Review

Circular Economy and Tourism: A Bibliometric Journey Through Scholarly Discourse

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Handling Editor: Julian Kirchherr

Received: 21.12.2023 / Accepted: 08.02.2024
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Abstract

This study conducts a bibliometric analysis of the integration of circular economy principles into the tourism industry, utilizing 181 articles. Employing Scientific Production Performance Analysis and Network and Cluster Analysis, this research explores key dimensions such as authorship, sources, countries, institutions, and keywords. The findings revealed a growing body of literature focusing on the link between circular economy and tourism, although this connection is in its early stages. From circular economy perspective, waste management and recycling dimensions emerge as the most prominent aspects contributing to the discourse in tourism studies. Conversely, from the tourism perspective, nearly all facets of tourism concepts appear receptive to a circular economy, regardless of whether the studies pertain to tourism development or management. In conclusion, this study enriches our scholarly understanding of how circular economy principles intersect with tourism. It guides researchers toward key areas of interest, shaping future exploration for this dynamic scientific relationship.

Keywords: Literature Review, Circularity, Tourism, Sustainability, Bibliometric

1. INTRODUCTION

In recent years, the study of circular economy (CE) has gained significant attention from scholars as a concept that maximizes resource management sustainably, by reducing waste, extending product life, promoting material recycling, and updating productivity of resources (D'Adamo, 2019; Geisendorf & Pietrulla, 2018; Kaszás et al., 2022; Rudan, 2023). In addition, the circular economy aims to maximize resource efficiency through initiatives to reduce, reuse, and redistribute materials and products (Axhami et al., 2023; Costa et al., 2020). In this case, the circular economy seeks to create a more environmentally friendly economic recovery system and a more efficient resource-use rehabilitation system (Hernández et al., 2020; Sillanpää & Ncibi, 2019a). Aware of the importance of change and the presence of the concept of a circular economy, scholars have studied circular economy from a wide range of perspectives, including the tourism sector (Costa et al., 2020; Einarsson & Sorin, 2020; Kurtagić, 2018; Li et al., 2023; Priatmoko et al., 2021; Sørensen & Bærenholdt, 2020).

Several tourism studies acknowledge the pivotal role of the circular economy in transforming the industry, highlighting its potential contributions to economic, social, and environmental dimensions (Cornejo-Ortega & Dagostino, 2020; Renfors, 2023; Rodríguez et al., 2020; Yang et al., 2023). Embracing environmentally friendly practices aligns with the economic growth of tourism, manifesting

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tangible positive impacts throughout the industry value chain (Sifolo & Henama, 2021; Vatansever et al., 2021). Therefore, tourism needs to shift its practices from linear (take-make-dispose) to circular (take-make-use-remake) (Girard & Nocca, 2017). This shift retains the entirety of the intrinsic value of products, materials, resources, and detritus that remains within the economy (Sillanpää & Ncibi, 2019b). Thus, the proposed framework and general rules of this circular economy are very promising by suppressing waste production and using waste as a resource for other processes (Vatansever et al., 2021), which in this case are to rearrange a more sustainable (Rodríguez et al., 2020), robust, safe, and inclusive way of travel (Bosone & Nocca, 2022; Nocca et al., 2023).

Several scholars have discussed circular economy in the literature of tourism from a variety of perspectives, both the challenges of application and the benefits of the circular economy in the tourism industry (Martínez-Cabrera & López-Del-pino, 2021). Such a tourism study that deals with a circular economy from the perspective of climate change and the living environment, which has emphasized the importance of resource efficiency and contributing to reducing environmental impact. For example, minimizing the bulk of garbage, noise and water pollution (Giurea et al., 2022; Nocca et al., 2023; Rodríguez et al., 2020; Yang et al., 2023), promoting recycling and reuse, and decreasing the use of once-used plastics (Raab et al., 2023), implementing resource-saving strategies (Rodríguez-Antón & Alonso-Almeida, 2019), also using plastic bottles to pay for tickets (Nocca et al., 2023), it is all about minimizing the negative impact of climate change and the environment from tourism activities (Girard & Nocca, 2017). In addition, there are circular economy studies in tourism studies that relate to economic and business perspectives, in this perspective, the concept of CE in the tourism sector can contribute to economic development by generating economic value, e.g. promoting local resources, supporting local businesses and procurement of products and services, and also creating employment opportunities for community (Barros et al., 2021; Manniche et al., 2021; Rodríguez et al., 2020; Sifolo & Henama, 2021; Valls et al., 2019).

Moreover, the study of circular economy in tourism studies also produces a social perspective, where the importance of the involvement of stakeholders in empowering and inclusive societies (Melo Ribeiro & de Souza, 2022; Mosgaard et al., 2022; Valencia et al., 2023), for instance, by encouraging social entrepreneurship through the reuse of goods/goods and the preservation of culture (Rudan, 2023). In addition, in the social perspectives of CE in tourism studies it is necessary to develop innovative solutions and knowledge exchange for the sustainable tourism development (Bosone & Nocca, 2022; Rudan, 2023), involving various tourism actors including tourism operators, local communities, government, and NGOs (Sørensen & Bærenholdt, 2020).

Others, there is a policy and governance perspective in the circular economy of tourism literature (Axhami et al., 2023; Pamfilie et al., 2018). From this perspective, for example, introducing a series of policy measures and providing incentive support (Xu et al., 2022), in driving a circular economy in the tourism industry. Another example is the need for a policy framework that supports stakeholder collaboration and strengthening the value chain of supply chains of cooperative networks (Axhami et al., 2023; Rudan, 2023), where increased capacity and building environment development are needed to drive transition to a circular tourism economy (Bolger & Doyon, 2019), hence regulation, incentives, providing a framework, and developing supporting structures that support sustainable practices (Costa et al., 2020).

Finally, the CE in tourism study also discusses a digital and technological perspective (Nassanbekova & Yeshenkulova, 2022), in this way discussing how technology and innovation can facilitate the application of circular practices in the tourism sector. For example, the availability of digital platform innovations (Pencarelli, 2020) and crop technologies for eco-ecosystems in the circular economy ecosystem (Leow & Tan, 2020), as well as technology optimization in support of energy efficiency, greenhouse gas reduction, water conservation, and also food waste reduction (Ben Youssef & Zeqiri, 2022).

Finally, tourism studies have explored the circular economy from various perspectives, showcasing diverse examples that intertwine and contribute significantly to sustainable development. While literature emphasizes the vast potential for circularity in the tourism industry, there is a noticeable gap in understanding the evolving trends of circular economy research. This study aims to fill this void by offering a comprehensive overview of existing knowledge in circular economy literature related to tourism. Through bibliometric analysis, it seeks to map the research landscape, identify gaps, emphasize areas of consensus, and suggest potential avenues for future research. This analysis serves as a valuable

resource for scholars, policymakers, and practitioners seeking a deeper understanding of the circular economy's pivotal role in tourism. It provides insights into the current research landscape and unveils emerging areas of interest.

In consideration of the aforementioned context, this article outlines four research questions intended to furnish direction for researchers and scholars within the domain of the circular economy and the tourism industry. These questions are as follows:

- RQ1: What is the current state and trajectory of scientific research within the domains of circular economy and tourism?
- RQ2: What are the visualizations that depict the relationships between the circular economy and various subfields of tourism studies?
- RQ3: What insights can be extracted from the observed patterns within thematic currents in the context of circular economy and tourism?
- RQ4: What are the research gaps and concealed essential elements within the fields of circular economy and tourism, and how can these findings inform directions for future research?

