

The development trajectories and research themes of tourism: A main path approach

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Abstract—Tourism has become one of the fastest growing sectors of the global economy and significantly contributes to regional and national economic development as well as cultural exchange. Researchers have published thousands of tourism papers over the past four decades, but there is no review paper that covers all the topics of tourism and which includes a large amount of articles. This study applies an integrated citation-based main path analysis to explore the development trajectories and the major research themes over the past four decades for this popular subject.

We retrieve 8799 relevant articles from ISI Web of Science and apply main path analysis and clustering technique on the citation network. Four research trends are identified: tourism sustainability, tourism destination choice, sociology of tourism, and tourism demand forecasting. This research depicts the overall development trajectory of the tourism literature. Some statistics are also provided, such as influential authors and influential journals. We believe that the results can be a valuable reference for those researchers who want to know more about the development trajectory of tourism and what to research and apply to this sector.

Keywords—tourism, tourism sustainability, tourism destination, tourism demand, main path analysis, clustering

I. INTRODUCTION

Tourism activities have changed from a simple holiday of enjoying good weather and scenery at the destination to learning and understanding more about the people and culture in the host country [1]. Researchers have published thousands of tourism papers over the past four decades, investigating tourism issues from various perspectives and enhancing our knowledge of tourism. Research topics consist of how to maintain the sustainability of tourism, how tourists choose their tourism destination, what are the impacts of tourism on the local society, what is the relationship between climate change and tourism, etc. Some researchers have looked at the tourism literature [2]-[7] from different viewpoints, but there is no review paper that covers all the topics of tourism and which includes a large amount of articles.

This study applies an integrated citation-based main path analysis to explore the development trajectories

and the major research themes of tourism over the past four decades. We believe the results are a valuable reference for researchers who want to know more about the development trajectory of tourism and what to research and apply to tourism. This paper aims to answer the following questions. What are the development trajectories of tourism research? Who are involved in the development of the tourism literature? What are the major research themes covering tourism?

This paper is organized as follows. After the introduction, Section 2 reports the methodologies used herein, including the key-route main path analysis and the edge-betweenness clustering technique. Section 3 describes the data and presents the basic statistics. Section 4 elaborates upon the overall development of tourism research and the major research themes. Section 5 concludes the findings and contributions and discusses future perspectives.

II. METHODOLOGY

The major methodologies used in this study include the key-route main path analysis and the edge-betweenness clustering. The key-route main path analysis can identify the major influential papers that contribute to the development of the tourism literature. The edge-betweenness clustering method is used to group those papers that address a similar topic via analyzing the citation network constructed among the tourism literature. We describe these two methods in the following sections.

A. Key-route Main Path Analysis

Hummon and Doreian [8] proposed to trace the ‘main path’ to identify the major development trajectory of a scientific field. The main path analysis proposed by them consists of two steps. It first calculates the significance index ‘traversal count’ for each link of the citation network. Next, it searches for the main path according to the traversal counts. Hummon and colleagues applied the method to several fields, such as the centrality-productivity literature [9] and the social network analysis field [10].

Many research studies have applied main path analysis to explore technological development trajectories, using not only bibliographical citation data, but also patent citation data. Mina et al. [11]

adopted both bibliographic and patent citation data to reveal the growth and transformation of coronary artery disease treatments. Verspagen [12] used patent citation data to identify the development trajectories of fuel cell technology. Harris et al. [13] employed the main path analysis to the literature on secondhand smoke so as to identify the gap between risk factors' discovery and delivery of interventions.

Liu and Lu [14] introduced an integrated approach to observe main paths from various perspectives, including local, global, multiple global, and key-route. The integrated approach is able to deliver more information than other methods. Many research studies have applied the integrated main path analysis on various fields [15]-[17] and confirmed its usefulness. In fact, the key-route main path approach is the most significant among all perspectives proposed in the integrated approach.

The key-route main path approach begins the search from the top significant links and thus avoids the risk of missing any top significant links that may appear on the local and global main path analyses. The key-route main path picks one top link and searches backward from the tail node of this link as well as forward from the head node of the same link. A path is formed by combining both backward and forward search results and the link itself. The same process is repeated upon all the specified top links. The key-route main path is the union of all the paths generated via the above processes.

B. Edge-betweenness Clustering

Newman and Girvan [18]-[20] introduced the concept of a community structure to group a social or a biological network via the edge-betweenness clustering approach. In a citation network, if two articles cite or are cited by the same other articles, then they have a high possibility of addressing similar issues. In other words, articles that address the same issues form a tightly knitted 'community' in the citation network. Newman and Girvan [19] demonstrated that community structure detection is a useful technique for identifying the structure of a large-scale social network.

