



Beyond physical accessibility: a bibliometric analysis about the influence of digital communication and the use of technology on inclusive tourism in WCAG 3.0 era—tourism for all from a more accessible content perspective

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Abstract

This study aims to analyze the impact of digital communication and the use of technology in tourism. It also evaluates how new digital and technological trends, such as mobile applications and emerging virtual or augmented reality technologies, can be applied to web pages. Information that is not accessible becomes another barrier for travelers with disabilities and does not contribute to the concept of “tourism for all.” A bibliometric analysis through Web of Science (WoS) of published articles related to the influence of digital communication and the use of technology in tourism. A total of 290 articles were analysed using VOSviewer and SciMAT. The web accessibility does contemplate the regulations currently in force and therefore progress continues to be slow in this aspect. Also, technology together with new digital communication channels improve the experience of tourists and visitors to a destination, in turn impacting on their quality of life and enhancing “Tourism for all”. Furthermore, it is determined that the “phygital” concept takes on special relevance since many studies are aimed at combining both dimensions so that if a space complies with accessibility regulations, they are also considered from the information point of view in its digital sphere. This study provides an evolution of digital accessibility from a technological and communicational perspective by combining two complementary analyses and allows us to understand tourist behavior from a more inclusive aspect. There are important gaps in other areas of study, especially focused on stakeholders’ knowledge of the importance of making improvements in tourism for all.

Keywords Accessible tourism · Digital accessibility · Bibliometric analysis · Web of Science (WoS) · VOSviewer · SciMAT

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1 Introduction

In recent years, the number of persons with disabilities or special needs has increased worldwide, outstripping the growth of the population [1]. There are currently an estimated 87 million people in the European Union who have a disability and therefore face daily challenges in accessing infrastructure, products, services and information [2]. The ageing of the population has increased to such an extent that life expectancy from birth has risen for both men and women by around ten years in the last 50 years. This is not only true for Europe, but also for other continents of the world [3]. This trend has had a significant impact on people's daily lives and on society, as ageing increases the daily challenges they have to face as their physical and mental abilities diminish as a result of age.

In this context, in March 2021, the European Commission established a strategy on the rights of persons with disabilities for the period 2021–2030 with the aim of ensuring that all people with disabilities in Europe can have equal opportunities in society and the economy without suffering discrimination, taking into account the great diversity of people with physical, mental, intellectual or sensory impairments in the long term. Accessibility encompasses all areas, not only related to the built environment, infrastructure and transport, but should be understood as an enabler for the participation of all people in virtual environments, information and communication technologies (ICT), as well as goods and services [4].

The tourism industry benefits greatly from the usage of the Internet, which is used to look for and buy services associated with individual travelers. Internet users worldwide have grown by 1.8 percent over the past 12 months, thanks to 97 million new users since the start of 2023. This means that more than 66% of the world's entire population uses the internet [5]. According to Kemp [5], among the main websites and applications used by users aged 16 to 64, search engines and web portals rank third with 80.7%. This author also mentions that among the main reasons for using the Internet, 'Looking for information' stands out in first position with 60.9%, and more specifically related to tourism, with 37.9%, is looking for holidays, places and trips, above even the 'Gambling' section, which occupies the last position with 29.3%. Hence the importance of research in the field of digital accessibility in tourism and to approach this aspect from a more comprehensive perspective.

The objective of this paper is to present a bibliometric study on digital accessibility to evaluate the purpose of accessible tourism through web accessibility, mobile applications, as well as other communication and technological trends such as virtual or augmented reality that

favor the implementation of new measures that meet the criteria established by the World Wide Web Consortium.

This paper is structured in the following sections: First, we provide theoretical framework of the importance of digitally accessible tourism as well as the importance of international World Wide Web standards for digital accessibility compliance. The research questions are set out in more detail at the end of the theoretical framework. The methodology is then detailed, specifying the databases on which the search was carried out, the type of bibliometric analysis as well as the reasons for inclusion and exclusion. This is followed by the results of the analysis showing the main findings, a discussion, and a final section of conclusions.