2. MATERIALS AND METHODS

This article utilized bibliometric analysis as the primary method for examining the scientific literature pertaining to the intersection of tourism and the circular economy. Bibliometric analysis stands as one of the most frequently employed and reliable tools for literature review across diverse scientific domains, including tourism and the circular economy (Kabil, Abouelseoud, et al., 2022). Originating in the 1890s, this approach involves a systematic assessment of academic publications, facilitating the identification of emerging trends, influential contributors, and the evolving research landscape in this field (Osareh, 1996). This study conducted bibliometric analysis across three distinct stages: search queries and data collection, scientific production performance analysis, and network and cluster analysis, as depicted in the following Figure (1), employing diverse software and bibliometric techniques.

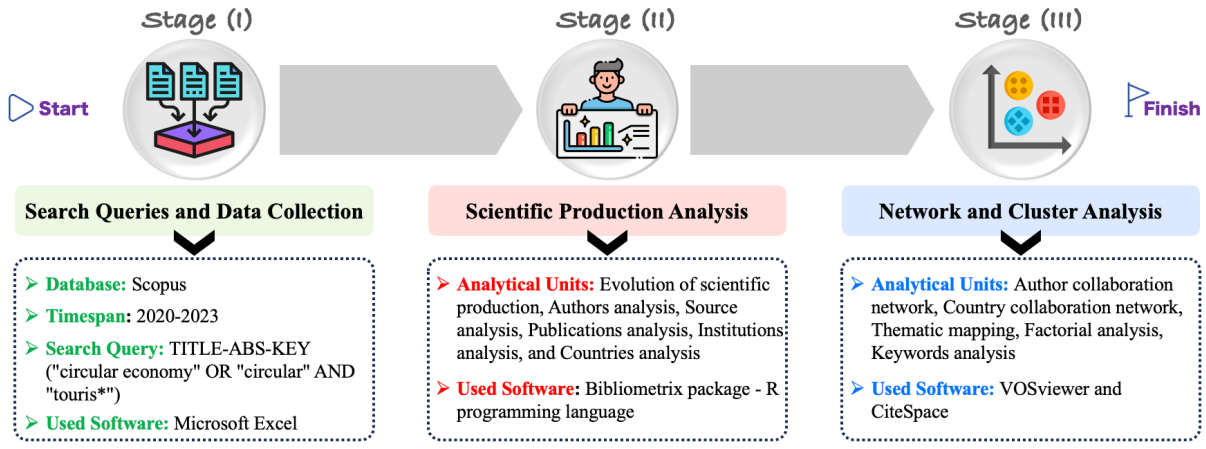

Figure 1. The Sequential Stages for Conducting Bibliometric Analysis of Circular Economy and Tourism Literature

2.1 Stage (I): Search Queries and Data Collection

The metadata utilized for this study were sourced from the Scopus database, employing the following search query: *TITLE-ABS-KEY ("circular economy" OR "circular" AND "touris*")*. The selection of these specific keywords was guided by several reasons. Firstly, we aimed to encompass a broad spectrum of all possible published articles linking circular economy to tourism. Secondly, the chosen keywords, "circular economy" OR "circular" AND "tourism," align closely with the core concept of the article and directly correspond to the article's objectives. For example, the primary term, "circular economy", focuses on literature explicitly centered on circular principles, while the inclusion of

"circular" and "tourism" widens the scope to encompass articles discussing circular practices in tourism, even without explicitly using the term "circular economy".

This comprehensive search was executed on August 12, 2023, and meticulously narrowed down to encompass solely those studies published in the English language between 2020 and 2022. This specific time frame was chosen because the primary objective of this article is to provide a current and up-to-date analysis of the scholarly discourse on the intersection of circular economy principles and the tourism industry during this pivotal period. The search criteria for inclusion were relatively broad, specifying only the English language and articles published in five scientific areas (e.g., social science, environmental science, economics, humanities, and decision science). This deliberate choice aimed to collect a comprehensive set of articles linking circular economy principles with tourism, enhancing the robustness of the analysis and findings. It is important to note that the collected articles underwent an extensive cleaning and evaluation process by the authors. This process ensured that each article aligned with the main aim of the study, resulting in a reduction in the number of articles from 234 to 181 during this stage. This refined set of articles forms the main dataset for investigation and analysis in this study. The primary software employed during this data preparation phase was Microsoft Excel, facilitating efficient data organization and refinement.

2.2 Stage (II): Scientific Production Performance Analysis

In this stage, a descriptive bibliometric analysis was employed to examine the fundamental attributes of the retrieved documents, encompassing the timeline of publication numbers, the most prolific authors, the most prolific sources, the articles with the highest citation counts, and the countries and institutions with the most productive contributions. The bibliometric analysis in this study relies on two foundational principles, namely Price's Law and Lotka's Law. Price's Law highlights that a small percentage of authors contribute the majority of publications in a specific field, while Lotka's Law suggests a mathematical formula for the unequal distribution of productivity among authors (Aria & Cuccurullo, 2017). These laws collectively underscore the concentration and distribution patterns of scholarly contributions in circular economy and tourism academic research.

Various recognition indicators, including total citations (TC), the number of publications (NP), the Hirsch index (h-index), and the journal impact factor (IF), were utilized. The primary software utilized for this purpose was the bibliometrix package in the R programming language (Aria & Cuccurullo, 2017), with the objective of offering a comprehensive overview of the amassed literature in the sphere of tourism and the circular economy.

2.3 Stage (III): Network and Cluster Analysis

This stage placed significant emphasis on the utilization of visualization techniques to unveil concealed and previously undiscovered relationships and research trends within the chosen dataset. Key attributes explored during this stage encompassed the author collaboration network, country collaboration network, thematic mapping, factorial analysis, keyword co-occurrence network, and keyword citation bursts. Within this context, the study harnessed the capabilities of two potent bibliometric analysis software tools, namely VOSviewer (van Eck & Waltman, 2010) and CiteSpace (Chaomei Chen, 2022; Chen, 2006). The inclusion of cluster analysis in this study aimed to systematically group various themes and key concepts discussed in the scientific production linking circular economy and tourism. For instance, specific clusters highlighted keywords that underscored the robust connection between circular economy and tourism, particularly in the scientific area of tourism waste management and others.

This research chose to utilize both tools for several reasons. Each software brings its unique strengths in terms of visualization. For example, VOSviewer proves excellent in constructing visual maps and comprehending keyword and thematic co-occurrence, while CiteSpace shines in identifying citation patterns, influential articles, and tracing the evolution of research trends over time. The decision to integrate both tools stems from the acknowledgment that this approach is endorsed by numerous researchers in the field of bibliometric analysis. It is a practice recommended for enhancing the analytical visualization of studies (Deng et al., 2020; Guo et al., 2019; Kabil, Abouelseoud, et al., 2022; Kabil et al., 2021; Tang et al., 2018; Zhao et al., 2019). By adopting this dual-tool approach, the study aimed to deliver a comprehensive and nuanced analysis.

3. RESULTS AND DISCUSSION

Based on the search query employed in this research, along with various refinements, a total of 181 articles were meticulously chosen to constitute the dataset, representing the scientific literature within the interdisciplinary field of circular economy and tourism. Figure (2) provides an overview of the primary characteristics of these articles, revealing a notable growth rate of 6.42%, which signifies a positive indication of the interconnectedness between the circular economy and tourism domains, particularly during the study period covering the last three years. These articles were collectively authored by 633 researchers and were published across 115 different journals and sources. Furthermore, they collectively featured approximately 754 keywords, serving as essential bibliographic information to decipher the research directions and prevailing thematic areas within this scientific domain.