Edge-betweenness clustering focuses on identifying the edges that are most likely 'between' clusters. If these edges that are 'between' clusters are removed, then separate clusters are isolated. In addition to the edge-betweenness concept, Newman [21] proposed the modularity concept to effectively determine the optimal community structure. The modularity of a network is defined as 'the number of edges (links) falling within groups minus the expected number in an equivalent network with edges placed at random'. The best division of a network is the one with the largest value of network modularity. One can apply edge-betweenness clustering in association with the optimal modularity concept in order to group patenting or

academic articles that discuss similar issues and to form the research fronts.

Price [22] first introduced the idea of a research front, defining it as a research domain under development where articles cite each other frequently. Researchers or scientists tend to cite the most recent published articles. If we can find the set of articles that are actively cited, then a research front can be identified. This means a major research theme can be detected via analyzing citation patterns.

The edge-betweenness of an edge is the number of shortest paths between pairs of vertices that run along it [18]. If there is more than one shortest path between a pair of vertices, then each path is assigned an equal weight. The edge-betweenness clustering method divides network nodes into groups within which the network connections are dense, but between which the network connections are sparse. Hence, the links that connect groups in a network have high edge-betweenness. The algorithm of edge-betweenness clustering is as follows.

- Calculate the betweenness for all edges in the network.
- Remove the edge with the highest betweenness.
- Recalculate the betweenness for all edges affected by the removal.
- Repeat the above two steps.

The network is eventually divided into two groups, and the modularity is calculated and recorded. The recalculation and removal steps are repeated until all the links in the network are removed. At this point, one can trace back the records and select the network division with the largest modularity as the grouping result. This study uses igraph [23] under Microsoft Visual Studio development environment to implement the algorithm of edge-betweenness based clustering

III. DATA

We retrieve the relevant articles in tourism from ISI Web of Science (WOS). WOS is a citation database with multidisciplinary coverage of high impact journals in science, social sciences, as well as international proceedings for conferences. The databases we select are the Science Citation Index Expanded (SCIE), the Social Sciences Citation Index (SSCI), the Conference Proceedings Index-Science (CPI-S), and the Conference Proceedings Index-Social Science and Humanities (CPI-SSH).

Tourism is used as the keyword to retrieve relevant articles from WOS. The data time span ranges from 1977 to 2013. In total, 11406 articles are retrieved. We remove articles from anonymous sources and those articles that have missing data, leaving 10986 articles for further analysis. Among these 10986 articles, some receive no citation from and do not cite other articles in the dataset. We remove these articles, because the methodologies used in this study are citation based. The final dataset keeps 8799 articles for conducting main path analysis and clustering.

We rank the journals by g-index and h-index to identify the influential journals in the tourism literature. Table 1 lists the top 20 influential journals. Annals of Tourism Research and Tourism Management contribute the most in the publishing tourism literature. Both of them have published more than fifteen thousand papers. Journal of Sustainable

Tourism and Journal of Travel Research began to publish tourism papers later, but they have already published 364 and 267 relevant papers since 2008. Their g-index and h-index are not so remarkable versus the total number of publications.

TABLE 1
 TOP 20 INFLUENTIAL JOURNALS

g-index	h-index	Total papers	Papers after 2000	Active years**	Journal title and abbreviation
100	74	1551	922	1982~2014	Annals of Tourism Research
85	63	1629	1288	1994~2014	Tourism Management
43	27	64	57	1983~2014	Biological Conservation
35	21	54	39	1989~2014	Environmental Conservation
34	19	57	52	1995~2014	Ecological Economics
29	22	364	364	2008~2014	Journal of Sustainable Tourism
29	20	86	78	1992~2014	Environmental Management
29	20	63	52	1990~2014	Journal of Environmental Management
28	11	34	19	1989~2013	Environment and Planning A
27	15	37	29	1990~2014	Landscape and Urban Planning
26	16	44	33	1988~2014	Applied Economics
26	14	38	16	1977~2013	Ambio
24	19	267	267	2008~2014	Journal of Travel Research
24	15	33	22	1983~2013	Journal of Leisure Research
24	14	39	31	1993~2014	Biodiversity and Conservation
24	12	56	46	1996~2014	Journal of Business Research
23	13	25	21	1992~2012	Urban Studies
23	11	25	17	1989~2013	International Journal of Forecasting
22	12	22	20	1996~2014	Climatic Change
21	10	21	19	1996~2014	Climate Research

