

Article

Mapping the Nexus between Sustainability and Digitalization in Tourist Destinations: A Bibliometric Analysis

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Abstract: Sustainability has become a key consideration for tourist destinations, and digitalization is increasingly being used as a tool to enhance sustainable tourism development. This paper aims to map the intersection between sustainability and digitalization in tourist destinations using a bibliometric analysis. The study is based on a bibliometric analysis of the existing literature in academic journals, conference proceedings, and books published between 2012 and 2022 from the Scopus database. Biblioshiny is used to visualize data. The results show that there is a growing interest in the convergence of sustainability and digitalization in tourist destinations, with an increasing number of publications in recent years. The co-occurrence analysis identified key themes and concepts such as sustainable tourism, digital technologies, smart tourism, social media, big data, smart city, COVID-19, digital marketing, and destination marketing. The study also highlights the different ways in which digitalization is being used to enhance sustainability in tourist destinations, including the use of smart technologies, data analytics, social media, and online platforms. However, the study also identified challenges and limitations to the integration of sustainability and digitalization, such as the need for stakeholder collaboration, data privacy concerns, and the potential for a digital divide.

Keywords: bibliometric analysis; digitalization; sustainability; tourist destinations; tourism research; digital technology; sustainable tourism



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1. Introduction

Tourism is one of the world's fastest growing industries, contributing significantly to the economies of many countries. However, this growth comes at a cost, with the environmental and social impacts of tourism raising concerns about its sustainability. As a result, sustainable tourism has become a key consideration for tourist destinations [1]. Sustainable tourism is defined as “tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment, and host communities” [2].

In recent years, digitalization has increasingly been used as a tool to enhance sustainable tourism development [3]. Digitalization refers to the integration of digital technologies into various aspects of society, including tourism [4–9]. The use of digital technologies in tourism has led to the emergence of new forms of tourism, such as e-tourism [10–14], smart tourism destinations [15–19], and sustainable tourism [20–23]. Digitalization has the potential to enhance the sustainability of tourism by providing new ways of managing

resources, improving communication, and reducing the negative impacts of tourism on the environment and host communities [24].

The convergence of sustainability and digitalization in tourist destinations is a relatively new research area that has received growing interest in recent years [25–28]. This convergence has the potential to create new opportunities for sustainable tourism development, as well as new challenges and limitations.

For example, the use of digital technologies can help tourist destinations monitor and manage their environmental impact more effectively; however, it also raises concerns about data privacy and the potential for a digital divide. Therefore, it is important to understand the intersection of sustainability and digitalization in tourist destinations and to identify the key themes, concepts, and research gaps in this area. This paper aims to map the intersection of sustainability and digitalization in tourist destinations using a bibliometric analysis. A bibliometric analysis is a quantitative analysis of the literature that provides an overview of research trends, topics, and relationships [29].

The study is based on the existing literature in academic journals, conference proceedings, and books published between 2012 and 2022 by using Biblioshiny version 4.1.2, a software tool for visualizing bibliometric networks. The analysis included the annual scientific production, most relevant sources, most relevant authors, most relevant affiliations, countries scientific production, word cloud, and trend topics.

The findings of this study can be used by researchers, practitioners, and policymakers to enhance the sustainability of tourist destinations through the use of digital technologies. The study provides a comprehensive overview of the intersection between sustainability and digitalization in tourist destinations, identifying key themes, concepts, and research gaps. The results of this study can also inform future research in this area and help guide policy and practice in the tourism industry.

Our study aims to contribute to the scholarly understanding of the linkages between sustainability and digitalization in tourist destinations by conducting a comprehensive bibliometric analysis. By examining the existing literature, we seek to identify the prevailing research themes and conceptual frameworks, ultimately providing a foundation for future studies in this area.

By synthesizing a wide range of scholarly publications, we aim to identify the dominant research themes that have emerged in the field of sustainability and digitalization in tourist destinations. These themes may encompass topics such as the impacts of digital technologies on environmental sustainability [30–32], the role of digital platforms in enhancing social and cultural sustainability [33,34], the use of data analytics for sustainable tourism management [35,36], and the implications of digitalization on economic sustainability within tourist destinations [37,38].

Furthermore, our research aims to contribute to the development of strategies and policies that can foster the sustainable and effective utilization of digital technologies in tourist destinations.

