used in the data visualization. The significant increase in research outputs confirms the growing global interest in sustainable tourism education.

4. Results

4.1. Citation Analysis by Countries

This initial analysis is a country-level citation review, with a minimum of 25 documents per country. Only 25 countries met the specified thresholds. The leading countries conducting research on sustainable tourism education include Australia, the United States, the United Kingdom, China, Spain, and Canada. These top-cited countries are included. Western countries that provide more sustainable tourism education than Asian countries command nothing, and only China, Taiwan, Indonesia, Malaysia, and Japan are among the top 20.

Table 1.
Citation analysis by countries.

No.	Country	Documents	Citations
1	Australia	114	2979
2	United States	152	2944
3	United Kingdom	92	1844
4	China	204	1355
5	Spain	97	1198
6	Canada	52	1163
7	Germany	57	1152
8	Taiwan	58	844
9	Italy	69	654
10	New Zealand	27	601
11	Greece	33	547
12	Indonesia	94	442
13	Portugal	59	440
14	Poland	44	438
15	Malaysia	46	425
16	Japan	31	388
17	Romania	35	351
18	Croatia	29	306
19	South Africa	43	298
20	Russian Federation	45	285

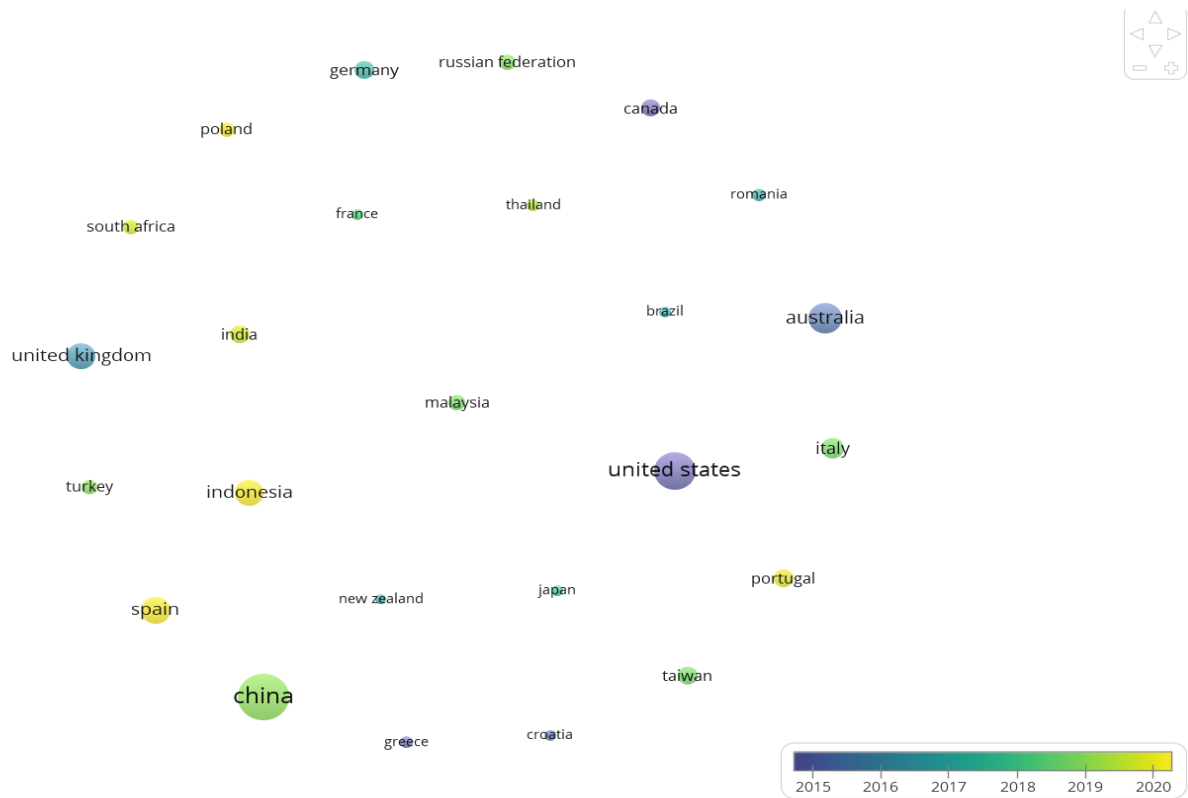


Figure 3.
Trend Analysis based on Citation analysis by countries.

The mapping of citations by country (Figure 3) shows a shift in the geographical epicenter of Sustainable Tourism Education (STE) research over the last decade. In the past, the intellectual foundations of the field were dominated by Western scholars, most notably those from the United States, Australia, Canada, and the United Kingdom. As indicated by their dark blue and purple hues, these nations were early adopters and main contributors to literature between 2015 and 2017. Their large node sizes indicate high citation counts, suggesting that these countries provided the important conceptual frameworks and studies that continue to serve as the foundations of current STE research.

