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Trends and Knowledge Structures in Sustainable Wine Tourism: A Bibliometric Review with Biblioshiny and VOS viewer

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Abstract

At this time, the wine industry has gained boundless relevance worldwide. Sustainable wine tourism has arisen as a critical area of research. The wine cultivation and wine are especially vulnerable to the introduction of new technologies and practices that can improve sustainability in the medium and long term, as well as facilitate improvement in product quality. This study is a bibliometric analysis of the literature on wine tourism sustainability, highlighting key themes, emerging areas, and global trends. Data were collected from Scopus databases from 2003 to April 11, 2025. A publication study was conducted to identify key authors, institutions, and journals. The findings indicate that wine tourism is increasingly interested in conserving biodiversity and practices that are sustainable practices. To find the major developments, this research aimed to use VOS viewer software and bibliometrics analysis (Biblioshiny). To achieve this, the keywords that are associated with "Wine tourism," "Viticulture," "Enotourism," and "Sustainab*" were searched within the "Scopus" database. There were 1267 items found. Applying all the filters to the English language, only 251 things remained. The results highlight co-citation, co-occurrence, theme analysis, top countries, journals, yearly publishing patterns, and the most appropriate journals. The results indicate that the most appropriate journal is "Sustainability (Switzerland)", the most cited keyword is "Viticulture", and the leading country is Italy. Studies indicate increasing interest in Sustainable Wine Tourism, underscoring the necessity for more theoretical and empirical work in this new domain.

Keywords: Sustainable wine tourism, bibliometric analysis, Biblioshiny, VOS viewer, tourism research trends, network analysis.

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1. Introduction

A remarkable revolution in the world of wines has been observed in recent decades. In "New World" territories, wine producers are on the rise, and markets are expanding. Changes in consumer tastes have marketing and production strategy implications (Jones et al., 2005). The market has been revolutionised by "New World" wine producers such as the United States of America, Australia, Chile, South Africa, and New Zealand. They have increased the quantity and quality of wine made since the 1970s (Rui et al., 2025; Vecchio et al., 2017). China is presently the main force behind the expansion of the wine market within the Asia-Pacific region. China boasts the largest global value share in the wine market. Wine consumption is projected to expand at a rapid rate within countries like China and Nigeria during the period between 2020 and 2025 (Rodrigues et al., 2020). Global vineyard area decreased from a peak of almost 7.8 million hectares during 2002–2003 to almost 7.3 million hectares in 2020–2022. Although the area has remained stable since 2017, this is a 6% drop from the early 2000s. The largest vineyard regions are China, France, and Spain, which together account for a significant percentage of the world's total. Wine production occupies about 75% of vineyards; the remaining vineyards are utilised for table grapes, raisins, and other uses (International Organisation of Vine and Wine, 2022; Karlsson, 2022; Karlsson & Karlsson, 2021). Viticulture, or cultivating grapes for wine production, has a significant economic advantage. Aside from making wine, it generates local economies through tourism and generates lovely landscapes. It also offers hedonic experiences that increase cultural appeal and attract tourists (Khan et al., 2020). One of the biggest parts of the global wine industry, growing steadily with improved vineyard techniques and rising consumer demand, is viticulture. With a compound annual growth rate (CAGR) of 6.3%, the global viticulture market is expected to reach USD 1,640 million in 2033 from USD 890 million in 2023. Helping the economy greatly, wine tourism comes in the form of vineyard tours, tastings, festivals, and cultural festivals (Market.us, 2024; Nickova, 2021). Thanks to its role in wine production, viticulture carries enormous economic value. It also encourages tourism because it results in beautiful landscapes of grapes. Hedonistic activities relating to wine recreation and culture are encouraged by the industry (Crespi-Vallbona & Mascarilla-Miró, 2020). The intensive methods used in viticulture have environmental impacts, even though they are economically and culturally significant. To control pests and diseases, it mainly depends on chemical pesticides and herbicides, just like other types of industrial agriculture (Springmann et al., 2018). Adopting sustainable practices in the wine sector can ensure long-term profitability, growth, and success in the next generations. Sustainable winemaking and production can be promoted by introducing new technologies and using green management approaches (Montalvo-Falcón et al., 2023). The international wine industry is confronted with challenges as farmers fight over optimal viticulture

practices, and wine quality must meet tough regulations. Farmers, governed by profit and personal belief, acknowledge the advantages of sustainability despite conflicting practices (Gary et al., 2020; Marín et al., 2021). While the wine industry contributes significantly to environmental degradation, sustainable practices can reduce its environmental impact and enhance its long-term sustainability. Discovering cost-effective, eco-friendly methods through research enables producers to meet local sustainability guidelines and regulatory requirements (Gilinsky et al., 2016). Although it holds great promise, very little is known about how sustainable wine tourism practices would enhance regional economic development and competitiveness (Alessandri et al., 2024).

Less than a small number of research studies have applied bibliometric analysis to Sustainable Wine Tourism, though it is important in the measurement of trends in research and the identification of gaps. This study analyses "Sustainable Tourism" and "Wine Tourism" publications in the Scopus database using bibliometric analysis. Through an analysis of this literature, we aim to determine key contributions, prevailing themes, and neglected areas. In consideration of this objective, the study addresses the following research questions:

1. Which are the most productive institutions, countries, and authors of academic papers for the sustainable wine tourism industry, and what are the global trends of publication and citation?
2. Based on citation analysis, what publications and journals make the most contribution to sustainable wine tourism?
3. What are the most common words, and how do keyword co-occurrence patterns signal important themes and research agendas for sustainable wine tourism?
4. What does this international collaboration and co-authorship analysis tell us about the international research network in sustainable wine tourism?
5. What do the new issues revealed by co-citation and bibliographic coupling analysis demonstrate, and how has the sustainable wine tourism theme developed over time?

2. Literature Review

2.1. Wine

Grape juice, although any other fruit can be used, is fermented to make wine, a type of alcoholic beverage. Yeast ferments the sugars in crushed grapes to alcohol and carbon dioxide. Its flavour, colour, and aroma are influenced by the grape type, area, and vinification. Whereas grapes serve as the primary

ingredient in most wines, fruit wines come in a variety of tastes and styles (Cozzolino, 2016; Amerine, 2025). Although the word "wine" is generally reserved for use with grape-based alcoholic beverages, it can be applied to beverages made from other fruits, such as plums, cherries, or blueberries; in such instances, the fruit name is typically included (e.g., "plum wine") (Amerine, 2025). The main categories of wine are red, white, rosé, and sparkling. The type of grape used in the production and the amount of juice exposure to the grape skins during the production process determine the style and colour of the wine (WSET Global, 2023).

2.2. Wine Tourism

Vineyard, winery, and wine region visits for tasting, drinking, and wine shopping at or close to the origin are the key aspects of wine tourism, a niche travel activity centred on education and experience about the world of wine-making (Food and road, 2021). Through activities like guided tours of wineries, wine tastings, participation in grape harvesting, wine festivals, educational workshops, and culinary tours featuring local wines, it provides visitors with an interactive experience with the history, culture, and wine-making process (Carvalho et al., 2021).

2.3. Sustainable Wine Tourism

Sustainable wine tourism is a sustainable type of wine-related travel that focuses on the conservation of the environment, preservation of culture, and local economic growth. It attempts to ensure that tourist activities benefit tourists, wineries, local people, and the environment too (Filopoulos & Frittella, 2019). Environmental sustainability is also a key consideration, and the majority of wineries are embracing green practices like enhancing biodiversity, water conservation, and the use of renewable energy. These practices beautify natural wine country while helping to minimise the adverse effects of tourism on the environment (Brito et al., 2024; Singh et al., 2024). The second fundamental aspect is the conservation of cultural heritage and society. Wine tourism has a big role in the conservation of the unique character of each region by exposing visitors to local traditions, culinary practices, viticultural techniques, and historical narratives. It also stimulates the economy of rural regions by providing jobs, stimulating local business development, and promoting the wine industry infrastructure as a whole. The industry tends to favour small, family-owned wineries with direct interaction with tourists (Turčinović et al., 2025; Kumar et al., 2025). Education is also involved, with most programs promoting moderate consumption and climate change and sustainability concerns impacting wine regions. Finally, community engagement ensures that tourism aligns with community values. Involvement of residents through planning and development guarantees that benefits are shared fairly, so sustainable wine

tourism is a positive force on regional development and cultural heritage (Martínez-Falcó et al., 2024; Thakur et al., 2023).

