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Bibliometric Analysis and Trends: An Application in Senior Tourism

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ABSTRACT

This study applies bibliometric analysis to senior tourism research from 1998 to 2017, identifies its intellectual structure, emerging trends, and future research opportunities. A detailed search of documents collated from Web-of-Science and Scopus was implemented and analyzed through CiteSpace. The results reveal a slowly increasing growth of research with six main areas of research. The network of journals shows a core peripheral structure with *Tourism Management* ranked first. Among countries' publications, the United States leads in volume. The identification of structural holes, the keyword analysis and development of emerging tendencies highlights priorities in senior tourism pointing to new opportunities for research. This study is differentiated from others by its temporal and dynamic analysis of the last two decades, utilizing CiteSpace for a co-citation and co-occurrence network analysis. As a result, the researchers and the hospitality sector were equipped with new exploration tools.

JEL classification: M 31

Keywords: Bibliometrics; Web-of Science; Scopus; senior tourism; co-citation network; co-occurrence network; CiteSpace.

1. Introduction

It is imperative that scholars monitor developing literature in order to glean new insights in varied topic areas, thereby adding to the body of existing knowledge (Chen, 2006). Bibliometrics is critical for conducting periodic reviews of existing research fields, identifying contributions to knowledge, and constructing substantiated arguments about the development of a field (Denyer & Tranfield, 2006). The bibliometric study involves the statistical analysis of scientific publications, which adopts quantitative performance indicators to get over the disadvantage of subjectivity in peer review and expert judgments (Van Raan, 2004).

Bibliometrics has become a critical tool for tourism studies by assessing of research or scientific production in a specific area over time. The increasing number and complexity of research papers has created a need for visualization tools that can produce maps, graphs, and diagrams to illuminate patterns, trends, and processes. Despite its usefulness, the number of bibliometric studies using network visualization is small and only covers short time periods (Evren & Kosac, 2014). This method is under utilised in tourism research and has the potential, if developed, to explore the structure of tourism networks in many different contexts (Scott, Baggio & Cooper, 2008); thus, its application in our research.

The most popular bibliometric visualisation tool CiteSpace (Chen, Ibekwe-SanJuan, & Hou, 2010), used in the current study, allows the researcher to take time series snapshots of the knowledge domain and merge these into a visual map. Moreover, different types of bibliometric networks can be constructed with CiteSpace: (i) co-citation networks of authors, documents and journals; (ii) co-occurring author keywords and keywords plus; (iii) co-authorship networks of authors; (iv) co-authors' institutions and (v) co-authors' country.

Although several studies have been conducted through CiteSpace in the areas of medicine (e.g. Pestana & Sobral, 2019), and hospitality (e.g. Li, Ma, & Qu, 2017), to the best of our

knowledge this tool have only recently been used in tourism in the areas of sustainable (Fang, Yin, & Wu, 2018), and tourism crisis (Jiang, Brent Ritchie, & Benckendorff, 2017).

Finally, it is important to understand the interest of the current study in the bibliometric analysis of senior tourism research. As elderly populations grow, this changing demographic is increasingly afflicted by adverse economic and social conditions. Traveling in particular is one of many methods countering these effects and may have a positive impact on quality of life for elderly populations (Alén, Losada, & Carlos, 2017). As their numbers grow, seniors will be an important segment for the tourism industry in coming decades (Alén, Losada, & Carlos, 2017). Senior travel reviews in the past have been dominated by cross-sectional designs which result in temporal gaps (Huber, Milne, & Hyde, 2017).

Therefore, the aim of our study in to show the value of a bibliometric visualisation by using CiteSpace in the field of senior tourism research from 1998 until 2017. We employ the co-citation network analysis and co-occurrence network analysis of keywords and references to visualize and detect the intellectual structure as well as the evolution footprints of intellectual turning points in the senior tourism research in the period. The study claims originality on several grounds: (1) by focusing on the last twenty years, our dataset identifies several generations of seniors; (2) use of citation index-based expansion allows a robust construction of our dataset (Chen, Ibekwe-SanJuan, and Houl, 2010); (3) the two most comprehensive literature databases, Web-of-Science (WoS) and Scopus (Guz & Rushchitsky, 2009), are used to create our dataset, providing more representative results relating to the senior tourism field; and (4) using metrics computed by CiteSpace to visualize the merged network and to identify the dynamics of its development, we provide a better pattern and understanding of this field for subsequent scholars to repeat our efforts using other data.

2. Methodology

2.1 Data Collection

WoS and Scopus databases generated global scientific outputs and were then analyzed by CiteSpace (http://cluster.cis.drexel.edu/~cchen/citespace/). The analysis reviews published work from 1998 to 2017 in keeping with the timeframe of other studies where a similar time horizon has been adopted (e.g. Ye, Li, & Law, 2013). It was also necessary to divide the study period into intervals to better analyse changes in the development network. Four-time periods were identified: first slice 1998-2002; second slice 2003-2007; third slice 2008-2012; fourth slice 2013-2017.