An important shift is observed during the 2017–2018 period, marked by the "greening" of visualization. During this stage, China emerged as a dominant country, evidenced by its substantial node size and central position in the network. This suggests that China has not only increased the volume of its research output but also improved its global presence, combining Western theories with localized Asian contexts. Additionally, other European nations, such as France, Germany, and Italy, are clearly present during this mid-term period, representing European contributions to sustainable tourism education within the broader EU sustainability focus.

The most important trend shown by the visualization is the recent increase in work in emerging economies, represented by the yellow and light-green nodes (2019–2020 and beyond). Countries such as Indonesia, Malaysia, India, South Africa, Poland, and Spain have seen significant increases in their research rankings. The vibrant yellow nodes for Indonesia and Spain, in particular, highlight their status as current areas of development for STE research. This improvement shows a broader expansion of knowledge, in which sustainable tourism is no longer viewed through a purely Western lens but is increasingly explored through the developmental perspectives of the Global South and emerging European markets.

Clearly, as tourism education becomes a strategic priority for post-pandemic recovery and economic resilience in these regions, the academic community has demonstrated a localized, more intensive research focus across different geographical areas worldwide.

4.2. Citation Analysis by Documents

To present the citation analysis by document, we included only documents with at least 50 citations; 72 of 1697 documents met this criterion, and Table 2 shows the top 20 documents. The most influential documents in sustainable tourism education focused on topics such as green tourism, overtourism, sustainable development goals, community participation, and destination competitiveness [21–28].

To provide an in-depth analysis of the highly cited document, Table 2 presents the foundational themes and multidisciplinary intersections that define Sustainable Tourism Education (STE). The most-cited work, by D'Amato et al. [21], with 600 citations, highlights a significant shift toward integrating the "Green, Circular, and Bio Economy" into the sustainability dialogue. Additionally, the current research agenda in STE is heavily influenced by industrial ecology and cleaner production, indicating that education in this field is moving toward a more technical and systemic understanding of resource allocation and management. As Hens et al. [29] reinforce, this trend indicates the consistent evolution of cleaner production as both a concept and a practical necessity for the tourism industry.

A secondary, critical theme emerging from the top-cited literature is the focus on Resident Well-being and Social Carrying Capacity. The high citation counts for Muler Gonzalez et al. [23] and Muresan et al. [27] demonstrate that the social focus of sustainability is a major concern for the research community. These studies focus on residents' perceptions of overtourism and rural tourism development, suggesting that contemporary STE curricula emphasize community-based tourism planning. According to Social Exchange Theory [30, 31], the sustainability of a destination is evaluated through the local population's perceptions of quality of life and attitudes toward tourism development.

The academic and ethical dimensions of the field are most prominently represented by the work of Higgins-Desbiolles [22] and Boluk et al. [24]. These authors offer a critical examination of the "Tourism Academy" and the United Nations Sustainable Development Goals (SDGs). Similarly, Boluk et al. [24] provide a critical framework for aligning tourism education with the 2030 Agenda. Together,

these studies indicate that STE is not only a technical field but also a socio-political area, encouraging students to engage with global ethics and justice.

Finally, the studies on Ecotourism and Geotourism by Stem et al. [26] and Fassoulas et al. [28] highlight the enduring importance of nature-based conservation and geoheritage management within the field. While newer literature emphasizes circular economies and overtourism, these studies demonstrate that protecting physical landscapes remains essential for sustainable tourism models.

Table 2.

Citation analysis by documents.

No.	Documents	Citations
1	D'Amato, et al. [21]	600
2	Higgins-Desbiolles [22]	260
3	Muler Gonzalez, et al. [23]	227
4	Boluk, et al. [24]	209
5	Gadd [25]	204
6	Stem, et al. [26]	203
7	Muresan, et al. [27]	179
8	Fassoulas, et al. [28]	179
9	Hens, et al. [29]	179
10	Lee, et al. [32]	170
11	Hultsman [33]	131
12	Halme [34]	130
13	Henriques and Brilha [35]	130
14	Andrades and Dimanche [36]	129
15	Fennell and Weaver [37]	129
16	Saufi, et al. [38]	127
17	Baum, et al. [39]	126
18	Imoize, et al. [40]	120
19	Loulanski and Loulanski [41]	117
20	Hasler and Ott [42]	113

It is also observed that, around 2020, scholarly output increased significantly in emerging countries such as Malaysia, Indonesia, and India.

4.3. Co-Occurrence Analysis by All Keywords

For the co-occurrence analysis using all keywords, with a minimum of 50 co-occurrences per keyword, 21 keywords met the criteria out of 7,561, as shown in Table 3. The terms "Sustainable Development" (497 occurrences) and "Tourism" (336 occurrences) represent the primary focus of the literature. Additionally, the data show a strong emphasis on specialized forms of tourism and environmental education. "Ecotourism" ranks as the third most prominent thematic area (267 occurrences), overtaking more general terms like "Tourism Management" (71 occurrences). It can be inferred that, over the past several decades, the primary approach to achieving sustainability in tourism education has been through the lens of nature-based and ecological tourism.

