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Green innovation and green practices in tourism, hospitality and foodservice: A bibliometric analysis

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Abstract

This study provides a bibliometric overview of research on green innovation and green practices in tourism, hospitality, and foodservice-related contexts. Data were collected from Web of Science and Scopus. The data were analyzed in RStudio using the Bibliometrix/Biblioshiny package. The study evaluates annual scientific outputs alongside influential publishing sources and highly cited papers. To map the field's conceptual framework, country-level production, cross-border collaborations, and keyword co-occurrences are analyzed. Furthermore, a thematic map highlights emerging trend topics, while the data selection process is visualized through a PRISMA Flow Diagram. The findings 1) indicate that research on green innovation and green practices has grown in recent years, particularly after 2021, and 2) point to a need for further research on how green innovation and green practices are developed, implemented, and perceived in food and beverage businesses.

Keywords: *Green innovation, Green practices, Tourism and hospitality, Foodservice, Bibliometric analysis*

1. Introduction

Sustainability has been central to academic and applied discussions in recent years, and businesses are developing sustainable strategies to build competitive advantage. In the context of sustainability-focused activities in food and beverage businesses, the three most important areas are supply chain management, operational efficiency, and brand value studies (Namkung & Jang, 2013; Wang et al., 2013; Xu & Gursoy, 2015). Product preparation and presentation also have significant environmental impacts; therefore, businesses must develop strategies for sustainable practices. Food and beverage businesses can improve environmental performance through strategies across water and energy efficiency, waste reduction, carbon management, packaging, and local supply practices (Erdogan & Baris, 2007; Wang et al., 2013). Furthermore, such strategies allow businesses to differentiate themselves from competitors offering related products or services. Empirical studies examining the impact of strategic applications of green innovation on performance show that they provide businesses with a competitive advantage in product and process innovation (Chen et al., 2006). Literature related to green branding indicates that businesses' sustainable activities have positive results, including green brand image, green customer satisfaction, and green trust, and it has been shown that this perspective should be considered not only in terms of perception, but also in terms of its capacity to create loyalty (Chaudhuri & Holbrook, 2001; Chen, 2010).

More recently, bibliometric analysis has emerged as a widely used research approach (Donthu et al., 2020; Khan et al., 2021), offering a convenient method for processing large volumes of scientific data and achieving high research impact. Bibliometric analysis helps identify trends related to the research topic, reveal collaboration models, and understand research components (Donthu et al., 2020, 2021; Verma & Gustafsson, 2020). Bibliometric analysis is considered a method used to understand substantial amounts of unstructured data. The aim of analyzing and understanding such a vast amount of information is to gain a general perspective and generate innovative insights into the research topic (Tranfield et al., 2003).

This study outlines the literature on green innovation in the tourism and hospitality industry using bibliometric methods. The study specifies publication dynamics, influential journals and countries, thematic clusters, collaboration patterns, and emerging trends. The aim is not to claim that food

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** Ethics committee approval was not required for this study because it relies on publicly available bibliographic data and does not involve human participants, surveys, interviews, or any direct data collection.*

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and beverage research is already a mature subfield, but to show how it appears within the wider tourism and hospitality literature.

Although earlier studies have examined green innovation in different sectors and contexts, fewer studies have mapped how this literature is structured within tourism, hospitality, and foodservice-related research. In this context, the article positions food and beverage as an emerging application area within the wider tourism and hospitality literature.

The paper first reviews the related literature and then presents the research questions. Next, the methodology section outlines the data selection criteria and search strategy, detailing the bibliometric workflows conducted in RStudio using the bibliometrix package. The results section then reports the main bibliometric findings. It analyzes annual scientific production, influential sources, and highly cited documents. This section also explores keyword co-occurrences and thematic maps, trend topics, and the PRISMA Flow Diagram. The paper concludes by discussing theoretical and practical implications, addressing limitations, and proposing directions for future research.

2. Literature review

2.1. Innovation

Businesses implement different innovative strategies to increase market share and ensure their continued existence. These strategies have become crucial for differentiation. Successfully implementing these strategies can strengthen a business's market position and provide a competitive advantage (Gürlek & Tuna, 2018).

Productivity is one of the primary reasons why innovation has become a crucial tool for businesses; innovative experiments can lead to new approaches and increased productivity in the long term. Even if experiments fail in the short term, this failure lays the groundwork for new approaches, enabling businesses to develop goal-oriented strategies (Chesbrough, 2010). Innovation can be conceptualized as a multidimensional construct consisting of product, process, marketing, and organizational innovation. Product innovation can be defined as the re-launch of a product that has been renewed or improved in terms of features or purpose. Planned improvements in the re-launch include technical specifications, materials used, software, and functional features.

The definition of "product" includes goods and services (OECD & EU, 2002). Green products may be classified according to the environmental benefits they offer at different stages of their life cycle (Dangelico & Pontrandolfo, 2010). Furthermore, product innovation has a multi-dimensional structure because numerous factors influence it. For instance, factors such as a business' diverse technological infrastructure and organizational skills highlight the need to operate in an integrated manner with the market (de Medeiros et al., 2014).

Process innovation is summarized as the renewal or improvement of production or delivery processes. Implementing significant changes in hardware or software constitutes a significant part of process innovation. Process innovation is utilized to reduce unit costs, improve quality, produce new or improved products or services, and improve delivery processes. One example of process management cited is the introduction of a new booking system in travel agencies (OECD & EU, 2005). From a green innovation perspective, process innovation encompasses operational transformations such as energy and water efficiency, waste reduction, emission reduction, reducing the environmental impact of cleaning and sterilization processes, and supply and logistics optimization. This perspective highlights the importance of addressing process innovation from an institutional and societal standpoint (Rennings, 2000). Furthermore, research indicates a complementary structure between green process innovation and green product innovation (Xie et al., 2019).

Marketing innovation refers to adopting new methods in product design or packaging, product placement, promotion, and pricing to respond more effectively to customer needs and expectations. The main goals of marketing innovation include repositioning the product in the market to reach new markets and increase sales share; this strategy can apply to new and existing products (OECD & EU, 2005). When considering marketing innovation, the goal is to evaluate it based on the components of the marketing mix and design an innovation that incorporates these components (Purchase & Volery, 2020). Even in products without technological changes, implementing an innovative application within the marketing mix can create customer value and be considered marketing innovation (Grimpe et al., 2017).

Organizational innovation is defined as implementing a renewed organizational management strategy across a company's practices, organizational activities, and relationships with external stakeholders, and it can include planned training programs for employees within a company. The aim is to reduce administrative and operational costs and increase workplace satisfaction (OECD & EU, 2005). Organizational innovation aims to ensure internal coordination within the business, conduct necessary measurements, and create a control mechanism, with the goal of implementing new management strategies for businesses and improving performance accordingly (Birkinshaw et al., 2008; Mol & Birkinshaw, 2009).

2.2. Green innovation

Green innovation is described as the development and implementation of new products/processes, services, management practices, or business models within the organization. Green innovation is associated with the innovation activities designed to reduce environmental harm and improve environmental performance. Throughout the life cycle of a product or process, these practices may help reduce resource use, pollution, environmental risks, and negative ecological effects (Gürlek & Çemberci, 2019; Gürlek & Tuna, 2018; Lin

et al., 2014). From a wider theoretical standpoint, Schumpeter (1934) conceptualized innovation as a driving force of economic development and described it as doing things differently.