The study is structured as follows: Firstly, a literature review provides an overview of the key concepts and theories related to sustainability and digitalization in tourist destinations, including digital technology adoption, sustainable development goals, and smart tourism. Secondly, the research methodology section outlines the study's research design and data collection methods. Thirdly, the data analysis section presents the results of the bibliometric analysis, highlighting the key findings and research gaps. Finally, the study concludes with a discussion of the implications, drawing on the findings of the study.

2. Literature Review

The intersection between sustainability and digitalization in tourist destinations is a relatively new research area that has received growing interest in recent years [39–42]. Sustainability has become a key consideration for tourist destinations [43–45], as the environmental and social impacts of tourism raise concerns about its long-term viability [46,47]. Sustainable

tourism development requires a holistic approach that considers the economic, environmental, and social aspects of tourism.

Digitalization has the potential to enhance the sustainability of tourism by providing new ways of managing resources [48], improving communication [49–51], and reducing the negative impacts of tourism on the environment and host communities [52]. Digital technologies can be used to monitor and manage the environmental impact more effectively [53], support local communities [54], enhance the tourist experience [55], and improve destination management [56].

The use of digital technologies in tourism has led to the emergence of new forms of tourism, such as e-tourism, smart tourism, and sustainable tourism. E-tourism refers to the use of digital technologies in the tourism industry [57], such as online booking platforms and digital marketing [58,59]. Smart tourism refers to the use of smart technologies [60], such as Internet of Things (IoT) devices and artificial intelligence [61–65], to enhance the tourist experience and improve destination management [66–71].

One of the key areas of research in the intersection between sustainability and digitalization in tourist destinations is the use of smart technologies. Smart technologies have the potential to enhance the sustainability of tourist destinations by providing real-time data on tourist behavior and environmental conditions [72]. These data can be used to manage resources more effectively [73–77], reduce waste [78–81], and minimize the negative impacts of tourism on the environment and host communities [82]. Another area of research is the use of digital technologies to support local communities [83]. Digital technologies can be used to promote local products and services [84–88], provide information on local culture and history [89–92], and facilitate community engagement in tourism development [93]. This can help to support local economies, preserve cultural heritage, and enhance the tourist experience [94].

Social media is another area of research in the intersection of sustainability and digitalization in tourist destinations [95,96]. Social media platforms can be used to promote sustainable tourism practices, raise awareness of environmental and social issues, and encourage tourists to adopt more sustainable behavior [97]. Social media can also be used to engage local communities in tourism development and facilitate communication between tourists and local residents [98].

Despite the potential benefits of digitalization for sustainable tourism development, there are also challenges and limitations. One of the key challenges is the potential for digital divide, where some communities may not have access to digital technologies or the skills to use them effectively [99]. Data privacy concerns are also a limitation, as the collection and use of tourist data can raise ethical concerns [100].

In conclusion, the intersection of sustainability and digitalization in tourist destinations is a growing research area that has the potential to enhance the sustainability of tourism. Key areas of research include the use of smart technologies, support for local communities, and social media. However, there are also challenges and limitations to the integration of sustainability and digitalization that must be addressed to ensure that digital technologies are used in a responsible and sustainable way.

3. Research Methodology

This study employs a bibliometric analysis methodology to map the intersection of sustainability and digitalization in tourist destinations. Bibliometric analysis is a quantitative research method that uses bibliographic data to analyze the development and structure of a particular research area [29]. Numerous bibliometric have been conducted in tourism, focusing on sustainability and digitalization [101–105]. The methodology involves collecting and analyzing bibliographic data, such as publication records and citation data, to identify key themes, concepts, and research gaps in the field.

The data for this study were collected from the Scopus database, a leading academic database that provides access to several peer-reviewed journals, conference proceedings, and book series in various fields. Many tourism researchers have used the Scopus database

for bibliometric analysis [106,107]. The following essential concepts and Boolean operators were used by the researchers to collect the required raw data.

TITLE-ABS-KEY ("sustainability" OR "sustainable" OR "sustainable development" OR "environmental sustainability" OR "climate change" OR "green technology" OR "renewable energy" OR "circular economy" OR "ecological footprint" OR "social sustainability" OR "economic sustainability" OR "environmental policy" AND "digital innovation" OR "digital divide" OR "digital inclusion" OR "digital entrepreneurship" OR "digital skills" OR "digital supply chain" OR "digital workplace" OR "digital art" OR "digital humanities" OR "e-commerce" OR "digital marketing" OR "cloud computing" OR "data analytics" OR "digital economy" OR "digitalization" OR "digital transformation" OR "Industry 4.0" OR "artificial intelligence" OR "big data" OR "Internet of Things" OR "smart cities" OR "blockchain" OR "cybersecurity" OR "data privacy" OR "social media" OR "big data" OR "mobile application" AND "tourist destination" OR "tourism destination" OR "touristic destination" OR "tourist place" OR "tourism place" OR "tourist attraction" OR "tourism attraction").

