"What is sustainable tourism in social media? Evidence from tweets"

| AUTHORS | Ming Li
Haiying Fu
Songyu Jiang (iD) |

NUMBER OF REFERENCES

56

NUMBER OF FIGURES

5

NUMBER OF TABLES

5

BUSINESS PERSPECTIVES

Ming Li, Ph.D., Lecturer, Rattanakosin International College of Creative Entrepreneurship, Rajamangala University of Technology Rattanakosin, Thailand.

Haiying Fu, Ph.D. Student, Faculty of Education, Kasetsart University, Thailand.

Songyu Jiang, Ph.D., Lecturer, Rattanakosin International College of Creative Entrepreneurship, Rajamangala University of Technology Rattanakosin, Thailand. (Corresponding author)

Ming Li (Thailand), **Haiying Fu** (Thailand), **Songyu Jiang** (Thailand)

WHAT IS SUSTAINABLE TOURISM IN SOCIAL MEDIA? EVIDENCE FROM TWEETS

Abstract

Social media is an essential tool and channel for tourism industry research. It has created significant value for tourism consumption, management, and trends. However, rare scientific achievements uncover sustainable tourism on Twitter, a famous social media worldwide. Therefore, this study aims to conceptualize sustainable tourism from the social media perspective. Based on 2,201 tweets, the study uses Nvivo12.0 to encode content thematically to explore the connotations and concepts of sustainable tourism. The study identified three crucial dimensions: tourism for sustainable development, sustainable tourism management, and sustainable tourism types. Tourism for sustainable development aims to promote the positive effects of sustainable practices in the tourism industry on various areas of life, economy, society, and environment. Moreover, its content serves for the better development in the future. Sustainable tourism management focuses on industries, leaders, experts, programs, and sectors. In addition, the study categorized sustainable tourism by entity, purpose, destination, and mode to determine the type of sustainable tourism. The paper helps to inspire stakeholders in the tourism industry to understand and pay attention to the content in the post-Covid-19 era and also provides recommendations for the tourism market, the tourism sector, and tourism consumers.

Keywords	sustainability, social media, big data, tourism industry, Nvivo 12.0, tourism for sustainability
JEL Classification	O14, D83, Z30, P47

INTRODUCTION

The World Tourism Organization (UNWTO) (n.d.b) stresses that sustainable tourism should fully use environmental resources while helping to protect the natural heritage and biodiversity, respecting local communities' social culture, and promoting cross-cultural understanding. Economically, it should also ensure long-term feasibility. Tourist destinations and various organizations also move on as people pay more attention to sustainability and their behavior's direct and indirect effects on the environment. Sustainable tourism has long been a global topic, and many tourism countries are trying to achieve sustainability (Streimikiene et al., 2021). New Zealand's Tourism Sustainable Development Commitment aims to make its tourism industry sustainable by 2025 (Insch, 2020), while Palau has asked visitors to sign an ecological commitment upon entry since 2017 (Albrecht & Raymond, 2022). Today, tourism accounts for a third of the country's revenue, and 60% of visitors came mainly from its reserves, ecotourism products, and nature-based attractions in 2015 (Sanchez, 2018). In Bali, tourists consume 65% of the local water resources (Mohan et al., 2021). Zanzibar tourists use 15 times more water per night than the residents (Monroe et al., 2019). To achieve the sustainable development goals (SDGs), one must do a part to protect resources, reduce pollution, and save biodiversity and ecosystems (Acosta et al., 2020). To achieve SDGs, appropriate resource management and waste discharge management must be undertaken (Mousa & Othman, 2020).

In recent years, there have been attempts to mitigate the adverse effects of tourism, and sustainable tourism has grown in popularity by avoiding destructive tourism and remedying this damage (Cheung & Li, 2019). Sustainable development of tourism is an effective measure to promote world economic development and expand total social employment (Streimikiene et al., 2021). Tourism has the characteristics of comprehensive linkage and a strong economy, which can play a significant role in promoting the development of related industries (Manzoor et al., 2019). UNWTO (n.d.a) found that every additional job in tourism could create five jobs in other industries. Accelerating tourism development will ease the severe employment pressure and bring more employment opportunities to the world (Sigala, 2020). Sustainable tourism is a significant boost to promote the transformation of the development mode and the development of the low-carbon economy (Qiu et al., 2021).

However, current research rarely uses Twitter to discuss the connotations and concepts of sustainable tourism. On the other hand, few studies have used the Nvivo software to analyze the qualitative research content of sustainable tourism. At the same time, social media is crucial for big data and qualitative research (Kauffmann et al., 2020). Therefore, this study aims to fill in this research gap.

1. LITERATURE REVIEW

The social media paradigm is a new system that uses social media methods to explore humanity's problems and come up with solutions (Rettberg, 2020). A growing body of research focuses on the social media paradigm and proposes research methods and outcomes from different industries (Vrontis et al., 2021). The new paradigm has significant potential for understanding the role of social media in business communication (Yu et al., 2022). At the same time, the social media paradigm positively affects information sharing and information management (Grassi et al., 2011). Moreover, the emerging paradigm provides new clues for creation (Rathore et al., 2016; Fernando, 2010). Although the social media paradigm as a term is rare in tourism studies, social media provides essential data sources and tools for travel industry research (Zhang, 2021). In business co-operation innovation, social media is still a new paradigm for solving business communication problems (Georgescu & Popescul, 2015).

Twitter, Facebook, and Instagram are prominent social media platforms. The data from Twitter are worth understanding and analyzing (Isa et al., 2022). Tweets often provide new clues for sentiment analysis that help reveal social media users' attitudes to different tourism products (Claster et al., 2013). In addition, Twitter is a potential platform to figure out how people feel about popular travel websites (Gulati, 2022). Therefore, it is necessary and meaningful to use Twitter to assess the connotations and concepts of sustainable tourism and explore this topic from a new perspective. Table 1 reveals the research on sustainable tourism from the social media perspective.

Therefore, Table 1 inspires the discussion on sustainable tourism from the social media perspective as a relatively new topic, and its contributions are mainly from 2018 onward. The results of quantitative (Seok et al., 2020; Joo et al., 2020) and qualitative research (Sarkar & George, 2018) fully illustrate the importance of sustainable tourism to academia and sustainable tourism practice. Twitter

Table 1. Research on sustainable tourism from the social media perspective

Source: Authors' elaboration.

Source	Contributions
Sarkar and George (2018)	Typical social media applications significantly promote the ecotourism
Hysa et al. (2021)	The differences in populations are reflected in using social media to check tourist destinations, recommend holidays tourism
Han et al. (2018)	The effectiveness of social media channels provides persuasive communication that can affect sustainable behavior
Joo et al. (2020)	Social media consumers play a vital role in enhancing the relationship between access intention and subjective norms
Seok et al. (2020)	Graffiti tourism may be a part of sustainable tourism because the keywords in the comments are related to the perspective of social and cultural sustainability

is the leading social media for studying tourism behavior and perception (Shaheer et al., 2022). There are rich achievements in tourism research based on Twitter (Ćurlin et al., 2019), specifically including learning about tourism destinations (Luo et al., 2022), tourism behavior (Nicolau et al., 2020), and tourism emotion (Guzmán de Núñez et al., 2018) through Twitter. However, few studies have focused on sustainable tourism using Twitter. It is almost a new attempt to interpret sustainable tourism from this perspective.