2.4. Multidisciplinary Research Focus on Sustainable Wine Tourism

A robust interdisciplinary endeavour is seen in the dissemination of documents across a broad spectrum of subject categories, particularly in the realm of sustainable wine tourism. The Social Sciences are responsible for most of the documents (176), highlighting the importance of understanding cultural dynamics, human behaviour, and community engagement in sustainable tourist activities. Energy (102) and Environmental Science (135) come close, indicating that wine tourist operations are the best in ecological sustainability, climate footprint, and energy efficiency. Strategic management, digital innovation, and data analysis in enhancing the sustainability and competitiveness of wine tourist businesses are seen in Business, Management, and Accounting (92) and Computer Science (72). The technical, agricultural, and economic viewpoints necessary for sustainable viticulture and tourist development are represented by the output from Engineering (29), Agricultural and Biological Sciences (25), and Economics, Econometrics, and Finance (20). Contributions from Earth and Planetary Sciences (9), Arts and Humanities (6), and Decision Sciences (6) indicate the importance of geographical, cultural, and decision-making paradigms for this topic, but are fewer in number. This idea that sustainable wine tourism is a multidisciplinary and multifaceted topic that must be tackled by a wide range of academic disciplines is also evidenced by the occurrence of specialist disciplines like Biochemistry, Genetics and Molecular Biology (3), Chemical Engineering (2), and other health sciences, including Medicine and Psychology, as shown in Figure 1.

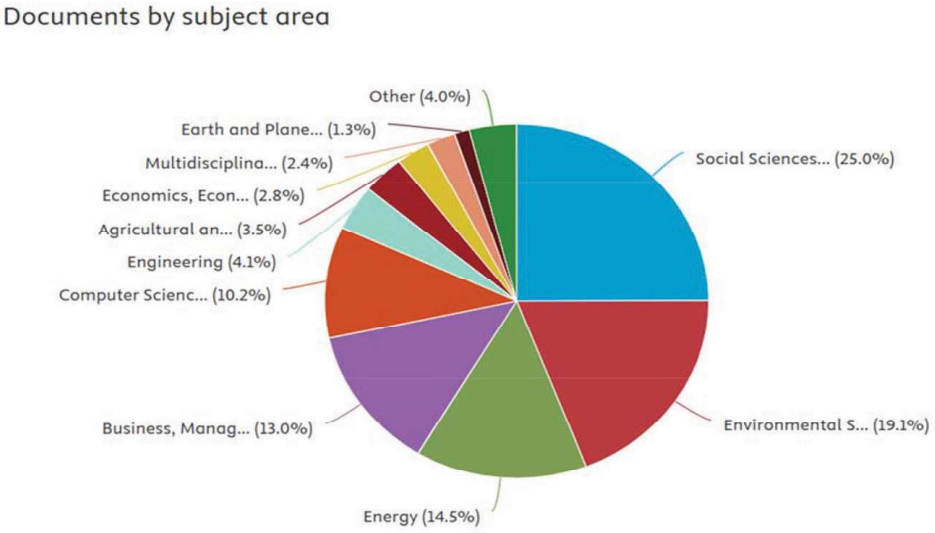


Figure 1: Research on Sustainable Wine Tourism by Subject Area Distribution

3. Materials and Methods

The Scopus database (accessed on April 11, 2025) was chosen to collect academic articles. It is now thought to be one of the most prestigious, complete, and dependable databases in the scientific world. It has a low duplicate document ratio and a wide range of time for searching. The Scopus database indexes peer-reviewed journals across all disciplines and categorises them by subject area and Cite Score-based quartiles (Q1–Q4), serving as a comprehensive alternative to Web of Science indices like ESCI, SSCI, and SCI-E. Afterwards, the following equation was introduced: "TS = ("wine tourism" OR "viticulture" OR "ecotourism") AND sustainab*" to collect all the papers published until 11-April of 2025, obtaining a total of 1267 documents. Then, the PRISMA statement (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) was applied to filter these studies (Piras, 2024), as shown in Figure 2.

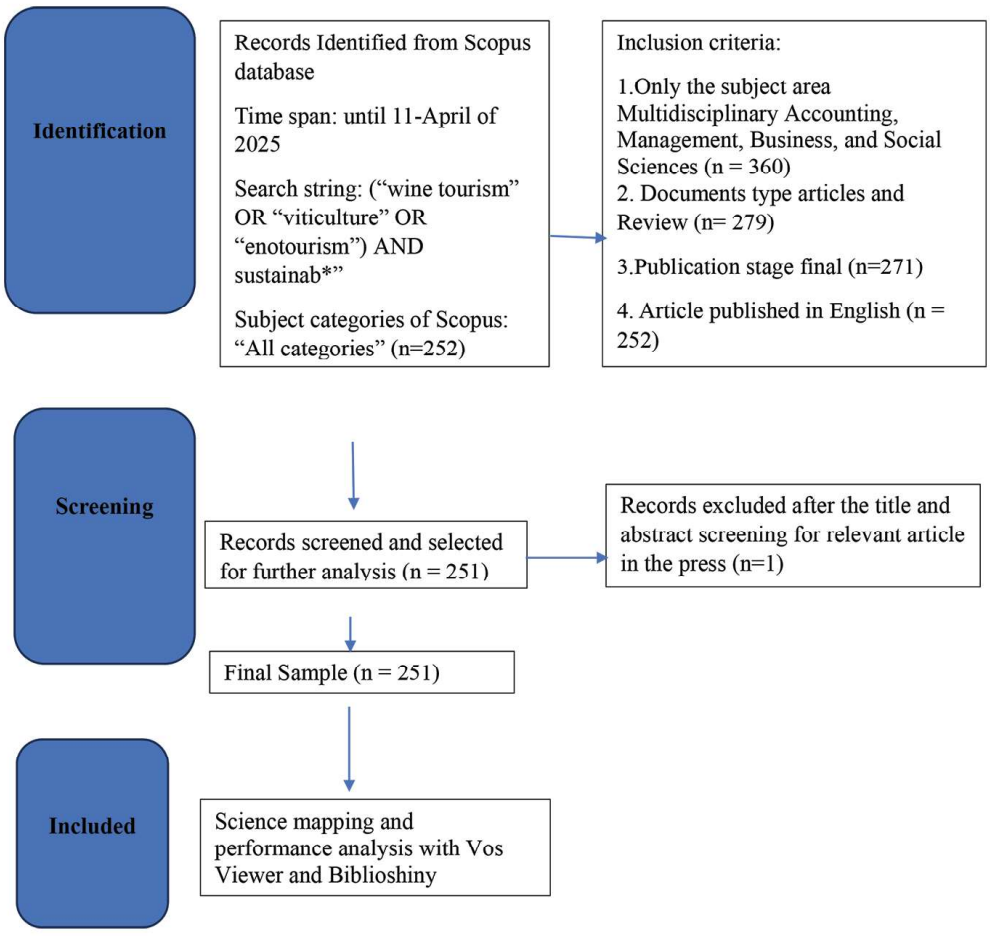


Figure 2: Screening by using the PRISMA methodology

This strict method has now gained fame to enhance the validity of literature review evaluations. We obtained 251 articles by discarding any

redundancies and screened for peer-reviewed "articles" and "review articles" to guarantee certified knowledge. The system's systematic, tested data acquisition maximises the validity of the study (Montalvo-Falcón et al., 2023). The bibliometric analysis in this research is utilised to estimate significant scholarly contributions to sustainability research in the wine industry. Research trends, influential publications, and new concepts in the area are systematically charted through the use of this method (Passas, 2024). By analysing crucial papers, journals, authors, institutions, and countries, bibliometric analysis effectively measures an academic subject and visualises collaboration networks. This process allows one to deeply analyse published work both at the macro and micro levels, uncovering neutral, underlying patterns within any scholarly discipline (Xu et al., 2025; Montalvo-Falcón et al., 2023). Aria and Cuccurullo, scientists and developers at K-Synth, a Naples-based scientific intelligence firm, created Bibliometrix®. The R-based software's easy-to-use "biblioshiny" interface enables systematic reviews of the literature and scientific mapping analysis. The software provides full bibliometric capabilities to evaluate patterns and trends in research (Celestino & Valente, 2024). As per the report, scientific progress in this field is cumulative, with newer research complementing previous results. The research looks at important bibliometric variables like publication numbers, citation frequency, and h-index values, as well as sustainability developments in the wine business, in an attempt to gauge its influence. These outcomes are quantitatively measurable and visually presentable due to Bibliometrix® (Bhardwaj et al., 2024).