These terms were combined using Boolean operators to ensure that the search results were relevant to the research area. The search was conducted in March 2023, and the results were limited to publications between 2012 and 2022. This timeframe was selected to capture the most recent research developments in the field. By focusing on the last decade, we aimed to analyze the most up-to-date insights and trends. The search yielded a total of 253 records.

After removing duplicates and irrelevant records, the final dataset for analysis consisted of 228 publications. These publications were analyzed using bibliometric software [108], notably Biblioshiny, to identify the key themes, concepts, and research gaps in the field. The analysis included the annual scientific production, most relevant sources, most relevant authors, most relevant affiliations, countries scientific production, word cloud, and trend topics.

The bibliometric analysis involved several steps. First, the most relevant sources were found to identify the most frequent journals for the publications. Second, the most relevant author analysis was conducted to identify the most influential publications and authors in the field. Third, the most relevant affiliations were found to identify the most influential institutions in the field. Fourth, analysis of the scientific production of different countries was conducted to identify the most productive countries in the world in terms of publications in this field. Fifth, word cloud and trend topics were created to identify the most emergent themes.

4. Results and Discussion

The bibliometric analysis conducted in this study revealed several key themes and concepts in the intersection of sustainability and digitalization in tourist destinations based on the papers published between 2012 and 2022.

The data provided (Figure 1) show the number of articles related to the topic that were published annually from 2012 to 2022. The analysis reveals a clear increasing trend in the number of publications over time, with a significant increase from 2018 onwards.

In 2012, only two articles were published, indicating a limited interest in the topic at that time. In the following years, there were no articles published in 2013, but in 2014 the number increased to four, followed by a steady growth in the following years.

The year 2020 saw the largest increase in the number of publications, with 49 articles published, followed closely by 2021 with 62 articles published. This significant increase in the number of publications in the last two years suggests that the topic of sustainability and digitalization in tourist destinations is currently a popular and important research area.

The journal with the highest number of articles related to the topic is *Sustainability (Switzerland)* with 41 publications, followed by *Proceedings of the International Conference on Tourism Research* with 10 publications and the *IOP Conference Series: Earth and Environmental Science* with 8 publications.

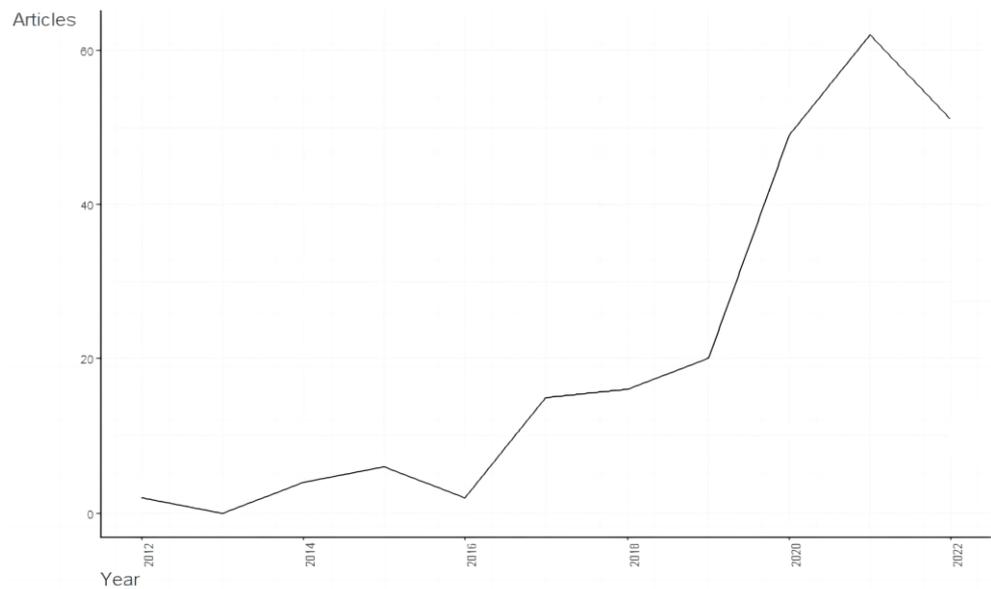


Figure 1. Annual scientific production.