Within Schumpeterian Innovation Theory, innovation is categorized into five forms: introducing a new product, developing a new production process, discovering a new source of input, creating a new industrial structure, and opening a new market. In recent years, climate change and environmental degradation have increased customer awareness of environmental issues. As a result, customers have shown greater interest in environmentally friendly products and services (Abbas & Sağsan, 2019; Altunöz et al., 2014; Gürlek, 2021; Kim et al., 2020). The increasing demand and growing knowledge of green innovation have led to constant changes in business strategies.

Firms may use green innovation to maintain or expand their market share and strengthen their competitiveness in the sector (Sellitto et al., 2020). Strategic moves in green innovation not only provide businesses with a competitive advantage but also help them minimize energy costs (Gürlek & Tuna, 2018). Because of these effects, green innovation has become an important topic in the literature (Hojnik & Ruzzier, 2016; Zhang, Sun et al., 2020). However, while a comprehensive range of studies examines green innovation in the manufacturing sector, research in the tourism sector remains limited (Garay et al., 2019; García-Villaverde et al., 2017; Gürlek & Tuna, 2018). Given tourism's negative impacts on the natural environment, a detailed examination of the issue is crucial.

Key problems include damage to natural resources, biodiversity loss, and air pollution from tourism development (De Grosbois, 2012; Gürlek & Tuna, 2019). However, given tourism's significant contributions to the regional and national economy, it seems impossible to ignore the sector. WTTC's *"Latest Environmental and Social Survey"*, prepared in collaboration with the Saudi Arabian Ministry of Tourism, reveals that the travel and tourism sector accounted for 6.5% of global emissions in 2023. This figure decreased from 7.8% in 2019, indicating the impact of efforts in this area (Lenzen et al., 2018; WTTC, 2025). These findings underscore the importance of green innovation in the tourism sector, whose increasing resource consumption and carbon dioxide emissions highlight the growing need for green innovation (Cocca & Ganz, 2015).

Chen et al. (2006) described green innovation as "software or hardware innovation in green products or processes." Chen et al. (2006) highlighted innovation practices related to energy conservation, pollution prevention, waste sorting, and corporate environmental management. A review of the relevant literature indicates that two main definitions of green innovation stand out. The first highlights green innovation's contribution to the ecological environment and focuses on corporate environmental and process innovation (Schiederig et al., 2012). The second definition describes innovation as a managerial process and innovative activity, emphasizing topics such as reducing environmental pollution, efficient resource use, production processes, and technology (Zhang & Zhang, 2013).

Digital transformation efforts, primarily in the manufacturing sector, enable the development of innovative technologies and, consequently, the creation of new processes (Abrell et al., 2016). Accordingly, green innovation is defined as green, safe, and optimized product and service outputs. Li et al. (2022) explain green technological and product innovation through the use of new technologies in place of traditional tools and methods. They also emphasize applying these technologies across different stages of the value chain, including research, design, supply, procurement, marketing, and logistics.

Green innovation can improve business performance, but it is also seen as a strategy to prevent potential competitors from entering the market (Chang, 2011). Leenders and Chandra (2013), taking a different approach, evaluate green innovation through its product and process dimensions, highlighting products' ecological features, support for waste recycling, and the development of innovative technologies. Taken together, these approaches suggest that green innovation gives businesses a competitive advantage and enables those offering related products or services to differentiate themselves.

Green innovation aims to create innovations by avoiding or minimizing harm to the environment. The goal is for businesses to combine their knowledge and skills in this field to make a strategic move, and consequently, strengthen their market position (Chen et al., 2006). Environmentally friendly products differentiate themselves from conventional alternatives and help build a positive consumer image (Leal-Millán et al., 2016). Supporting such environmental initiatives also helps prevent potential environmental protests (Henriques & Sadorsky, 1999). Early adoption of green innovation practices may enable firms to pursue premium pricing strategies, thereby contributing to higher profitability through first-mover advantage (Peattie & Ratnayaka, 1992).

Green innovation is commonly conceptualized along four main dimensions: green product, process, managerial, and marketing innovation. Firms that effectively implement these dimensions may strengthen customer responses by fostering an environmentally responsible corporate image (Ahmed et al., 2023). This positive synergy can also strengthen financial performance. In their research, Yunzhao (2022) and Ahmed et al. (2023) focused on the organization, green innovation, and its environmental consequences, showing increased performance from combining green innovative initiatives with green operational planning and creativity. The research also showed that creative, environmentally supportive strategic planning positively influenced the customer perspective and positively impacted sales.

Rennings (2000) explains sustainable development in relation to three main types of innovation: technological,

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social, and organizational innovation. Building on this, Hellstrom (2007) emphasizes that businesses aiming to implement green innovation should consider three fundamental dimensions: technology, society, and institutions. In this vein, Li et al. (2022) conducted an in-depth study, examining green technological innovation with four fundamental dimensions: green technological innovation, green product innovation, green organizational innovation, and green environmental innovation, and were the first to use mapping to determine these dimensions. Beise and Rennings (2005), in their examination of the international diffusion of environmental innovations, addressed two dimensions of green innovation: technological and organizational innovation.

Frondel and Horbach (2008) investigated what triggers environmental management and innovation, focusing solely on the environmental innovation dimension. Noppers et al. (2014), in their study on the adoption of sustainable innovations, focused on technological and product innovation. Carrion and Innes (2010), evaluated the concept of green innovation through the dimension of environmental innovation. El-Kassar & Singh (2019), focusing on green innovation and organizational performance, examined the issue through the lens of technological innovation. Cainelli et al. (2012) focused on the environmental innovation dimension. By contrast, Brunnermeier and Cohen (2003) focused specifically on the manufacturing sector and, in their study on the determinants of environmental innovation, examined the dimensions of product and organizational innovation.

Green technological innovation primarily aims to reduce environmental pollution and promote resource conservation by improving technologies and processes. The widespread use of waste separation and recycling tools is a key potential environmental benefit of green technological innovation, leading to more efficient resource use and reduced emissions, among other outcomes (Visnjic et al., 2020). As innovative technologies become more widespread, organizational management strategies also change, and business awareness increases. The literature suggests that the rise in green patents clearly indicates the diffusion of green innovation (Hu et al., 2021).

The European Commission conceptualizes green product innovation as products that minimize resource use and prevent waste generation to diminish potential environmental risks (Qi et al., 2018). Green product innovation aims to solve or reduce potential problems during production, such as environmental pollution and resource depletion (CEC, 2001). Businesses' green product designs, certifications, and investments enable green product innovation. The level of green product innovation may also be related to the market position of green products (Dangelico, 2016).

Existing studies on green corporate innovation reveal that most research focuses on country-, region-, and sector-specific studies rather than examining individual organizations in this field (Rennings, 2000). Green corporate innovation refers to the organizational dimension of green innovation. It covers the use of green technologies, green products, and environmental management practices within the firm. Through green technology standards, businesses may improve energy efficiency and support environmental management (Sui et al., 2015).