3.1. Performance Analyses

Performance analysis examines the contribution of research participants in a field towards research (Cobo et al., 2011). Performance analysis is one of the popular methods utilised in review studies to analyse the performance of several research dimensions. As such, even those non-science mapping theses make some form of performance analysis present, targeting such dimensions as authors, institutions, countries, and journals (Donthu et al., 2021). Table 1, constructed using Biblioshiny software, offers a descriptive overview of the prepared Scopus dataset for our research following application of the required filters. Analysis ranges from the period 2003-2025, the oldest publication having the selected keywords tracing back to the year 2003. With 251 papers and 101 sources in all, the evidence is for moderate but steady scholarly development at a 7.59% rate of annual growth. Of the 884 unique authors in the corpus, 18 have written papers individually. There is a sense of collaborative research reflected in the average of 4.1 co-authors per paper. On international collaboration, 20.24% of articles have international collaborators. The dataset cites 15,682 sources and consists of 914 author keywords (DE), that is, the scope of literature dealt with. The articles show moderate scholarly impact, as demonstrated by their mean age of 4.87 years and mean citations per paper of 21.7.

Table 1: Statistics for Descriptive Data

Timespan	2003-2025
"Sources (Journals, Books, etc.)"	101
"Documents(articles)"	251
"Annual Growth Rate %"	7.59%
"Document Average Age"	4.87
"Average citations per doc"	21.7
"International co-authorships% %"	20.24
"Author's keywords"	914
"Authors"	884
"Authors of single-authored docs"	18
"Co-Authors per docs%"	4.1%
"References"	15,682

Source: Using the Scopus database to extract data from RStudio

3.2. Number of documents published

The data on publications related to sustainable wine tourism reveal a compelling trajectory of academic interest over the past two decades. The first paper on this topic was the Directions in British Columbia wine tourism policy. (Martin & Williams, 2003) examined the policies influencing British Columbia's wine tourism value chain, particularly in the Okanagan Valley. We have determined the total number of documents released over the years after finishing the analysis pattern.

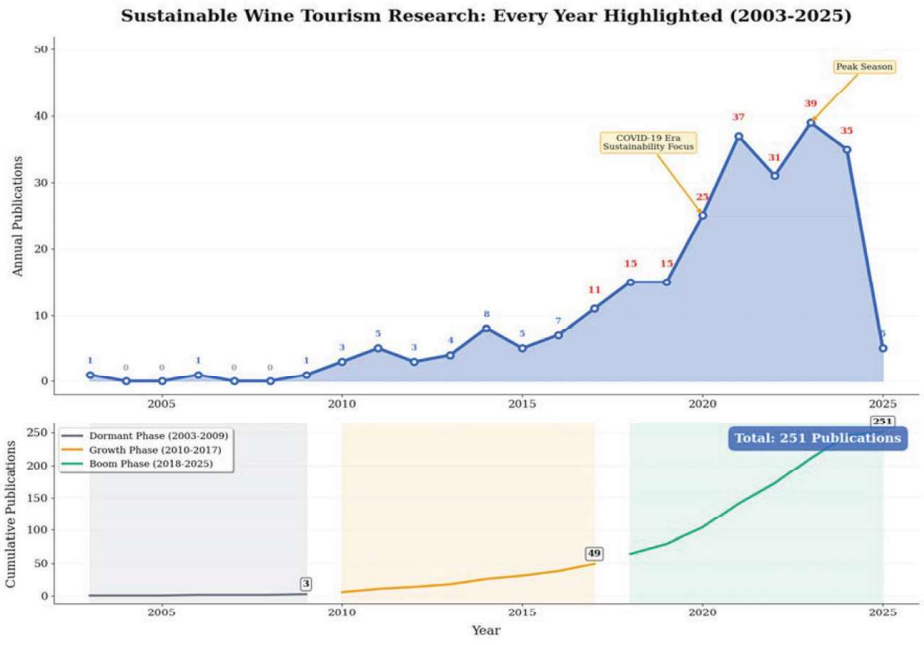


Figure 3: shows the status of Sustainable Wine Tourism research publications between 2003 and 2025.

The diagram plots the course of Sustainable Wine Tourism scholarship from 2003 to 2025. The top panel displays yearly production—initially irregular (usually zero-to-one papers), then gradually rising after 2010 and spiking over ten papers a year from 2018 onwards, with a high of 39 in 2023. Each dot is annotated by its precise number, so you can visualise the discipline's extended quiet period, the very first surge around 2010, and the post-2017 explosion in striking red figures. The lower panel provides a cumulative view: a glacially growing grey line (2003-2009) yields to an amber steady increase (2010-2017) and a sharp mint-green rise (2018-2025), reaching 251 total publications. Combined, the panels show a discipline that slept for ten years, established its footing in the 2010s, and then took off rapidly, particularly after the pandemic years focused on sustainability issues. While 2025 shows only 5 publications thus far, this is expected, given that authors are only in May of the current year. This clear progression from niche research area to mainstream topic within tourism and sustainability studies underscores the timely relevance of research in this rapidly expanding field.

3.3. Most Relevant Journal Sources

Table 2 lists the top ten journals that are pertinent to sustainable wine tourism. With 78 articles, "SUSTAINABILITY (SWITZERLAND)" is the top journal with the most articles published. With 12 published pieces, the "JOURNAL OF CLEANER PRODUCTION" comes in at number two. There are currently eleven papers published in the "INTERNATIONAL JOURNAL OF WINE BUSINESS RESEARCH." "QUALITY - ACCESS TO SUCCESS" has 11 articles published. "SCIENTIFIC REPORTS" has 07 number of articles published. The remaining 5, i.e. "JOURNAL OF TOURISM AND DEVELOPMENT", "PLOS ONE, "JOURNAL OF SUSTAINABLE TOURISM", "LAND USE POLICY", "AFRICAN JOURNAL OF HOSPITALITY, TOURISM AND LEISURE" have published 23 articles.

Table 2: Top 10 Journals

Sources	Articles
SUSTAINABILITY (SWITZERLAND)	78
JOURNAL OF CLEANER PRODUCTION	12
INTERNATIONAL JOURNAL OF WINE BUSINESS RESEARCH	11
QUALITY - ACCESS TO SUCCESS	07
SCIENTIFIC REPORTS	07
JOURNAL OF TOURISM AND DEVELOPMENT	05
PLOS ONE	05
JOURNAL OF SUSTAINABLE TOURISM	04
LAND USE POLICY	04
AFRICAN JOURNAL OF HOSPITALITY, TOURISM AND LEISURE	03

Source: Extracted from RStudio by use of the Scopus database

3.4. Most Relevant Affiliations. Top 10 Universities

Table 3: Trends in publishing at universities

Affiliation	Articles
UNIVERSITÉ DE STRASBOURG	26
INTERNATIONAL HELLENIC UNIVERSITY (IHU)	19
CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE	15
UNIVERSITY OF BEIRA INTERIOR	14
UNIVERSITY OF NATURAL RESOURCES AND LIFE SCIENCES VIENNA (BOKU)	14
GEISENHEIM UNIVERSITY	13
HOCHSCHULE GEISENHEIM UNIVERSITY	12
UNIVERSIDADE DE LISBOA	12
SAN FRANCISCO STATE UNIVERSITY	11
UNIVERSITY OF PALERMO	11

Table 3 explains the top academic institutions that are working on the mentioned research field, as per the number of published articles. Université de Strasbourg holds the first rank with a total of 26 publications, showcasing its high involvement in academia. The International Hellenic University (IHU) ranks second, having published 19 articles. The Czech University of Life Sciences Prague has contributed 15 publications. Both the University of Beira Interior and the University of Natural Resources and Life Sciences Vienna (BOKU) have a total of 14 articles each. Geisenheim University then has 13 articles to its name. Hochschule Geisenheim University and Universidade de Lisboa have each published 12 articles. Finally, both San Francisco State University and the University of Palermo have contributed 11 articles each, reflecting their high involvement in this research sector.