Other journals that had a significant number of articles related to the topic include *Tourism Management*, *Journal of Sustainable Tourism*, and *Current Issues in Tourism*, each with four publications. The list also includes a number of conference proceedings, with the *2021 IoT Vertical and Topical Summit for Tourism* and the *ACM International Conference Proceeding Series* each having two publications.

Furthermore, the list shows that the topic of sustainability and digitalization in tourist destinations has been addressed by a diverse range of sources, including both journals and conferences from various fields. This suggests that the topic is being explored from multiple perspectives and highlights the interdisciplinary nature of the research in this area (Figure 2).



Figure 2. Network of influential sources in the nexus between sustainability and digitalization in tourist destinations.

The number of articles from Kyung Hee University and Universitas Atma Jaya Yogyakarta suggests that these institutions have a strong focus on the intersection of sustainability and digitalization in tourist destinations. Overall, the diverse range of affiliations

indicates the global interest and collaboration on this topic among researchers from various fields and regions.

Kyung Hee University has published six articles on the topic, indicating a strong focus on the intersection between sustainability and digitalization in tourist destinations. It suggests that researchers from Kyung Hee University are actively engaged in studying and contributing to this field. Universitas Atma Jaya Yogyakarta has also made a significant contribution to the topic. It demonstrates that researchers from this institution have been actively involved in exploring the relationship between sustainability, digitalization, and tourist destinations.

Cebu Technological University, Pelita Harapan University, Sri Lanka Institute of Information Technology, the Hong Kong Polytechnic University, Universitas Padjadjaran, Universitas Sebelas Maret, University of Alicante, and University of Málaga have all published four articles each. This suggests that researchers from these institutions are actively involved in studying the relationship between sustainability, digitalization, and tourist destinations (Figure 3).



Figure 3. Most relevant affiliations.

China is leading the way with 70 scientific publications in this area, followed by Spain with 51 and Indonesia with 36. Italy and Portugal round off the top five with 31 and 25 publications, respectively. It is worth noting that the United States, despite being a major player in tourism and technology, only has 17 scientific publications on the topic, ranking it sixth in this list. Other notable countries such as the UK and Australia are also outside the top five.

These data suggest that countries with strong tourism industries, such as Spain, Italy, and Portugal, are also actively researching the intersection of sustainability and digitalization in this field. Additionally, China's position at the top of the list indicates its growing role in the global tourism industry and its focus on sustainability and technology. This analysis may include aspects such as government initiatives, policy frameworks, investment patterns, technological advancements, or unique socio-economic conditions that have facilitated China's progress in this domain (Figure 4).