Figure 2. Key Dataset Information (Articles Discussing Circular Economy and Tourism)

3.1 Scientific Production Performance Analysis

The scholarly output concerning the integration of the circular economy paradigm within the realm of tourism exhibits a discernible albeit moderate growth. This growth is evident in the number of articles, which increased from 39 publications in 2020 to 56 in 2022. Additionally, it is noteworthy to acknowledge that the count for published studies in 2023, presently standing at 47, remains incomplete due to the ongoing academic year, and it is expected that more articles will be published within the current year. Figure (3) below illustrates the progression of published articles in the field of circular economy and tourism.

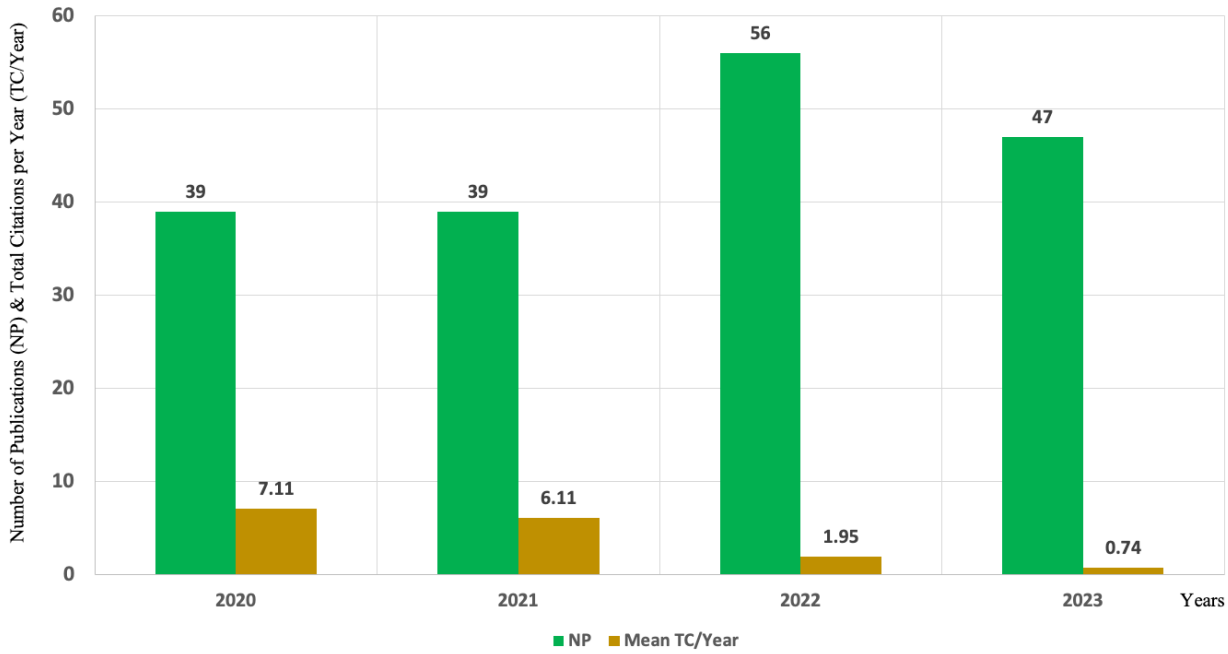

Figure 3. Scientific Production of Published Articles on Circular Economy and Tourism. Legend: NP (Number of Publications); TC (Total Citations)

Moving to the authors analysis, Table (1) presents a summary of the most productive authors in the context of articles related to the circular economy and tourism, based on the number of publications (NP). *Molinos-Senante M* emerges as the most prolific contributor with seven articles, illustrating his extensive engagement with this research area. Following closely is *Sala-Garrido R* with five articles, a commendable output that underscores his substantial involvement. *Maziotis A* and *Mocholi-Arce M* each have four publications, signifying their significant contributions to this field. The next group of authors, including *Liu J*, *Loizia P*, *Papamichael I*, *Voukkali I*, *Zorpas AA*, and *Amicarelli V*, have contributed three or two articles, further enriching the body of literature on the intersection of circular economy principles and the tourism industry. The fractionalized values indicate the average number of articles produced per year, shedding light on their sustained research efforts and impact within this interdisciplinary domain.

Table 1. Authors with the Highest Number of Publications on Circular Economy and Tourism

Authors	**NP**	**Articles Fractionalized**
Molinos-Senante M	7	1.92
Sala-Garrido R	5	1.17
Maziotis A	4	1.00
Mocholi-Arce M	4	1.00
Liu J	3	1.20
Loizia P	3	0.75
Papamichael I	3	0.70
Voukkali I	3	0.75
Zorpas AA	3	0.75
Amicarelli V	2	0.70

It is also noteworthy to highlight that the current year, 2023, appears to be particularly significant in terms of authors' contributions to published articles that bridge the connection between tourism and the circular economy. In contrast to the previous years, 2020, 2021, and 2022, where authors' contributions varied with some publishing articles while others did not, the year 2023 stands out as a year when all the most ten productive authors have contributed to the body of literature in this field. This observation indicates a notable advancement in the integration of the circular economy approach with tourism studies. Figure (4) below illustrates this trend and provides a visual representation of the authors' productivity over the years.

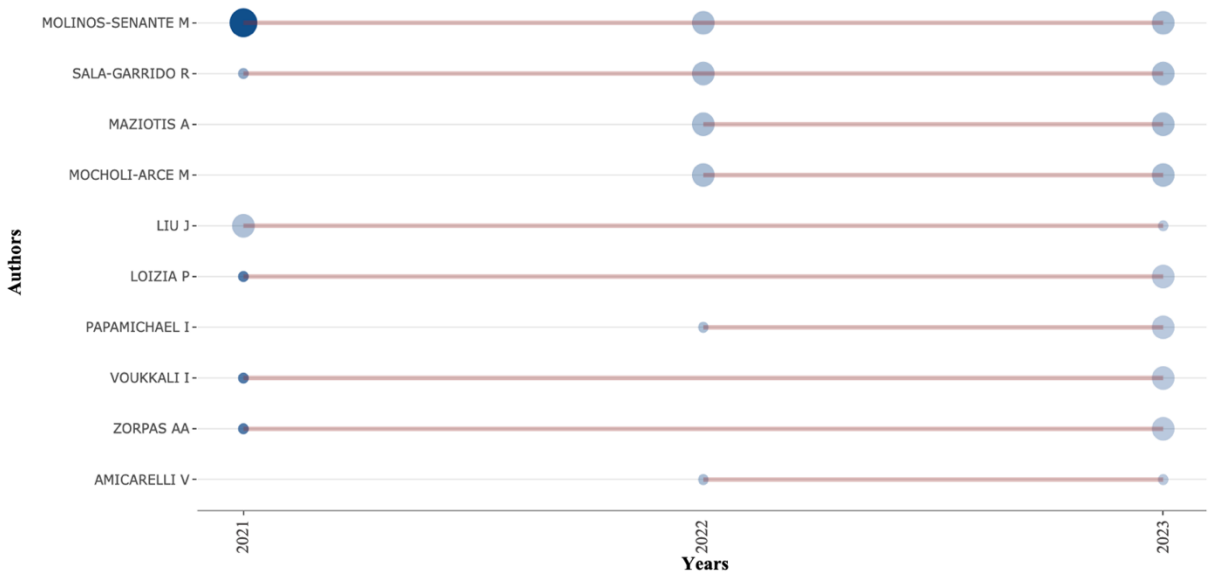

Figure 4. Authors Scientific Production Over the Years. Legend: Line (refers to publishing timeline); Point color intensity (refers to % of total citations TC/year); Point size: (refers to number of publications NP)

Regarding the analysis of sources, the visualization below (Figure 5) presents the rankings of the top 10 relevant journals that have published articles relevant to the circular economy and tourism, based on the number of publications (NP) and the total number of citations (TC).