Furthermore, the high frequency of "Environmental Education" (110 occurrences) and "Environmental Protection" (73 occurrences) confirms that the field's core focus is highly dependent on natural sciences and conservation approaches. Other keywords such as "Economics" (55), "Higher Education" (55), and "Economic Development" (52) indicate that these terms are similarly crucial for sustainable tourism education, along with "Geotourism" (51) and "Stakeholder" (51). These words are important components of the sustainable tourism curriculum.

Table 3.

Co-occurrence analysis by all keywords.

No.	Keyword	Occurrences	Total link strength
1	Sustainable Development	497	1008
2	Tourism	336	683
3	Sustainability	283	571
4	Ecotourism	267	691
5	Education	207	473
6	Sustainable Tourism	194	347
7	Tourism Development	171	463
8	Environmental Education	110	296
9	Environmental Protection	73	256
10	Tourism Management	71	172
11	China	64	195
12	Protected Area	63	175
13	Planning	62	172
14	Conservation	61	170
15	Biodiversity	60	170
16	Perception	60	194
17	Economics	55	152
18	Higher Education	55	89
19	Economic Development	52	148
20	Geotourism	51	69
21	Stakeholder	51	142

be explained as the type of tourism aiming to maintain or improve the diversity of the tourism destination in various aspects, including the natural environment, historical and cultural heritage, destination aesthetics, and also the quality of life of the host or residents of the tourism destination [43-46].

The author also noticed that sustainable tourism education emphasizes environmental and economic development. In contrast, research on sustainable tourism education should focus more on social and cultural tourism development, which has yet to receive much attention from the research community.

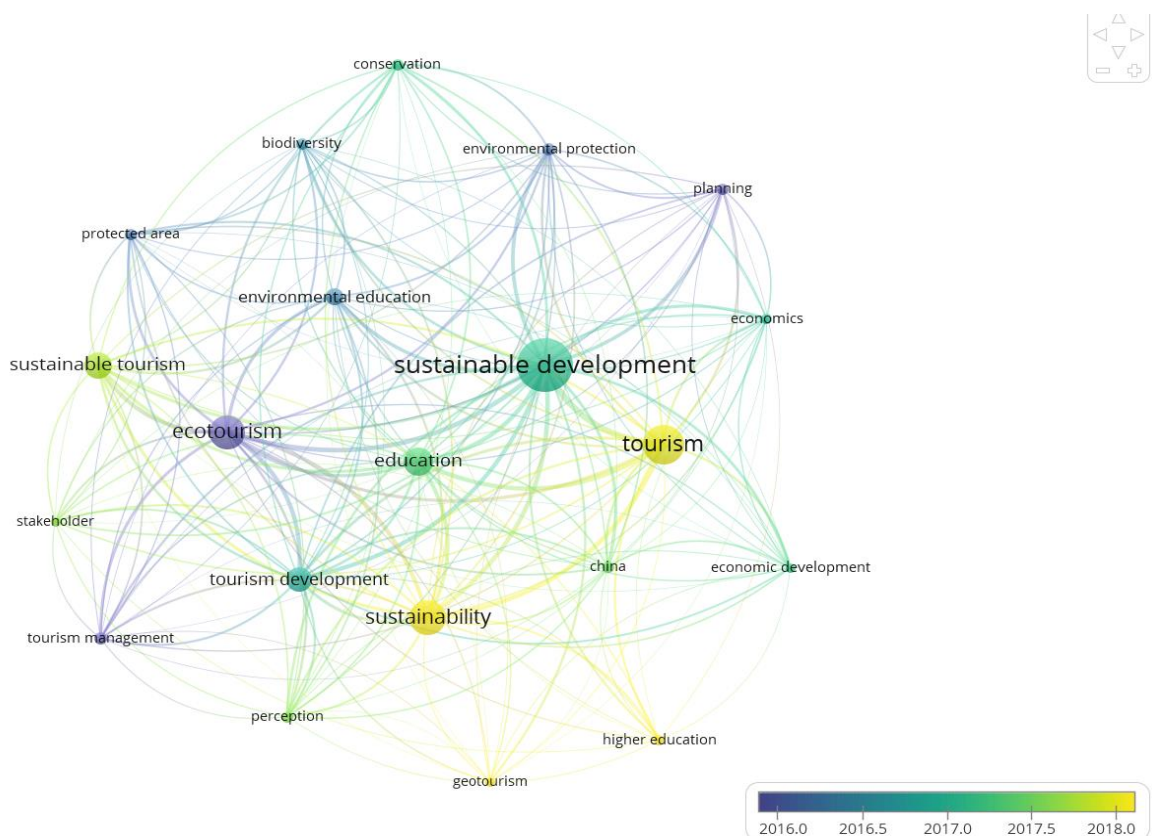


Figure 5.
Trend analysis based on Co-occurrence analysis by all keywords.