Aside from interest in the senior travel segment within tourism scholarship begun in the 1980s (Sie, Patterson, & Pegg, (2016), until the 1990s, documents collected from Web-of-Science (WoS) and Scopus are discontinued and almost nonexistent.

The empirical study was carried out at the beginning of May 2018 and the keywords *senior tourists*, *senior travel*, *mature tourists*, *elderly tourist*, *older tourists*, *elderly travel*, *elderly tourists*, *grey tourists*, *silver tourists*, and *motivation* were searched in WoS and Scopus, considered the most widespread databases in different scientific fields used for searching literature (Guz & Rushchitsky, 2009).

The gross sample includes 1,524 articles from WoS and 1,944 articles from Scopus. All articles were analyzed to verify their relationship with the "senior tourism" research stream. This analysis led to the identification of outliers among articles. Additionally, papers that are not cited by other studies remain disconnected to others and were eliminated based on the assumption that they are not relevant to the topic. For further analysis with CiteSpace, a total of 512 articles from Scopus were converted to the WoS format (Chen, 2006). Duplicated articles were eliminated resulting in the net sample of 700 connected articles (Table 1). Figure 3 shows an increase in the number of published articles on senior tourism, growing slowly by 0.21 per year in the total research undertaken on senior tourism.

Table 1 Sample size

Subnetwork	Documents		Gross sample Articles		Outliers		Disconnected		Connected	
Years	N	%	N	%	N	%	N	%	N	%
Web-of-Science										
1998-2002	111	5.0	84	75.68	54	64.29	8	9.52	22	26.19
2003-2007	187	8.5	118	63.10	79	66.95	10	8.47	29	24.58
2008-2012	580	26.2	384	66.21	240	62.50	50	13.02	94	24.48
2013-2017	1333	60.3	938	70.37	728	77.61	83	8.85	127	13.54
Total	2211	100	1524	68.93	1101	72.24	151	9.91	272	17.85
Scopus										
1998-2002	236	9.35	156	66.10	79	50.64	4	2.56	73	46.79
2003-2007	404	16.00	377	93.32	274	72.68	7	1.86	96	25.46
2008-2012	763	30.22	563	73.79	388	68.92	19	3.37	156	27.71
2013-2017	1122	44.44	848	75.58	564	66.51	61	7.19	223	26.30
Total	2525	100	1944	76.99	1305	67.13	91	4.68	548	28.19

	Scopus converted to WoS		Scopus and WoS Connected		Web-of-Science and Scopus Duplications	Net sample of connected articles		
	N	%	N	%	N	N	% per articles	% per year
1998-2002	73	46.79	95	39.58	7	88	36.67	12.57
2003-2007	96	25.46	125	25.25	7	118	23.84	16.86
2008-2012	145	25.75	239	25.24	32	207	21.86	29.57
2013-2017	198	23.35	325	18.20	38	287	16.07	41.00
Total	512	26.34	784	22.61	84	700	20.18	100

Source: The authors from WoS and Scopus databases.

2.2 Data Analysis

CiteSpace includes structural, temporal and semantic metrics. Structural metrics include *betweenness centrality, modularity, and silhouette*: *betweenness centrality* indicates the important position of a node in bridging different stages of the development of a scientific field (Chen, Dubin, and Kim, 2014); m*odularity* is the extent to which a network can be divided into independent clusters with clear boundaries; s*ilhouette* gives the quality of a clustering configuration.

Temporal metrics include *citation burst* and *sigma*: *citation burst* is a specific duration in which the frequency of an entity increases abruptly with reference to its peers. It represents a statistically significant change in the number of citations about a specific phenomenon over a short time span within the overall time interval (Chen, 2006), irrespective of the frequency of

the host entity; *sigma* is a combination of betweenness centrality and citation burst. It highlights those articles that herald new ideas (Chen, 2006).

Semantic metrics define cluster labels from phrases extracted from titles, abstracts, and keywords or from index terms of citing articles, through several algorithms, like the log-likelihood ratio (LLR) this one usually giving the best result in terms of uniqueness and coverage (Chen, 2006).