Green innovation can be theoretically explained through firm-level and consumer-level perspectives. According to the resource-based view, valuable, rare, difficult-to-imitate, and well-organized resources can support sustained competitive advantage (Barney, 1991). The natural resource-based view applies this argument to the environmental side of business activity. According to Hart (1995), environmental capabilities such as reducing pollution, managing products responsibly, and supporting sustainable development can help companies obtain competitive advantage. This perspective emphasizes that green innovation may help firms use resources more carefully and reduce environmental harm. It may also help them improve their market position.

From the customers' perspective, signaling theory helps explain how people interpret green practices. Sometimes, customers lack direct access to information about a firm's real environmental responsibility or credibility. In these situations, visible practices can signal the firm's environmental commitment and reliability (Spence, 1973). In food and beverage businesses, customers' perceptions of green value, trust, and business image may be affected by variables such as waste reduction, local sourcing, energy efficiency, sustainable packaging, and environmentally responsible service design.

Social exchange theory could also help explain customer responses. Blau (1964) argues that social relationships are based on value, reciprocity, and trust; accordingly, customers may respond more positively when they find green innovation and green practices reliable, useful, and consistent with their expectations. These responses may include satisfaction, trust, positive word-of-mouth, or stronger behavioral intentions. Thus, green innovation should not be limited to operational or environmental activities. Conversely, in tourism, hospitality, and foodservice businesses, green innovation can help firms present their environmental efforts more clearly and build more positive customer responses.

2.3. Green innovation and tourism

Recent tourism and hospitality studies also show growing interest in green innovation. Jo et al. (2026), for example, discuss technological innovation as a way to support green growth in tourism. They suggest that destinations and tourism businesses can move toward more sustainable practices through technological change. Mensah et al. (2026) focus on hotels and argue that green innovation strategies may improve sustainable performance when supported by organizational and managerial practices. Achmad and Wiratmadja (2026) also examine green innovation in relation to sustainable performance in the tourism industry. Taken together, these studies show that green innovation is not only related to environmental protection. It is also discussed in relation to business strategy, sustainable performance, and long-term development in tourism and hospitality.

Table 1. Comparison of previous bibliometric studies and the contribution of the present study

Previous bibliometric study	Focus	Main context	Methodology	Limitation in relation to the present study	Distinctive contribution of the present study
Fauzi et al. (2025) / Green hotel research	Green hotel, environmental practices, sustainability trends and consumer related	Hotel industry	Bibliometric analysis of green hotel publications	The focus is mainly on hotels; food and beverage businesses and brand-related outcomes are not positioned as the central analytical intersection	Extends the discussion beyond hotels by examining how green innovation and brand-related outcomes are positioned within the broader tourism and hospitality literature, with implications for food and beverage research
Zhang et al. (2023) / Green loyalty research	Green loyalty, its theoretical foundations, antecedents, outcomes and mechanisms	Green consumer and marketing literature	Bibliometric-content analysis of green loyalty studies indexed in Web of Science	Addresses green loyalty as a broad construct, but does not specifically map its connection with green innovation in tourism, hospitality or food and beverage settings	Connects green innovation with loyalty-related constructs such as green trust, green satisfaction, green perceived value and brand loyalty within a tourism and hospitality-oriented dataset
Agarwal and Dubey (2024) / Green marketing and green consumer behavior research	Green marketing and green consumer behavior	Marketing and consumer behavior	Bibliometric and thematic review	Provides a broad view of green marketing and consumer behavior, gives limited explicit attention to green innovation as a distinct construct and to food and beverage businesses	Position green innovation as the central construct and examine its relationship with brand-related outcomes in hospitality-related literature
Blanco-Moreno et al. (2025) / Sustainability in hospitality	Sustainability, research trends and methodologies in hospitality	Hospitality sector, specifically hotels and restaurants	Bibliometric analysis of Web of Science publications	Provides a broad sustainability perspective on hotels and restaurants; however, it does not specifically focus on the intersection between green innovation and brand-/loyalty-related outcomes	Narrows the focus to the green innovation–brand outcome interface and identifies the limited visibility of food and beverage-specific research
Durán-Sánchez et al. (2017) / Beverage and wine tourism research	Scientific production and development of wine tourism research	Wine tourism	Bibliometric analysis comparing publications indexed in Web of Science and Scopus	Focuses on wine tourism as a tourism experience and destination-related research domain rather than on green innovation, brand-related outcomes, or consumer-side loyalty mechanisms	The present study shifts the focus from wine tourism as an experience-based tourism field to the intersection of green innovation and brand-related outcomes, identifying food and beverage businesses as a relatively underdeveloped application area within tourism and hospitality literature

As shown in Table 1, previous bibliometric studies have mainly focused on green hotels, green loyalty, green marketing and consumer behavior, sustainability in hospitality, or wine tourism as separate research streams. By contrast, this study maps green innovation in tourism and hospitality. In the wider tourism and hospitality literature, the food and beverage context remains relatively limited. Existing studies discuss green innovation in this area mainly through customer perceptions, trust, satisfaction, and other consumer-related outcomes. Therefore, food and beverage can be considered a developing application area that needs more direct attention in future research.

Emphasizing green innovation in the tourism industry may enable businesses to generate value by differentiating themselves and lowering costs (Hsiao & Chung, 2016). Environmental protection and sustainability are predicted to play a fundamental role in shaping consumer preferences in the future (Jayawardena et al., 2013). Therefore, tourists who are more aware of sustainability issues may be more willing to pay higher prices for environmentally friendly products.

Green innovation can strengthen perceptions of service quality through environmentally focused improvements and contribute to businesses' competitive advantage through differentiation (Ar, 2012). By using innovative technologies and restructuring the supply chain, businesses can improve environmental performance and efficiency, reduce costs, and maximize resource utilization (Porter & Kramer, 2006).

ISSN: 2458-7583

Green innovation improves resource utilization, making processes more effective and efficient (Chen et al., 2006). Furthermore, optimizing resource utilization has been found to enable cost savings in tourism businesses (Hsiao & Chung, 2016).

However, the relevant literature also presents opposing findings. Some argue that environmentally focused innovative investments may not increase productivity much, especially in the short term, because they require additional investment and employee learning and adaptation (Ambec et al., 2013). Some argue that environmental investments create opportunity costs, and that diverting resources from other potentially profitable areas to environmental investment can create productivity problems (Gray, 1987).

Although green innovation has been studied across different dimensions, the broader literature still offers a limited overall view of how these practices connect with customer responses in food and beverage businesses. Although studies on green innovation dimensions exist across many sectors, fewer studies focus specifically on the food and beverage industry. Also, although most existing studies examine specific aspects of green innovation, they offer limited understanding of how these dimensions influence customer loyalty. Rapid shifts in customer attitudes towards sustainability highlight the need for new analyses that reflect current trends and methodologies in the field. A bibliometric analysis is therefore useful for bringing the scattered literature together, showing visible trends, and locating food and beverage research within the wider field.

This bibliometric review is guided by the following research questions:

RQ1. What is the thematic structure of the literature on green innovation and green practices in tourism and hospitality, and what implications emerge for food and beverage research?

RQ2. Which journals, documents, and countries have the most visible impact in this field, and how are country-level collaboration networks structured?

RQ3. How have themes and keywords evolved over time, and which emerging topics indicate future research directions?

RQ4. What research gaps and future directions emerge for food and beverage studies within the literature on green innovation and green practices in tourism and hospitality?