Moreover, emerging trends in new research on sustainable tourism education from 2017 to early 2025 include keywords such as higher education in tourism and tourism. Additionally, geotourism has been the subject of increased investigation in recent years and is closely linked to higher education. This research suggests that higher education in sustainable tourism supports sustainability and stakeholder well-being. This finding highlights the importance of tourism collaboration and stakeholder management, and tourism education courses for sustainability should also provide mechanisms and tools to help build tech support for tourism participation and partnership development to achieve sustainable tourism in the long run.

4.4. Co-Citation Analysis by Cited Authors

Based on co-citation analysis, using cited authors as the unit of analysis and a minimum of 95 citations per author, 21 of 84,191 authors met the criteria; the top 20 authors are presented in Table 4.

The intellectual structure of Sustainable Tourism Education (STE) is built upon a multidisciplinary foundation, as evidenced by the co-citation analysis presented in Table 4. The co-citation analysis is led by Hall, C.M. (271 citations; TLS: 2,684) and Weaver, D.B. (204 citations; TLS: 1,786). Hall's influence,

focused on tourism geography and global environmental change, suggests that the core context of sustainable tourism education and tourism educational institutions (as shown in Figure 1) is closely related to macro-level environmental and regional development theories. Weaver's focus on ecotourism further reinforces the findings of the keyword analysis, underscoring that ecological concepts are at the core of the primary educational direction for sustainability in tourism education.

Additionally, the co-citation data reveal significant clustering of research around Tourism Management and Epistemology, as represented by scholars such as Moscardo, G., Buckley, R., and Tribe, J. These scholars focus on both "Institutional Course Design" and the "Teaching and Learning Experience." For instance, Tribe's focus on the epistemology of tourism education provides the learning framework for how knowledge should be provided in tourism institutions. At the same time, Moscardo's work on tourist experience and destination planning links educational theory to practical industry outcomes.

Interestingly, a new trend in data highlights the concepts of Geoheritage and Geotourism, as advanced by scholars such as Brilha, J., and Newsome, D., indicating growing interest in and importance of Geotourism.

Table 4.
Co-citation analysis by cited authors.

No.	Author	Areas Of Research	Citations	Total Link Strength
1	Hall [47]	Tourism Geography, Sustainability, Regional Development, Global Environmental Change	271	2684
2	Weaver [48]	Tourism, Sustainable Tourism, Ecotourism	204	1786
3	Gössling [49]	Transport, Tourism, Mobilities	176	1576
4	Moscardo [50]	Sustainable Tourism, Sustainability, Education, Tourist Experience, Destination Planning	168	1712
5	Buckley [51]	Ecotourism, Conservation Tourism, Environment, Ecology	162	1492
6	Tribe [52]	Tourism Education, Epistemology	157	1613
7	Zhang [53]	Tourism, Low-Carbon Tourism	153	1397
8	Wang and Fesenmaier [54]	Tourism And Hotel Management	129	975
9	Zhang [55]	Tourism Management, Performance Evaluation, Service Management	119	1259
10	Brilha [56]	Geoheritage, Geoconservation, UNESCO Global Geoparks, UNESCO World Heritage, Geodiversity	118	551
11	Bramwell and Sharman [57]	Tourism Management, Sustainable Tourism, Tourism Development	114	1547
12	Newsome, et al. [58]	Ecotourism, Wildlife Tourism, Geotourism, Protected Area Management	113	924
13	Wilson [59]	Higher Education, Gender, Tourism, Qualitative Research, Women's Travel	107	1093
14	Scott, et al. [60]	Tourism, Climate, Global Change, Geography	106	1074
15	Liu [61]	Tourism Destination Management, Cultural Tourism, And Rural Tourism. Sustainable Tourism	105	922
16	Jamal and Getz [62]	Sustainability, Heritage Tourism, Tourism Planning, Qualitative Research	99	1045
17	Lane [63]	Rural Tourism, Sustainable Tourism, Tourism Collaboration	99	1384
18	Baum [64]	Human Resource Management, Tourism, Hospitality	96	773
19	Cooper [65]	Tourism Knowledge, Tourism Education	96	949
20	Wearing [66]	Sustainable Tourism Planning and Management, Ecotourism, Community-Based, and Volunteer Tourism-Leadership Stewardship & Environment	96	602
21	Law, et al. [67]	Tourism, Hospitality, Technology Management	95	1080
22	Gursoy, et al. [68]	Hospitality Marketing, Tourism Marketing, Consumer Behavior	94	806

23	Liu [69]	Economic/Tourism Geography, Regional Development, Industrial Upgrading, Emotion Computing	94	744
24	Reynard and Panizza [70]	Geoheritage, Water Management, Landscape	94	637