3.5. Most relevant authors in sustainable wine tourism by number of articles published and fractionalized are:

Table 4: The largest number of articles that authors have written and the articles that have been fractionalised

Author	Number of articles	Article Fractionalized
KASTENHOLZ E	6	1.43
SZOLNOKI G	5	2.20
MARTA-COSTA A	4	1.25
NAVE A	4	1.50
VECCHIO R	4	1.17
ALONSO AD	3	1.25
BELLIA C	3	0.96
COLLINS C	3	0.75
CUNHA C	3	0.59
CUNHA D	3	0.59

The highest research scholars who have written on sustainable wine tourism are ranked based on the above table. The information includes three columns:

"Authors" (names of the researchers), "Articles" (number of publications), and "Articles Fractionalized" (a weighted measure that takes into account the co-authorship).

Although with a total of six publications, Kastenholz E has a fractionalized count of 1.43, which is a sign of shared authorship. Coming in second with five publications and the highest fractionalized count (2.20) is Szolnoki G, who is likely to have more lead or solo authorship. The three authors (Marta-Costa A, Nave A, and Vecchio R), each of whom had four publications, had different fractionalized counts (1.25, 1.50, and 1.17, respectively), which is a sign of variable patterns of authorship participation.

The fractionalized counts were 0.59 to 1.25, and the other researchers—Alonso AD, Bellia C, Collins C, Cunha C, and Cunha D—each had three publications. The lower fractionalized counts observed for both Cunha researchers (0.59) and Collins C (0.75) imply that these authors are part of larger groups, where several contributors receive attributed authorship.

With the fractionalized counts offering insight into their usual publication patterns and collaboration inclinations, this bibliometric data aids in identifying the most active and significant scholars in sustainable wine tourism.

3.6. Prominent Scholars in Sustainable Wine Tourism: Leading researchers by h-Index and g-Index:

Table 5: The Top 10 authors in terms of h and g Indexes on sustainable wine tourism

Sr. No.	Authors	Total Citations	Total No. of Publications	h-Index	g-index	Country
1	Kastenholz E	44	6	4	6	Portugal
2	Szolnoki G	83	5	4	5	Germany
3	Alonso Ad	83	3	3	3	Australia
4	Bellia C	58	3	3	3	Italy
5	Collins C	107	3	3	3	Australia
6	Giampietri E	33	3	3	3	Italy
7	Jerram C	107	3	3	3	Australia
8	Metcalfe A	107	3	3	3	Australia
9	Nave A	80	4	3	4	Portugal
10	Santiago-Brown I	107	3	3	3	Australia

The top ten authors by total citations, total publications, h-index, g-index, and countries are displayed in Table 4 based on the Scopus database. According to their h-index and g-index scores, the top 10 authors of sustainable wine tourism publications are shown in this table. From the data, the highest authors are Szolnoki G (Germany) and Kastenholz E (Portugal), with at least

four publications cited a minimum of four times, with h-indices of 4. With average overall citations (44) relative to other publications, but with the overall highest g-index (6), Kastenholz has the highest g-index, meaning that the first 6 publications garnered at least 36 citations in total. Szolnoki, with a g-index of 5, is next. All the other authors have an h-index of 3. Australia has been a major contributor to this domain, as revealed by the eminent presence of five researchers from this country. With just three articles each, several authors (Collins C, Jerram C, Metcalfe A, and Santiago-Brown I) possess the maximum citations of 107, which means that they are highly impactful. Germany is represented by one researcher in the top 10, and two each from Portugal and Italy. The prominence of wine tourism research in traditional wine-producing nations, as well as emerging markets such as Australia, is reflected in this regional breakdown. The table shows that influence in this area is not necessarily linked to publication number, since some very highly-cited authors have quite a few publications but high citation numbers.

3.7. Most Cited Countries. Top 10 Countries

Total Citations (TC) and Average Article Citations (AAC), which represent the research influence of various countries, are displayed in Table 6. The total number of times research articles from a country have been cited is displayed in Total Citations, which illustrates the overall influence of that country's research output. For example, with 828 citations, Italy has the most research footprint. On the other hand, by calculating the average number of citations per article, average article citations demonstrate the quality and relevance of the articles. Luxembourg has the greatest AAC of 184.00, while having a lower TC than countries like the USA or Canada. This suggests that its articles have a substantial influence on a per capita basis. This information sheds light on the volume and calibre of research contributions made in these countries.

Table 6: Top 10 Cited Countries

Country	TC	AAC
ITALY	828	18.00
AUSTRALIA	736	49.10
SPAIN	498	22.60
PORTUGAL	497	17.80
USA	411	31.60
LUXEMBOURG	368	184.00
CANADA	154	51.30
GREECE	150	15.00
GERMANY	146	14.60
NEW ZEALAND	106	35.30

AAC: Average Article Citations; TC: Total Citations Source: Information taken from the Scopus database

3.8. Document by Country

The contributions of different nations to international publications on sustainable wine tourism are shown in Table 7, along with the proportion of documents from each country. Based on the quantity of papers in the sector, this analysis only takes into account the top 15 most productive nations. One of the most developed countries in the world, Italy, leads the globe in research on sustainable wine tourism, with 46 publications, or 18.3% of the total documents. With 28 publications (11.2%), Portugal comes in second, and Spain comes in third with 22 publications, which also contribute 8.8%. This information demonstrates how actively Italy, Portugal, and Sri Lanka are involved in the field of research. Furthermore, nations like Italy, Australia, and Spain continue to be important contributors, routinely ranking in the top 15 out of 31 countries, demonstrating their ongoing commitment to sustainable wine tourism scholarship.

Table 7: Top Countries for Sustainable Wine Tourism Research in Terms of the Total Number of Publications and Documents Percentage

Ranking	Countries	Documents	Documents %
1	ITALY	46	18.3
2	PORTUGAL	28	11.2
3	SPAIN	22	8.8
4	AUSTRALIA	15	6.0
5	USA	13	5.2
6	GERMANY	10	4.0
7	GREECE	10	4.0
8	ROMANIA	09	3.6
9	BRAZIL	08	3.2
10	FRANCE	05	2.0
11	CHINA	04	1.6
12	POLAND	04	1.6
13	CANADA	03	1.2
14	NEW ZEALAND	03	1.2
15	AUSTRIA	02	0.8

3.9. Citation Analyses

Table 8: Top 10 most referenced publications by authors

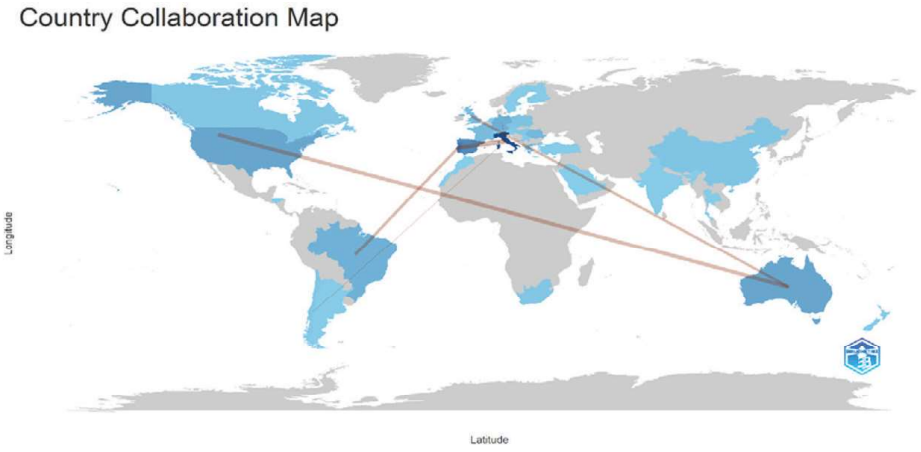
Year	Author	Title	Source	TC	CPY
2015	Santiago-Brown, I., Metcalfe, A., Jerram, C., & Collins, C. (Santiago-Brown et al., 2015)	"Sustainability Assessment in Wine-Grape Growing in the New World: Economic, Environmental, and Social Indicators for Agricultural Businesses"	"Sustainability (Switzerland)"	69	6.273