3. Methodology

Ethics committee approval was not required because this study relies on publicly available bibliographic data and does not involve human participants, surveys, interviews, or direct data collection.

Bibliometric analysis is a preferred method because it allows researchers to measure the development of the academic and industrial fields over time. By mapping the existing literature, researchers can identify key trends, gaps, and the evolution of thinking in green innovation (Ellegaard & Wallin, 2015). Bibliometric analyses in the industry, along with literature on sustainable practices and consumer behavior, are constantly evolving, and the databases used in these analyses can reveal trends and research gaps. Bibliometric methods allow for the analysis of changes in themes over time and the contribution of academic studies to the green marketing discourse (Agarwal & Dubey, 2024). The growing attention to integrating digital technologies with green innovation strategies in recent literature shows that green innovation research is evolving in line with technology and consumer trends (Song et al., 2025).

The search was conducted on Web of Science on 15 June 2026. The timespan was set to all years, and the Topic (TS) field was used. The initial search returned 877 records. Limiting the language to English reduced the dataset to 850 records. Then, the search was limited to the Web of Science Core Collection, resulting in a final dataset of 805 records. No document type restriction was applied. To keep the review broad, no further index-level filtering was used, such as SCI, SSCI, or ESCI. The search terms were: ("green innovation" OR "environmental innovation" OR "eco-innovation" OR "eco innovation" OR "sustainable innovation" OR "green practices" OR "green capabilities") AND ("tourism" OR "hospitality" OR "hotel" OR "restaurant" OR "food and beverage" OR "foodservice" OR "food service"). Additionally, the Scopus search yielded 990 records. The records retrieved from Web of Science and Scopus were merged and processed in RStudio. During duplicate removal, 569 duplicate records were identified and excluded, resulting in a final dataset of 1,226 records for bibliometric analysis. After data collection and duplicate removal, the final dataset was analyzed using the Bibliometrix package in R and its web-based interface, Biblioshiny. The final dataset was examined through performance analysis and science mapping. The analysis covered annual scientific production, relevant sources, highly cited documents, country-level production, country collaboration, keyword co-occurrence, thematic map, and trend topics. This process helped organize the literature on green innovation and show how the field has developed. It also helped identify the main concepts, recent themes, and the position of foodservice-related topics within the wider literature.

4. Results

The annual production graph shows that research on green innovation, environmental innovation, and green practices in tourism and hospitality remained low for many years (Figure 1). After 2015, publications began to rise slowly. The increase became more visible after 2021. This change points to growing academic interest in the topic. It also shows that sustainability and green transformation have become more visible in tourism and hospitality research.

The source analysis indicates that this literature is concentrated in journals related to sustainability, tourism,

hospitality, and environmental management (Figure 2). This pattern shows that green innovation and green practices are studied across multiple fields. They span areas such as sustainable tourism, environmental management, hospitality management, and service studies. In this sense, the source distribution reflects the topic's interdisciplinary nature.