In terms of NP, *Sustainability (MDPI)* occupies the top spot with 25 published articles, followed by *Environmental Science and Pollution Research (ESPR)* and *Worldwide Hospitality and Tourism Themes* journals, both with 6 published articles. The *Journal of Sustainable Tourism* takes the fourth position with 5 publications. The remaining journals in this list can be categorized into three groups: those that published 4 articles (e.g., *Science of the Total Environment*, *Journal of Tourism Studies*, and *Waste Management*), those with 3 articles (e.g., *Waste Management and Research* and *Journal of Environmental Management and Tourism - JEMT*), and the lone journal with 2 publications, *International Journal of Mathematical, Engineering and Management Sciences (IJMEMS)*.

From the TC perspective, several journals that were not on the NP list make an appearance. The most cited journal is *Resources, Conservation and Recycling* with 403 citations, followed closely by *Tourism Geographies* with 350 citations. *Annals of Global Health*, *Sustainability (MDPI)*, and *Information Technology and Tourism* secure the third to fifth positions with total citations exceeding 100, at 193, 186, and 171, respectively. The remaining journals in this list include *Water* (TC=97), *Marine Policy* (TC=43), *Annals of Tourism Research* (TC=40), *Waste Management and Research* (TC=39), and *Science of the Total Environment* (TC=32).

Upon examining these two lists of the top 10 relevant journals in the field of circular economy and tourism, categorized by NP and TC, a common pattern emerges. The journals ranked by NP reflect the quantity of research output, and only three journals in this list are specialized in the tourism field (e.g., *Worldwide Hospitality and Tourism Themes*, *Journal of Sustainable Tourism*, and *Journal of Tourism Studies*). This indicates that the connection between the circular economy and tourism, in terms of quantity, is still evolving and requires further exploration. This pattern is similarly evident in the journals ranked by TC, which underscores the impact and recognition of research within the field of circular economy and tourism. In this list, only three journals are primarily focused on the tourism discipline (e.g., *Tourism Geographies*, *Information Technology and Tourism*, and *Annals of Tourism Research*), highlighting the need for more comprehensive exploration and integration between these two areas.

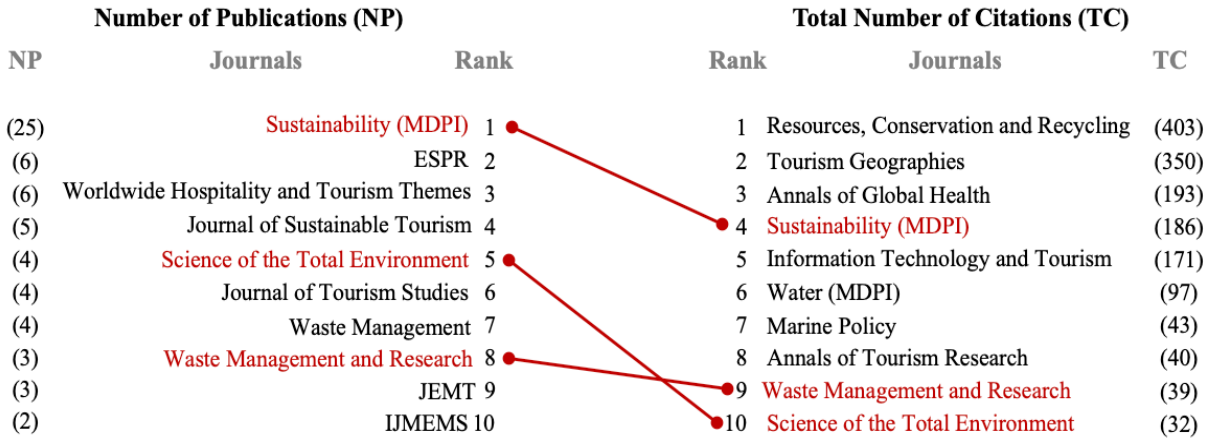

Figure 5. The most impactful sources. Legend: ESPR: Environmental Science and Pollution Research; JEMT: Journal of Environmental Management and Tourism; IJMEMS: International Journal of Mathematical, Engineering and Management Sciences; NP (Number of Publications); TC (Total Citations)

Turning our attention to the analysis of publications, the Table (2) below showcases the most highly cited articles within our examined dataset, focusing on published works at the intersection of the circular economy and the tourism industry. Notably, the article titled "*A critical analysis of the impacts of COVID-19 on the global economy and ecosystems and opportunities for circular economy strategies*" by (Ibn-Mohammed et al., 2021) stands out with a substantial TC of 400, exploring the multifaceted impacts of COVID-19 on the global economy, including tourism sector. Similarly, "*Human Health and Ocean Pollution*" (Landrigan et al., 2020) in with 193 citations underscores the intricate connection between human health and ocean pollution from the perspective of coastal tourism development. Furthermore, "*Lessons from COVID-19 can prepare global tourism for the economic transformation needed to combat climate change*" by (Prideaux et al., 2020) with 176 citations provides insights into how the lessons learned during the pandemic can inform the transformation of global tourism to address climate change within the framework of a circular economy. "*Transforming the (tourism) world for good and (re)generating the potential 'new normal'*" by (Ateljevic, 2020) and also published in "*Tourism Geographies*" with 174 citations explores the potential for positive change in the tourism sector as it adapts to new post-pandemic realities. The table also includes other valuable contributions, each exploring unique dimensions of the circular economy within the tourism realm.

Table 2. Authors with the Highest Number of Publication on Circular Economy and Tourism

Title	Author/Year	Source/Journal	TC
A critical analysis of the impacts of COVID-19 on the global economy and ecosystems and opportunities for circular economy strategies	(Ibn-Mohammed et al., 2021)	Resources, Conservation and Recycling	400
Human Health and Ocean Pollution	(Landrigan et al., 2020)	Annals of Global Health	193

Lessons from COVID-19 can prepare global tourism for the economic transformation needed to combat climate change	(Prideaux et al., 2020)	Tourism Geographies	176
Transforming the (tourism) world for good and (re)generating the potential 'new normal'	(Ateljevic, 2020)	Tourism Geographies	174
The digital revolution in the travel and tourism industry	(Pencarelli, 2020)	Information Technology & Tourism	171
Massive Influx of Pelagic Sargassum spp. on the Coasts of the Mexican Caribbean 2014–2020: Challenges and Opportunities	(Chávez et al., 2020)	Water (MDPI)	97
An emergency responding mechanism for cruise epidemic prevention—taking COVID-19 as an example	(Liu & Chang, 2020)	Marine Policy	43
Tourist practices in the circular economy	(Sørensen & Bærenholdt, 2020)	Annals of Tourism Research	40
Urban strategies evaluation for waste management in coastal areas in the framework of area metabolism	(Voukkali et al., 2021)	WM&R*	38
A Dashboard for Supporting Slow Tourism in Green Infrastructures. A Methodological Proposal in Sardinia (Italy)	(Balletto et al., 2020)	Sustainability (MDPI)	33

* WM&R: Waste Management & Research: The Journal for a Sustainable Circular Economy. Legend: TC (Total Citations)

Regarding the institutions and countries analysis, the presented table offers valuable insights into the affiliations and countries that have exhibited significant research activity in the realm of circular economy and its relationship with the tourism industry. In terms of the institutions analysis, the "*Pontificia Universidad Católica de Chile*" leads the ranking with seven publications, indicating a robust commitment to scholarly contributions in this area. Following closely is the "*University of Naples Federico II*" with five publications, signifying a substantial research output in this field. "*Brunel University London*" holds the third position with four publications, highlighting their active engagement in exploring the interface of circular economy principles and tourism. In the fourth position, several institutions, including "*Les Roches Hospitality School*", the "*Open University of Cyprus*", "*Universidad Nacional Autónoma de México*" and the "*University of KwaZulu-Natal*", all have four publications each, underscoring their collective contribution to the academic discourse in this interdisciplinary domain. Equally significant, "*University Of Salento*" stands at the eighth rank with four publications, while "*Chengdu University*" and "*De La Salle University*" each hold the ninth and tenth positions with three publications, respectively.