The following analysis were used in the current study: co-citation analysis of cited references and journals; co-authorship analysis of countries; and co-occurrence analysis of keywords. Co-citation is one of the most frequently used bibliometric techniques (Evren & Kosak, 2014) for dealing with a diverse and growing academic literature (Denyer & Tranfield, 2006). Co-citation describes the intellectual development of the overall domain and detect existing scientific schools and academic networks (de Solla Price, 1965). Co-authorship analysis identifies the underlying patterns of collaboration between researchers working in the filed. Authors and countries are connected to each other when they share authorship of an article included in the sample of source articles. Co-occurrence analysis is based on the theory that research fields can be analyzed based on patterns of keyword usage in publications, which has been largely and successfully used for dynamic evolution of science. It is a content analysis technique that is effective in mapping the strength of association between keywords in textual data (Jiang, Brent Ritchie, & Benckendorff, 2017). CiteSpace includes co-occurring *author keywords* and *keywords plus* to evaluate the trend of senior tourism research. *Keyword plus* are generated independently of the title and author keywords, describing article's contents with greater depth and variety (Wang et al., 2013). In recent years, the distribution change of keyword in different period was applied to evaluate research trends (e.g. Wang et alc. 2013).

Table 2 includes CiteSpace metrics for a dynamic analysis of the network of senior tourism research, discussed in the corresponding sections.

Table 2 CiteSpace metrics by node type

Network	Node Type by year	Modularity	Nodes	Links	Density	# Clusters	Mean Silhouette
Journal co-citation network	**Journals**						
	1998-2002	0.4929	51	153	0.1200	7	0.7143
	2003-2007	0.6272	64	192	0.0952	7	0.8571
	2008-2012	0.6920	120	360	0.0504	12	0.6667
	2013-2017	0.7015	210	630	0.0287	21	0.4286
Network of co-authors'country	**Countries**						
	1998-2002	0.5283	29	30	0.0739	13	0.3077
	2003-2007	0.4300	36	94	0.1492	7	0.4286
	2008-2012	0.4692	56	127	0.0825	9	0.5556
	2013-2017	0.4151	86	237	0.0648	14	0.6429
Document co-citation network	**Documents**						
	1998-2002	0.3445	18	36	0.235	7	0.4273
	2003-2007	0.5799	19	26	0.152	7	0.5703
	2008-2012	0.5002	27	46	0.131	8	0.4994
	2013-2017	0.4313	42	126	0.146	7	0.7131
Author co-citation network	**Cited Author**						
	1998-2002	0.4392	186	814	0.0473	30	0.2286
	2003-2007	0.4012	41	123	0.1500	8	0.6250
	2008-2012	0.4886	80	240	0.0759	15	0.4000
	2013-2017	0.4913	139	417	0.0435	38	0.3421
Co-occuring author keywords and keywords Plus	**Keyword**						
	1998-2002	0.6397	26	40	0.1231	7	0.571
	2003-2007	0.5266	41	123	0.1500	4	1.000
	2008-2012	0.4714	68	68	0.0896	15	0.467
	2013-2017	0.5106	115	115	0.0526	7	1.000

Source: The authors.

3. Results and Discussion

3.1 Top journals

The network of journals has good modularity over time (Table 2), which indicates that the journals tend to have more connections inside the group within it they are located, exhibiting a good degree of collaboration. This network is centralized around the top journals, as can be seen by the great variation among the number of links each node possesses. Nevertheless, the density is decreasing with time while the number of clusters is increasing (from 7 to 21), suggesting the connection among the top journals become more decentralized with the passage

of time as more new journals become involved in senior tourism research. The top 10 journals account for 48.71% of total publications (TP) and 47.47% of total citations (TC). *Tourism Management* accounts for most of the senior tourism research with 91 articles; while *Journal of Travel and Tourism Marketing* and *Tourism Review* stand out among the other sources with the highest ratio of citations per publication.

A citation burst can be used to detect the most active journals of research. A citation burst provides evidence that a particular type of node is associated with a surge in citations, which means the node has attracted an extraordinary degree of attention from the scientific community (Chen, Dubin & Kim, 2014). Table 3 shows the top 10 journals with the strongest citation bursts in the data set. The first two that were detected are the *International Journal of Tourism Review*, with the highest citation burst from 2011 until 2017, followed by *Tourism Management*, with a citation burst from 2008 until 2012. *Current Issues in Tourism* is the journal with the highest length of citation bursts (2010-2017).

Table 3 Citation burst of the top journals.

Cited Journals	Strength	Begin	End	1998 - 2017
International Journal of Tourism Review	10.6632	**2011**	2017	
Tourism Management	9.535	**2008**	2012	
Annals pf Tourism Research	8.6588	**2008**	2012	
International Journal of Contemporary Hospitality Management	7.7612	**2015**	2017	
Asia Pacific Journal of Tourism Research	6.2816	**2014**	2017	
Current Issues in Tourism	6.0601	**2010**	2017	
Journal of Travel & Tourism Marketing	5.4793	**2009**	2012	
Journal of Vacation Marketing	4.6176	**2008**	2012	
Journal of Travel Research	4.561	**2008**	2011	
Tourism Analysis	3.971	**2015**	2017	

Source: the authors.