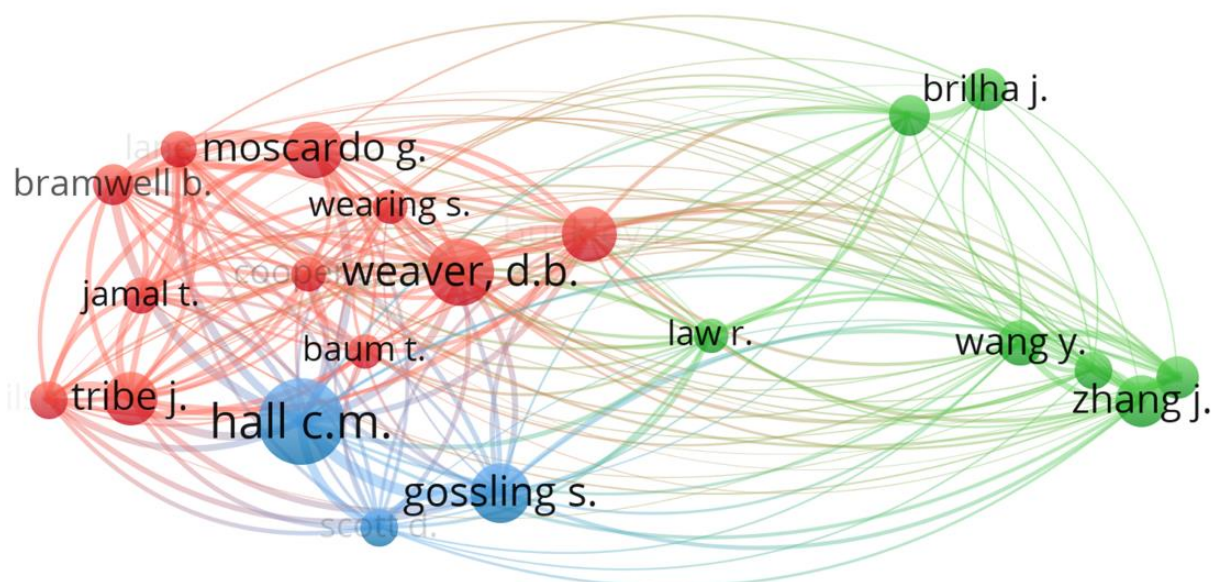


Figure 6.

School of thoughts based on Co-citation analysis by cited authors.

Source: Brillha [56]; Moscardo [50]; Bramwell and Sharman [57]; Wearing [66]; Jamal and Getz [62]; Weaver [48]; Baum [64]; Tribe [52]; Hall [47]; Gössling [49]; Law, et al. [67]; Wang and Fesenmaier [54]; Zhang [53].

Figure 6 shows three Schools of Thought. By mapping these clusters, this study clarifies how foundational theories are integrated into educational practices. Firstly, School 1: Sustainable Tourism Planning and Education (Red Cluster), represented by the Sustainable Tourism Planning and Pedagogy school. Primarily shaped by prominent scholars such as Weaver, Moscardo, and Tribe, this paradigm focuses on the macro-level governance of destinations and the epistemology of tourism education. This school emphasizes the integration of teaching and learning experience (see Figure 1), supporting a shift from vocational training to critical reflective practice. In addition, the contributions of Weaver and Moscardo highlight a research agenda dedicated to destination resilience, tourist experience management, and the ethical responsibility of tourism education and institutions. Secondly, School 2: Global Environmental Change and Regional Development (Blue Cluster), represented by the works of Hall, Gössling, and Scott, highlights the crucial intersection of tourism with climate change, carbon mitigation, and biodiversity loss. Hall and Gössling's works in this area reflect a significant shift toward a geography of sustainability, in which tourism education is developed in response to global ecological concerns. This school of thought suggests that educational institutions realign their curricula with the actual tourism problems posed by a changing natural environment, from local areas to global policy goals. Next is School 3: Tourism and Hospitality Corporate Management, Performance Evaluation, and Technology (Green Cluster). This school focuses on tourism/hospitality management and performance evaluation, as highlighted in the works of Wang, Zhang, Brillha, and Law, and emphasizes the implementation of sustainability through innovation, technology management, and service excellence. In addition, the works of Brillha highlight a key integration between performance evaluation and geoheritage/geoconservation, showing that modern STE is increasingly concerned with the technical evaluation of sustainability, using data-driven metrics and technological tools (such as Law's focus on

tech management) to measure the effectiveness of sustainable practices in the hospitality and heritage sectors.

4.5. Co-Citation Analysis by Countries

Using a minimum of 35 documents per country across 137 countries, the results showed that 18 countries met the thresholds.