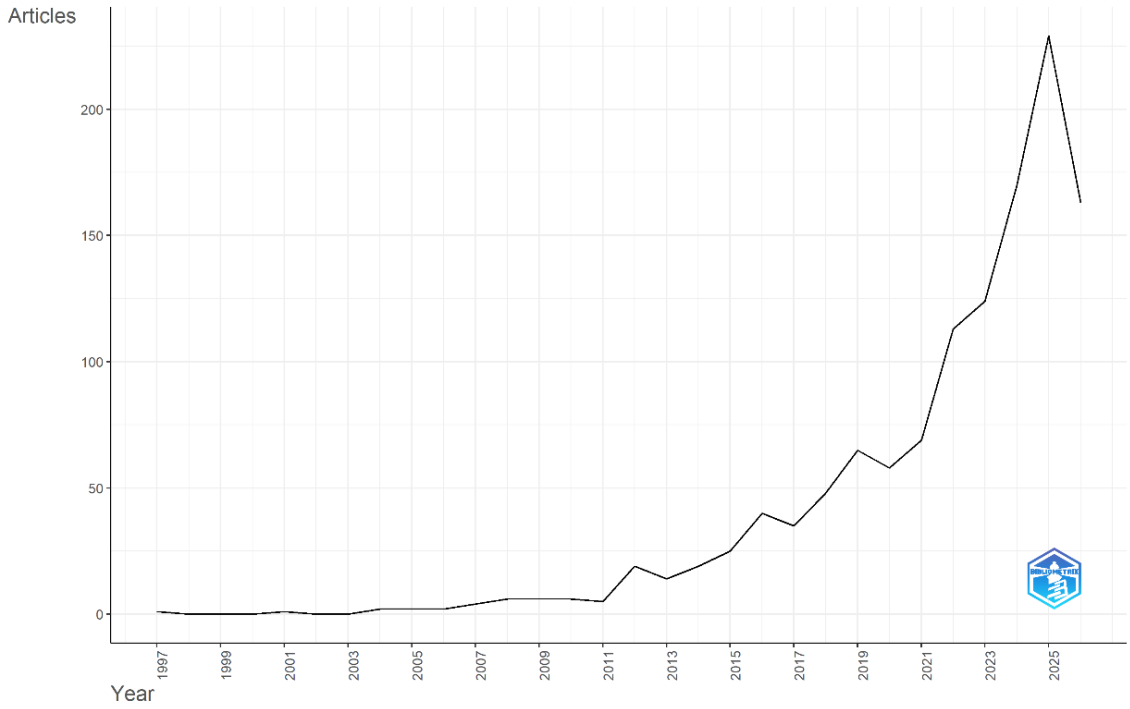


Figure 1. Annual scientific production

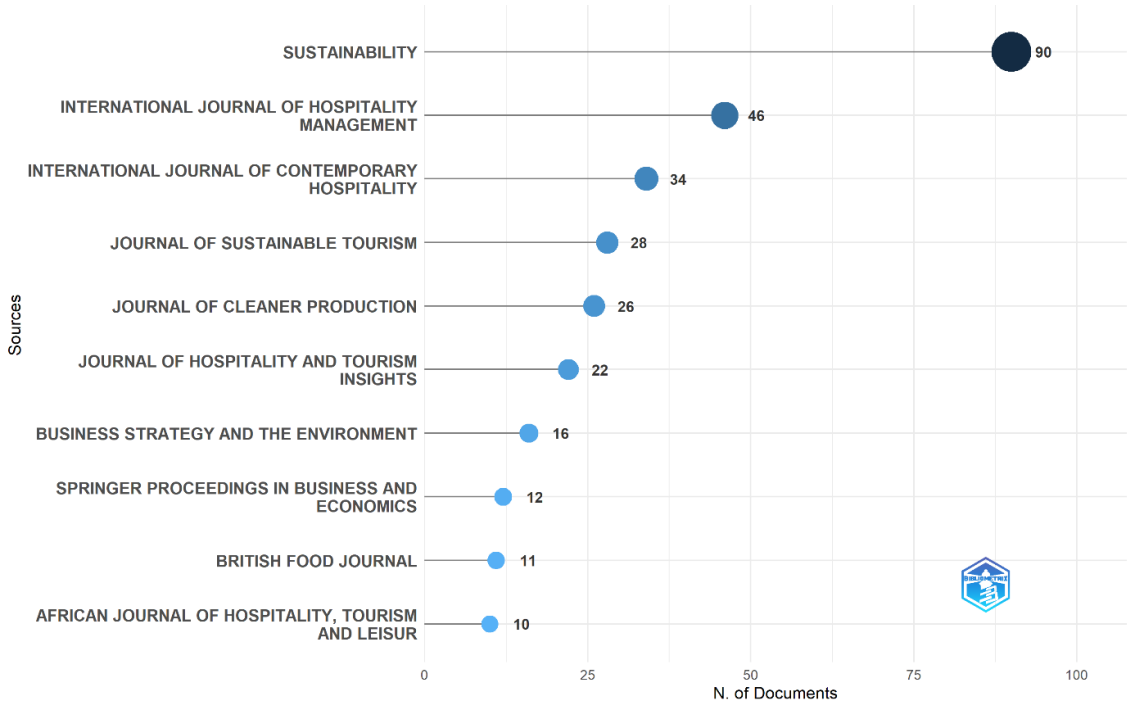


Figure 2. Most relevant sources

Globally cited documents reveal a field rooted equally in environmental management and tourism-hospitality (Figure 3). While highly cited studies focus heavily on environmental innovation, cleaner production, and sustainability-oriented business practices, hospitality and tourism literature addresses green practices and sustainability within service and destination contexts. This pattern suggests that both environmental research and tourism-hospitality studies shape the literature.

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Country-level production shows that research on green innovation and green practices is not limited to one region (Figure 4). Country-level production shows that the topic has an international profile, although publication counts vary considerably by country. The United States, India, and Australia also emerge as primary contributors, with substantial research outputs also coming from the United Kingdom, Spain, and Türkiye. This distribution suggests the topic has attracted attention worldwide, although some countries contribute more to the literature.

The country collaboration map shows that international cooperation is mostly concentrated around productive countries such as China, the United States, India, Australia, and several European countries (Figure 5). Links between regions show that this research area has developed through international academic networks. This also suggests that green innovation and green practices in tourism and hospitality are not only local issues, but also global research topics.