3.3 Scholarly communities and collaboration by country

The network of co-authors' country aims to demonstrate the collaboration relationship between authors country and territory. All years have an acceptable modularity (Table 2). The

partitions the network on the basis of its connectivity characteristics show some variation in the number of clusters (from 7 to 14), an indicator of its dynamics. The development of senior tourism research collaboration in different countries is presented along a time axis in Figure 1. The USA and Australia have acted as the foundation for collaboration with other countries in later years. The density of the network has its highest value in the second slice, where the structure of the network is more concentrated in some countries. Nevertheless, the decreasing values of density, and the increased number of nodes and links, highlights that the foundation researchers are active collaborators with researchers across many countries.

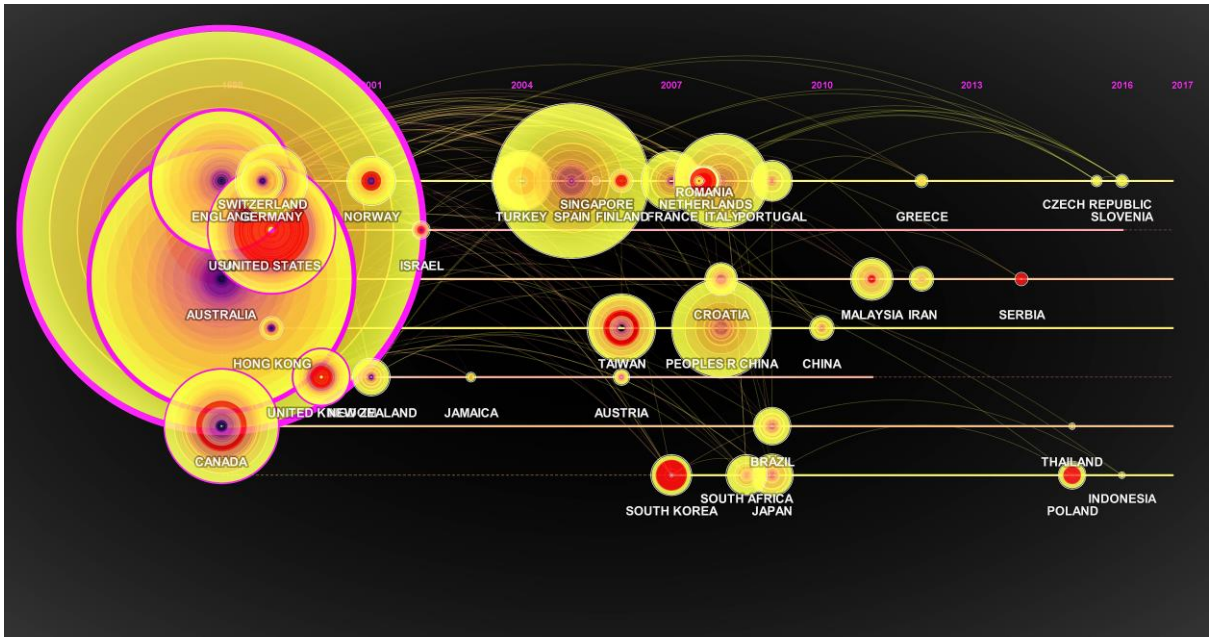

Figure 1. Time-slice view of co-authors 'country.

3.4 Research themes

The evolution of key research-front terms between 1998 and 2017 are shown in Table 4. The centrality of a keyword quantifies its importance in the network, and all the top keywords have significant centrality values, being relevant to the expansion of knowledge. It can be seen that the growth of research topics occurred mainly in 2013, where the following main central keywords occurred: *tourism management, tourist perception, tourism behavior, motivation, tourist satisfaction, tourism attraction, ecotourism,* and *tourist attitude*, which

indicated a growing focus on the management and development of tourism, specially tourist perception, motivation and attitude. This illustrates that detailed issues related to senior tourism were being examined through a broader range of disciplinary backgrounds as the field matured.

Table 4 Keywords with high frequencies and centrality by slices.

Years	Keywords	Count	Centrality
1998-2002	tourist perception	35	0.34
	USA	34	0.41
	tourism development	33	0.35
	tourism safety	30	0.34
	Australia	25	0.21
	tourism destination	24	0.39
	heritage tourism	23	0.42
	tourist attraction	20	0.31
	tourist satisfaction	19	0.34
	elderly population	14	0.28
2008-2012	tourism destination	43	0.42
	tourism development	42	0.44
	tourism management	40	0.46
	tourism attraction	39	0.38
	China	36	0.36
	heritage tourism	29	0.35
	motivation	25	0.36
	tourist perception	23	0.16
	USA	20	0.41
	Spain	18	0.21
	tourism attitude	16	0.22
	tourism satisfaction	13	0.18
	ecotourism	11	0.23