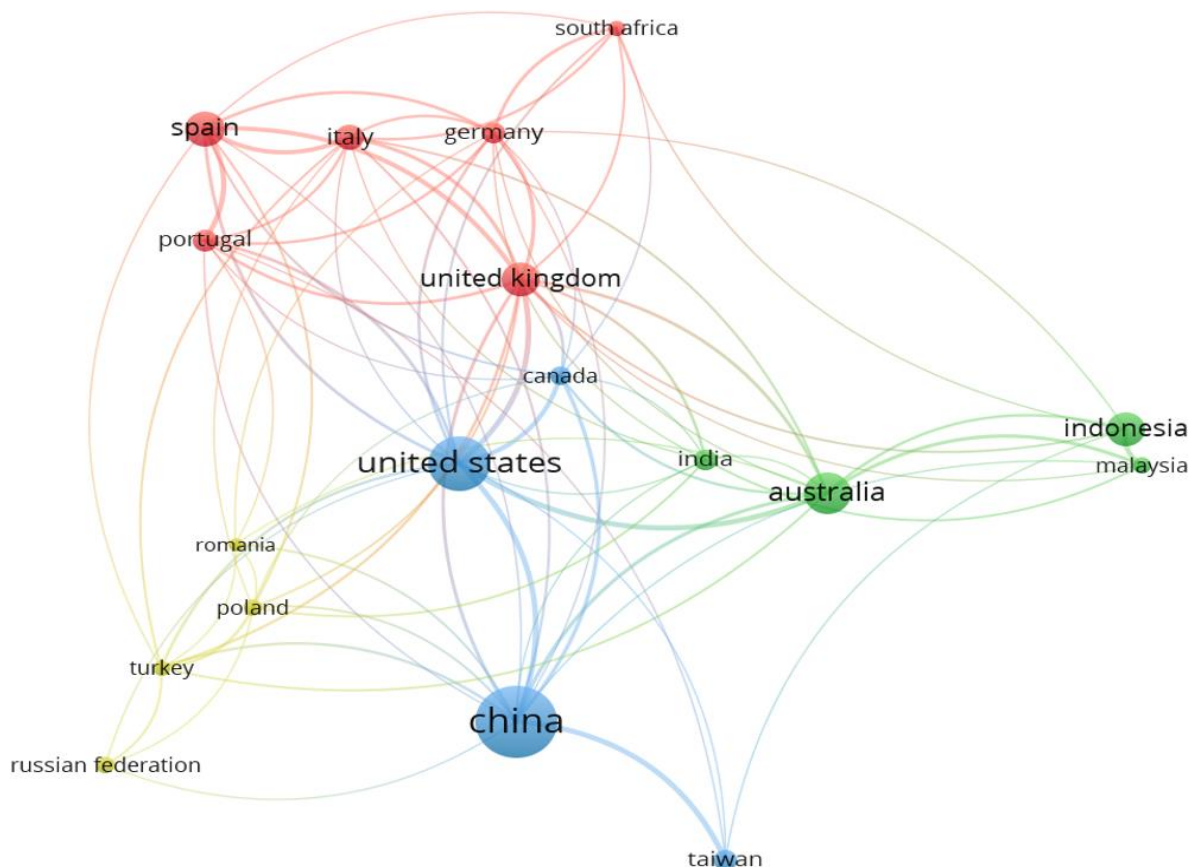


Figure 7.
Co-citation analysis by countries.

The co-citation analysis by country can be presented in four clusters, shown in Figure 7. These clusters reveal regional relationships among the countries. The first cluster includes China, the United States, Canada, and Taiwan. The second group comprises Australia, Indonesia, Malaysia, and India. The third cluster mainly consists of European countries, such as the United Kingdom, Spain, Germany, and Italy, along with South Africa. The fourth cluster features Russia, Poland, Romania, and Turkey. The authors identified major countries in sustainable tourism education research, ranking Australia, the United States, the United Kingdom, China, Spain, and Canada.

In addition, the trend analysis presents the temporal evolution of international collaboration and intellectual influence in Sustainable Tourism Education (STE) within the country co-citation network (Figure 8). This map uses an overlay visualization to trace the evolution of sustainable tourism education from 2016 to 2020 and beyond. The network shows three main dominant countries, including the United States, Australia, and the United Kingdom, indicated by their large node sizes and deep purple/blue hues. These three countries were the main sources of theoretical frameworks for studies in

this field. Their central point in the network, with interlinking lines, highlights Western-centric methodologies for sustainable tourism education globally.

Another important highlight is a critical transition during the 2017–2018 period, evidenced by the emergence of China as a major bridging node (shown in green). China's substantial node size and its links to both Western and emerging Asian countries suggest an important role in supporting global sustainability goals within regional development contexts. This period marks the mid-term expansion of the field, during which research began to pivot toward large-scale infrastructure, low-carbon tourism, and rapid destination planning.

Furthermore, the contemporary developments in the field (2019–2020+) are indicated by the yellow-hued nodes, which show the broad expansion of knowledge toward emerging economies and specific European contexts, including Indonesia, Malaysia, Spain, South Africa, Poland, and India. Specifically, Indonesia and Spain make active contributions to the field, focusing on geotourism, resident well-being, and the socio-cultural impacts of tourism. This recent shift confirms that the field is moving away from a broadly and globally sustainable tourism development perspective toward a more localized, multidisciplinary approach, highlighting the unique way of life and the quality of life of destination residents.