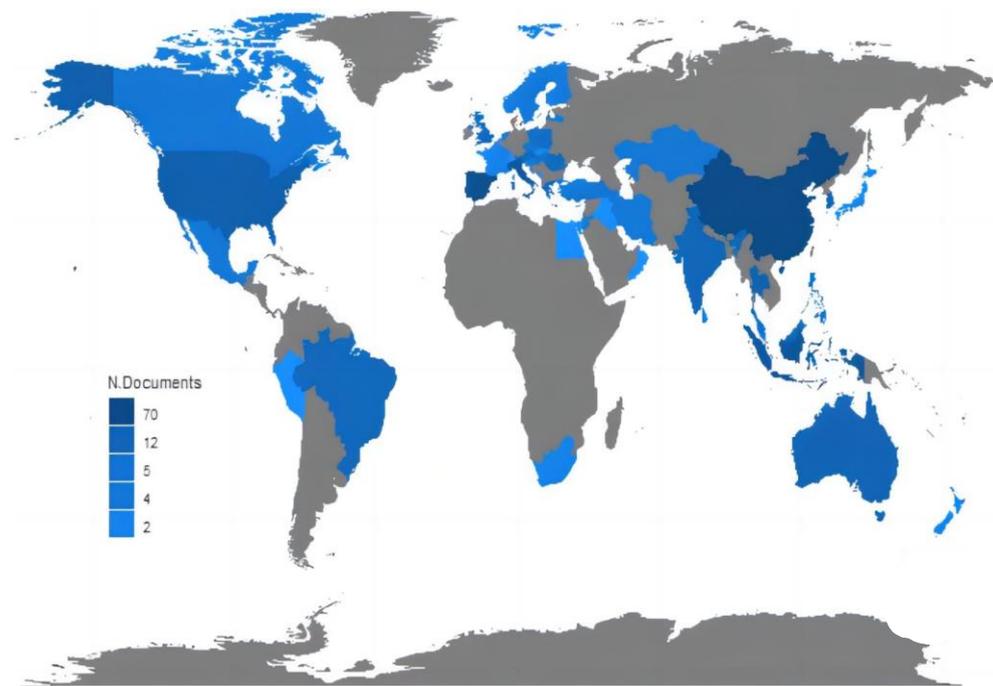


Figure 4. Scientific production by country.

The word cloud shows the most frequently occurring terms in the bibliometric analysis on the nexus of sustainability and digitalization in tourist destinations. The larger the size of the term, the more frequently it occurred in the analyzed literature.

Based on the paper's keywords, the most prominent terms in the word cloud are "smart tourism" and "sustainable tourism", which indicates that these concepts are the most widely studied in the context of digitalization and sustainability in tourism destinations. Other important terms include "social media", "smart city", "sustainability", and "big data", which suggests that these topics are also of great interest in this field of research. The word cloud also highlights the relevance of COVID-19 in the analyzed literature, with "COVID-19" being a frequently occurring term. Finally, terms such as "destination image", "tourist attractions", and "place attachment" emphasize the importance of the destination and the tourist experience in the context of sustainability and digitalization.

These results suggest that the intersection between sustainability and digitalization in tourism destinations is a popular and growing research area, with a focus on smart tourism, sustainable tourism, and the roles of social media and big data in tourism (Figure 5).

One major topic is "tourist destination", which has been the focus of 57 publications over the last three years. This suggests that there is ongoing interest in studying various aspects of tourist destinations, such as destination image, marketing, and management.

Another important topic is "sustainability", which has a total of 34 publications related to it. This indicates a growing interest in exploring the relationship between sustainability and tourism, including sustainable tourism development and ecotourism.

Similarly, "sustainable development" has been the focus of 47 publications, suggesting a growing emphasis on examining how digitalization can support sustainable development in tourist destinations.

"Social media" and "tourism" have also been popular topics, with 39 and 37 publications on them, respectively, indicating that there is ongoing research on the impact of social media on tourism and how digitalization is transforming the tourism industry (Figure 6).

COVID-19 and digital marketing, which are not closely related to the other concepts in the network.

The betweenness and PageRank centrality measures indicate the importance of each node in the network. Sustainable tourism and social media are the two most important nodes in the network as they have the highest PageRank and betweenness centrality measures. This suggests that these two concepts are the most frequently mentioned and influential concepts in the literature on sustainability and digitalization in tourist destinations. Smart tourism, big data, and sustainability also have high centrality measures and are important concepts in the analysis (Figure 7).