Years	Keywords	Count	Centrality
2003-2007	tourism management	35	0.41
	ecotourism	34	0.43
	motivation	33	0.42
	Japan	29	0.23
	elderly population	28	0.21
	intentions	25	0.37
	Australia	23	0.37
	Canada	22	0.13
	USA	19	0.36
	tourist attraction	18	0.23
	landscape	15	0.18
2013-2017	tourist perceptions	57	0.44
	tourist behavior	54	0.43
	tourism management	53	0.44
	tourism attraction	50	0.41
	ecotourism	48	0.34
	motivation	43	0.41
	health tourism	36	0.27
	tourist satisfaction	35	0.41
	tourist attitude	34	0.28
	Spain	34	0.21
	tourist experience	31	0.23
	landscape	27	0.13
	experience	23	0.13
	information technology	23	0.36
	rural tourism	20	0.22
	authenticity	17	0.14
	service	16	0.13

Source: The authors.

Table 5 shows the top 15 keywords with strong citation burst from 1998-2017. *Burst* detection can identify bursts of keywords as indicators of emerging trends (Chen, Dublin, & Kim, 2014). Geographical keywords such as United States and Australia are evident in the results because the tourism industry is largely based on physical location and resources, thus keywords are likely to reflect research exploring this growing segment of seniors and case studies in specific locations. United States was the strongest burst between 1999-2009. The hottest topics from 2008-2012 were tourism destination, tourism development, tourism management, destination attractiveness, and heritage tourism. The most recent burst of keywords is Spain which reflects recent financial issues in this country. Tourism management and motivations are also hot topics from 2013-2017. This indicates that recent hot topics attracted researchers with a management and psychological background.

Table 5 Top 15 keywords with the strongest citation bursts.

	Citation burst			
Keywords	Strength	Begin	End	Duration (1998 - 2017)
Unites States	186.993	**1999**	2009	
Australia	72.342	**2004**	2009	
Ecotourism	11.395	**2004**	2009	
Japan	67.619	**2005**	2012	
Tourism development	62.102	**2008**	2014	
Tourism destination	60.954	**2008**	2014	
Heritage tourism	64.261	**2010**	2012	
Destination attractiveness	35.602	**2010**	2014	
Spain	39.519	**2014**	2017	
Tourism management	42.992	**2011**	2017	
Tourist satisfaction	83.727	**2014**	2017	
Motivation	40.394	**2014**	2017	
Tourist experience	43.317	**2015**	2017	
Health tourism	50.791	**2015**	2017	
Service	44.676	**2015**	2017	

Source: the authors.

3.5 Co-citation analysis by thematic clusters

Figure 2 shows some highly cited articles in a timeline visualization of the network, where red rings indicates citation bursts over time periods (Chen, Dubin, & Kim, 2014). The cited articles are represented by nodes in the network, and links between nodes represent the number of times citations appeared together in the source documents included in the data set. The color of links denotes the time a particular connection was made, based on the publication year of the source article. Blue colors indicate older connections, whereas red colors indicate more recent connections. The Figure shows some relevant articles (identified by the first author) distributed by thematic clusters.

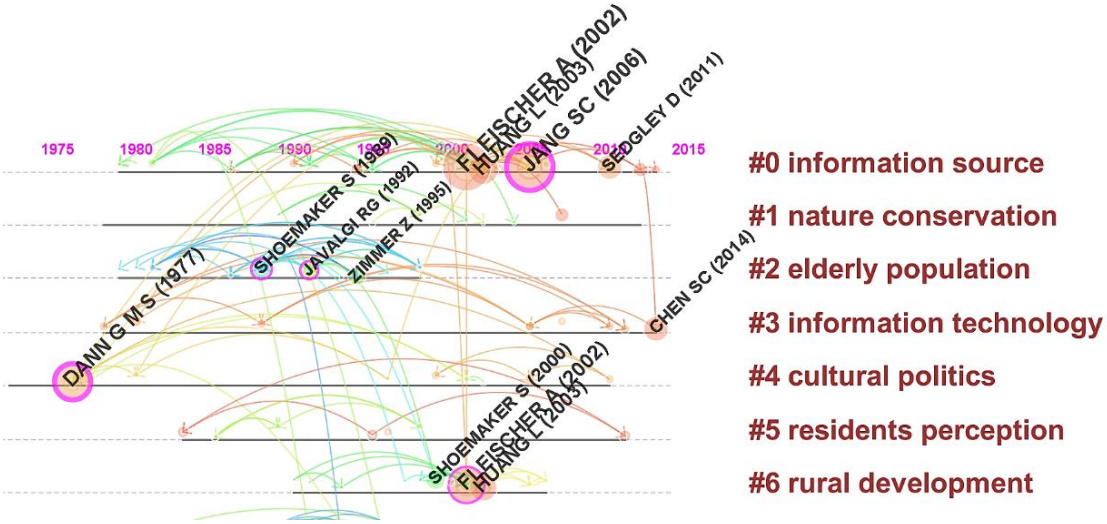

Figure 2 Timelines of co-citation clusters.