In terms of countries analysis, Italy leads the chart, solidifying its prominent role in this area with 31 publications. China follows closely with 26 publications, showcasing its robust engagement in scholarly endeavors related to circular economy and tourism. The United States stands at the third position with 20 publications, underlining its significant presence in this interdisciplinary field. Spain holds the fourth place with 19 publications, signifying its active participation in contributing to the academic discourse on the subject. Switzerland follows with eight publications, indicating its substantial research output within this domain. Chile, Cyprus, Portugal, and the United Kingdom share the sixth position with five publications each, demonstrating a global interest in exploring the links between the circular economy and tourism. Croatia rounds off the list with four publications, indicating its involvement in the research activities in this emerging and crucial area of study.

Table 3. Top 10 Most Productive Institutions and Countries in the Tourism and Circular Economy

Rank	Affiliation	NP	Country	NP
1	Pontificia Universidad Católica de Chile	7	Italy	31
2	University of Naples Federico II	5	China	26

3	Brunel University London	4	USA	20
4	Les Roches Hospitality School	4	Spain	19
5	Open University of Cyprus	4	Switzerland	8
6	Universidad Nacional Autónoma de México	4	Chile	6
7	University of KwaZulu-Natal	4	Cyprus	5
8	University Of Salento	4	Portugal	5
9	Chengdu university	3	United Kingdom	5
10	De La Salle University	3	Croatia	4

NP: Represents the Number of Publications

3.2 Network and Cluster Analysis

Understanding the collaborative relationships among authors who have jointly contributed to academic publications within the context of the circular economy and the tourism industry is of paramount importance. Such understanding aids in the identification of key contributors, influential researchers, and the dynamics of information and idea flow within the academic community (Kabil, Ali, et al., 2022; Osareh, 1996). Therefore, the following Figure (6) represents the author's collaboration network analysis in the field of circular economy and tourism literature.

The collaboration among authors in this scientific area has been categorized into eight main clusters. The first cluster, represented by the colour red, is labelled "Ocean Pollution" and boasts the highest number of authors, featuring 44 scholars such as Brucker-Davis F and Pedrotti ML. This cluster focuses on the implementation of circular economy practices and sustainable tourism initiatives to mitigate the impact of pollution, striving to create a more responsible and eco-friendly tourism sector. The second largest cluster, denoted in orange and labelled "Coast," is comprised of 14 researchers, including Francisco V and Masia L. This group explores the relationship between the circular economy and tourism in coastal areas, delving into the associated challenges and opportunities.

Next, the lime green cluster, named "Tourism Facilities," includes nine researchers such as Luis JC and Morales-Sierra S, who examine the application of circular economy principles within tourism facilities. The fourth cluster, in green, is titled "Residual Waste" and features seven researchers such as Molinos-Senante M and Sala-Garrido R. This group investigates the collection of recyclable waste and its relevance to the tourism and residential sectors. The fifth cluster, "Tourism Waste Management," encompasses six researchers, including Milanez GD and Villaflores O, and focuses on the linkage between circular economy principles from the waste management perspective and the tourism sector.

The following cluster, represented in blue and labelled "Tourist," comprises five members such as Bellia C and Altamore L. It explores the relationship between the circular economy and various tourism patterns, including agritourism. The seventh and eighth clusters, "Geomorphology" and "Agritourism Dynamics," respectively, each involve five researchers. They investigate diverse relationships between circular economy principles and different tourism patterns. It's worth noting that some authors who have

contributed to published articles on circular economy and tourism may not appear in this specific list as they might not be strongly connected to any particular cluster.

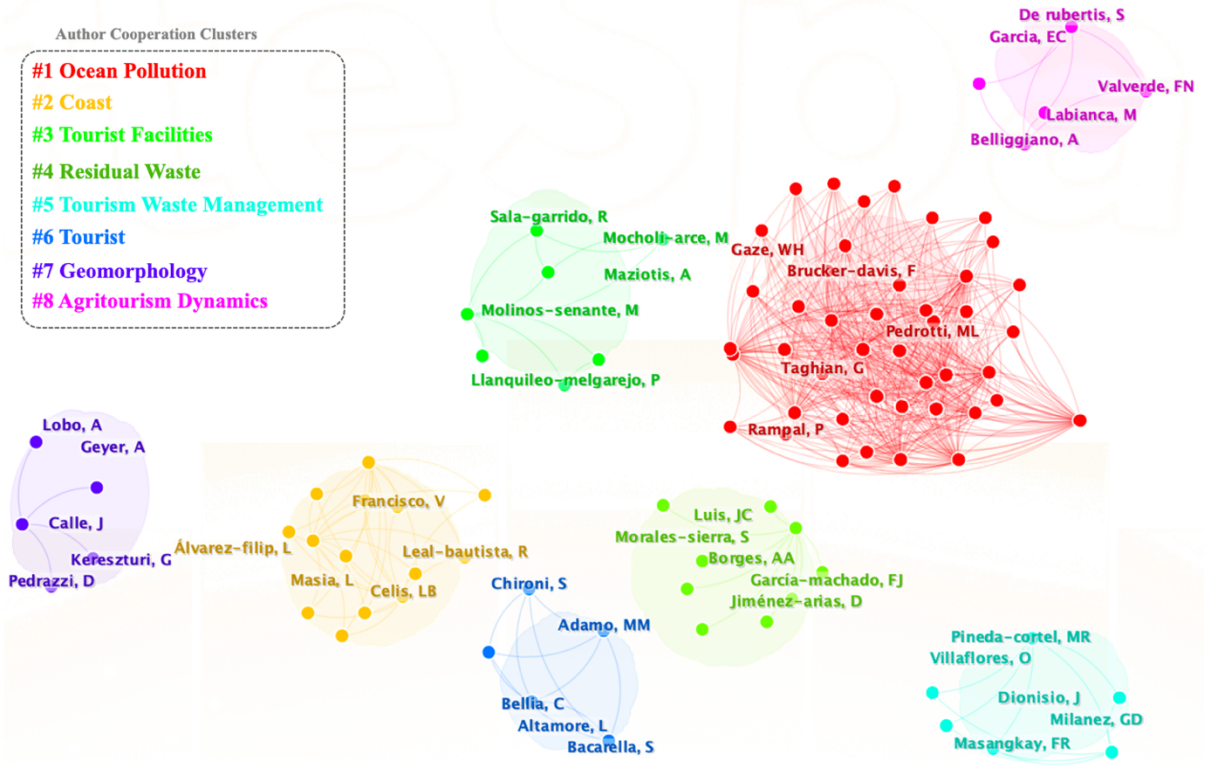

Figure 6. Clusters Based on Author Collaboration Network. Legend: Color (refers to different clusters); Link (refers to co-authorship); Link thickness (refers to co-authorship strength); Nodes (refers to authors). Note: these cluster formed using the following parameters in VOSviewer software (cluster resolution 0.03, minimum cluster size 1, merge small clusters, weighted mean silhouette 1 and harmonic mean 0.63)

Transitioning to the analysis of countries' collaboration in producing articles related to the circular economy and tourism, Figure (7) presents the countries' collaboration network based on corresponding authors. The primary objective of this network is to offer insights into international research partnerships and the global impact of academic research in the field of circular economy and tourism. This, in turn, aims to facilitate cooperation, knowledge exchange, and advancements within this research domain (Zupic & Čater, 2015). Upon examining this network, it becomes evident that Italy, Spain, China, and Switzerland emerge as the key contributors, as evidenced by their respective high total numbers of publications (NP) which stand at 31, 26, 20, and 19 articles. In the following tier, we find countries such as the United Kingdom (NP=8), Portugal (NP=6), Chile, Cyprus, and Greece (all with NP=5), with India rounding out the list with four publications.