Tourism for sustainable development is primarily manifested in the sustainable development of environmental, social, and economic development and the mutual circulation of the three parties. In popular terms, the next generation can enjoy the rich diversity of natural resources and environment on the earth and people today (Pan et al., 2018). Its core manifestations focus on the following five aspects: improving the local community welfare and happiness index through tourism; supporting the protection of natural and cultural heritage; promoting and focusing on product quality and tourist satisfaction; using scientific management methods and real-time monitoring; and continuous improvement, continuous progress, without perfection (Chi & Han, 2021).

The research on sustainable tourism has made a tremendous breakthrough in recent years. The sustainable practice of rural tourism is one of the main problems to be solved in the current governance of the tourism industry. Rural tourism routes and plans provide new opportunities for the sustainable development of tourism (Mutana & Mukwada, 2018). In addition, cultural tourism should break through the traditional development mode, paying attention to the cultural aspects and increasing the cultural inspiration to tourists. Thus, it can protect the heritage scenic spots and realize the sustainable and ecological management of heritage tourism (Cannas et al., 2019).

In line with these considerations, the development of peripheral products of heritage tourism has also become more abundant, especially encouraging the tourism of world-class intangible cultural heritage sites, which has made remarkable achievements in the sustainable development of European tourism (Jurado-Rivas & Sánchez-Rivero, 2019).

Mirea and Nistoreanu (2021) described the evolution of sustainable development indicators in tourism as a tourist destination that can be included in practicing sustainable tourism. Hartoyo et al. (2021) explored the conceptual analysis of sustainable tourism management in Indonesia. Hence, the forms of sustainable tourism are diverse. However, the sustainable practical activities of heritage tourism, humanistic tourism, and ecological tourism that have been concerned in recent years easily resonate with consumers, which provides appropriate opportunities for sustainable tourism development (Matteucci et al., 2022).

It is clear to discuss the achievements of sustainable tourism based on social media data. There should be more perspectives and ways to study sustainable tourism (Bramwell & Lane, 2014). Therefore, the conceptual discussion of sustainable tourism management is still continuing and essential to sustainable tourism research. The conceptualization of sustainable tourism management from social media is almost a new attempt. This study excavates data on sustainable tourism research on Twitter and conducts a thematic analysis. Furthermore, the paper aims to assess the connotation of sustainable tourism under the social media paradigm and construct the content of sustainable tourism from the perspective of Twitter to deepen the connotation of sustainable tourism research and provide new ideas for future attention to sustainable tourism development.

2. METHODS

Searching for sustainable tourism using the Ncapture function to obtain 2,201 related Tweets is a significant way to understand sustainable tourism from the perspective of the social media paradigm (Isa et al., 2022). Nvivo 12.0 is an essential tool for text analysis, often helping capture and analyze web page comments, report, or benefit the completion of qualitative research pictures, videos, and other important content. Nvivo 12.0 was used to encode the 2,201 tweets (Jiang & Pu, 2022). After the software had completed the auto-coding, the study continued using manual coding for text abstraction until the coding was saturated. The investigation constructed the coding table for sustainable tourism. Based on this, the coding results

are explored using the lexical cloud analysis, cluster analysis, hierarchical analysis methods, and comparative analysis, focusing on the frequency between topics, relationships, and sustainable tourism-related content, thus conceptualizing sustainable tourism. The auto-coding function of Nvivo 12.0 received 172 codes and 12,946 reference points. In order to ensure the accuracy of the coding processing, the study has proofread all the codes one by one, merged the same and similar codes, and abstracted the codes of the same category. Finally, there are three thematic codes for research: tourism for sustainable development, sustainable tourism type, and sustainable tourism management. As a result, 122 codes with 2,150 reference points became the analyzed objective.

3. RESULTS

3.1. Coding processing

The first-level encoding in Table 2 includes only tourism for sustainable development. The second-level encoding is rich in content, comprising environmental, economic, and social topics – the impact of tourism on sustainable development in many ways. From the perspective of secondary coding, sustainable agriculture, tourism destinations, tools, education, markets, living environments, models, stories, and supply chains are all critical topics of sustainable tourism. In other words, sustainable tourism development is of great significance to these topics. The third-level encoding is more specific and detailed under a sustainable economy, including sustainable business, sustainable ocean economy, sustainable online marketplace, sustainable visitor economy, and sustainable work. Sustainable education is primarily the role of higher education. Sustainable food security, sustainable homeownership, and sustainable livelihood are several topics abstracted for sustainable living. Sustainability practices are abundant in content, consisting of sustainable experiences, sustainable innovations, sustainable production, sustainable recovery, sustainable responses, sustainable services, sustainable travel, and sustainable use. Sustainable mountain tourism with 123 nodes indicates that Twitter user is more concerned about mountains or other natural resources. Initially, sustainable mountain tourism is also an essential

task of sustainable tourism. In the sphere of sustainable tourism, there are a lot of gaps worth exploring, and it is in the theme of tourism for sustainable development, which is almost an interdisciplinary concept with important implications for the future of humanity and the world.

Table 2. The coding process of tourism for sustainable development

Source: Authors' elaboration.

Code name	Number of references
Tourism for sustainable development[a]	420
Environmentally sustainable[b]	5
Sustainable accommodation[b]	2
Sustainable agriculture[b]	3
Sustainable alternative[b]	1
Sustainable approach[b]	2
Sustainable conservation efforts[b]	3
Sustainable country[b]	1
Sustainable destination[b]	10
Sustainable development[b]	56
Sustainable development goals[c]	9
Sustainable development option[c]	1
Sustainable economy[b]	21
Sustainable business[c]	3
Sustainable ocean economy[c]	1
Sustainable online marketplace[c]	1
Sustainable visitor economy[c]	1
Sustainable work[c]	1
Sustainable education[b]	2
Sustainable future[b]	102
Sustainable growth[c]	5
Sustainable living[b]	78
Sustainable food security[c]	1
Sustainable home-ownership[c]	1
Sustainable livelihood[c]	7
Sustainable manner[b]	1
Sustainable mode[b]	1
Sustainable mountain tourism[b]	123
Sustainable operations[b]	1
Sustainable outlook[b]	1
Sustainable practices[b]	17
Sustainable experiences[c]	4
Sustainable innovations[c]	8
Sustainable production[c]	1
Sustainable recovery[c]	1
Sustainable responses[c]	2
Sustainable services[c]	1
Sustainable travel[c]	21
Sustainable use[c]	3
Sustainable projects[b]	4
Sustainable story[b]	2
Sustainable supply chains[b]	2

Note: a – first-level encoding; b – second-level encoding; c – third-level encoding.