2012	Alonso, A. D., & Liu, Y. (Alonso & Liu, 2012)	"Old Wine Region, New Concept and Sustainable Development: Winery Entrepreneurs' Perceived Benefits from Wine Tourism on Spain's Canary Islands"	Journal of Sustainable Tourism	69	4.929
2021	Nave, A., Laurett, R., & do Paço, A. (Nave, Laurett, et al., 2021)	"A Systematic Literature Review on Sustainability in the Wine Tourism Industry: Insights and Perspectives"	"International Journal of Wine Business Research"	37	7.400
2020	Tafel, M., & Szolnoki, G. (Tafel & Szolnoki, 2020)	"Estimating The Economic Impact of Tourism in German Wine Regions"	"International Journal of Tourism Research"	37	6.167
2021	Borrello, M., Cembalo, L., & Vecchio, R. (Borrello et al., 2021)	"Role Of Information in Consumers' Preferences for Eco-Sustainable Genetic Improvements in Plant Breeding"	"Plos One"	26	5.200
2021	Nave, A., Laurett, R., & do Paço, A. (Nave et al., 2021)	"Relation Between Antecedents, Barriers and Consequences of Sustainable Practices in the Wine Tourism Sector"	"Journal of Destination Marketing and Management"	26	5.200
2014	Santiago-Brown, I., Metcalfe, A., Jerram, C., & Collins, C. (Santiago-Brown et al., 2014)	"Transnational Comparison of Sustainability Assessment Programs for Viticulture and A Case-Study on Programs' Engagement Processes"	"Sustainability (Switzerland)"	22	1.833
2016	Bellia, C., & Pilato, M. (Bellia & Pilato, 2016)	"Competitiveness of Wine Business Within Green Economy: Sicilian Case"	"Quality - Access to Success"	22	1.833
2021	Bellia, C., Scavone, V., & Ingrassia, M. (Bellia et al., 2021)	"Food And Religion in Sicily—A New Green Tourist Destination by an Ancient Route from the Past"	"Sustainability (Switzerland)"	20	4.000
2022	Szolnoki, G., Bail, S., Tafel, M., Feher, A., & Veith, C. (Szolnoki et al., 2022)	"A Cross-Cultural Comparison of New Implemented Sustainable Wine Tourism Strategies During the COVID-19 Crisis"	"Sustainability (Switzerland)"	18	4.500

TC: Total Citation, CPY: Citation Per Year

With the Scopus database, the Table shows the top 10 most referenced publications by authors. (Santiago-Brown et al., 2015) and (Alonso & Liu, 2012) have both the most citations with 69, but (Santiago-Brown et al., 2015) has the highest average citation count, 6.273, while (Alonso & Liu, 2012) has 4.929. (Nave, Laurett, et al., 2021) and (Tafel & Szolnoki, 2020) also have 37 total citations, but (Nave, Laurett, et al., 2021) has the highest average citation count, 7.400, while (Tafel & Szolnoki, 2020) has 6.167. Additionally, the final six research papers have fewer citations (Borrello et al., 2021; Nave et al., 2021; Santiago-Brown et al., 2014; Bellia & Pilato, 2014; Bellia et al., 2021; Szolnoki et al., 2022). Citations are expected to increase soon due to the field's rapid growth. Numerous academics have made noteworthy progress in sustainable wine tourism since the study's start. We found 884 authors in our database who worked on projects from 2003 to 2025. We compiled the top 10 writers with the most citations into a ranking list in order to get the authors' table with the most pertinent data. According to this Table, the paper with the maximum number of citations is "Sustainability Assessment in Wine-Grape Growing in the New World: Economic, Environmental, and Social Indicators for Agricultural Businesses" (Santiago-Brown et al., 2015).

4. Global Collaboration Patterns in Sustainable Wine Tourism: Insights from Top Co-Authorship Links:

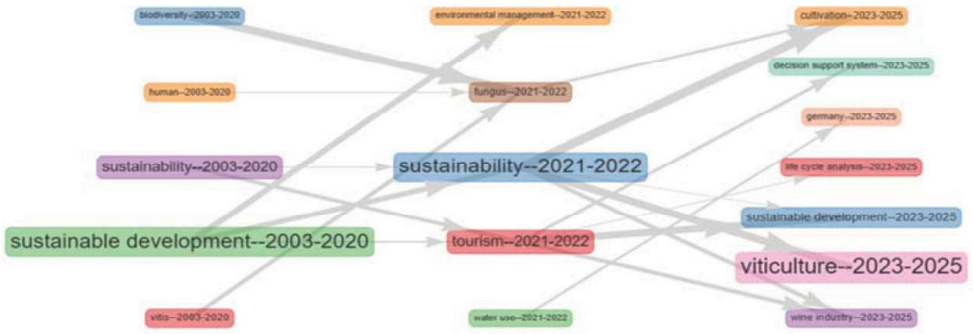


The information shows the top ten global cooperation pairs in Sustainable Wine Tourism based on jointly published papers in the Bibliometrix database. Every entry reflects the number of occasions authors from two countries co-published within this speciality sector. Italy and Portugal have the highest connection with 5 papers, followed by USA–Australia with 4, with several pairs in a tie at 3 jointly published papers each, of which are Australia–UK, Portugal–Brazil, and France–Italy. European nations are the most prevalent in the network, with Italy being the most visible, indicating that it plays a pivotal role in the discipline. Australia is also a prominent collaborator with partners from around the world, such as the USA, the UK, and China.

Though collaboration crosses hemispheres—such as in Portugal, Brazil and the USA–South Africa collaborations, the discipline is otherwise very thin, and low publication volumes suggest room for expansion. The prominent absence of top wine-producing nations such as Argentina, Chile, and New Zealand points towards unrealised potential for international cooperation. The results indicate strategic recommendations for policymakers and researchers: reinforcing already existing partnerships (e.g., Italy–Portugal), developing hitherto underrepresented areas, and promoting early-career researchers, as even limited papers can hugely shape the collaboration dynamic.

4.1. Thematic Evolution of Sustainable Wine Tourism

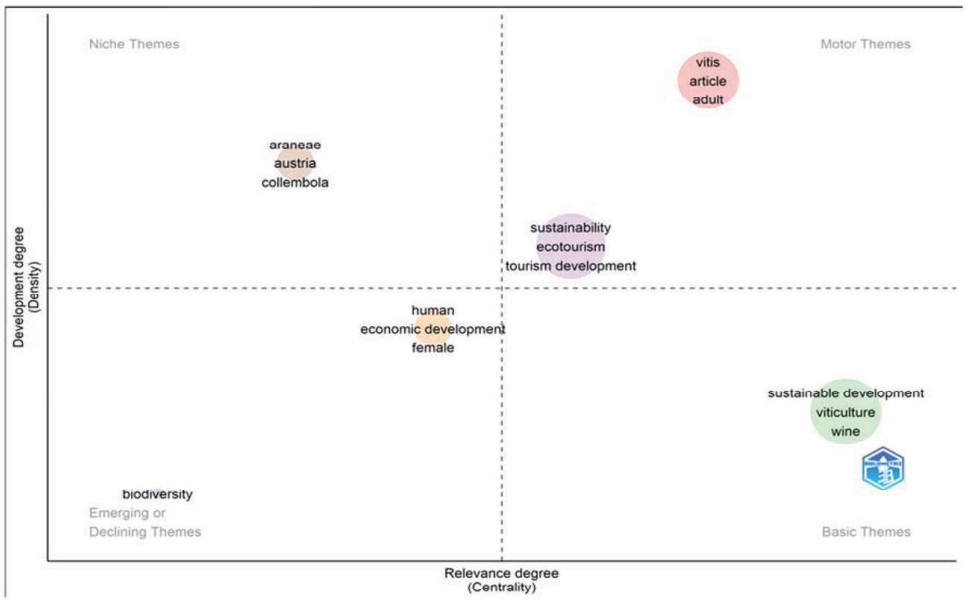
The illustration shows the three time periods (2003–2020, 2021–2022, and 2023–2025) that constitute the thematic development of scholarship in Sustainable Wine Tourism. An early scholarly foundation for the topic was set by the earliest scholarship (2003–2020), which covered biodiversity, sustainable development, and viticulture fundamentals. As water management became a subject of interest, the middle period (2021–2022) shows a shift toward more applied topics such as tourism integration, fungus management, and environmental management. With Germany being set as a regional case study, the recent scholarship (2023–2025) shows increasing specialisation with a focused effort on practices in viticulture, wine industry niches, life cycle analysis methodology, and decision support systems. Knowledge diffusion trends among subjects are represented by the network's connecting lines, which indicate how early general principles of sustainability had direct effects on later specific uses. The field's development from theoretical sustainability frameworks to realistic, region-specific implementation techniques for environmentally conscious wine tourism is shown in this transition.