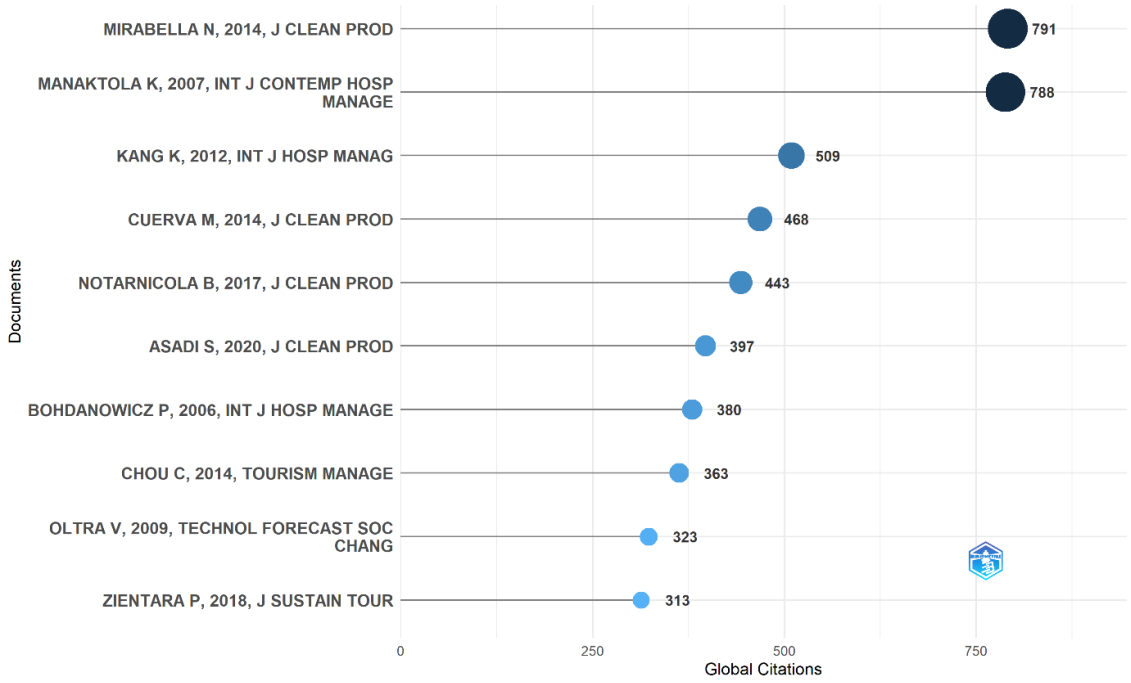


Figure 3. Most globally cited documents

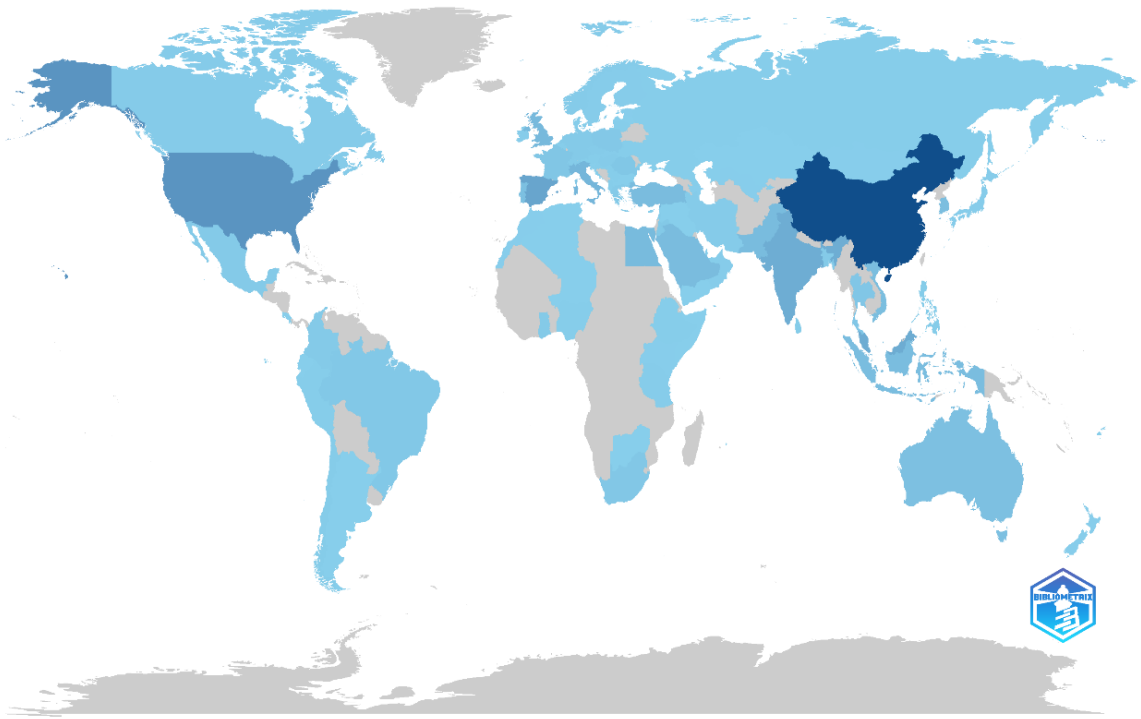


Figure 4. Country scientific production

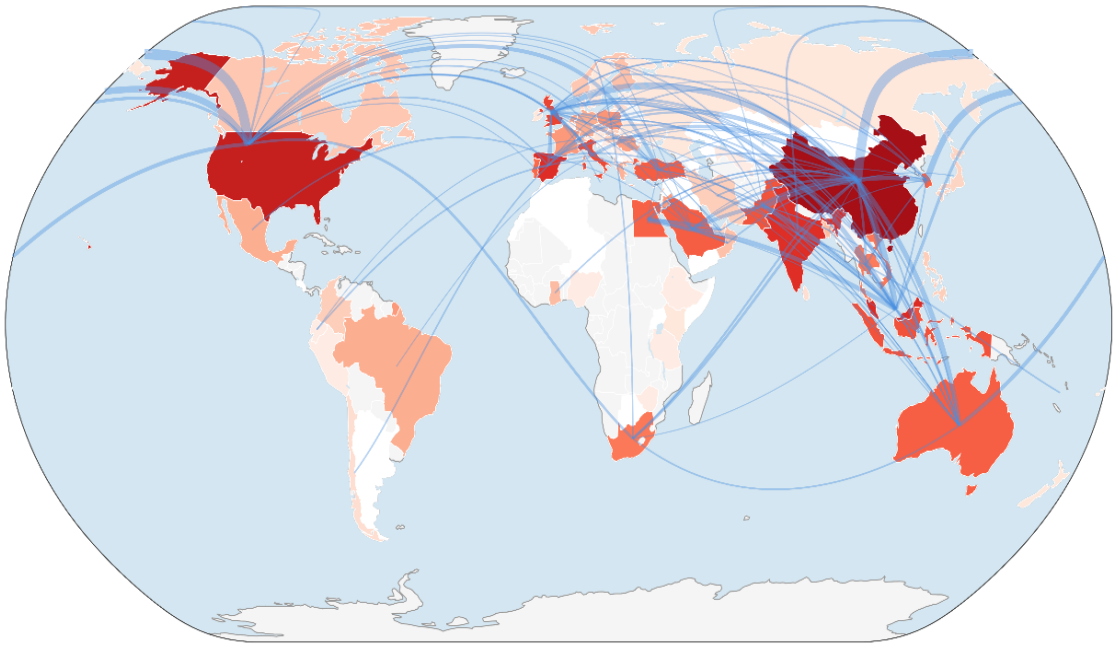


Figure 5. Country collaboration map

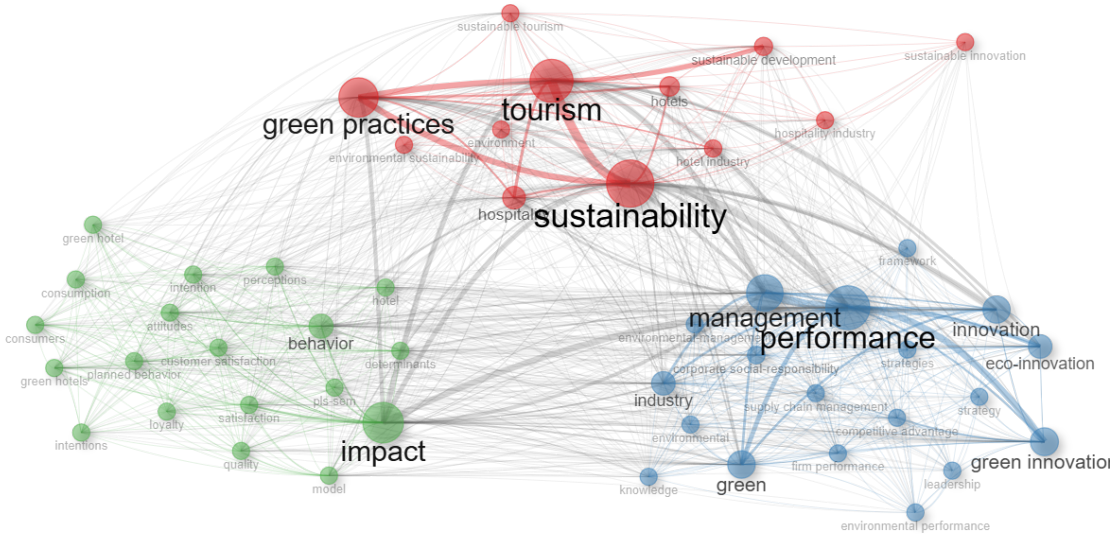


Figure 6. Keyword co-occurrence network

Before conducting the bibliometric analysis, similar terms were reviewed and standardized to improve the quality and consistency of the keyword maps (Figure 6). Some keywords appeared in different forms although they referred to the same concept. For example, "eco innovation" and "eco-innovation" were combined as "eco-innovation", while "green practice" and "green practices" were standardized as "green practices". Similarly, singular and plural forms such as "green hotel" and "green hotels", and "hotel" and "hotels" were merged into one standard term. In addition, terms with similar meanings, such as "corporate social-responsibility" and "CSR", were standardized as "corporate social responsibility". "Sustainable tourism" and "tourism sustainability" were also combined as "sustainable tourism". This cleaning process reduced repetition, avoided fragmented results, and made the keyword analysis more reliable and easier to interpret. The findings show that green innovation research in tourism and hospitality focused mostly on sustainability, management, performance, and green practices. However, topics related to restaurant, food and beverage, and foodservice remain peripheral rather than central in the bibliometric maps. Based on these results, green innovation in food and beverage businesses appears to be an emerging research area. Therefore, more empirical and conceptual studies are needed to understand this topic in food and beverage contexts.

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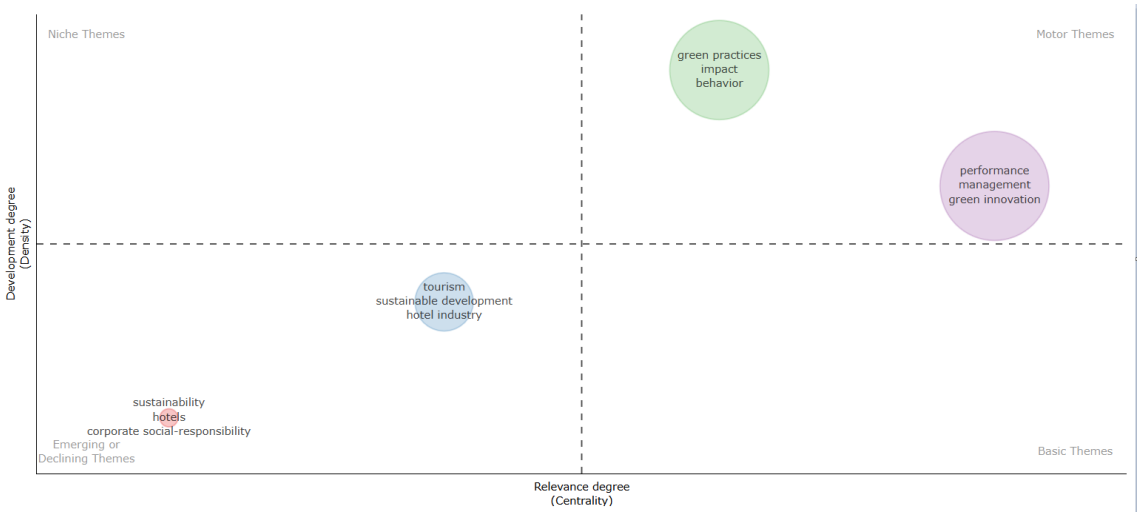


Figure 7. Thematic map

The keyword co-occurrence network reveals three main thematic clusters. The first cluster includes terms such as tourism, hospitality, sustainability, sustainable development, and hotels. This shows that the literature is strongly related to sustainable tourism and hospitality research. The second cluster connects green innovation with performance, management, environmental management, and competitive advantage. This indicates that many studies examine green innovation from a strategic and organizational perspective. The third cluster includes consumers, behavior, attitudes, intentions, and customer satisfaction. This cluster shows that customer perceptions and behavioral responses are also important in the literature. The network shows that the field has both organizational and consumer-oriented dimensions.