The sustainable tourism type is the second-level code obtained by analyzing 2,201 tweets. Table 3 shows responsible tourism is the most significant of the sustainable tourism types, as 61 reference points under this topic are much higher than other topic codes. There are more sustainable types of tourism in the secondary coding. Therefore, the types of sustainable tourism include a wide range of dimensions. From the perspective of tourism entities, there are boating tourism, coffee tourism, film tourism, heritage tourism, showcase tourism, sports tourism, marketing tourism, mountain tourism, and nature tourism. The perspective of tourist destinations is divided into sterilization tourism, indigenous tourism, international tourism, suburban tourism, and rural tourism, marine tourism. From the perspective of tourism goals, equitable tourism, future-proofing tourism, growing tourism, harnessing tourism, health tourism, increasing tourism, co-designing tourism, community-based tourism, cultural tourism, photo tourism, and well-being tourism have emerged. Among the ways to travel are rethinking tourism, regenerative tourism, responsible tourism, seasonal tourism, year-round tourism, slow tourism, sensible tourism, and mass tourism. In summary, the types of sustainable tourism are vast, and from the results of the theme coding, almost every type of tourism can be related to sustainable development.

Table 3. The coding process of tourism for sustainable tourism type

Source: Authors' elaboration.

Code name	Number of reference
Sustainable tourism type[a]	183
Tourism entity[b]	25
Boating tourism[c]	1
Coffee tourism[c]	3
Film tourism[c]	1
Heritage tourism[c]	1
Showcase tourism products[c]	3
Sports tourism[c]	9
Marketing tourism[c]	1
Mountain tourism[c]	3
Nature tourism[c]	3
Travel destination[b]	36
Community-based tourism[c]	1
Conservation-based tourism industry[c]	9
Domestic tourism[c]	3

Code name	Number of reference
Suburban tourism[c]	1
International tourism[c]	1
Local tourism[c]	4
Rural tourism[c]	7
Marine tourism[c]	9
Indigenous tourism[c]	1
Tourism purpose[b]	26
Increasing tourism[c]	1
Equitable tourism[c]	1
Future-proofing tourism[c]	1
Growing tourism[c]	2
Harnessing tourism[c]	2
Health tourism[c]	5
Co-designing tourism[c]	1
Cultural tourism[c]	1
Photo tourism[c]	5
Well-being tourism[c]	7
Travel modes[b]	117
Regenerative tourism[c]	14
Responsible tourism[c]	61
Rethinking tourism[c]	9
Mass tourism[c]	23
Seasonal tourism[c]	3
Sensible tourism[c]	1
Slow tourism[c]	5
Year-round tourism[c]	1

Note: a – first-level encoding; b – second-level encoding; c – third-level encoding.

Twelve second-level codes are shown in Table 4, the most informative of which is tourism management, followed by sustainable tourism. Tourism management is a second-level code, which includes tech tourism hub, tourism activities, tourism businesses, tourism capacity, tourism cause, tourism cluster, tourism council, tourism growth, tourism partnerships, tourism planning, tourism policy, tourism products, tourism promotion, tourism revenue, tourism sector, tourism sites, tourism stakeholders, and tourism tax funds. The sustainable tourism industry has fewer mid-latitudes and focuses mainly on the development of the industry. The post-Covid-19 pandemic tourism industry, tourism industry merchants, and tourism industry rebuilds received some attention on Twitter, but not obviously. In the theme of sustainable tourism management, economy, leader, management plan, market, offer, project, sector, and specialists are essential dimensions in sustainable tourism management.

Table 4. The coding process of tourism for sustainable tourism management

Code name	Number of reference
Sustainable tourism management[a]	319
Sustainable tourism industry[b]	24
Post-covid tourism industry[c]	1
Tourism industry merchants[c]	1
Tourism industry rebuilds[c]	1
Tourism infrastructure[c]	2
Tourism management[b]	101
Tech tourism hub[c]	1
Tourism activities[c]	2
Tourism businesses[c]	6
Tourism capacity[c]	1
Tourism cause[c]	15
Tourism cluster[c]	6
Tourism council[c]	4
Tourism growth[c]	10
Tourism partnerships[c]	1
Tourism planning[c]	2
Tourism policy[c]	1
Tourism products[c]	17
Tourism promotion[c]	9
Tourism revenue[c]	1
Tourism sector[c]	17
Tourism stakeholders[c]	4
Tourism tax funds[c]	4
Sustainable tourism development[b]	53
Sustainable tourism economy[b]	1
Sustainable tourism industry[b]	10
Sustainable tourism leader[b]	1
Sustainable management plan[b]	2
Sustainable tourism market[b]	2
Sustainable tourism offer[b]	1
Sustainable tourism project[b]	4
Sustainable tourism sector[b]	2
Sustainable tourism specialists[b]	12

Note: a – first-level encoding; b – second-level encoding; c – third-level encoding.

In summary, sustainable tourism mainly comprises three dimensions of tourism for sustainable development, sustainable tourism type, and sustainable tourism management, which are rich in content and determined by the research level through a thematic level. These are the connotation of sustainable tourism.

3.2. Word frequency analysis

Word frequency analysis is an essential means of text mining, statistics, and analysis of important words that appear in the data. The basic principle is to determine the hot topics and their changing trends by portraying the frequency of words (Jiang & Pu, 2022). Figure 1 shows a word frequency graph of sustainable tourism on Twitter. The core vocabulary, tourism and sustainable, is in the middle of the diagram, presented in the most apparent fonts. Around tourism are words such as mountains, conservation, future, village, industry, urbanization, climate, and technology, indicating that tourism is closely related to these spheres. The sustainable lexicon cloud includes development, utilization, life, facilitation, and building, meaning that the travel industry has been operating sustainably and striving for sustainability. Through the analysis of the lexicon cloud, it is clear that sustainable tourism has a more significant role in promoting society (future, living, technology), economy (rural economy, urbanization, employment, technology), environment (climate, water, energy conservation), and the tweets are more concerned about these aspects.

Figure 1. Lexicon cloud analysis map of sustainable tourism

3.3. Coding similarity

According to the coding similarity, the similarity measurement using the Jaccard coefficient is conducive to summarizing the commonalities between the codes and clustering similar coding classes together, which is convenient for studying the information involved in the first-level topic more intuitively (Pu & Jiang, 2021). The study conducted a clustering analysis of first-level coding tourism for sustainable development. The middle part of clustering is the most concentrated, and the number of codes is the most enormous: sustainable response, sustainable project and recovery, sustainable practice, and production clustering are the most significant. Sustainable ethnic groups, patterns, and behaviors form the second-largest cluster. The third category included sustainable future, innovation, and life. Sustainable economy and education are at the fourth level. Sustainable cities, countries, and approaches also have a place on the map. Agriculture, home-stay, supply chains, and services also have some clues in clustering. This cluster provides a study demonstrating the importance of sustainable tourism, with a wide range of content beneficial to sustainable development in all aspects of society, economy, and education.