IV. RESULTS

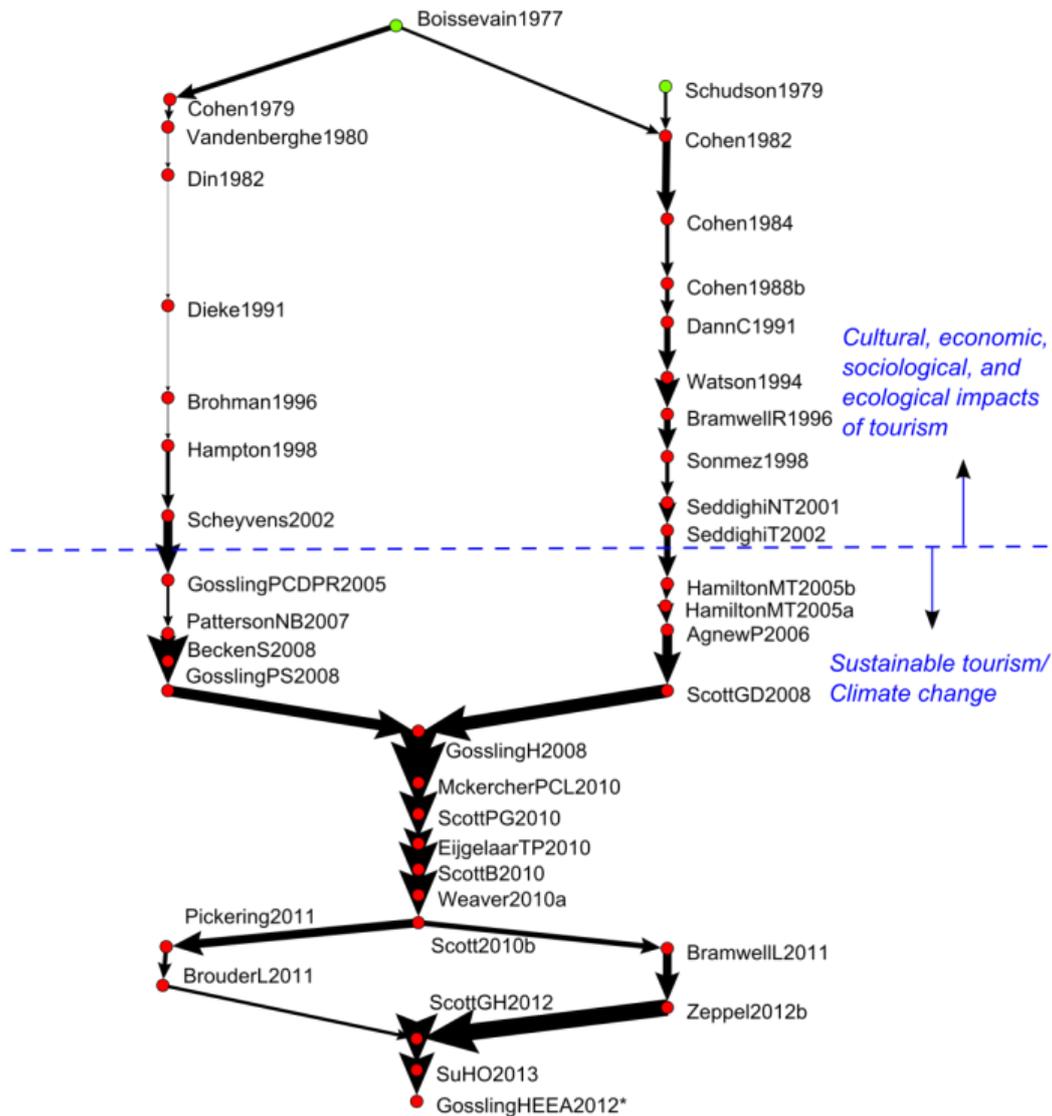
We present the overall development trajectory and the major research trends in the following sections. In this study we specify the number of key-routes as 10 to guarantee the inclusion of the top 10 links.

A. Overall Development Trajectory

Key-route main path analysis is applied, with the number of key-route as 10, to explore the overall development trajectory of the tourism literature. Fig. 1 shows the results. The line thickness reflects the size of its traversal count. The thicker

the line is, the more significant the route is. Each paper in the figure is attached with a notation that begins with the last name of the 1st author followed by the 1st initials of the co-author's last name and ends with the publication year of the paper.

Before 2002, researchers discussed the impacts to tourism from the perspectives of anthropology, culture, economics, environment, sociology, and ecology. From 2005, researchers focused on the issues of climate change and tourism sustainability.



*: the disorder in the year is caused by the publishing lag.

Fig. 1 Overall development trajectory of tourism

In the late 1970s, researchers revealed that the economic effects of tourism are exaggerated. Boissevain [24] argued

that the economic value of tourism to developing countries is overstated and the social and cultural costs are almost neglected. Cohen [25] found that tourism has not yet had any markedly disruptive effects on the economic and social life of the villagers in his research, but neither has it been of much benefit to them.