2 Theoretical framework

2.1 Tourism for all concept and related studies

From a scientific point of view, studies have analysed the intrapersonal, interpersonal and structural limitations faced by persons with disabilities when participating in leisure activities [6, 7]. The provision of information in itself is already very important for tourism for persons with reduced mobility, as the absence or reduction of information affects the planning of their trips [8]. Accessible tourism is a loyal and financially profitable market, with tourists travelling frequently accompanied, in low season and with long stays in destinations [9, 10]. This context, together with the increase of digitalisation in society, has meant a challenge for any person, whether they have a disability or not, to be able to develop in this environment without any kind of technological barriers.

Increasingly, digital cities are investing in digital tourism, which has benefited from advances in the digital arts. Digitisation projects can extend both the reach and accessibility of cultural heritage content and enable interactions in a more sustainable and environmentally friendly way [11]. Therefore, accessible communication and information through new technologies contribute to making the tourism experience more accessible and satisfying needs, being a central part of any responsible and sustainable tourism, contributing in turn to the economy as a business opportunity for destinations and businesses to welcome all visitors, which is defined as "Tourism for All" [12].

From a digital perspective, and as it affects how information can reach all people, the World Wide Web Consortium (W3C) develops standards to ensure that web communication reaches all web users regardless of the software they use, the network infrastructure, their language, culture, geographic location or physical or mental capacity [13]. This international body has developed different standards and is currently drafting the (WCAG) 3.0,

which will address not only aspects related to the web, but will also expand to interactive content, visual and auditory media, and virtual and augmented reality [14]. Information and communication technologies are driving tourism by bringing benefits such as improving tourism experiences, co-creating value and fostering relationship marketing and “phygital” experiences, where online and offline environments are combined [15]. It is about breaking down the barrier between the digital and physical areas by merging the advantages of both schemes. For example, a user could be physically in a travel agency to get information about a tourist product and in the offices themselves enjoy an online experience through virtual reality that allows them to visualise experiences in that destination in a more tangible way. The use of “phygital” interaction is supported by several theoretical approaches that emphasise the development of cognitive skills that depend on embodied interactions with the physical environment. Among the most recent related bibliometric studies in this area is that of Tlili et al. [16], whose premise is the analysis of technology in accessible hospitality and tourism, but from a more technological and less communication and information oriented perspective, where both “phygital” aspects coexist, as was our case, as well as different methodologies of analysis with respect to our study.

In relation to the most recent bibliometric analysis published on technology in smart destinations, we can highlight the one by Sustacha et al. [17], but equally the focus is technological and not so much communicational, although both have aspects in common. According to Berners-Lee and Fischetti [18] within the realm of information and communication technology, accessibility is founded on the skill of guaranteeing that any resource, via any media, is accessible to everyone, hence the importance of taking into account concepts such as technology, information and communication technology, and smart technology as part of digital accessibility.

The purpose of this study is to carry out a bibliometric analysis of the existing literature on the influence of digital communication and the use of technology in tourism and to evaluate how, through the application of new digital and technological trends, on web pages, mobile applications as well as emerging virtual or augmented reality technologies, accessible tourism can be improved and the technological future in this area determined. To address this purpose, the following research questions are proposed:

1. How has scientific knowledge on the influence of digital communication and the use of technology on tourism evolved, as well as its impact on accessible tourism?
2. How is it geographically distributed?
3. Which authors, journals and scientific articles are most influential on this topic?

4. What is their main conceptual structure and evolution of the topics?

3 Methodology

A bibliometric analysis was carried out to analyse the influence of digital communication and the use of technology on tourism, as well as its impact on accessible tourism by compiling articles published on the subject in the Web of Science (WoS) database, a collection of more than 68 million documents from 1900 to the present day [19]. Once the source that best fits the scientific coverage of our research area has been decided, the next step is to decide which analysis tool best suits our research needs. Numerous studies have examined the most pertinent applications in the last years [20–22], however, they evolve with time, and some new ones emerge. Among the most comprehensive studies on the most appropriate tools for carrying out bibliometric analysis is that of Moral-Muñoz et al. [23] with a description of each of the three categories—general bibliometric and performance analysis, science mapping analysis, and libraries—and their corresponding incorporated tools is given. Out of all the tools that were examined, VOSviewer is particularly noteworthy because of its excellent visualization and ability to import and export data from a variety of sources. SciMAT is another tool that is highly effective at preprocessing and exporting data. A different tool that is suggested is Bibliometrix, which offers a highly comprehensive and suitable collection of professional procedures through Biblioshiny. However, we have chosen the first two since they work extremely well together for this investigation.