The clustering method helps this study to analyze the first-level coded sustainable tourism. Under the sustainable tourism type, slow tourism, showcase tourism, seasonal tourism, and responsible tourism are other purposeful ways of traveling in clusters. Furthermore, tourism entities include mountain tourism, marine tourism, marketing tourism, and local tourism. On this basis, heritage tourism, health tourism, equality tourism, and film tourism constitute a large cluster. Finally, sports tourism, happiness tourism, social tourism, cultural tourism, boat tourism, and domestic tourism come together to form a part. Furthermore, this section forms an aggregation with the middle of regenerative and responsible tourism and seasonal tourism. It shows that sustainable tourism contains many types, and there is a certain similarity between different types, which provides clues for the study of the definition of sustainable tourism.

Based on the analysis function of the similar clusters of codes, the study identified the sustainable tourism experts and movements. They formed the most significant clusters with sustainable tourism projects and selectors. Moreover, sustainable tourism leadership, management plans, markets, and offers can also be aggregated with the former to become the central cluster of sustainable tourism. In addition, the cluster of economies, industries, courses, and destinations forms a cluster with sustainable tourism businesses, companies, and campaigns. Thus, the paper explains that sustainable tourism management is a concept that focuses on experts, activities, projects, markets, industries, and courses in tourism development and provides some guidance for sustainable tourism development.
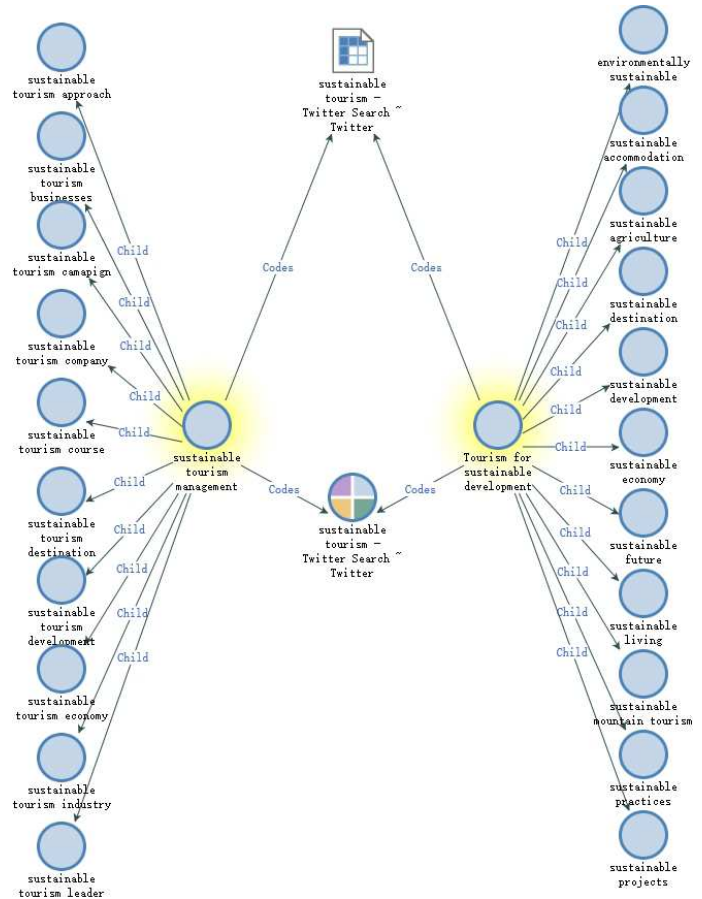
3.4. Comparative analysis

Comparative analysis is fundamental to understanding Nvivo software (Nguyen et al., 2021). The comparison between different codes is essential, and the purpose is to discover the possible relationships between the codes (Guo, 2022). Figure 2 compares the codes of sustainable tourism management and sustainable tourism types. Thus, the paper understands the sustainable tourism management and tourism types as two-parent codes containing particular sub-coding. Because there are many sub-coding contents, the study only selected about ten sub-coding with richer nodes to display. By analogy, Figure 3 compares the two codes of sustainable tourism management and tourism for sustainable development. At the same time, a comparative analysis of sustainable tourism types and tourism for sustainable development is presented in Figure 4. From the comparison point of view, there is less similarity between the relationship of different codes. Figures 2, 3, and 4 almost all show parallel relationships between different codes, and there is no link or intersection. The co-occurrence relationship between the three parent codes (sustainable tourism management, sustainable tourism types, and tourism for sustainable development) is not apparent, indicating that under the conceptual framework of sustainable tourism, the three are independent components, respectively. It also reflects the saturation of the coding process.
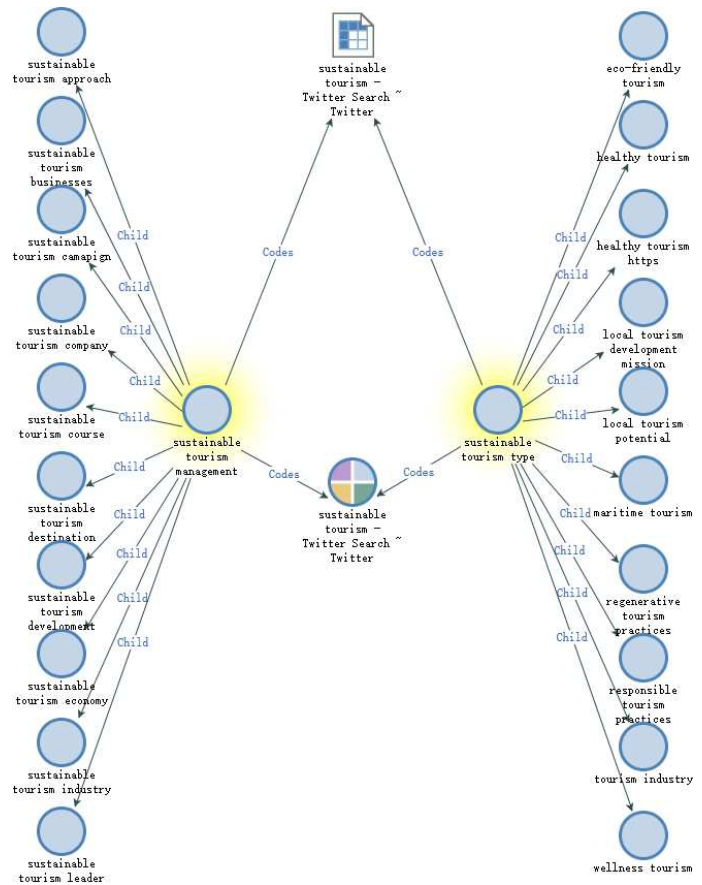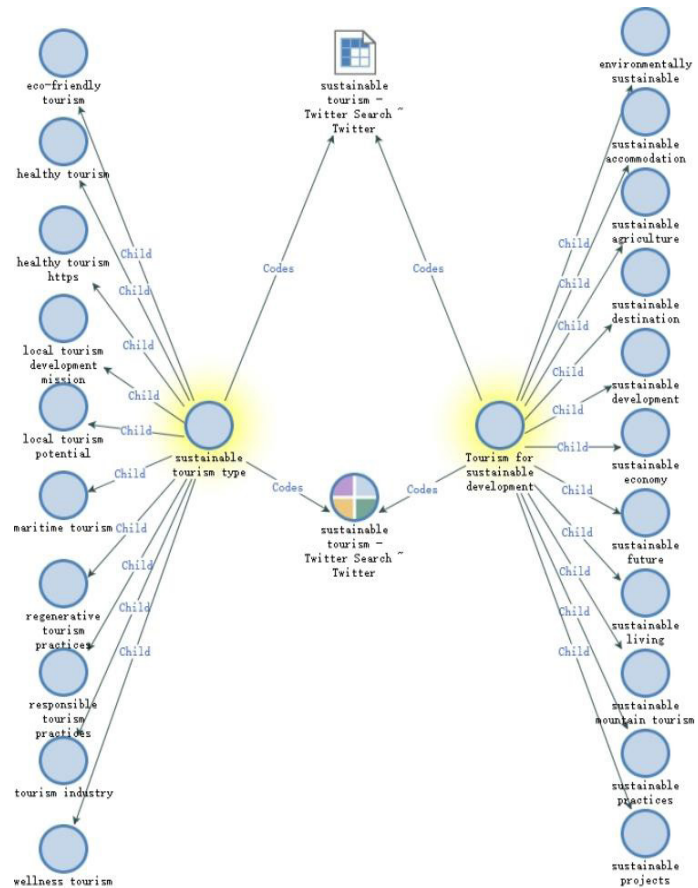
Source: Authors' elaboration.