Source: Extracted from RStudio using the Scopus database

4.2. Thematic Map between 2003-2020

The diagram below shows a thematic map or strategic diagram dividing study topics of sustainable wine tourism into two axes: centrality of relevance on the x-axis and density of development on the y-axis. Each of the four quadrants making up the diagram is a distinct type of theme. High centrality and high-density themes, such as "vitis," "article," and "adult," as well as "sustainability," "ecotourism," and "tourism development," appear in the upper-right quadrant (Motor Themes), showing their relevance and the developed level of research on these themes. The terms "sustainable development," "viticulture," and "wine," in the lower-right quadrant (Basic Themes), indicate their basic applicability to the research, but with a less developed level. In contrast, specialised themes like "araneae," "austria," and "collembola," in the upper-left quadrant (Niche Themes), indicate that they are known but niche fields of study. Additionally, the terms "biodiversity," "human," "economic development," and "female," indicating themes that are emerging or declining, are in the lower-left quadrant (Emerging or Declining Themes). By identifying central concepts and their relationships within the broader discipline, this diagram maps the intellectual landscape relevant to the study of sustainable wine tourism.

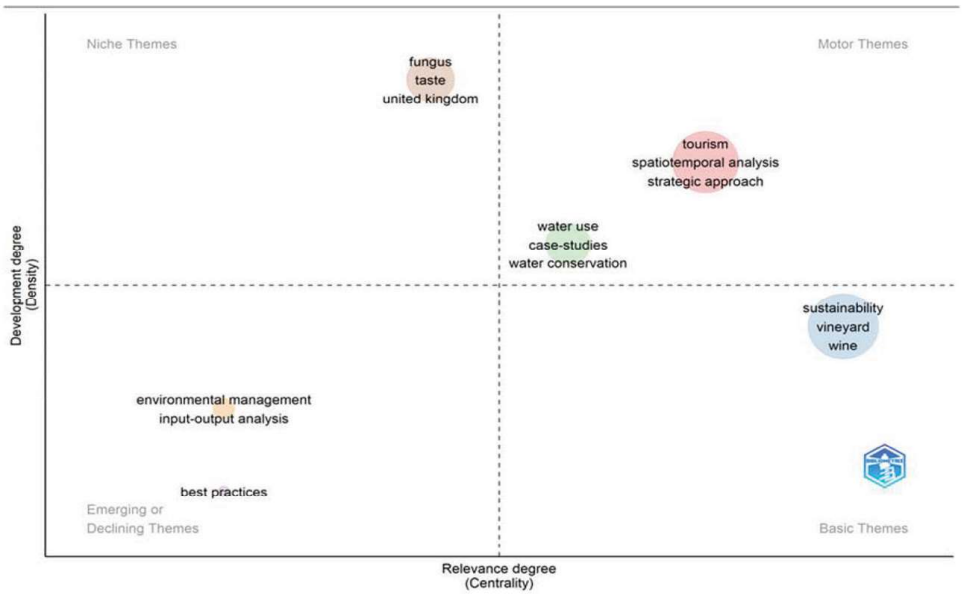


Source: Extracted using the Scopus database from RStudio

4.3. Thematic Map between 2021-2022

This strategy diagram provides a thematic representation of research into sustainable wine tourism on two dimensions: Degree of Relevance (Centrality) on the x-axis and Degree of Development (Density) on the y-axis. The four quadrants reflect various types of study problems based

on their internal development and relevance to the topic. The "tourism," "spatiotemporal analysis," and "strategic approach" themes are well-developed and prevalent in the Motor Themes quadrant (upper-right), and "water use," "case-studies," and "water conservation" are some examples of well-developed themes that are leading the field ahead. The terms "sustainability," "vineyard," and "wine," which are highly related to the subject but less internally developed, are in the Basic Themes quadrant (lower-right). "Fungus," "taste," and "United Kingdom," which are specialised, well-developed themes that are distantly related to the primary study area, are in the Niche Themes quadrant (upper-left). "Environmental management," "input-output analysis," and "best practices" are in the lower-left Emerging or Declining Themes quadrant and are emerging areas of study or lagging in research. This graph illustrates how, while wineyard sustainability is at the centre, research on sustainable wine tourism has moved to emphasise water management and tourism strategy as the drivers. A possible research shift away from general management to more specific approaches, such as water saving practices, is indicated by the location of environmental management in the emerging/declining quadrant.



Source: Extracted using the Scopus database from RStudio

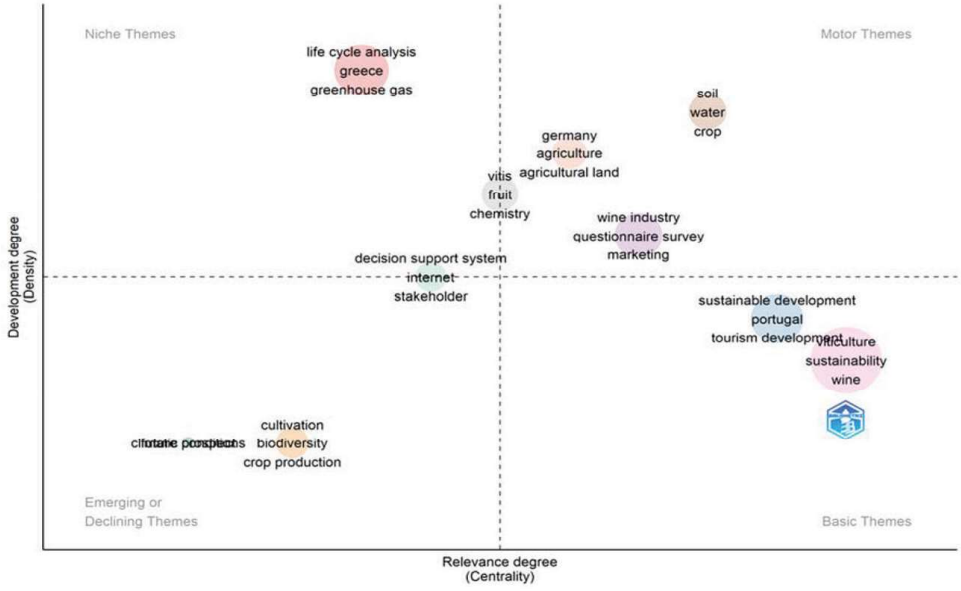
4.4. Thematic Map between 2023-2025 (Map Generated by Biblioshiny)

The development level (Density) and relevance level (Centrality) axes of this strategy diagram represent the research field of Sustainable Wine Tourism. The Motor Themes quadrant (upper right) includes country-based themes such as "agriculture," "agricultural land," and "Germany," as well as well-developed and critical research fields, including "soil," "water," and "crop." The wine industry appears to have a good reputation due to

corresponding methodological orientations, such as "questionnaire survey" and "marketing." The discipline's basic concepts, which are less internally constructed, are found in the Basic Themes quadrant (lower-right). They are "sustainable development," "viticulture," "sustainability," "wine," and regional focus areas such as "Portugal" and "tourism development."