Some researchers focused on the sociology and anthropology of tourism. Schudson [26] reviewed three essays that discuss the issues of anthropology of tourism and argued that tourism is a medium for cultural exchanges between hosts and guests. Van den Berghe [27] argued that a complex system of class and ethnic inequalities exist between the mestizos, middlemen, and the Indians of the Department and City of Cuzco. Din [28] presented an overview of the socioeconomic impacts of tourism with particular reference to the role of ethnicity in the development of the tourist industry of Malaysia. Dieke [29] reviewed the main features of tourism development in Kenya and suggested that new planning directions are required. Brohman [30] suggested that tourism-led development should always conform to the long-term interests of the popular majority instead of the short-term goals of an elite minority.

Cohen [31] reported that touristic paradises are marginal to both the life plan of the tourists and the ecology and economy of the native society. Cohen [32] reviewed the sociological and anthropological literature on tourism from the perspectives of the tourists, the relations and perceptions of tourists and locals, the structure of the tourism system, and the socioeconomic and sociocultural impact of tourism. Cohen [33] argued that there are three principal "traditions" in the qualitative sociology of tourism, departing respectively from the approaches of [34]-[36]. Dann and Cohen [37] traced the development of sociological theory and the emergence of a variety of approaches and concluded that there is no universal accepted perspective on the sociology of tourism.

Other researchers investigated tourism from the perspectives of marketing and political issues. Watson [38] argued that tourism is an extension of the commodification of modern social life under capitalism and provided meaningful content to some theoretical ideas latent in tourism research. Bramwell and Rawding [39] examined the tourism marketing of five UK industrial cities and reported the similarities and differences in their marketing imagery. Hampton [40] investigated the impacts of backpacker tourism in less developed countries, including the leakage of foreign exchange earnings, the issues of local control, and the political/economic gains or losses. Sonmez [41] looked at the relationship among terrorism, political instability, and tourism. Seddighi et al. [42] explored the cross-cultural differences in the perceptions of travel agents concerning the impact of political instability on tourism. Seddighi and Theocharous [43] proposed that tourists' perception/ feelings, including quality of service, advertising, and political instability, strongly affect travel choice behaviour. Scheyvens [44] noted that third world governments should establish

appropriate policies and effective infrastructure to support community involvement in tourism.

Tourism sustainability and climate influence are the major focuses in tourism research since 2005. Hamilton et al [45], [46] argued that the impacts from climate change are smaller than that from population and income changes. Agnew and Palutikof [47] investigated the impacts of short-term climate variability in the UK on demand for domestic and international tourism. Scott et al. [48] examined the influence of climate on tourists' decision making and presented an approach for revealing the complexities of their preferences for climate.

Gossling et al. [49] reported that aviation mitigation policies affect tourism demand to developing countries and suggested 'carbon smart' tourism market restructuring approaches to reduce the intensity of emissions from tourism. Gossling and Hall [50] assessed the emissions from tourism in Sweden and concluded that governments should consider emissions from tourism, particularly aviation, in any climate policy. Mc Kercher et al. [51] studied attitudes to tourism and climate change among residents of Hong Kong and reported that government intervention may be required to create meaningful behavioral change in travel patterns. Scott et al. [52] looked at greenhouse gas emission reduction targets and found that their achievement is largely dependent on major changes in policy and practices of air travel. Eijgelaar et al. [53] examined a paradoxical issue in tourism's adaptation to climate change and emission reduction demands. They reported that high levels of greenhouse gas emissions are created by cruise ship tourists, but 59% of the tourists feel that their travel does not impact climate change.

Scott and Becken [54] discussed tourism's role in relation to climate change mitigation and adaptation, highlighting key challenges that tourism faces in its attempts to better understand and manage the problem of climate change. Weaver [55] argued that an uncommitted tourism industry and traveling public cause the likelihood of unsuccessful climate change policies and strategies. Scott [56] presented that addressing climate change is considered a prerequisite to sustainable development. Pickering [57] analyzed the visitation patterns of six ski resorts in Australia to study the relationship between demand changes for tourism and climate change. Brouder and Lundmark [58] surveyed winter-oriented tourism entrepreneurs in Sweden to assess their perceptions of the potential threat from climate change. Scott et al. [59] outlined the complex interrelationships between climate change and the multiple components of the international tourism system. Zeppel [60] assessed the collaborative governance of climate change in Australian tourism. Su et al. [61] explored the awareness, attitudes, and behaviours of Taiwanese tourist hotels with respect to climate change and its potential impacts as well as the hotels' overall environmental practices.