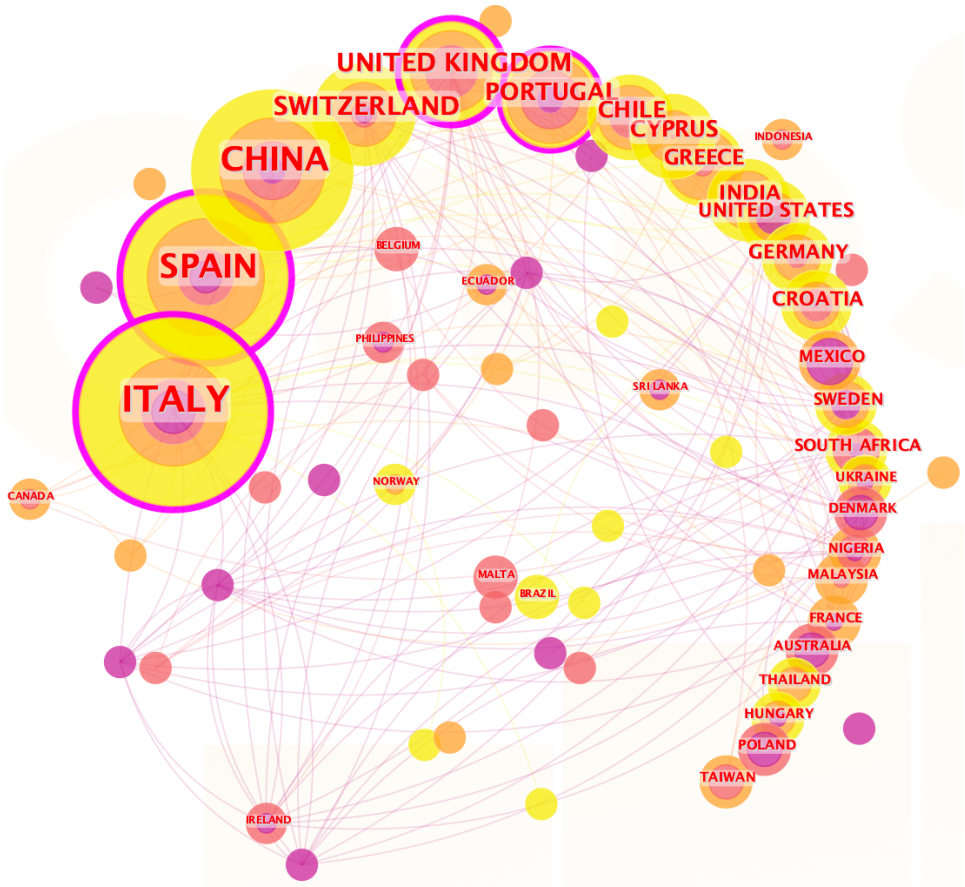

Figure 7. Countries' Collaboration Network Based on Corresponding Authors. Legend: Node (refers to countries); Node size (refers to country's number of publications); Link (refers to coloration between countries in publishing); Colors (refers to represent the temporal orders of co-occurrence links between countries); Pink outside circle color (refers to countries with centrality above 0.1/core countries). Note: this network formed using the following parameters in CiteSpace software (density 0.08 and modularity 0.45)

The analysis of the circular economy and tourism literature unveils critical insights into the research landscape. Visual representations, such as the Thematic Map and Factorial Analysis (Figure 8 and Figure 9), play a pivotal role in understanding the themes and trends that have shaped this scholarly domain. The Thematic Map is particularly instrumental, as it categorizes research themes into four distinct quarters based on density and centrality, offering a nuanced view of the research landscape (Zeggelink et al., 1996). One quarter of the Thematic Map highlights "Emerging/Declining Themes", characterized by low density and low centrality. These themes represent relatively new and less-explored concepts in the context of the circular economy and tourism. Examples, such as land use, transportation model travel time, and travel behaviour, underscore these themes' less prominent status within the academic community.

Conversely, another quarter signifies "Basic Themes", denoted by low density and high centrality. These are foundational topics that have undergone extensive research, forming the bedrock of the circular economy and tourism literature. "Controlled studies" stands as an example, showcasing the widespread recognition and well-established analytical method for analysing the studies in this research area. The "Motor Themes," occupying a quarter with high density and high centrality, are both highly researched and influential in the field. These themes, such as waste management, tourism, sensitivity analysis, environmental impact, eco-tourism, and sustainability, lead to a wealth of related research and discussions, reflecting their central position in the circular economy and tourism scholarly discourse. Lastly, the "Niche Themes," found in the quarter with high density and low centrality, represent specialized or emerging areas of study. While they exhibit a concentrated body of research, they have not yet gained mainstream recognition. An example within the circular economy and tourism literature

is the "tourism market", indicating significant research interest within a specialized subfield but limited recognition in broader academic circles.

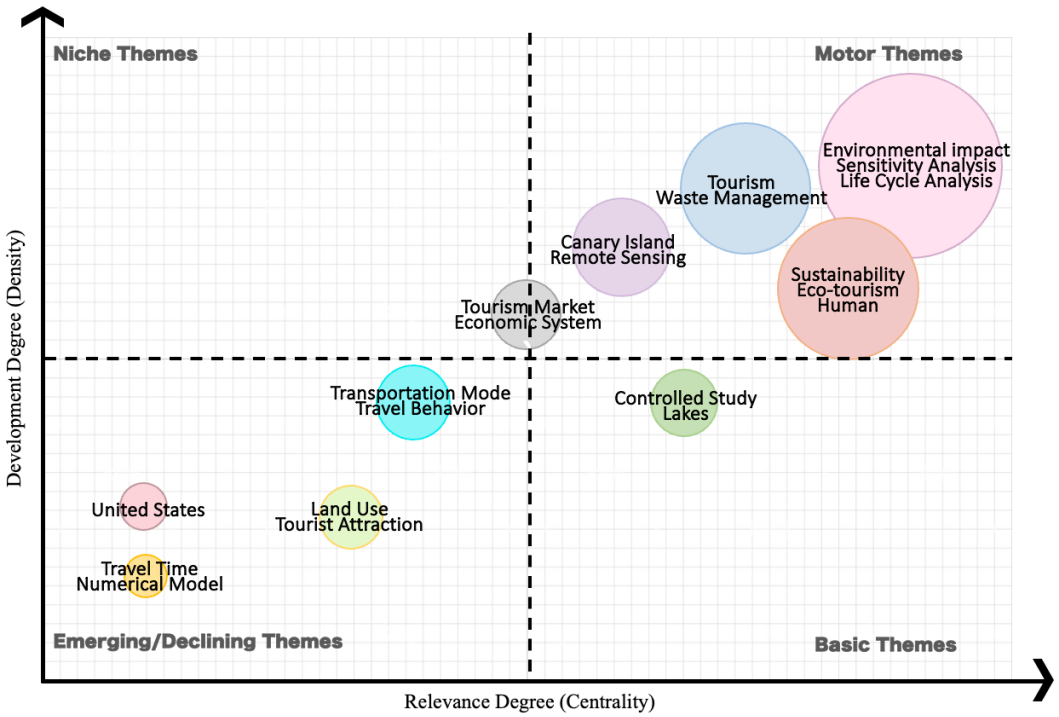

Figure 8. Thematic Map. Legend: Color (refers to different themes); Node size (refers to the number of sub-themes that form the node)