In the thematic map, green innovation appears together with performance and management in the motor themes area (Figure 7). This shows that these topics are well-developed and central in the field. Green practices, impact, and behavior also appear as motor themes. This result shows that customer and stakeholder responses to green practices are becoming more important. In contrast, tourism, sustainable development, and the hotel industry appear in a less central position. Sustainability, hotels, and corporate social responsibility appear as less developed or less central themes. This result suggests that although sustainability is a key concept, some specific subtopics still need further development in the literature.

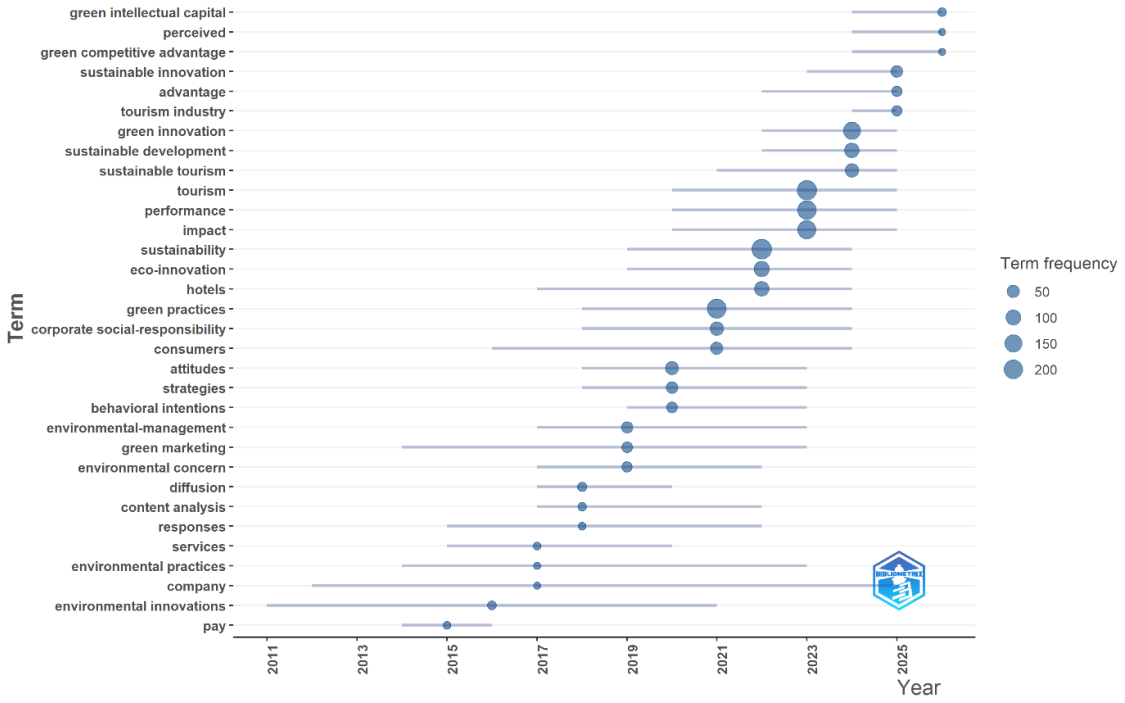


Figure 8. Trend topics

The trend topic analysis (Figure 8) shows changes in the field over time. The analyses show that studies mostly focused on environmental practices, companies, services, and green marketing in earlier years. As the years passed, consumers, attitudes, behavioral intentions, green practices, sustainability, and eco-innovation became the focus. Recently, topics such as green innovation, sustainable innovation, green competitive advantage, and green intellectual capital have become more visible. Over time, the literature focus shifted from operational environmental practices to broader strategic, behavioral, and innovation-related issues.

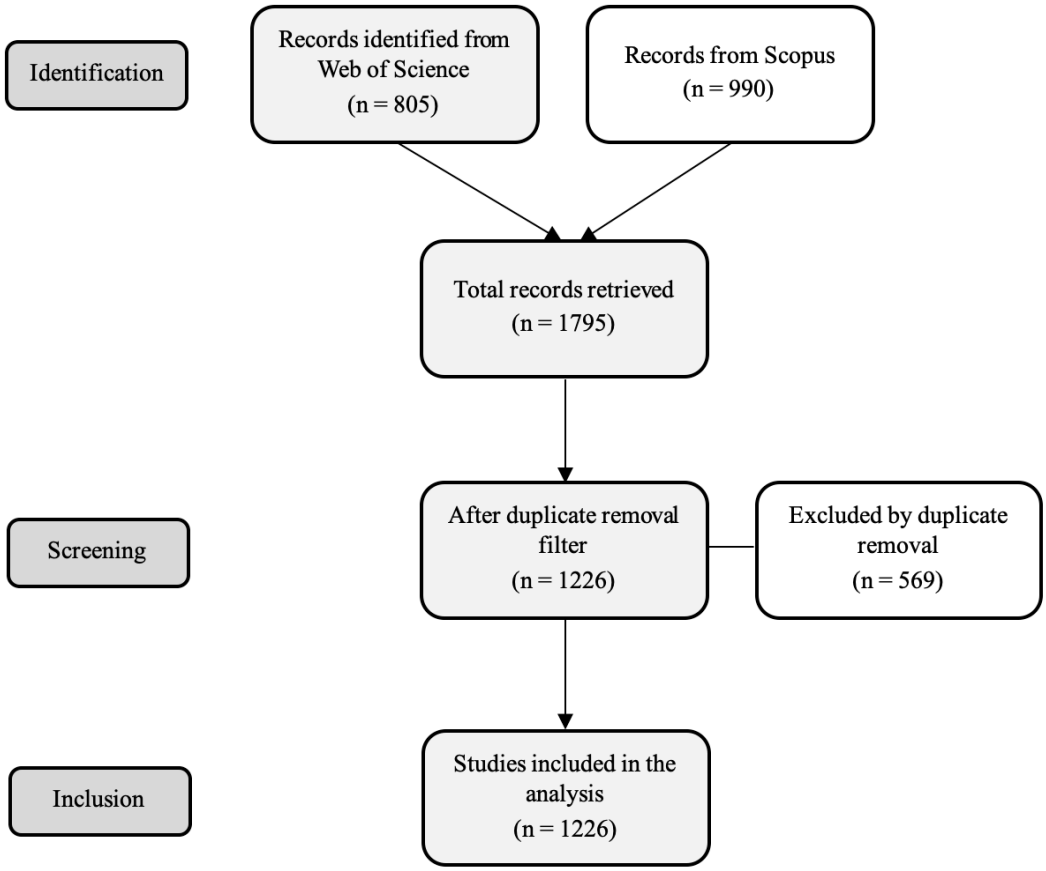


Figure 9. PRISMA flow diagram (adapted for bibliometric studies)

The PRISMA flow diagram (Figure 9) summarizes how the final dataset was obtained. First, records were collected from Web of Science and Scopus, retrieving 1,795 records in total. After removing duplicate records, 1,226 studies remained in the final dataset. These studies were included in the bibliometric analysis, making the data collection and screening stages more transparent.