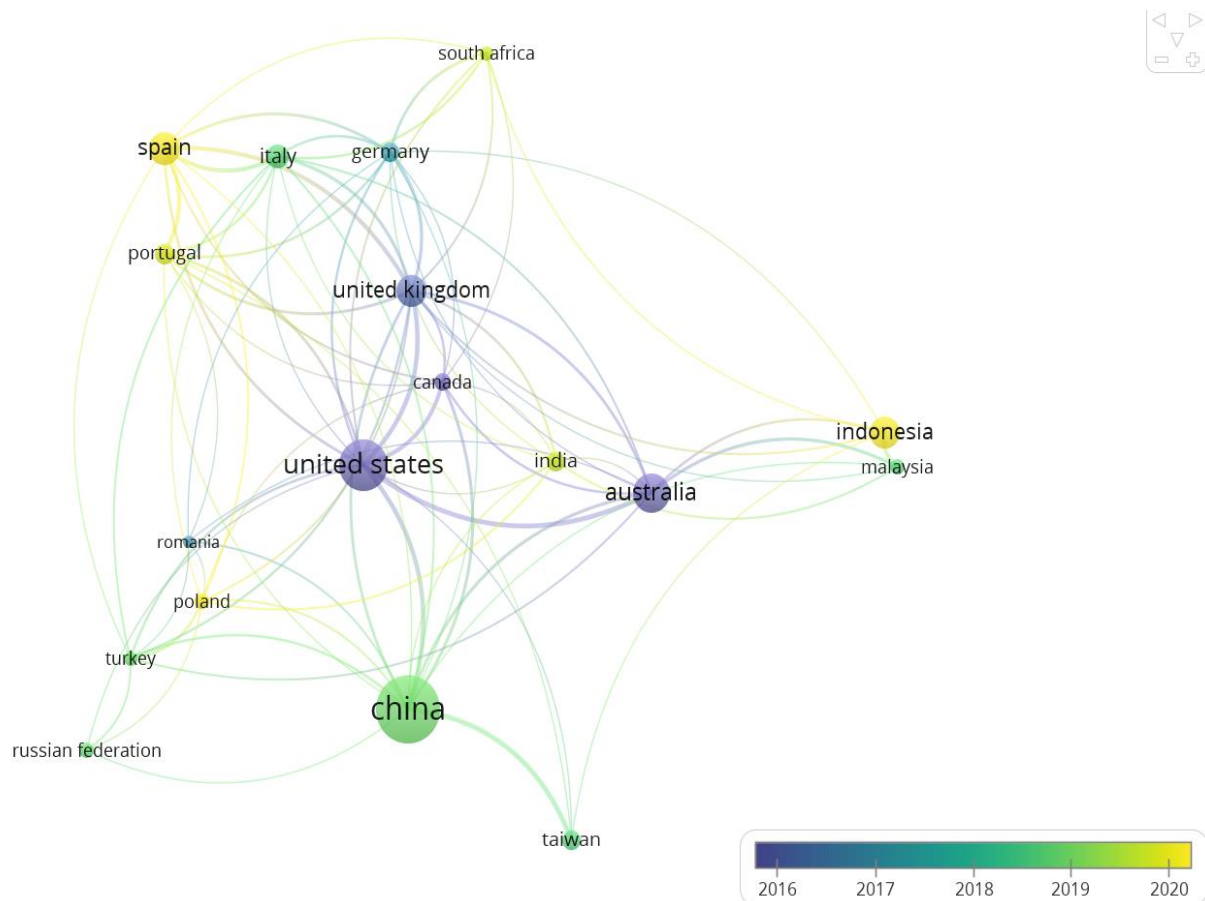


Figure 8.
Trend analysis based on Co-citation analysis by countries.

4.6. Citation Analysis by Sources (Journals)

With a minimum of 10 documents in each source, out of 800 sources, 21 sources or journals met the thresholds, and the top 20 journals were presented in Table 5. Interestingly, the journals publishing

research on sustainable tourism education included the Journal of Sustainable Tourism, Sustainability, Cleaner Production, Geo Heritage, and Ocean and Coastal Management. Even though the number of documents was higher in sustainability (journal) with 117 documents (1,666 citations), the Journal of Sustainable Tourism had the highest number of citations at 1,932 (43 documents). This indicates that the Journal of Sustainable Tourism has a greater impact not only on sustainable tourism in general but also on its educational aspects. The journal specifically focuses on teaching, appearing under #8, Journal of Teaching in Travel and Tourism, and #9, Journal of Hospitality, Leisure, Sport, and Tourism Education.

Table 5.
Citation analysis by sources (Journals).

No.	Source	Documents	Citations
1	Journal of Sustainable Tourism	43	1932
2	Sustainability (Switzerland)	117	1666
3	Journal of Cleaner Production	14	997
4	Geoheritage	20	473
5	Ocean and Coastal Management	14	422
6	Journal of Ecotourism	19	337
7	Journal of Coastal Research	22	269
8	Journal of Teaching in Travel and Tourism	17	221
9	Journal of Hospitality, Leisure, Sport and Tourism Education	12	171
10	Environment, Development and Sustainability	10	162
11	Tourism Recreation Research	10	145
12	Worldwide Hospitality and Tourism Themes	27	114
13	CSR, Sustainability, Ethics, and Governance	11	66
14	Land	15	61
15	International Journal of Environmental Research and Public Health	10	54
16	IOP Conference Series: Earth and Environmental Science	43	48
17	Springer Proceedings in Business and Economics	20	35
18	E3S Web of Conferences	32	34
19	African Journal of Hospitality, Tourism and Leisure	11	33
20	WIT Transactions on Ecology and the Environment	12	33