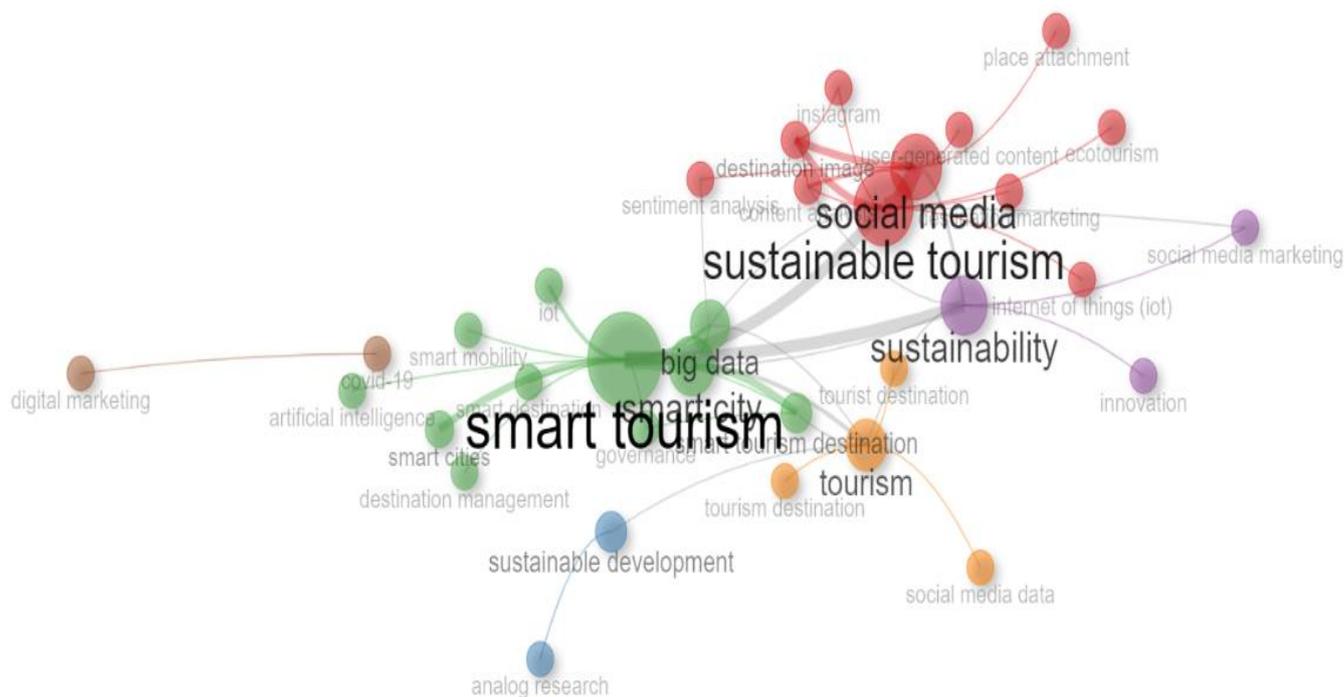


Figure 7. Co-occurrence Network.

The results of the bibliometric analysis demonstrate that sustainability and digitalization are key areas of research in the tourism industry. The integration of digital technologies in tourism has the potential to enhance the tourist experience, increase tourism revenue, and promote sustainability [109–112]. However, the integration of digital technologies must be performed in a sustainable way to avoid negative impacts on the environment and local communities.

The research also emphasizes the importance of sustainable tourism practices, such as eco-friendly accommodations, waste management, and community engagement [113]. Sustainable tourism practices can help to reduce the environmental impact of tourism [114,115] while also supporting local economies and communities [116]. The results suggest that sustainable tourism practices are essential for the long-term sustainability of tourist destinations.

The analysis also reveals some gaps in the research. For example, the effectiveness of sustainable tourism practices in promoting sustainability in tourist destinations needs to be further explored. More research is also needed to understand how digital technologies can be integrated in a sustainable way and how these technologies can be used to promote sustainability in tourist destinations [117].

COVID-19, the internet of things, and sustainable tourism are emerging topics with a smaller number of publications [118–122]; however, they are gaining increasing attention in the research community. This suggests that researchers are starting to explore the impact of these areas on sustainability and digitalization in tourist destinations.

The journal with the highest number of articles related to the topic is *Sustainability (Switzerland)* with 41 publications, followed by *Proceedings of the International Conference on Tourism Research* with 10 publications and the *IOP Conference Series: Earth and Environmental Science* with 8 publications. The most prominent terms in the word cloud are “smart tourism” and “sustainable tourism”, which indicates that these concepts are the most widely studied in the context of digitalization and sustainability in tourism destinations. Other important terms include “social media”, “smart city”, “sustainability”, and “big data”, which suggests that these topics are also of great interest in this field of research.

The results of this study can inform future research in the intersection of sustainability and digitalization in tourist destinations. The findings highlight the need for further research on sustainable tourism practices and the integration of digital technologies in the tourism industry. The research can also inform policymakers and tourism stakeholders on the importance of sustainable tourism practices and the potential benefits of digital technologies for tourism.

From an academic perspective, the study highlights the need for further research on the intersection of sustainability and digitalization in tourist destinations. The study has identified gaps in the research, such as the need for more research on the effectiveness of sustainable tourism practices and the integration of digital technologies in a sustainable way. Researchers can use the findings of this study to identify new areas of research and to develop research questions that address these gaps in the literature.

For tourism industry managers, the study provides insights into the potential benefits of sustainable tourism practices and the integration of digital technologies in the tourism industry. The study highlights the importance of sustainable tourism practices for the long-term sustainability of tourist destinations and the potential benefits of digital technologies for enhancing the tourist experience and promoting sustainability. Managers can use these insights to develop sustainable tourism strategies and to implement digital technologies in a sustainable way.