Gossling et al. [62] looked at the eco-efficiency of tourism and highlighted that limiting fossil energy use is a

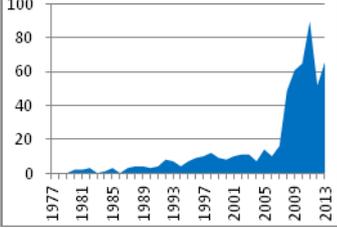
precondition for achieving sustainable tourism development. Patterson et al. [63] compared the ecological footprint of tourists and the host population and reported that arrival transport accounts for 86% of the total tourism impact. Becken and Simmons [64] assessed the sustainability of different tourist types in New Zealand, proposing a tool for making complex policy decisions and identifying strategies that lead to high-yield tourism. Gossling et al. [65] provided a theoretical framework for stakeholder involvement and policy implementation processes in sustainable tourism.

B. Groups in Tourism

Edge-betweenness clustering is applied to the citation network to identify the major research themes in tourism. The subgroups consist of 1 to 1930 articles. We only analyzed four of them that include more than 500 articles. In each subgroup, we conduct text mining on the titles and abstracts of all articles to identify the major keywords. We also extract the keywords from the title and abstract of the influential articles on the key-route main paths. Common terms are excluded - for example, case, study, impact, tourism, tourist, research, travel, data, management, etc. We combine these two keyword sets to form the major theme of each subgroup. Table 2 shows the major theme, number of articles, keywords, and the growth curve of each group.

TABLE 2
DATA OF EACH GROUP

Group	Major theme	No. of articles	Keywords	Growth curve
1	Tourism sustainability	1930	Development Community Sustainable Ecotourism Environmental Perception	
2	Tourism destination choice	1412	Destination Image Satisfaction Marketing Experience	
3	Sociology of tourism	1309	Cultural Social Authenticity Identity Ethnic Heritage	

4	Tourism demand forecasting	606	Forecasting Tourism demand International tourism Economic growth arrival	
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1) Group 1: Tourism Sustainability

Fig. 2 shows the key-route main path of this group. The focus of this group is tourism sustainability, including tourism planning, residents' support, partnership, and governance.

Some researchers discussed the issues of tourism planning. Jenkins [66] concluded that large-scale tourism developments in developing countries are likely inevitable, but the consequences of such developments can be foreseen and therefore be mitigated by appropriate pre-

project planning. Cater [67] argued that tourism planning in least developed countries should be integrated with the rest of the spatial economy. Jamal and Getz [68] investigated the application of the collaboration theory to the planning and development of tourism destinations. Reed [69] identified how power relations affect attempts at community-based tourism planning. Yuksel et al. [70] noted stakeholders' views on the implementation of tourism planning.

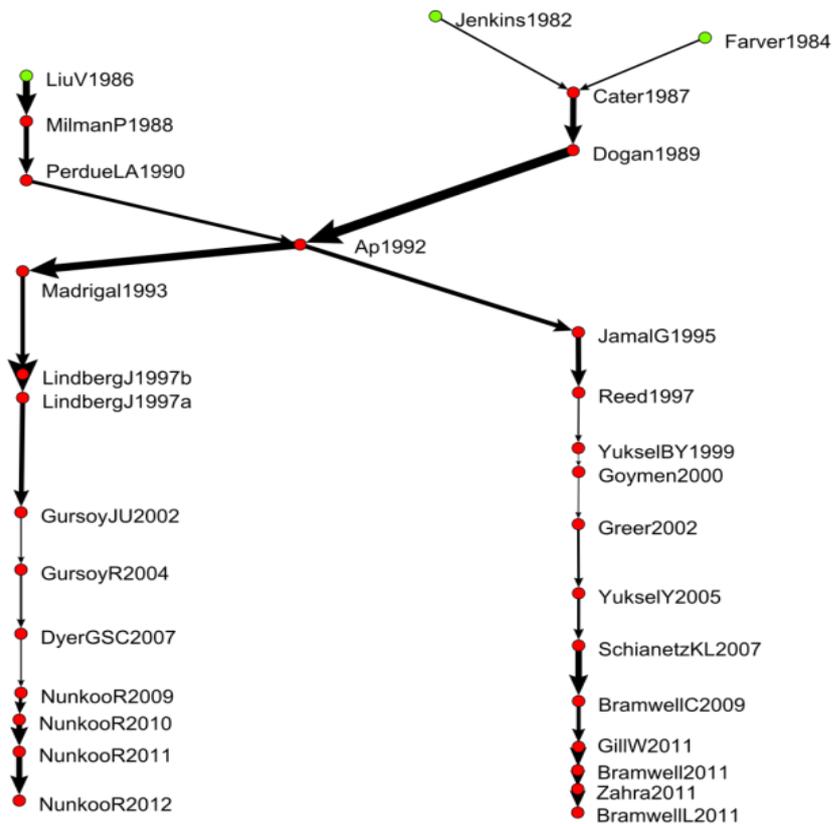


Fig. 2 Group 1: Tourism sustainability

Several researchers explored sociocultural impacts of tourism. Farver [71] found that the tourism investments in The Gambia have not improved its employment

possibilities, but rather tourism has had non-economic impacts on moral, social, and family issues. Liu and Var [72] determined resident attitudes to the economic, sociocultural, and ecological impacts of tourism

development in Hawaii. Milman and Pizam [73] reported that central Floridians identify some specific positive and negative social impacts that tourism has had on their community. Dogan [74] investigated the sociocultural impacts of tourism and concluded that the impacts vary from country to country. Goymen [75] indicated that tourism in Turkey is constantly interacting with political, social, and economic components of the policy.