5. Discussion and Conclusions

The current research achieved its objectives by providing the critical themes of sustainable tourism education as presented in the results. Top journals and top-up documents were presented, and the country highlighted more academic work outputs. The main focus of sustainable tourism education is environmental education, the Sustainable Development Goals, and higher education mechanisms and support for the long-term development of sustainable tourism. Moreover, this study found that the concept of geotourism, or the approach to sustain and promote the diversity of tourism resources and residents' well-being, should always be the primary concern for tourism destination developers. In addition, these themes can serve as the core knowledge in sustainable tourism education at this time.

The current research also highlights a trend among emerging economies, such as South Africa, India, Indonesia, and Poland, with an increasing number of research publications in this field, suggesting that sustainable tourism approaches have been implemented across these countries. By nature, sustainable tourism education relies on multidisciplinary collaboration, and this research also confirmed that enhancing research output leads to more global collaborations among scholars, thereby promoting the long-term quality of this field of education. The article discussed and proposed guidelines to help scholars and policymakers further strengthen sustainable tourism education to support the long-term growth of the tourism industry. The study also finds that geotourism is increasingly important for supporting future sustainable tourism education. This highlights the significance of supporting sustainable tourism and promoting uniqueness in the context of nature, culture, history, ways of life, and residents' quality of life in tourist destinations.

Furthermore, this paper's results highlight that sustainable tourism education is clearly multidisciplinary. The increasing and integrated complexity of global tourism environments requires a collaborative research perspective and interdependence among researchers and tourism institutions. This study shows that an increase in research outputs is directly related to international scholarly collaboration. This is important for promoting long-term educational quality and for developing guidelines for tourism institutions globally.

6. Contributions and Recommendations

In conclusion, sustainable tourism education is essential to fostering an economically viable, environmentally responsible tourism industry. By equipping individuals with the tools to make informed decisions and implement sustainable practices, this educational approach helps ensure that tourism contributes positively to global sustainability goals. As the industry continues to evolve, ongoing advancements in education will be pivotal in promoting a more sustainable and equitable future for tourism.

The current research identified three schools of thought in sustainable tourism education: sustainable tourism planning and education, global environmental change, and tourism/hospitality management and performance evaluation. These schools can serve as curriculum focus and development guidelines for tourism institutes, helping them create relevant and impactful course designs for their educational programs.

For the recommendations, educational institutions should highlight sustainable thinking when developing learning and teaching materials and include the essential concepts of the following, namely, environmental sustainability, sustainable development goals, and the continuous development of higher education from bachelor's to master's to doctoral or post-doctoral degrees, to ensure that all these main concepts are highly mentioned and focused. Lastly, educational institutions should also focus on the diversity of tourism destinations, on maintaining the quality of environmental and cultural resources, and on the quality of life of residents.

7. Direction for Future Research

Future researchers may focus on sustainable tourism education across different regions, such as Europe and North America. Additionally, they may conduct more detailed research on the theme presented in the current paper, such as environmental sustainability in education command and the application of sustainable tourism goals in each person's destination, as well as collecting listings of courses and programs offered regarding sustainable tourism in higher education and institutions worldwide.

Future research studies may also further conduct qualitative assessments of the three Schools of Thought (including School 1: Sustainable Tourism Planning and Education (Red Cluster), School 2: Global Environmental Change and Regional Development (Blue Cluster), and School 3: Tourism and Hospitality Corporate Management, Performance Evaluation, and Technology (Green Cluster)) identified in this paper. Moreover, scholars are encouraged to conduct regional focus or case studies to evaluate how specific higher education curricula translate into measurable, sustainable outcomes in local tourism zones.

Lastly, regarding the growing role of digital transformation and artificial intelligence in sustainable tourism education, researchers should explore the applications and adoption of new technological tools, including virtual reality (VR), big data analytics, and carbon-tracking simulations, which can be integrated into the "Integrated Teaching and Learning Experience" to enhance student learning and experiences. Moreover, since this study highlights multidisciplinary collaboration among researchers and countries, future studies should explore the factors that support and hinder cross-departmental research—such as those across tourism, business, environmental science, and urban planning—to inform a more comprehensive approach to sustainable tourism education.

8. Limitations of the Current Study

The current research is not without limitations. Some limitations were maintained, including, first, the limited number of studies in English, while studies in other languages' incessant built-up education were not included in this research. Secondly, the current research focused only on the Scopus database, even though it represents the most extensive collection of academic works in the social sciences; however, some publications may need to be included in this study.

Finally, the study is constrained by the methodological limitations of bibliometric software. While VOSviewer is a powerful tool for visualizing intellectual structures, its reliance on citation counts and keyword co-occurrence tends to reflect established authors and frequently used terminology. Therefore, the analysis results may diminish the importance of emerging keywords, niche topics, or radically new theories that have not yet reached a high citation threshold.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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