The study also highlights the importance of collaboration between academia and industry. Collaboration between researchers and industry stakeholders can help to identify research questions that are relevant to the tourism industry and to develop practical solutions to the challenges faced by the industry. Additionally, the study emphasizes the importance of collaboration between academia and industry to address the challenges faced by the tourism industry. This can help to identify research questions that are relevant to the industry and to develop practical solutions that promote sustainable tourism practices and the integration of digital technologies in a sustainable way.

The authors have explored the research landscape to shed light on the need for greater integration between sustainability and digitization in tourist destinations. Whereas our analysis has indeed revealed that there are existing papers discussing this integration, the call for more work in this area stems from several key factors.

Firstly, the complex and evolving nature of the tourism industry necessitates continuous research and innovation to address emerging challenges and to capitalize on opportunities. Sustainability and digitalization are two critical dimensions that can significantly impact the future of tourist destinations. By integrating sustainability principles into digitalization efforts and leveraging digital technologies to enhance sustainable practices, destinations can achieve long-term viability, competitiveness, and resilience. The existing research, although a valuable starting point, indicates that there is still considerable room for further exploration, experimentation, and refinement of the strategies and approaches that effectively integrate sustainability and digitization.

Moreover, the relevance of this integration to policymakers cannot be overstated. As stewards of the tourism industry, policymakers play a crucial role in shaping destination development and management practices. Our paper provides policymakers with practical insights by highlighting the current research landscape, identifying gaps, and showcasing potential areas for policy intervention and support. By understanding the existing knowledge base and the ongoing discourse around sustainability and digitalization, poli-

cymakers can make informed decisions, develop targeted policies, and allocate resources to foster sustainable and digitally enabled destinations. The paper offers policymakers a comprehensive overview of the academic research, enabling them to align policy priorities with the emerging trends and opportunities in this field.

Regarding the link between academics and industry, our paper primarily focuses on bibliometric analysis and does not explicitly delve into the specifics of industry stakeholders with whom academics are engaging. However, it is widely acknowledged that effective collaboration and knowledge exchange between academia and industry are critical for driving practical innovation and real-world implementation. Although our study does not directly provide insights into the specific industry stakeholders that academics are engaging with, it highlights the overall research output and trends within the academic domain. This can serve as a foundation for further investigations into the nature and extent of academic–industry collaboration in the context of sustainability and digitalization in tourist destinations. Future research should aim to bridge this gap by exploring the specific types of industry stakeholders involved, examining the nature of their collaborations and uncovering the practical outcomes and impacts of these partnerships.

5. Conclusions

The intersection of sustainability and digitalization in tourist destinations is a relatively new research area that has received growing interest in recent years. This study has highlighted the importance of the intersection of sustainability and digitalization in tourist destinations. The study has provided a bibliometric analysis of the current state of research in this area, revealing the significance of sustainable tourism practices and the potential benefits of digital technologies for promoting sustainability in tourist destinations. The search was conducted in March 2023, and the results were limited to publications between 2012 and 2022. This timeframe was selected to capture the most recent research developments in the field. The search yielded a total of 253 records. After removing duplicates and irrelevant records, the final dataset for analysis consisted of 228 publications.

This study has also identified gaps in the literature, such as the need for further research on the effectiveness of sustainable tourism practices and the integration of digital technologies in a sustainable way.

The findings of this study have important implications for both academia and tourism industry managers. For academia, the study has identified areas for further research and highlighted the need for collaboration with industry stakeholders to develop practical solutions to the challenges faced by the tourism industry. For tourism industry managers, the study has provided insights into the potential benefits of sustainable tourism practices and the integration of digital technologies in the tourism industry that can be used to develop sustainable tourism strategies.

Furthermore, this study has made an important contribution to the understanding of the intersection of sustainability and digitalization in tourist destinations and has identified areas for future research that can inform the development of sustainable tourism practices and strategies. The study highlights the importance of sustainable tourism practices for the long-term sustainability of tourist destinations and the potential benefits of digital technologies for enhancing the tourist experience and promoting sustainability.

The main contribution of this study is the identification of the intersection of sustainability and digitalization in tourist destinations as a key area of research in the tourism industry. Through a bibliometric analysis, the study has provided an overview of the current state of research in this area and identified gaps in the literature.

The study has also highlighted the importance of sustainable tourism practices and the potential benefits of digital technologies for promoting sustainability in tourist destinations. This has important implications for tourism industry managers, who can use these insights to develop sustainable tourism strategies and implement digital technologies in a sustainable way.

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