Many researchers examined the impacts of residents' perceptions, attitudes, and support on tourism development. Perdue et al. [76] stated that rural resident perceptions of tourism impacts are related to their support for additional development. Ap [77] used the social exchange theory to examine the impacts of residents' perceptions on tourism. Madrigal [78] adopted the same theory to investigate residents' perceptions of community tourism development. Lindberg and Johnson introduced a synthetic model of resident attitudes [79] and identified the factors that impact resident attitudes toward tourism [80]. Nunkoo and Ramkissoon [81] applied the means-end chain theory and the laddering technique to investigate residents' attitudes to tourism. Nunkoo and Ramkissoon [82] discovered the influence of residents' satisfaction with community services on their attitudes and support for tourism development.

Gursoy et al. [83] revealed that host community support is affected by the level of concern, ecocentric values, utilization of resource base, and perceived costs and benefits of the tourism development. Gursoy and Rutherford [84] found that host community backing for tourism development is influenced directly and/or indirectly by nine determinants of residents' support. Dyer et al. [85] stated that the perceived positive economic impact factor has the largest influence on residents' support for further tourism development. Nunkoo and Ramkissoon presented that community support of tourism is influenced by perceived benefits, perceived costs, community satisfaction [86], trust, and power [87].

Some researchers investigated sustainable tourism development from the perspectives of partnership and governance. Greer [88] outlined important lessons for developing tourism partnerships across national, regional, and local administrative boundaries. Yuksel and Yuksel [89] showed that managing collaboration relations between organisations in tourist destinations is a complex and difficult task. Bramwell and Cox [90] adopted the stage approach and the combined path dependence and path creation approach to examine the evolution of a national park tourism partnership.

Gill and Williams [91] used the path dependency framework to understand evolving governance strategies in Whistler, British Columbia. Bramwell [92] utilized a political economy approach to understand the governance and the state's influences on tourism sustainability. Zahra [93] examined the governance of regional tourism organisations and related governance to the principle of subsidiarity. Bramwell and Lane [94] argued that tailored and effective governance is a key requirement for implementing sustainable tourism.

2) *Group 2: Tourism Destination Choice*

The articles in this group focus on the factors that impact tourism destination choice. Fig. 3 shows the key-route of this group.

Some researchers discussed the factors that affect tourism destination choice. Um and Crompton [95] argued that attitude is influential in determining tourism destination. Crompton [96] used the choice structure taxonomy as an analytical tool for destination choice. Crompton and Ankomah [97] suggested that the destination decision process consist of three stages: possible destinations, probable alternative, and final selection. Sirakaya and Woodside [98] provided a model to understand, describe, and predict tourist destination choice.

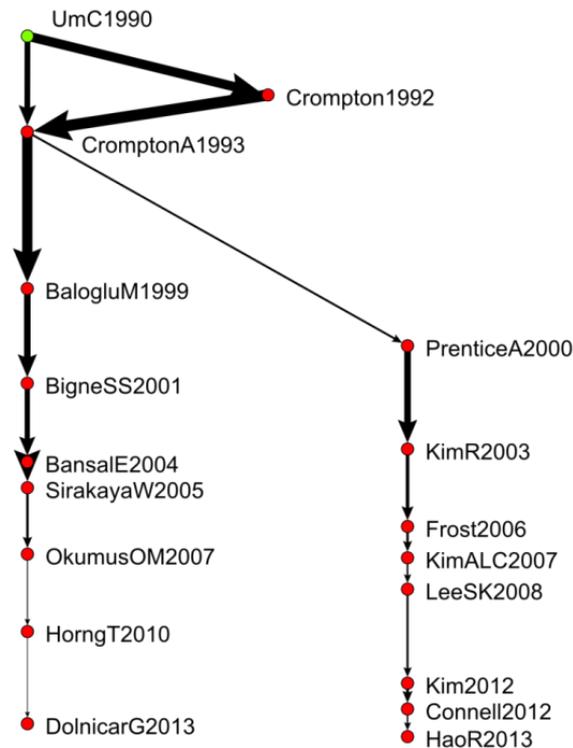


Fig. 3 Group 2: Tourism destination choice

Numerous authors examined the influence of tourism image, familiarity, and celebrity on tourists' behavior. Baloglu and McCleary [99] noted that image is an important influence in the selection of vacation destinations and that a destination image is formed by both stimulus factors and tourists' characteristics. Bigne et al. [100] found that tourism image affects tourists' perceived quality, satisfaction, intention to return, and willingness to recommend the destination. Dolnicar and Grun [101] showed that a "forced-choice full binary" format performs better than "Likert scale" and "pick-any" formats in measuring destination image. Prentice and Andersen [102] claimed that familiarity is a direct and indirect determinant of visiting propensity and offered a choice model for cultural tourism. Lee et al. [103] stated that celebrity involvement affects the perceptions of tourism destinations and highlighted the powerful impacts of mass media and popular culture in post-industrial societies.