CiteSpace divides the co-citation network into many clusters of co-cited references, so that references are tightly connected within the same cluster. The recentness of a cluster is measured by percentiles and the mean year of publication. The number of elements in each major homogenous cluster is listed in Table 6, all with 10 or more documents and with good silhouettes, meaning they can be labeled by noun phrases from titles of the cited articles in the cluster (Chen, Ibekwew-SanJuan, & Hou, 2010).

CiteSpace allows the identification of a core of thematic clusters, defined by clusters #0 up to cluster #6. All clusters have good silhouette (>= 0.70), which is an indicator not only of its homogeneity, but also of the quality of the cluster configuration.

Cluster #0 is labelled *information source* because it includes articles focusing mainly on travel information sources as an input for their travel motivations, constraints, market segmentation, and well-being motivations.

Cluster #1 is labelled *nature conservation* because it includes articles focusing mainly on nature-based motivations, psychological well-being, and tourists' environmental concerns.

Cluster #2 is labelled *elderly population* because it includes articles focusing on seniors, including their heterogeneity, their motivations and differences with non-seniors.

Cluster #3 is labelled *information technology* because it includes articles focusing on use of the internet, social media platforms and mobile devices.

Cluster #4 is labelled *cultural politics* because it includes articles focusing on seniors cultural, economic and social diversity.

Cluster #5 is labelled residents' perception because include articles focusing on resident's perception. As these articles goes beyond describing senior tourism, this cluster was omitted from our research.

Finally, cluster #6 is labelled *rural development* because includes articles focusing on destination attractiveness in the rural area, and on cultural tourism and mass tourism activities as ways to promote rural development.

Table 6. Major clusters of co-cited references

#	Size	Silhouette	Label (LLR)	Year Ave.	Std.	Min	P50	P75
0	23	0.705	Information source	1998	10.1	1980	2001	2006
1	15	0.863	Nature conservation	1998	9.83	1979	1999	2005
2	15	0.94	Elderly population	1991	6.49	1980	1992	1997
3	14	0.782	Information technology	1998	12.9	1979	2006	2010
4	13	0.695	Cultural politics	1991	13.6	1973	1997	2001
5	12	1	Residents' perception	1996	8.49	1997	1997	2002

6	12	0.874	Rural development	1999	4.9	2000	2000	2002

Source: The authors

The most cited papers give historical perspective on scientific progress and reveal recognition of scientific advancement (Chen, 2006). Our databases show the highest cited articles belongs to cluster #2, labeled *elderly population* by LLR, with a median of publications between 1980 up to 1992. As usual in the literature, older papers receive more citations than recent one, given the time length of knowledge diffusion. This research stream is slowly increasing and therefore very old papers represent the pillars of senior tourism research. Shoemaker (1989) and Javalgi, Thomas and Rao (1992) are the two most highly cited and central articles from both clusters #2 and #3. Shoemaker (1989) was one of the first articles to question homogeneity in the senior market and to use senior travel motivations to segment the market into clusters, while Javalgi, Thomas and Rao (1992) did a research comparing the behavior of senior versus non-senior tourists.

Table 7 shows the that the two more cited articles provide conceptual frameworks in the early stages of the field and are central to the network.

Table 7 Top articles with the most citation counts.

Citations	Author	Year	Source	Cluster #
167	Jang & Wu.	2006	*Tourism Management*	0
164	Fleischer & Pizam.	2002	*Annals of Tourism Research*	0
104	Hsu, Cai & Wong.	2007	*Tourism Management*	0
98	Horneman, Carter, Wei & Ruys.	2002	*Journal of Travel Research*	0
85	Huang & Tsai.	2003	*Tourism Management*	0
62	Kim, Wei & Ruys.	2003	*Tourism Management*	0
44	Sedgley, Pritchard & Morgan.	2011	*Annals of Tourism Research*	0
29	Chen, Liu & Chang.	2013	*International Journal of Hospitality Management*	0
7	Alén., Losada & de Carlos.	2017	*Current Issues in Tourism*	0
98	Sangpikul.	2008	*Tourism*	1
383	Shoemaker.	1989	*Journal of Travel Research*	2
232	Javalgi, Thomas & Rao.	1992	*Journal of Travel Research*	2
289	Zimmer, Brayley & Searle.	1995	*Journal of Travel Research*	2
177	Romsa & Blenman.	1989	*Annals of Tourism Research*	2
383	Shoemaker.	1989	*Journal of Travel Research*	3
232	Javalgi, Thomas & Rao.	1992	*Journal of Travel Research*	3
68	Chen & Shoemaker.	2014	*Annals of Tourism Research*	3
288	Dann.	1977	*Annals of Tourism Research*	4
172	Milman.	1998	*Journal of Travel Research*	6