Figure 2. Comparative analysis map of the relationship between sustainable tourism management and sustainable tourism type

Source: Authors' elaboration.

Figure 3. Comparative analysis map of the relationship between sustainable tourism management and tourism for sustainable development

Source: Authors' elaboration.

Figure 4. Comparative analysis map of the relationship between the sustainable tourism type and tourism for sustainable development

3.5. Hierarchy analysis

The hierarchy diagram of Nvivo 12.0 helps the study discover the patterns in code or view attribute values for cases and files (Pu & Jiang, 2021). A tree map is a diagram displaying hierarchical data as a set of variable-sized nested rectangles. It is advised to use a tree map to analyze hierarchies in one view and compare the relative sizes of different aspects of the data (Jiang & Pu, 2022). Comparing rectangles is easier than curving line segments, so the study used a hierarchical analysis of treemaps to complete the interpretation of sustainable tourism (Jiang & Pu, 2022). Regarding rectangular distribution, the number of codes for sustainable tourism management is similar to that of tourism for sustainable development, as in Figure 5. However, the theme of tourism for sustainable development has a clear advantage. The specific code has been shown by Jiang and Pu (2022). The primary connotations of sustainable tourism reflected in the structural hierarchy diagram are sustainable tourism management and tourism

for sustainable development. The sustainable tourism type accounts for almost only 1/5 of the entire tree map, so the sustainable tourism type is an additional part of sustainable tourism. In addition, sustainable tourism management is more dominant in the connotation of sustainable tourism. In tourism for sustainable development, sustainable mountain tourism, sustainable future, sustainable life, and sustainable development has become the primary connotation. As for sustainable tourism, the development of the industry is more critical. Therefore, analytic hierarchy helps us determine sustainable tourism's primary and secondary contents, thus helping to study the connotation framework of constructing sustainable tourism.

Sustainable tourism contains three dimensions: sustainable management, sustainable development, and tourism type. Table 5 concludes the several related concepts, which are all derived from the results of the tweets text analysis, further making sustainable tourism research more mature and rich.

Source: Authors' elaboration.
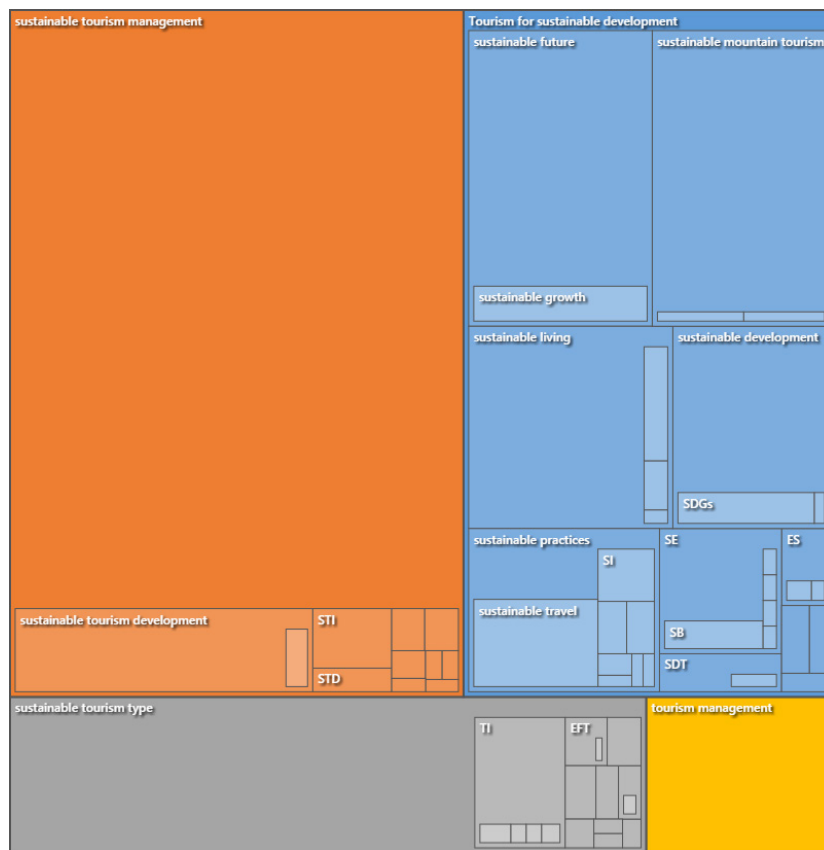
Note: STI = sustainable tourism industry; STD = sustainable tourism development; SDGs = sustainable development goals; SE = sustainable economy; ES = environmentally sustainable; SB = sustainable business; SDT = sustainable destination; TI = tourism innovation; EFT = eco-friendly tourism.

Figure 5. Tree-map of hierarchy analysis for sustainable tourism

Table 5. The relevant definition of sustainable tourism from the perspective of social media

Source: Authors' elaboration.

Items	Definition
Sustainable tourism	A mode of respecting the harmonious coexistence between nature, human beings, and society, and still pursuing the tourism mode of balanced development of the environment, society and economy without affecting the living rights and interests of the next generation
Tourism for sustainable development	Taking tourism as the means and method in the trinity development of the environment, society, and economy. Promoting sustainable development through practical activities (education, recycling, accommodation, supply chain, etc.) in tourism and realizing the survival rights and interests of contemporary and future human beings
Sustainable tourism type	Tourism activity with responsibilities and commitments from tourist entities, destinations, purposes, and patterns
Sustainable tourism management	The various management departments of the tourism industry, including leaders, experts, policies, employees, and projects, work together to promote the sustainability of the tourism industry

4. DISCUSSION

Tourism for sustainability is a common topic, and transportation, hotels, restaurants, attractions, and tourism industry routes seek sustainable development models, including energy conservation and emission reduction, adapting to digital development, and solving employment problems (Jurado-Rivas & Sánchez-Rivero, 2019).