Figure 8 displays the results of the factorial analysis, which is a conceptual structure map created through multiple correspondence analysis (MCA) and keywords plus (Valderrama et al., 2022). This map illustrates the interconnected topics within the context of circular economy and tourism literature, forming two distinct clusters. The first cluster, highlighted in red, emphasizes the topics that bridge the circular economy with sustainability in the tourism sector. Within this cluster, one can find subjects like climate change, environmental economics, spatiotemporal analysis, tourism management, recycling, and sustainability, among others. The second cluster, depicted in blue, focuses on the relationship between sustainable resource management, a foundational element of the circular economy, and the tourism industry. This cluster includes key topics such as waste disposal, solid waste, population density, and more.

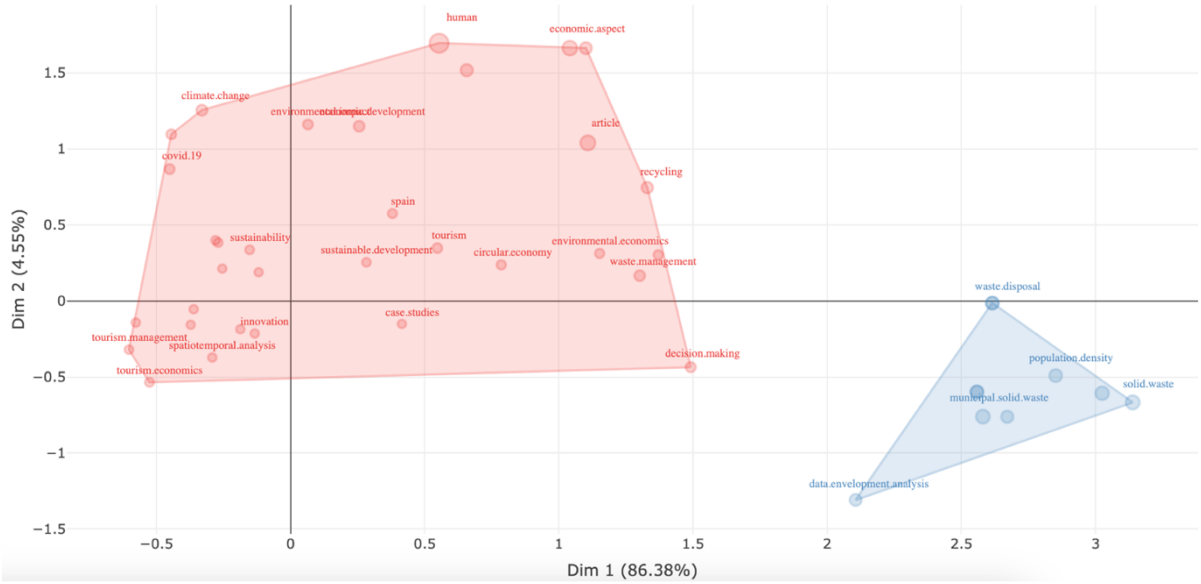

Figure 9. Factorial Analysis - Conceptual Structure Map Based on Multiple Correspondence Analysis (MCA) and Keywords Plus. Legend: Node (refers to keywords plus); Node size (refers to node frequency/importance); Color zone (refers to different clusters or categories)

Furthermore, to gain deeper insights into the intricacies of the scholarly discourse on circular economy and its intersection with the tourism industry, a keyword network analysis was conducted using VOSviewer (see Figure 10). This visual representation goes beyond the traditional tabulation of keywords and offers a dynamic perspective of the relationships among the various concepts within our dataset. The generated keyword network not only reaffirms the core thematic elements identified earlier, but also reveals additional keywords and their connections, painting a more comprehensive picture of the nuanced discussions within this field. For example, Figure 8, displaying the keyword network analysis, clearly highlights the connections between tourism, the circular economy, and sustainability. This underscores the significance of the circular economy approach in achieving sustainability within the tourism sector, a central theme in most of the articles published in this scientific area. Additionally, the analysis reveals a connection between waste management, a fundamental aspect of the circular economy, and economic sectors, including tourism.

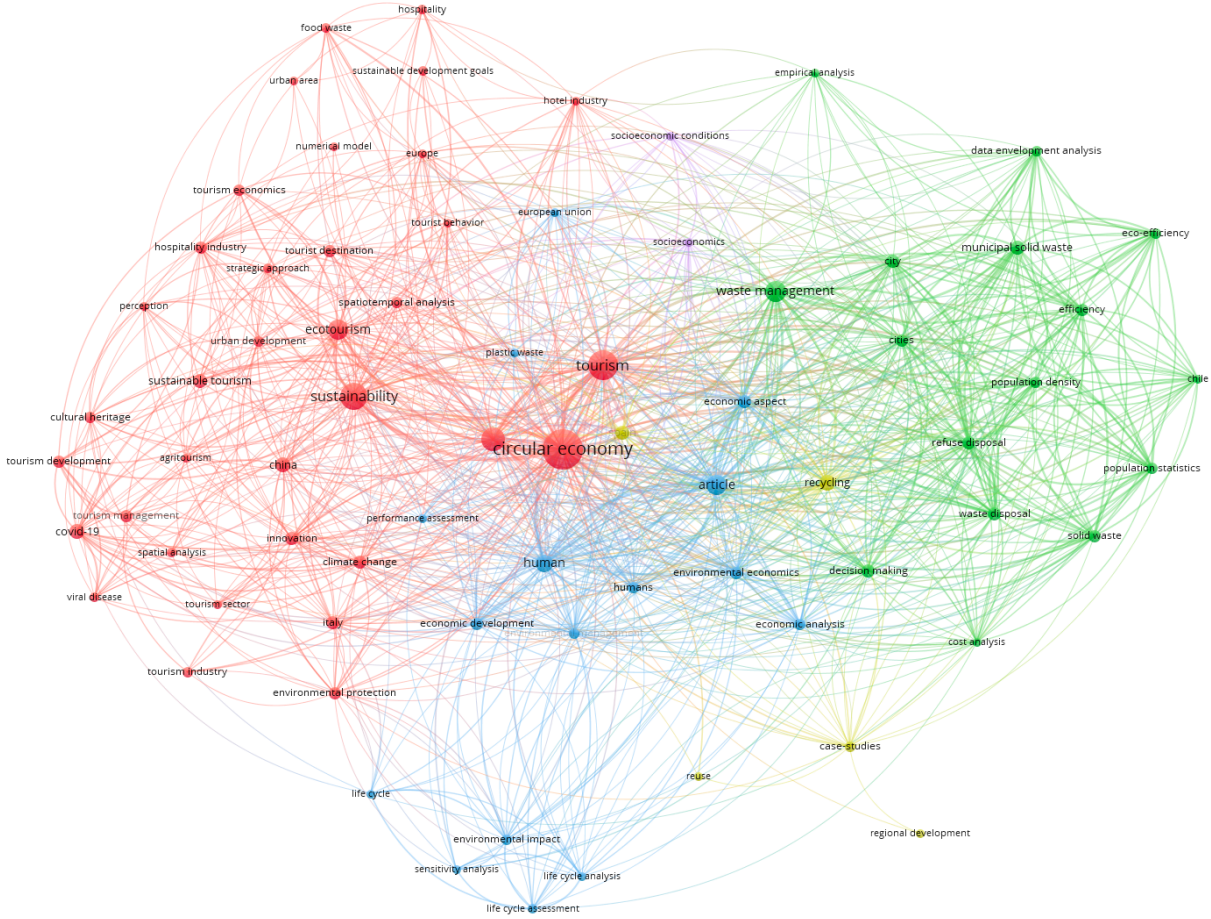

Figure 10. Keywords Co-occurrence Network. Legend: Node (refers to keywords); Node size (refers to keywords frequency); Link (refers to realtion between keywords); Colors (refers to temporal orders of appearance of keywords - lighter color means closer time). Note: this network formed using the following parameters in VOSviewer software (cluster resolution 0.021, minimum cluster size 1, merge small clusters, weighted mean silhouette 1 and harmonic mean 0.84).