Research themes such as "life cycle analysis," "Greece," and "greenhouse gas," although present, are more peripheral, appearing in the Niche Themes quadrant (upper-left). That is also where titles related to viticulture, such as "vitis," "fruit," and "chemistry," appear. "Cultivation," "biodiversity," "climate conditions," "crop production," and technological terms such as "decision support system," "internet," and "stakeholder" all appear in the Emerging or Declining Themes quadrant (lower-left), indicating that these are either new topics of research or declining topics.

This graph demonstrates how sustainable wine tourism research has evolved to focus on managing resources and farming practices while maintaining key sustainability principles. The position of biodiversity and technical tools in the emerging/declining quadrant might indicate where more research or inclusion in the general discussion of sustainable wine tourism is needed.

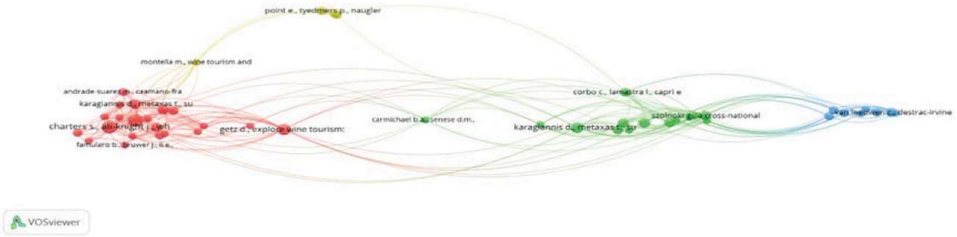


Source: Extracted using the Scopus database from RStudio

4.5. Co-Citation Figure of Reference taken from Vos-Viewer

Out of 14481 cited references, 48 had a minimum of 5 citations. For each one of the 48 cited references, the sum of overall co-citation link strengths to other references was computed, and the top ones were chosen. All references were not linked to each other; the largest group that was linked consisted

of 47 items. The last co-citation network analysis generated four clusters. In cluster 1st, there is a cluster of 21 items, in cluster 2nd, there is a cluster of 14 items, in cluster 3rd, there is a cluster of 8 items, and in cluster 4th, there is a cluster of 4 items. Cluster 1st is in red; cluster 2nd is in green colour; cluster 3rd is in blue, and cluster 4th is in yellow. Full counting is used as the counting method. The total linkages are 267, and the total link strength is 454. The co-citation network and the cited reference indicate four distinct clusters, and a single top author is selected from each of them based on total link strength. Cluster 1 (red) is (Charters & Ali-Knight, 2002) with a total link strength of 53, 16 citations, and 20 links. Cluster 2 (green) is (Szolnoki et al., 2022) with a link strength of 34, 8 citations, and 16 links. Cluster 3 (blue) is (Schultz & Jones, 2010) with a link strength of 25, 6 citations, and 14 links. Cluster 4 (yellow) is (Montella, 2017) with a link strength of 15, 5 citations, and 11 links. These authors were the most influential nodes in these four distinct clusters based on connectivity strength.



Source: Extracted from Vos-Viewer

4.6. Journal Co-Citation Figure Extracted from Vos-Viewer

In Figure 8, out of 6,988 sources that were found, 425 were more than the minimum of five citations and were chosen for co-citation analysis. Out of these, the largest connected set included 424 items, reflecting the occurrence of some disconnected sources in the network. The analysis was done based on the total link strength of the chosen sources. Authors thus had 424 connected items with 16,030 links, a total link strength of 142,923, and five distinct clusters. Full counting is used as the counting method. Cluster 1, coloured red, is the biggest with 140 items. Cluster 2, coloured green, consists of 1,300 items and has a link strength of 7298. Cluster 3, coloured blue, consists of 74 items, and Cluster 4, coloured yellow, consists of 69 items. Cluster 5, coloured purple, is the smallest with 11 items. The top five journals that best represent the top clusters are the following: The most cited journal is Sustainability in Cluster 4 (yellow) with 399 links, 445 citations, and 169,64 total link strength. Tourism Management journal is the next with 199 citations, 169 links, and 7298 total link strength in Cluster 2 (Green). 74 citations, 74 connections, and 6796 total link strength are the records of the International Journal of Wine Business Research (IJWBR) publication, which is associated with Cluster 3 (Blue). 168 citations, 184 connections, and 6525 total link strength are seen in The Journal of Cleaner Production Journal in

Cluster 1 (Red). Finally, the Agriculture system journal in Cluster 5 (Purple) contributes 54 links, 19 citations, and 466 total link strength.

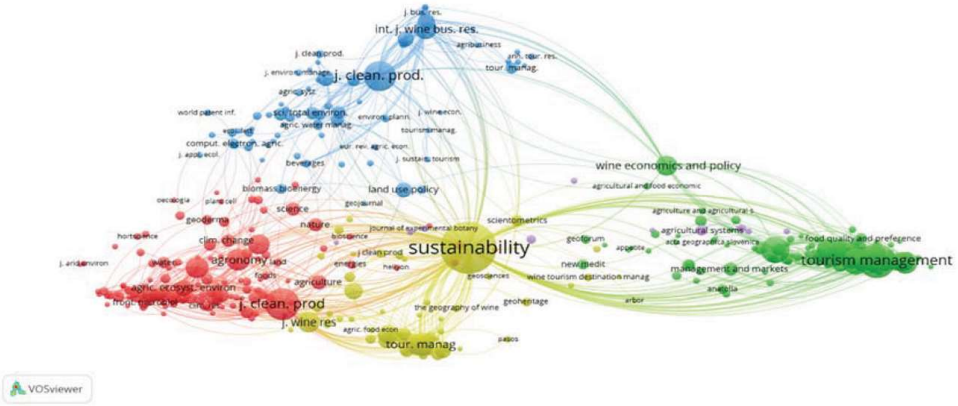


Figure 8: Journal co-citation Figure Extracted from Vos-Viewer

4.7. Co-Occurrence Analysis of the Keywords Used by the Authors

Analysis of co-occurrence: A grid of regions and their connections in a scientific topic is achieved through keyword co-occurrence analysis (Choudhary et al., 2024). The visual co-occurrence network of the authors' words is shown in Figure 9. Only 21 out of 913 words in the data set passed the minimum threshold of 5 occurrences through the full counting method used. A total of 178 connections were made between the 21 items in each of the six clusters. The clusters are described as follows: There are six entries in Cluster 1 (Red): (Wine tourism). "Wine tourism" was the most common word in the cluster, appearing 65 times. Additionally, it was situated at the centre of the network, and almost all other keywords were associated with it. Particularly remarkable were the terms "rural tourism" (10), "climate change" (9), "innovation" (9), "rural development (6), and "covid-19" (5). Cluster 2 (Green): (Sustainability and Viticulture); the most common word occurrences in this cluster are "viticulture" (49) and "sustainability" (49) respectively. "Wine industry" (11) and "agriculture" (8) are other keywords. Cluster 3 (Blue): "Wine" (17), in addition to "Ica" (5), "terroir" (5), and "vineyard" (5), are other keywords. Cluster 4 (Yellow): "Sustainable Development" (15) is the most common keyword. Other keywords include "economic sustainability" (6), "sustainable tourism" (7), and "wine routes" (5). Cluster 5 (Purple): "Wine Sector" (6) and "Wineries" (5) are the only two, and "wine sector" and "wineries" have the total link strength of 8 and 11, respectively. Cluster 6 (Cyan): "tourism" (9) is the only keyword that appears once, and the link strength is eight in total.

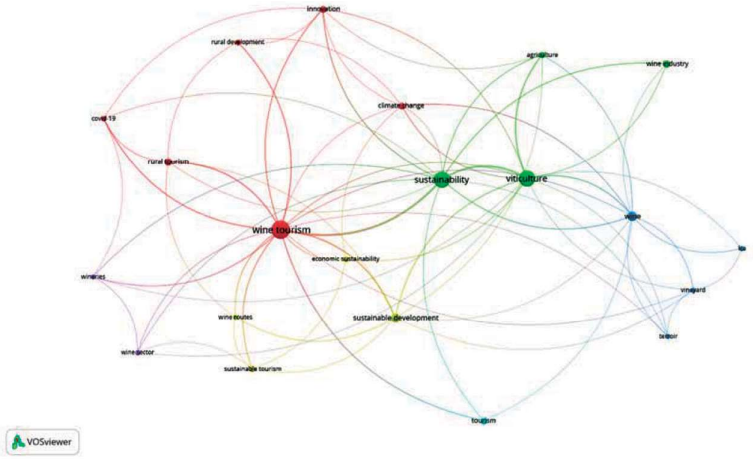


Figure 9: Co-occurrence of authors' keywords

4.8. Most Cited Keywords

As shown in Table 9, we were able to identify the most frequently used author keywords in ecotourism and sustainability studies worldwide using the Biblioshiny tool. The preceding observation suggests that Sustainable Wine Tourism is ranked among the top 10 terms in this category, as the majority of its writers are also employed in these disciplines. The most cited keywords figure was obtained by using Biblioshiny software.