The study can inspire stakeholders to pay more attention to industry trends, especially mountain tourism, a virtual channel for living in harmony with nature. Secondly, the industry's planning,

policies, markets, projects, and experts can play an essential role in sustainable tourism construction. Specifically, the tourism sector and enterprises must have a more in-depth investigation and understanding of the market to determine more projects suitable for the current tourism consumption model. Moreover, they should actively develop tourism projects to truly let tourism drive the economy, drive employment, and enhance consumer tourism products. At the same time, experts in the tourism industry also have a particular strength, so their advice and training are crucial to promoting sustainable tourism.

Current research is more focused on discussing some of these specific contents, such as the sustainable development of mountainous and rural tourism (Hussain et al., 2019), the sustainable construction of coastal tourism (Andersen et al., 2018), and the sustainable development of tourism classics.

Even in business management, there is more discussion in the study of tourism company planning, leadership, and human resources for sustainable development (Belias et al., 2017). Still, few studies have explored the definition and connotations of sustainable tourism from social media data. Therefore, the study theoretically breaks through the concrete discussion of the predecessors and uses qualitative research methods to discuss the understanding of sustainable tourism in social media more abstractly, providing a relevant theoretical basis for the research of sustainable tourism and promoting the development and progress of this industry.

Sustainable tourism management promotes sustainable development in the tourism industry through management behaviors and models, integrating all available management channels (Belias et al., 2017). The study explains the connotation of sustainable tourism management in more depth, almost determines the awareness and suggestions of social media users on sustainable tourism management, and facilitates the management of tourism departments and tourism companies to better understand the content and methods of sustainable management.

The discussion of sustainable tourism only comes from tweets, so the data had certain limitations. It is not easy to reflect on the situation of this topic on other social media, such as Instagram and Facebook. Research on large online social media may be different. Therefore, in the future, research can pay attention to more social media discussions on sustainable tourism and set up a framework for sustainable tourism awareness of different social media through comparative analysis. It is also possible to make a comparative study of sustainable tourism, which is commonly used in different countries, to enrich the connotation of sustainable tourism further.

The results are almost a purely qualitative research output. They do not use quantitative methods to prove the feasibility of conclusions, so future research may explore more quantitative possibilities based on this, and even study sustainable tourism as a variable in different tourism management models, perhaps making discoveries.

Although the study proposes many concepts related to sustainable tourism, it is difficult to explain each concept exhaustively due to the limited space. Hence, the study only explains the principal codes. Therefore, the subsequent research can discuss the specific content and, combined with quantitative research methods, actively explore the relationship between the concepts related to sustainable tourism. This study also encourages more scholars to enter the research and promotion of sustainable tourism, making an expected contribution to tourism development and sustainable development in the digital age and post-Covid-19 era.

CONCLUSION

The Covid-19 pandemic poses a massive challenge to tourism almost everywhere, so it is essential to further clarify from a management perspective what aspects of sustainable tourism should be focused on at present and in the future.

The study of 2,201 tweets, coding to construct the concept and connotation of sustainable tourism, is almost a new attempt. However, tweets have long been an essential database for tourism industry research. From the perspective of social media, the study identified three dimensions in the concept of sustainable tourism through a three-level coding model, lexicon cloud analysis, cluster analysis, comparative analysis, hierarchical analysis, and other visual analysis functions.

First, sustainable tourism is a comprehensive concept, starting from the tourism industry to all environmental, economic, and social aspects. Specifically, it means that to achieve sustainable tourism, more disciplines and professionals should enter the research of this field, and the current discussion on this topic is primarily focused on management and the tourism industry. The study emphasizes the importance of sustainable tourism for the future, life, accommodation, agriculture, supply chain, and other topics closely related to social and human development. Therefore, the study results encourage people in different industries to pay attention to sustainable tourism. In this era when tourism has become fashionable, all human beings are one of them. Social media discussion is even more supportive of this, so no matter when, where, or who, while feeling the benefits of the tourism industry, people must also pay attention to the details of life and promote the sustainable development of tourism.

Second, tourism type is a concept abstracted from coding from the four dimensions of tourism entity, tourism destination, tourism purpose, and tourism mode. This study introduces the main types of tourism that exist in social media, and the various types of attraction tourism, emotional tourism, time tourism, and humanistic tourism have become the tourism industry's focus in the discussion of sustainable development. Therefore, stakeholders in the tourism industry should understand the diversity of tourism types and actively maintain this diversity. However, research still has a long way to go to catch up with and achieve sustainable tourism. While the current study on sustainable tourism has yielded fruitful results in the tourism type, social media-based evidence can be found further afield.

AUTHOR CONTRIBUTIONS

Conceptualization: Ming Li, Songyu Jiang.
Data curation: Ming Li, Haiying Fu, Songyu Jiang.
Formal analysis: Ming Li, Haiying Fu, Songyu Jiang.
Investigation: Haiying Fu, Songyu Jiang.
Methodology: Songyu Jiang.
Project administration: Ming Li, Haiying Fu, Songyu Jiang.
Supervision: Ming Li, Songyu Jiang.
Validation: Ming Li, Haiying Fu, Songyu Jiang.
Visualization: Ming Li, Haiying Fu, Songyu Jiang.
Writing – original draft: Ming Li, Songyu Jiang.
Writing – review & editing: Haiying Fu.

REFERENCES

1. Acosta, L. A., Maharjan, P., Peyriere, H. M., & Mamiit, R. J. (2020). Natural capital protection indicators: Measuring performance in achieving the Sustainable Development Goals for green growth transition. *Environmental and Sustainability Indicators, 8,* 100069. https://doi.org/10.1016/j.indic.2020.100069

2. Ainin, S., Feizollah, A., Anuar, N. B., & Abdullah, N. A. (2020). Sentiment analyses of multilingual tweets on halal tourism. *Tourism Management Perspectives, 34,* 100658. https://doi.org/10.1016/j.tmp.2020.100658

3. Albrecht, J. N., & Raymond, E. M. (2022). National destination pledges as innovative visitor management tools-social marketing for behaviour change

in tourism. *Journal of Sustainable Tourism.* https://doi.org/10.1080/09669582.2022.2037620

4. Andersen, I. M. V., Blichfeldt, B. S., & Liburd, J. J. (2018). Sustainability in coastal tourism development: An example from Denmark. *Current Issues in Tourism, 21*(12), 1329-1336. https://doi.org/10.1080/13683500.2016.1272557