Taken together, the results point to a field that has expanded quickly, particularly in the most recent period covered by the dataset. The annual production and source analysis indicate that the field has gained stronger academic attention and is mainly published in sustainability, tourism, hospitality, and environmental management journals. The citation and country-level analyses show that the literature is shaped by both influential environmental studies and sector-specific tourism and hospitality research, with increasing international contribution and collaboration.

The keyword co-occurrence network, thematic map, and trend topic analysis further suggest that the field has moved from general environmental practices toward more strategic, behavioral, and innovation-oriented themes. However, food and beverage, restaurant, and foodservice-related contexts remain less central in the maps. This suggests these contexts are still emerging within the broader green innovation and green practices literature. Therefore, future studies may provide more focused empirical and conceptual research on how food and beverage businesses understand, implement, and perceive green innovation. Since bibliometric maps show patterns of association rather than causal relationships, these findings should be interpreted as a structured overview of the field and as a basis for future research directions.

5. Discussion and conclusion

The findings show that green innovation and green practices have become increasingly visible in tourism and hospitality research. Especially after 2021, annual scientific production has grown. This shows strong academic attention to the topic, which can be linked to the emerging importance of sustainability, environmental responsibility, and green

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transformation in service industries. These maps only show which topics appear together and how visible they are in literature, but they do not prove that one variable causes another.

The field is interdisciplinary, as the source and citation analyses show. Green innovation and sustainable practices are not tied to a single academic discipline or tradition, as the most relevant journals are mostly linked to sustainability, environmental management, tourism, and hospitality. The literature discusses green innovation and sustainable practices from different perspectives, such as cleaner production, sustainable tourism, hospitality management, and environmental responsibility. The international character of the topic is shown in country-level production and collaboration patterns, although research output is not equally distributed across countries. Based on the keyword co-occurrence network and the thematic map, it is possible to express that there are different main thematic lines in the literature. The first line is related to tourism, hospitality, sustainability, sustainable development, and hotels.

The second line connects green innovation with management, performance, environmental management, and competitive advantage, while the third line focuses on green practices, consumers, behavior, attitudes, intentions, and customer satisfaction. This structure shows that the field includes both organizational and customer-oriented perspectives. Therefore, green innovation goes beyond environmental practice in tourism and hospitality businesses. It may also support business strategy and help firms communicate their environmental efforts to customers.

Trend topic analysis also shows an important shift in the field. Earlier studies focused more on environmental practices, services, companies, and green marketing. Over time, the literature has shifted toward consumers, attitudes, behavioral intentions, sustainability, eco-innovation, and green practices. More recent topics, such as green innovation, sustainable innovation, green competitive advantage, and green intellectual capital, show that the field has become more strategic and innovation-oriented. Sustainability is no longer treated only as an environmental issue; it is also linked to business capabilities, customer perceptions, and long-term competitiveness.

Tourism, hospitality, hotels, sustainability, and green practices are clearly visible in the maps. In contrast, restaurant, food and beverage, and foodservice-related terms are less central. This pattern suggests that, while the food and beverage concept exists in academic research, it is overshadowed by dominant themes like hotels, tourism, or general sustainability. Given the close connection between food and beverage businesses and waste management, local sourcing, energy use, packaging, service design, and customer experience, this gap offers an important path for future studies. Thus, future studies can examine green innovation more directly in foodservice and restaurant settings.

From a theoretical perspective, the results bring together lines of discussion such as strategic management, sustainability, environmental responsibility, and consumer behavior. Therefore, future research can benefit from more integrated theoretical approaches. As an example, the natural-resource-based view can explain green innovation as an environmental capability of firms.

To understand consumers' evaluation of visible green practices, signaling theory provides a framework, while social exchange theory introduces another perspective on understanding the process. This framework shows how customer perception directly influences trust, satisfaction, positive word-of-mouth, and behavioral intentions. These perspectives offer a more balanced understanding of green innovation in tourism, hospitality, and foodservice contexts.

The findings also provide valuable clues for industry practice. Managers in the tourism, hospitality, and foodservice sectors should recognize that green innovation is more than an internal duty. Sharing green practices with customers transparently through visible signals could be vital; to do this, consistently applying waste reduction, local sourcing, energy efficiency, sustainable packaging, and environmentally responsible service design becomes necessary. To prevent customers from seeing green messages as insincere and deceptive, there should be no gap between words and actions, meaning communication must be supported by real practices.

While the study provides valuable insights, it also has some limitations. The dataset lacks some relevant studies because it includes records from Web of Science and Scopus, which are indexed only in English. The dataset's publication structure brings up another limitation. In the bibliometric results, Journals such as Sustainability appear more frequently because, on sustainability-related topics, some open-access journals publish a large number of studies. Because these journals have high publication volumes, although they are indexed in major databases, the distribution of sources, keywords, and citations could be affected.

Testing whether the main patterns remain similar by excluding such journals, or examining high-volume journals separately, could be a valuable direction for future studies. Another limitation relates to the nature of bibliometric analysis. Bibliometric analysis can show patterns, associations, and thematic structures in the literature, but it does not explain causal relationships. In addition, although keyword cleaning was conducted carefully, standardizing similar terms still involves researcher judgment. Since food and beverage-related terms were less central in the maps, future studies may combine bibliometric analysis with systematic literature review or content analysis. This may allow researchers to examine the food and beverage context in more detail.

In conclusion, this study presents a bibliometric overview of green innovation and green practices in tourism, hospitality, and foodservice-related research. The findings show that the field has grown in recent years and has developed around sustainability, management, performance,

green practices, and consumer-related themes. However, food and beverage and restaurant contexts do not appear to be central in the literature. This suggests a need for studies that focus more on how green innovation and green practices are used in foodservice settings. Overall, the study clarifies the field's current structure and offers directions for future food and beverage research.

This indicates a clear need for more focused research in food service settings. The study contributes by showing where the literature is concentrated, which themes have become more visible, and where foodservice-related research may develop further. Although food service settings still lack sufficient studies for meta-analytic synthesis, the more established literature on green innovation in tourism offers a suitable basis for such analysis. Therefore, to provide more universal insights and a useful blueprint for the developing food service literature, future research could apply a meta-analysis within the tourism context.

Author contribution

The authors equally conducted the research design and implementation, analysis, and article writing.

Disclosure statement

The authors reported no potential conflicts of interest.

Funding statement

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Ethics committee approval

Ethics committee approval was not required for this study because it relies on publicly available bibliographic data and does not involve human participants, surveys, interviews, or any direct data collection.

Data availability statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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