Table 9: Most cited keywords

Sr. No.	Terms	Frequency
1	Viticulture	56
2	Sustainability	53
3	Wine	47
4	Vineyard	36
5	Sustainable Development	34
6	Wine Industry	32
7	Climate Change	25
8	Italy	25
9	Ecotourism	21
10	Vitis	20

Source: *Taken from Biblioshiny*

Figure 10: Word cloud

4.9. Tree map of Most Cited Keywords

In a Word Tree Map, words that appear frequently are displayed in boxes that mimic map regions; the greater the square area, the more words that appear.

Figure 11: Tree map extracted using Biblioshiny

The frequency of word usage in the 251 articles from the database above is displayed in Figure 10 as a tree map, extracted using Biblioshiny. Following the use of a Biblioshiny software filter by selecting the Field-Authors keywords and a word count of 50, the top three keywords with the most occurrences are "viticulture," "sustainability," "wine," and "vineyard."

5. Conclusion

This research advances our understanding of the current state of research on Sustainable Wine Tourism. It lasted for over 22 years, from 2003 to 11 April 2025, and allowed for comprehensive research, covering the entire period of publishing about this topic. Intense interdisciplinary input defines the science environment of Sustainable Wine Tourism, which is dominated by the Department of Social Sciences with 25% of all publications (176 documents). The Department of Energy Studies is second with 14.5% (102 documents) and the Department of Environmental Sciences with 19.1% (135 documents). Nevertheless, the yield of academic papers on the topic has become significantly higher since 2010, when scholars started to be interested in it. On 11 April 2025, there were 251 publications, while in 2008 there were 3. Found an evident pattern of increasing papers starting after the year 2009. Only Sustainability (Switzerland) has authored over 50 articles among the

top three journals—the International Journal of Wine Business Research, the Journal of Cleaner Production, and Sustainability (Switzerland)—suggesting relatively low but focused journal-level contributions to the subject. With 26 publications, the Université De Strasbourg (France) is the leading academic institution in sustainable wine tourism. The International Hellenic University (IHU), Greece, comes in second with 19 publications, followed by the Czech University of Life Sciences Prague with 15. These numbers demonstrate the interest of scholars worldwide, especially in Europe. According to h-index and g-index, Kastenholz E. from Portugal is one of the leading researchers in the subject of sustainable wine tourism, with an h-index of 4 and a g-index of 6. Szolnoki G from Germany, who has a slightly lower g-index of 5 but an h-index of 4, comes in second. With an h-index and g-index of 3, Australia's Alonso Ad comes in third place, demonstrating significant global contributions to the scholarly conversation in this area. With 828 citations and a staggering average of 18.00 citations per article, Italy dominates the research on Sustainable Wine Tourism. Australia comes next with 736 citations, followed by Spain (498), Portugal (497), and the United States (411), each of which has an impressive global intellectual impact. Italy leads in sustainable wine tourism research with 46 publications (18.3%), followed by Portugal with 28 (11.2%) and Spain with 22 (8.8%). These figures reflect strong research engagement from Europe in this domain. Australia, the USA, and Germany also remain prominent contributors, consistently ranking among the top 15 globally. (Santiago-Brown et al., 2015) and (Alonso & Liu, 2012) are the most cited researchers in sustainable wine tourism, each with 69 citations. However, Santiago-Brown et al. lead in average citation count with 6.273, compared to Alonso & Liu, 4.929. Among emerging contributors, (Nave, Laurett, et al., 2021) and (Tafel & Szolnoki, 2020) both have 37 total citations. Nave, Laurett, et al. outperforms Tafel & Szolnoki in average citations, with 6.273 compared to 4.929.

International partnerships in the Sustainable Wine Tourism space are a reflection of the vibrant and varied global research environment. Notably, with 5 jointly published publications, Italy and Portugal demonstrate the highest degree of cooperation. A solid collaboration between the USA–Australia, with 4 publications, comes next. Furthermore, several country pairs— Australia–UK, Portugal–Brazil, and France–Italy —each submitted 3 joint papers, highlighting the cross-cultural and international dedication to promoting sustainable practices in wine tourism through scholarly cooperation. Italy stands among the leaders in contributing to the European-dominated network, which is indicative of the continent's relatively high influence in the sustainable wine tourism sector.

A notable shift in research areas is evident in the thematic evolution of sustainable wine tourism between 2003 and 2025. The earlier research

between 2003 and 2020 was on topics like "sustainable development," "sustainability," and "vitis." Topics like "tourism," "water use," and "environmental management" were introduced between 2021 and 2022. Topics like "viticulture," "environmental sustainability," and the "wine industry" were introduced in the period 2023–2025. The trend reflects a transition of sustainable tourism towards more technology-intensive, integrated, and globally oriented practices. The provided reference network and co-citation revealed four clusters of highest importance, and the most influential authors were selected based on the aggregated strength of all the links. The highest authors in each of the four clusters were Charters & Ali-Knight, Szolnoki et al., Schultz & Jones, and Montella. The co-citation analysis of the journal covered 6,988 sources and found 424 appropriate items scattered in 5 different clusters with a minimum cutoff of 5 citations. The co-citation analysis picked out the five most relevant journals in various clusters; the most prominent in the overall relationship, and the most cited was the Sustainability journal in Cluster 4. These are the hubs of the network, reflecting their high scholarly value and thematic significance. A thematic co-occurrence analysis of keywords used by authors identified six clear thematic clusters, highlighting the high relevance of themes such as wine tourism, sustainability, viticulture, wine, and sustainable development. These results highlight the interdisciplinary scope of the discipline and shifting research focus. Prevalent research issues on the subject of Sustainable Wine Tourism are revealed via the most frequent keywords. With 56 citations (8%), the leading keyword is "Viticulture". "Sustainability" (53, 8%) and "Wine" (47, 7%) follow. "Vineyard" (36, 5%) and "Sustainable Development" (34, 5%) are also frequent keywords that demonstrate their applicability in recent academic endeavours.

The significance of the study to understanding scholarly and applied debate on these interconnected issues is significant to perform a bibliometric analysis of "Sustainable Wine Tourism" through applications like Biblioshiny and VOSviewer. This study investigates the research pattern, top authors, and influential papers, presenting an overall vision of the evolution of the field. It identifies research gaps and possibilities through the focus on the geographical and topical distribution of the literature. Through the combined examination of collaborations, co-citations, and keyword dynamics, this study assists in the evolution of sustainable practices and policies that facilitate stakeholder prioritisation. Lastly, it is a powerful tool for policymakers, researchers, and specialists who are working towards establishing ecotourism as sustainable development. Restrictions & Future Studies: Bibliometric analysis does have some limitations in the case of Sustainable Wine Tourism. In the case of Sustainable Wine Tourism, there is still considerable research to be carried out to optimise this growing demand and provide the best services to tourists. Require a scientific understanding of Sustainable Wine Tourism to provide tourists with flawless service.

To begin with, it is typically constrained by the scope and coverage of indexed databases, which may lead to the omission of studies in regional or non-English literature. The dynamic and multi-dimensional character of Sustainable Wine Tourism studies renders it challenging to identify emerging themes and evolving notions of sustainability. Subsequent studies may circumvent these limitations by employing a mixed-methods approach that integrates bibliometrics and content analysis to better determine thematic trends and areas of knowledge gaps. Concurrently, regional database growth encompassing non-traditional publishing venues and a diverse array of geographic locations may also enable in-depth analysis.

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