5. Belias, D., Trivellas, P., Koustelios, A., Serdaris, P., Varsanis, K., & Grigoriou, I. (2017). Human resource management, strategic leadership development and the Greek tourism sector. In V. Katsoni, A. Upadhya, & A. Stratigea (Eds.), *Tourism, culture and heritage in a smart economy* (pp. 189-205). Cham: Springer. https://doi.org/10.1007/978-3-319-47732-9_14

6. Bramwell, B., & Lane, B. (2014). The "critical turn" and its implications for sustainable tourism research. *Journal of Sustainable Tourism, 22*(1), 1-8. https://doi.org/10.1080/09669582.2013.855223

7. Cannas, R., Argiolas, G., & Cabiddu, F. (2019). Fostering corporate sustainability in tourism management through social values within collective value co-creation processes. *Journal of Sustainable Tourism, 27*(1), 139-155. https://doi.org/10.1080/09669582.2018.1501053

8. Cheung, K. S., & Li, L. H. (2019). Understanding visitor–resident relations in overtourism: Developing resilience for sustainable tourism. *Journal of Sustainable Tourism, 27*(8), 1197-1216. https://doi.org/10.1080/09669582.2019.1606815

9. Chi, X., & Han, H. (2021). Emerging rural tourism in China's current tourism industry and tourist behaviors: The case of Anji County. *Journal of Travel & Tourism Marketing, 38*(1), 58-74. https://doi.org/10.1080/10548408.2020.1862026

10. Claster, W., Pardo, P., Cooper, M., & Tajeddini, K. (2013). Tourism, travel and tweets: Algorithmic text analysis methodologies in tourism. *Middle East Journal of Management, 1*(1), 81-99. https://doi.org/10.1504/MEJM.2013.054071

11. Ćurlin, T., Jaković, B., & Miloloža, I. (2019). Twitter usage in tourism: Literature review. *Business Systems Research, 10*(1), 102-119. https://doi.org/10.2478/bsrj-2019-0008

12. Fernando, I. (2010). Community creation by means of a social media paradigm. *The Learning Organization, 17*(6), 500-514. https://doi.org/10.1108/09696471011082367

13. Georgescu, M., & Popescul, D. (2015). Social media – The new paradigm of collaboration and communication for business environment. *Procedia Economics and Finance, 20,* 277-282. https://doi.org/10.1016/S2212-5671(15)00075-1

14. Grassi, M., Cambria, E., Hussain, A., & Piazza, F. (2011). Sentic web: A new paradigm for managing social media affective information. *Cognitive Computation, 3,* 480-489. https://doi.org/10.1007/s12559-011-9101-8

15. Gulati, S. (2022). Tapping public sentiments on Twitter for tourism insights: A study of famous Indian heritage sites. *International Hospitality Review, 36*(2), 244-257. https://doi.org/10.1108/IHR-03-2021-0021

16. Guo, X. (2022). Relationship between parents' educational expectations and children's growth based on NVivo 12.0 qualitative software. *Scientific Programming, 2022,* 9896291. https://doi.org/10.1155/2022/9896291

17. Guzmán de Núñez, X. M., Núñez-Valdez, E. R., Espada, J. P., Crespo, R. G., & García-Díaz, V. (2018). A proposal for sentiment analysis on twitter for tourism-based applications. In *New trends in intelligent software methodologies, tools and techniques* (pp. 713-722). IOS Press. https://doi.org/10.3233/978-1-61499-900-3-713

18. Han, W., McCabe, S., Wang, Y., & Chong, A. Y. L. (2018). Evaluating user-generated content in social media: An effective approach to encourage greater pro-environmental behavior in tourism? *Journal of Sustainable Tourism, 26*(4), 600-614. https://doi.org/10.1080/09669582.2017.1372442

19. Hartoyo, A. P. P., Sunkar, A., Fadillah, A., Hidayati, S., Winata, B., & Hadi, A. N. (2021). Vegetation cover analysis and ecotourism business model for sustainable forest management in Gunung Leuser National Park, Indonesia. *IOP Conference Series: Earth and Environmental Science, 771*(1), 012001. https://doi.org/10.1088/1755-1315/771/1/012001

20. Hussain, T., Chen, S., & Nurunnabi, M. (2019). The role of social media for sustainable development in mountain region tourism in Pakistan. *International Journal of Sustainable Development & World Ecology, 26*(3), 226-231. https://doi.org/10.1080/13504509.2018.1550823

21. Hysa, B., Karasek, A., & Zdonek, I. (2021). Social media usage by different generations as a tool for sustainable tourism marketing in society 5.0 idea. *Sustainability, 13*(3), 1018. https://doi.org/10.3390/su13031018

22. Insch, A. (2020). The challenges of over-tourism facing New Zealand: Risks and responses. *Journal of Destination Marketing & Management, 15,* 100378. https://doi.org/10.1016/j.jdmm.2019.100378

23. Isa, N. A., Salleh, S. A., Chan, A., Zakaria, N. H., Suif, Z., & Halim, M. A. (2022). Analyzing windstorm pattern in Malaysia based on extracted Twitter data. *IOP Conference Series: Earth and Environmental Science, 1019*(1), 012011. https://doi.org/10.1088/1755-1315/1019/1/012011

24. Jiang, S., & Pu, R. (2022). An empirical investigation on sustainable consumption behaviors in the online education industry: Perspectives from Chinese college student. *International Journal of*

Entrepreneurship, 26(1), 1-17. Retrieved from https://www. abacademies.org/articles/ an-empirical-investigation-on- sustainable-consumption-beha- viors-in-the-online-education-in- dustry-perspectives-from-chinese- college-13339.html

25. Joo, Y., Seok, H., & Nam, Y. (2020). The moderating effect of social media use on sustainable rural tourism: A theory of planned behavior model. *Sustainability, 12*(10), 4095. https://doi. org/10.3390/su12104095

26. Jurado-Rivas, C., & Sánchez-Rivero, M. (2019). Willingness to pay for more sustainable tourism destinations in world heritage cities: The case of Caceres, Spain. *Sustainability, 11*(21), 5880. https://doi.org/10.3390/ su11215880

27. Kauffmann, E., Peral, J., Gil, D., Ferrández, A., Sellers, R., & Mora, H. (2020). A framework for big data analytics in commercial social networks: A case study on sentiment analysis and fake review detection for marketing decision-making. *Industrial Marketing Management, 90,* 523-537. https:// doi.org/10.1016/j.indmar-man.2019.08.003

28. Liu, Z. (2003). Sustainable tourism development: A critique. *Journal of Sustainable Tourism, 11*(6), 459-475. https://doi. org/10.1080/09669580308667216

29. Luo, C., Jiang, S., Pu, R., Li, L., & Yang H. (2022). Knowledge map of digital tourism: A bibliometric approach using CiteSpace. *Problems and Perspectives in Management, 20*(4), 573-587. doi:10.21511/ppm.20(4).2022.43

30. Manzoor, F., Wei, L., Asif, M., Haq, M. Z. U., & Rehman, H. U. (2019). The contribution of sustainable tourism to economic growth and employment in Pakistan. *International Journal of Environmental Research and Public Health, 16*(19), 3785. https://doi. org/10.3390/ijerph16193785

31. Matteucci, X., Nawijn, J., & von Zumbusch, J. (2022). A new materialist governance paradigm for tourism destinations. *Journal*

of Sustainable Tourism, 30(1), 169-184. https://doi.org/10.1080/09669 582.2021.1924180

32. Mirea, C. N., & Nistoreanu, P. (2021). Is Calarasi county possible for practicing sustainable tourism? *Journal of Tourism and Hospitality, 10*(1).