167	Jang & Wu.	2006	*Tourism Management*	6
140	Shoemaker.	2000	*Journal of Travel Research*	6
98	Horneman, Carter, Wei & Ruys.	2002	*Journal of Travel Research*	6

Source: The authors

Figure 3 shows an overview of the network of co-cited references and burst terms on senior tourism research. Major foundation articles are likely to be located towards the center of the network because they are often cited together in the same source documents. Articles that link two clusters together indicate an opportunity for researchers to fill an information gap (Haythornthwaite, 1996). Consequently, articles produced as a result of this kind of effort provide conceptual bridges and it is probable that in linking disparate fields of understanding, they will be cited by scholars engaged in researching different areas. These articles are measured in CiteSpace by betweenness centrality and are also defined as structural holes by Burt (1992). The most central articles belong to cluster #0, the major cluster in terms of size, with 23 references and is the second more recently-formed cluster, with a median of publications between 1980 up to 2001. Fleischer and Pizam (2002) review of senior travellers' motivations and constraints forms an important bridge between the former cluster #0 and the secondary cluster #2 dominated by Shoemaker (1989). Jang and Wu (2006) more recent article in the study of push and pull motivations and emotions provides an important bridge between the former cluster #0 and cluster #6, dominated by Milman (1998). Huang and Tsai (2003) analysis of the destination selection attributes focusing on direct travel suppliers and indirect travel motivator, provides an important bridge between the primary cluster and cluster #5. From an overview of the network of co-cited references and burst terms, other structural holes and disconnected clusters may indicate developing areas, such as the cluster of nodes connected to Vigolo, Vania and Bonfanti (2016) in hospitality services (cluster # 36); and connected to Vila, Cathy and Gerald (2012) in the restaurant industry (cluster #50).

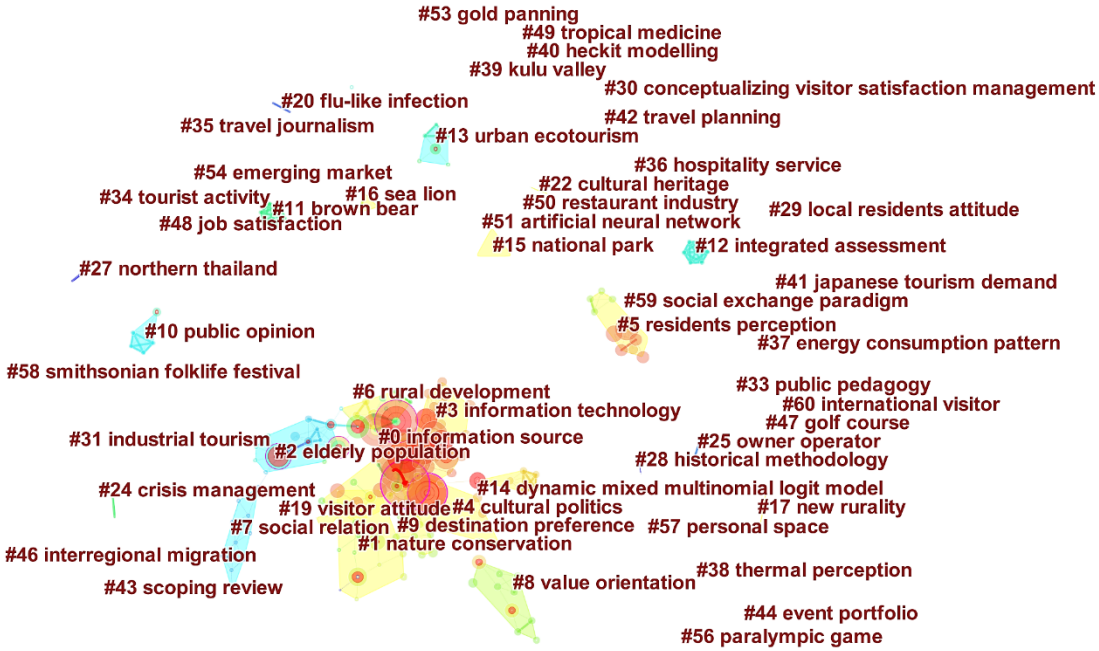

Figure 3 Overview of the network of co-cited references and burst terms.

3.6 Temporal analysis

Table 8 includes the articles that have significant values in structural and temporal metrics.