Some researchers suggested tools for tourism promotion and marketing, such as movies, films, and dramas. Bansal and Eiselt [104] examined the procedure of tourism planning and decisions. They also provided a tool for promotion and marketing. Okumus et al. [105] stated that food can play an important role in promoting tourism

destinations. Horng and Tsai [106] analyzed the techniques used by East Asian governments to promote their tourist destinations' cuisine and food service on websites.

Kim and Richardson [107] argued that movies, as a form of popular culture, can be a tool for marketing destination image. Frost [108] found that feature films may create attractive destination images. Kim et al. [109] explored that Korean television dramas impact the flow of Japanese tourists. Kim [110] found that audience involvement or engagement with a TV drama affects their actual on-site film tourism experiences. Connell [111] evaluated the effects of film tourism on tourism destinations from a cross-disciplinary perspective. Hao and Ryan [112] suggested that interpretation of 'film language' is a key to the promotion of destination image and the transformation of a place.

3) Group 3: Sociology of Tourism

The major theme discussed in Group 3 is sociology of tourism. Fig. 4 shows the key-route main path of this group. Some researchers investigated the social and cultural impacts of tourism. Others examined the impacts of the tourism experience.

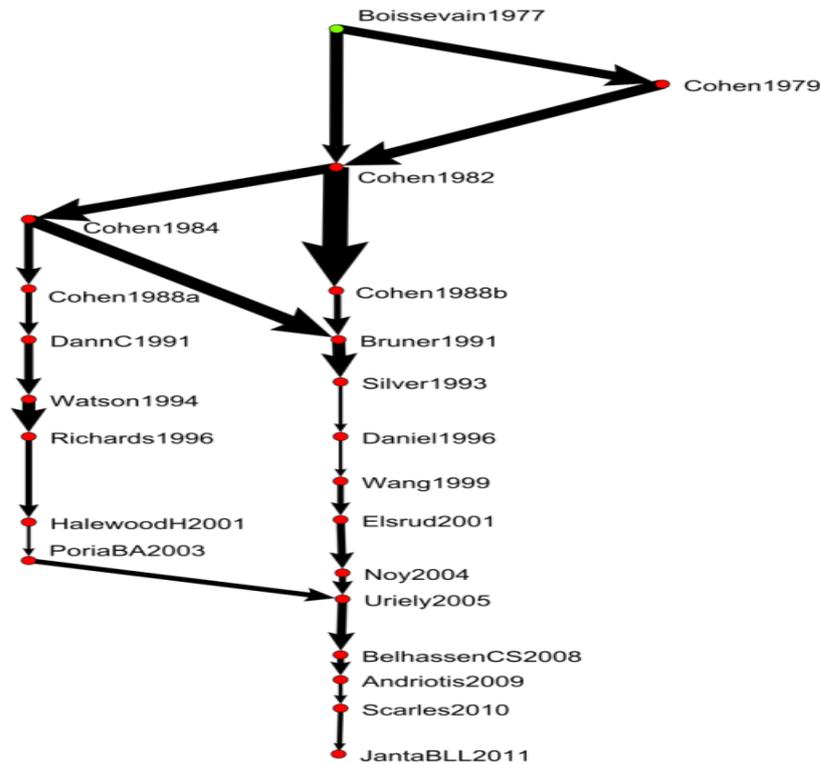


Fig. 4 Group 3: Sociology of tourism

Aside from the articles mentioned in the overall development trajectory, some papers also discussed the issues of tourism sociology. Bruner [113] found that the tourist self is changed very little by a tour, while the consequences of tourism are profound for the native self. Silver [114] discovered that the impact of touristic discourse upon the Western imagination has an independent political significance. Based on cultural framing and an examination of dance behavior, Daniel [115] noted that dance performance in tourism remains authentic and creative. Wang [116] demonstrated that existential authenticity can explain a greater variety of tourist experiences. Elsrud [117] addressed how culturally and socially constructed narratives about risk and adventure are manifested by individuals in backpacker communities and further argued that tales and acts of “risk and adventure” work particularly well in individuals’ efforts to “narrate identity”. Noy [118] examined backpackers’ narratives of self-change to address the sociocultural context pertaining to identity of the host society.