33. Mohan, G., Chapagain, S. K., Fukushi, K., Papong, S., Sudarma, I. M., Rimba, A. B., & Osawa, T. (2021). An extended input-output framework for evaluating industrial sectors and provincial-level water consumption in Indonesia. *Water Resources and Industry, 25,* 100141. https://doi. org/10.1016/j.wri.2021.100141

34. Monroe, A., Mihayo, K., Okumu, F., Finda, M., Moore, S., Koenker, H., Lynch, M., Haji, K., Abbas, F., Ali, A., Greer, G., & Harvey, S. (2019). Human behaviour and residual malaria transmission in Zanzibar: Findings from in-depth interviews and direct observation of community events. *Malaria Journal, 18*(1), 220. https://doi. org/10.1186/s12936-019-2855-2

35. Mousa, S. K., & Othman, M. (2020). The impact of green human resource management practices on sustainable performance in healthcare organisations: A conceptual framework. *Journal of Cleaner Production, 243,* 118595. https://doi.org/10.1016/j. jclepro.2019.118595

36. Mutana, S., & Mukwada, G. (2018). Mountain-route tourism and sustainability. A discourse analysis of literature and possible future research. *Journal of Outdoor Recreation and Tourism, 24,* 59-65. https://doi.org/10.1016/j. jort.2018.08.003

37. Nguyen, A. T., Pansuwong, W., & McClelland, R. (2021). Exploring residents' support for integrated casino resort development: A new gaming destination in Vietnam. *Tourism Recreation Research.* https://doi.org/10.1080/02508281. 2021.1894691

38. Nicolau, J. L., Sharma, A., & Shin, S. (2020). The tourism effect of President Trump's participation on

Twitter. *Tourism Management, 81,* 104133. https://doi.org/10.1016/j. tourman.2020.104133

39. Pan, S. Y., Gao, M., Kim, H., Shah, K. J., Pei, S. L., & Chiang, P. C. (2018). Advances and challenges in sustainable tourism toward a green economy. *Science of the Total Environment, 635,* 452-469. https://doi.org/10.1016/j.scito-tenv.2018.04.134

40. Pu, R., & Jiang, S. (2021). Understanding the consumption behaviors in online education towards promoting the sustainable development goals (SDGs). *Academy of Entrepreneurship Journal, 27*(6), 1-16.

41. Qiu, S., Wang, Z., & Liu, S. (2021). The policy outcomes of low-carbon city construction on urban green development: Evidence from a quasi-natural experiment conducted in China. *Sustainable Cities and Society, 66,* 102699. https://doi.org/10.1016/j. scs.2020.102699

42. Rasoolimanesh, S. M., Ramakrishna, S., Hall, C. M., Esfandiar, K., & Seyfi, S. (2020). A systematic scoping review of sustainable tourism indicators in relation to the sustainable development goals. *Journal of Sustainable Tourism.* https://doi.or g/10.1080/09669582.2020.1775621

43. Rathore, A. K., Ilavarasan, P. V., & Dwivedi, Y. K. (2016). Social media content and product co-creation: An emerging paradigm. *Journal of Enterprise Information Management, 29*(1), 7-18. https:// doi.org/10.1108/JEIM-06-2015-0047

44. Rettberg, J. W. (2020). Situated data analysis: A new method for analysing encoded power relationships in social media platforms and apps. *Humanities and Social Sciences Communications, 7*(1), 5. https:// doi.org/10.1057/s41599-020-0495-3

45. Roman, M., Roman, M., & Niedziółka, A. (2020). Spatial diversity of tourism in the countries of the European Union. *Sustainability, 12*(7), 2713. https:// doi.org/10.3390/su12072713

46. Sanchez, R. V. (2018). Conservation strategies, protected areas, and ecotourism in Costa Rica. *Journal of Park and Recreation Administration, 36*(3). https://doi.org/10.18666/JPRA-2018-V36-I3-8355

47. Sarkar, S. K., & George, B. (2018). Social media technologies in the tourism industry: An analysis with special reference to their role in sustainable tourism development. *International Journal of Tourism Sciences, 18*(4), 269-278. https://doi.org/10.1080/15980634.2018.1551312

48. Seok, H., Joo, Y., & Nam, Y. (2020). An analysis of the sustainable tourism value of graffiti tours through social media: Focusing on TripAdvisor reviews of graffiti tours in Bogota, Colombia. *Sustainability, 12*(11), 4426. https://doi.org/10.3390/su12114426

49. Shaheer, I., Carr, N., & Insch, A. (2022). Qualitative analysis of social media historical data: A case study of Twitter and tourism boycotts. In F. Okumus, S. M. Rasoolimanesh, & S. Jahani (Eds.), *Advanced research methods in hospitality and tourism* (pp. 163-178). Emerald Publishing Limited. https://doi.org/10.1108/978-1-80117-550-020221009

50. Sigala, M. (2020). Tourism and COVID-19: Impacts and implications for advancing and resetting industry and research. *Journal of Business Research, 117,* 312-321. https://doi.org/10.1016/j.jbusres.2020.06.015

51. Streimikiene, D., Svagzdiene, B., Jasinskas, E., & Simanavicius, A. (2021). Sustainable tourism development and competitiveness: The systematic literature review. *Sustainable Development, 29*(1), 259-271. https://doi.org/10.1002/sd.2133

52. Vrontis, D., Makrides, A., Christofi, M., & Thrassou, A. (2021). Social media influencer marketing: A systematic review, integrative framework and future research agenda. *International Journal of Consumer Studies, 45*(4), 617-644. https://doi.org/10.1111/ijcs.12647

53. World Tourism Organization (UNWTO). (n.d.a). *Transforming Tourism for Climate Action.* Retrieved from https://www.unwto.org/sustainable-development/climate-action

54. World Tourism Organization (UNWTO). (n.d.b). *Sustainable Development.* Retrieved from https://www.unwto.org/sustainable-development

55. Yu, S., Abbas, J., Draghici, A., Negulescu, O. H., & Ain, N. U. (2022). Social media application as a new paradigm for business communication: The role of COVID-19 knowledge, social distancing, and preventive attitudes. *Frontiers in Psychology, 13.* https://doi.org/10.3389/fpsyg.2022.903082

56. Zhang, J. (2021). Big data and tourism geographies – An emerging paradigm for future study? In *Tourism Spaces* (pp. 131-136). Routledge. https://doi.org/10.4324/9781003152453-7