The article with the highest strength of citation bursts (62.8) of all the co-citation network is Shoemaker (1989), a reference from clusters #2 and #3. Dann (1977) is the reference with the highest citation burst (strength 47.622) from cluster #4, being a relevant mark in senior tourism research, with a current citation burst from 2012 until 2017. Dann (1977) was the first researcher to analyse the connection between tourists' home situation and their leisure patterns, including factors stemming from "anomie" and "ego-enhancement" in the tourist himself. Dann (1997), is a sleeping beauty, because there is a gap of 35 years between its publication and subsequent citation burst, in contrast with Shoemaker (2000), which waited only three years. Apart from these articles, Shoemaker (1998, 2000), Romsa and Blenman (1989), and Javalgi, Thomas and Rao (1992), have citation burst before 2009. Shoemaker (2000) focuses on the analysis of senior market over a ten-year; Romsa and Blenman (1989), focuses on differences in their preferred activities from non-seniors; while Javalgi, Thomas

and Rao (1992) focuses on differences of the behaviour of seniors with that of non-senior tourists.

All the following articles have citations burst near 2017. Huang and Tsai (2003), is also a sleeping beauty, because a gap of ten years exists between publication and citation burst; Sedglay, Pritchard and Morgan (2011), focused on the need for more individualised, subjective research that explores the intricacies of older people's lives; and finally Kim, Wei, & Ruys, 2003) is another article of interest representing an investigation of seniors' perception of the relevant travel features.

Table 8 Top articles in centrality, citation burst and sigma

Authors	Year	Centrality	Sigma	Citation burst				To be cited (years)	#
				Strength	Begin	End	Duration (1998 - 2017)		
Shoemaker.	1989	0.33	2.12	62.8	1999	2004		10	2; 3
Shoemaker	2000	0.26	1.36	51.4	2003	2009		3	6
Sedgley, Pritchard & Morgan.	2011	0.20	1.02	50.8	2015	2017		4	0
Dann.	1977	0.41	2.68	46.7	2012	2017		35	4
Huang & Tsai.	2003	0.25	1.08	37.4	2013	2017		10	0
Romsa & Blenman.	1989	0.22	1.06	31.9	2002	2003		13	2
Javalgi, Thomas & Rao.	1992	0.28	1.41	21.4	2002	2009		10	2
Fleischer & Pizam.	2002	0.37	1.47	20.5	2015	2017		13	0
Kim, Wei & Ruys.	2003	0.25	1.10	18.8	2014	2017		11	0
Jang & Wu.	2006	0.44	1.40	17.4	2013	2017		7	0

Source: The authors

5. Conclusion

Using bibliometric analysis through CiteSpace, this paper seeks to reveal its potential to analyse senior tourism's evolution over the past twenty years, its particular dynamics, and which areas are being pursued by scholars. The results extent past bibliometric studies of senior tourism research combining co-citation analysis and co-occurrence of keywords to understand

the development of this field from different perspectives. These techniques offer several advantages compared with the traditional approaches to analyse the literature Firstly, by measuring and visualizing along the period the relational analysis of different nodes (authors, articles, journals and countries), this dynamic study provides insides into the knowledge domain (Chen, 2006). Secondly, the clustering techniques used in this research not only identifies articles that serve as an important bridge between two clusters, but also suggest potential research directions. Thirdly, the bibliometric visualisation used in this paper provide an important temporal data of country co-authorship, citation burst of articles, journals and keywords co-occurrence, which adds a new dimension to the analysis and provides insights into the flow of major trends and collaborations. Finally, co-occurrence analysis was used to detect the most frequently keywords and to identify trends and emergent research topics. When keywords are analysed from a geographical point of view, and considering the whole period, it is apparent that research efforts on senior tourism have been concentrated in two countries mainly: USA and Australia. Nevertheless, in the last years countries such as Spain, and Japan have emerged, which makes sense if the severe problem of aging population in these societies is taken into consideration, which has an evident impact in the growth of this market segment and the corresponding interest on it. Keywords are also helpful for understanding research priorities and their evolution over time. Thereby, during the time span 2008-2012 the analysis of some dimensions of senior tourism segment -related to tourism destination and development, tourism management, tourism attraction and heritage tourism- has seen a period of consolidation. However, between 2013 and 2017 new topics have strongly burst onto the research scene: tourist satisfaction, tourist experience, health tourism, service and motivations, attracting researchers with a management and psychological background. The results show that research on senior tourism moved from broader topics, like tourism management, to more specific topics, like satisfaction, motivation, experience, as the field has matured. Therefore,

this field of study is turning more multidisciplinary, being progressively analysed from the new angles provided by diverse scientific approaches, which complement and enrich its content.

The results of this study could help hospitality sectors to benefit from the knowledge of this segment. Moreover, senior tourists will soon constitute one of the largest prospective market segments for hotel, restaurant, and shopping industries (Chen, Liu, & Chang, 2013).

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