4. EXPLANATORY NOTES

The connection between the circular economy and the field of tourism is a vital theme that emerges from our comprehensive literature review study, although it is still in its nascent stages. However, it is not the sole insight to be gleaned from the results of this review. Beyond this fundamental relationship, there are other noteworthy findings that warrant our attention. This particular significance is the role of the circular economy in shedding light on specific dimensions within the tourism sector. These dimensions are instrumental in guiding the transformation of the tourism industry, shifting its focus from mere sustainability with a goal of doing " less damage" to the concept of regenerative tourism, wherein the industry aims to "give back" (Dredge, 2022; Gonella et al., 2023).

This study highlighted several key themes and concepts that have shaped the relationship between the circular economy approach and tourism studies. One such theme is “tourism waste management” which is considered a cornerstone of the circular economy within tourism. Waste reduction, recycling, and repurposing are key strategies to minimize the environmental impact of tourism activities (Allevi et al., 2021; Mandpe et al., 2023). Regenerative tourism encourages innovative waste management practices that contribute to the health of the local environment and communities (Bellato et al., 2023). Furthermore, our investigation has underscored the importance of certain tourism patterns in the broader context of the circular economy. Notably, “ecotourism” and “agritourism” have surfaced as key elements that emphasize the conservation and sustainable utilization of natural resources. Regenerative tourism promotes ecotourism practices that support local ecosystems and contribute to their recovery.

Simultaneously, it encourages sustainable farming practices that enhance the natural environment, promote local agriculture, and enhance agritourism.

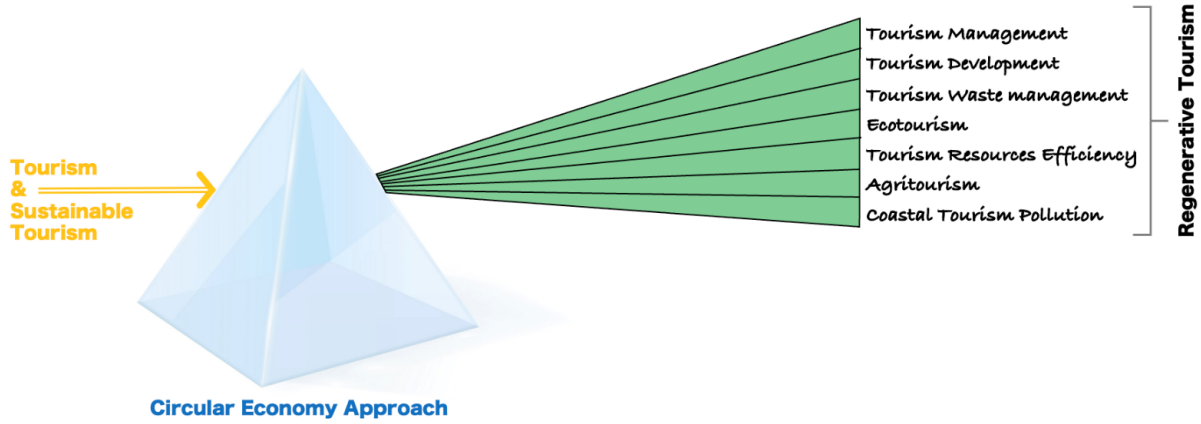

Figure 11. The Role of the Circular Economy in Shifting Tourism/Sustainable Tourism Toward Regenerative Tourism

5. CONCLUSION, LIMITATIONS AND FUTURE AGENDA

In this study, a comprehensive bibliometric analysis was conducted to explore the scholarly literature at the intersection of the circular economy and the dynamic tourism sector. The research objectives were centred on unveiling crucial themes, identifying influential sources, and gaining insights into the evolving landscape within this emerging field. A dataset comprising 181 articles was meticulously extracted from the Scopus database.

The key findings of this investigation underscore the growing interest in the circular economy approach within the realm of tourism studies. However, this relationship is still in its nascent stages, as evidenced by several bibliometric variables, including the total number of publications and the total number of citations in the scientific literature that connects circular economy principles and tourism. For instance, the keyword analysis shed light on various dimensions of tourism influenced by the circular economy, such as waste management, recycling, sustainability, and ecotourism. Additionally, the author analysis revealed the most productive researchers in this scientific area, including researchers such as *Molinos-Senante M* and *Sala-Garrido R*. Notably, the sources analysis emphasized that the academic exploration of the relationship between tourism and the circular economy is still in its early stages. This was evident from the results of two lists: the most productive sources based on the total number of publications (NP) and the total citations (TC). Both lists featured only a limited number of sources and specific journals directly related to tourism. Notably, three sources appeared in each list, such as the *Journal of Sustainable Tourism*, *Journal of Tourism Studies*, *Journal of Environmental Management and Tourism*, and *Tourism Geographies*.

While offering insights into the evolving landscape of circular economy principles in the tourism sector, this study acknowledges its limitations. It focuses solely on English-language publications from 2020 to 2022, excluding grey literature and non-academic sources. This exclusion may have overlooked valuable insights from industry reports and government publications. Methodologically, the bibliometric analysis, though informative, provides a quantitative assessment, potentially missing qualitative nuances. Future research could address these limitations by incorporating non-academic sources and conducting longitudinal analyses to trace the evolution of circular economy principles in tourism over an extended period. Exploring regional and cultural variations in how these principles are integrated into tourism practices could also be a fruitful avenue for further investigation, providing insights into unique challenges and opportunities across different global contexts.

Future research directions may also consider the temporal aspect by conducting longitudinal analyses to trace the evolution of the relationship between circular economy principles and tourism over a more extended period. This can provide a better perspective on the trends and changes that might be occurring in the academic discourse. Lastly, considering the regional and cultural diversities in how circular economy principles are integrated into tourism practices, future studies may benefit from examining the

regional variations in this regard, shedding light on the unique challenges and opportunities specific to different global contexts.

AUTHOR CONTRIBUTIONS

Moaaz Kabil: Conceptualization, methodology, investigation, resources, and writing original draft preparation.
Al Fauzi Rahmat: Methodology, visualization, and writing original draft preparation.
Mihály Hegedűs: Conceptualization, investigation, and visualization.
Bernadett Galovics: Resources and methodology.
Lóránt Dénes Dávid: Supervision, project administration and funding acquisition.

DECLARATIONS

Competing interests The authors declare no competing interests.

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ACKNOWLEDGEMENTS

This work was supported by the Flagship Research Groups Programme of the Hungarian University of Agriculture and Life Sciences.

Funding

This research was funded by the Hungarian National Research, Development, and Innovation Office (project TKP2021-NVA-22) and by the Hungarian Ministry of Technology and Industry (project KEHOP-3.2.1-15-2021-00037).

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