Richards [119] studied European cultural tourism and disclosed a rapid increase in both the production and consumption of heritage attractions. Halewood and Hannam [120] examined how notions of authenticity and commodification are constructed by key participants through the staging of particular types of Viking tourism.

Poria et al. [121] indicated that the perception of a place is associated with the visitation patterns of heritage tourism.

After 2005, researchers put more focus on tourism experiences. Uriely [122] identified four conceptual developments in the tourist experience and suggested that contemporary conceptualizations of this subject correspond to the so-called “postmodernist” theorizing in the social sciences. Belhassen et al. [123] explored the experiences of pilgrims and argued that the concept of authenticity should be rethought due to its lack of consideration of ideological and spatial dimensions. Andriotis [124] studied the experiences of male sacred shrines and found the emergence of five core elements of authentic experience. Scarles [125] presented a visual autoethnography method for exploring the embodied performances of tourists’ experiences. Janta et al. [126] examined how tourism employment and workplace experiences influence migrant workers’ adaptation in the host society and argued that tourism employment provides access to multiple social networks, which subsequently support the improvement of foreign workers’ social and cultural competencies.

4) Group 4: Tourism Demand Forecasting

Fig. 5 shows the key-route main path of group 4. The papers in this group focus on discussing the issues about tourism demand forecasting, including how to increase the demand for international tourism and the models of forecasting tourism demand. Kliman [127] analyzed

Canadian overseas travel and argued that some of the conventional observations about the demand for international travel are correct, while others are not supported. Martin and Witt [128] reported that substitute prices play an important role in determining the demand for international tourism, but there is considerable variation in importance. Smeral et al. [129] specified demand equations to generate forecasts of tourism imports and exports for various major geographical areas. Witt and Witt [3] reviewed the empirical research of forecasting tourism demand and found that no single forecasting method performs consistently best across different situations. Kulendran and King [130] compared a range of tourist flow forecasting models and concluded that time-series models perform better than error correction models.

Kulendran and Witt [131] investigated the models of tourism demand forecasting and found that the least squares regression model is less accurate than newer econometric models. Song et al. [132] evaluated the forecasting accuracy of six econometric models in the demand for international tourism in Denmark. Song and Witt [133] used vector autoregressive models to forecast

tourist flows to Macau and suggested that Macau will face increasing tourism demand by residents from mainland China. Wong et al. [134] adopted four different forecasting models to examine the efficiency of combined forecasts of tourist arrivals in Hong Kong and concluded that a forecast combination can reduce the risk of forecasting failure.

Song and Li [5] concluded that there is no single model that consistently outperforms other models in all situations and also identified some new research trends. Bonham et al. [135] applied a vector error correction model to forecast Hawaii tourism and demonstrated satisfactory forecasting performance. Athanasopoulos et al. [136] evaluated the performances of various methods for forecasting tourism and found that pure time series approaches provide better accuracy than models with explanatory variables. Song et al. [137] showed that time-varying parameter structural time series models outperform other models on tourist arrival forecasting. Song et al. [138] reviewed tourism economics research and identified the methodological innovations, emerging topics, and research gaps over the past decade.



Fig. 5 Group 4: Tourism demand forecasting

V. CONCLUSIONS

This study integrates key-route main path analysis and the edge-betweenness clustering technique to identify the development trajectories and the major research themes in the tourism literature. We first retrieved tourism-related articles and their citation data from ISI WOS and constructed the citation network. We then applied key-route main path analysis to explore the overall development trajectory from the citation network.

The overall development trajectory depicts the historical evolution of the tourism literature. The clustering method is further conducted on the network to identify the research groups, which make up four major research trends: ‘tourism sustainability’, ‘tourism destination choice’, ‘sociology of tourism’, and ‘tourism demand forecasting’. We identified the influential papers and described the major topics in each group to illustrate their development trajectories. After combining the overall development trajectory with

the key-route main paths of the four research groups, we are able to present the whole picture of the development of the topic of tourism in the literature.

If one wants to know what to research and how to apply tourism, the methodology and the results herein could be a useful guide. The methodologies applied and the results shown in this study have demonstrated a feasible and practical approach for exploring the overall development trajectories and identifying the major research themes in the tourism literature. The methodology adopted by us offers a feasible solution and can be a good reference for any future study with a similar purpose.

This study contributes to both the tourism and bibliometrics fields. For the tourism field, we provide a feasible way to answer the questions of what to research and how to apply them in a tourism study. For the bibliometrics field, we propose a unique approach to enhance the methodology pool of citation-based social network analysis. The ability of including a large amount of literature supplements the traditional qualitative approaches of a literature survey.

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