The main collection was used and then analysed by the following softwares.

- (1) VOSViewer v.1.6.18 is a software tool for building and visualising bibliometric networks. A noteworthy characteristic of VOSviewer is that it is a software tool for creating and visualizing bibliometric networks based on co-authorship, bibliographic coupling, and co-citation interactions, with journals, researchers, or individual publications [24].

- Unit of analysis: Organisations, Authors, Countries/Regions, Sources and Documents
- Network type: Citation analysis
- Cluster network design: Network visualisation and Density visualisation (provides a quick overview of the main areas/relationships in a bibliometric network).

Regarding the software’s visualization capabilities, there are three options available: network, overlay, and density.

(2) SciMAT v.1.04 is an open source software tool (GPLv3) developed to perform a scientific mapping analysis under a longitudinal framework; combining all the components (measures, algorithms, and procedures) required to produce the various analyses and visualizations [21]. The four key steps of the analysis process are as follows, according to SciMAT: (i) Building the dataset; (ii) Creating and normalizing the network; (iii) Applying a clustering method to obtain the map and any associated clusters or subnetworks; and (iv) Network, performance, and longitudinal assessments. SciMAT offers a variety of visualization methods, including overlapping maps, cluster networks, strategic diagrams, and evolution maps [23].

- Unit of analysis: Words
- Network type: Co-occurrence
- Normalisation measure: equivalence index
- Clustering algorithm.

To perform the scientific mapping analysis, we have based ourselves on the workflow scheme of Cobo et al. [20], which is carried out in four consecutive stages, i.e. data retrieval, processing, network extraction, normalisation, mapping, analysis and visualization.

(1) In the first step, the search is carried out in the main collection of the Web of Science (WOS) database—Advanced Search (Table 1). The time frame for this is

- taken as a time frame (no date limitation). The period chosen for the study was 1997 to August 2022.
- (2) In a second step, after applying several keyword search filters, as shown in Table 1, preliminary filtered results are obtained (n = 692).
 - (3) In a third step, articles related to the exploration are categorised for further filtering. In this case, they are categorised into three groups taking into account the title, the abstract or keywords of the article, and the full article if necessary:
 - 3.1 Those article that explicitly mention the influence of digital communication and the use of technology in tourism are selected.
 - 3.2 Articles are also explored where accessibility can be inferred in the context of tourism, but the contents are not explicitly about digital communication and technology and are removed from the analysis.
 - 3.3 The articles are neither related to accessibility nor to digital communication and technology in the context of tourism and are removed from the analysis.
 - (4) In a fourth step, once all authors had reviewed and agreed that the selected articles were correctly categorised based on the criteria of category 3.1 described in the third step, a total of 290 definitive articles were obtained for analysis (n = 290).

Table 1 Search terms and Boolean operators in WoS. *Source:* Own elaboration (2023)

Database	Search strategy	Results
Boolean operators without any selection criteria		
Web of Science (All databases)—Search date: 05/08/2022	(((((((((TS=(WEB ACCESSIB*) OR TS=(WEBSITE* ACCESSIB*) OR TS=(ICTs ACCESSIB*) OR TS=(DIGITAL ACCESSIB*) OR TS=(INFORMATION ACCESSIB*) OR TS=(APP ACCESSIB*) OR TS=(APPLICATION* ACCESSIB*) OR TS=(MOBILE ACCESSIB*))))))))))	155.429
Boolean operators with filters applied on item selection	(((((((((TS=(WEB ACCESSIB*) OR TS=(WEBSITE* ACCESSIB*) OR TS=(ICTs ACCESSIB*) OR TS=(DIGITAL ACCESSIB*) OR TS=(INFORMATION ACCESSIB*) OR TS=(APP ACCESSIB*) OR TS=(APPLICATION* ACCESSIB*) OR TS=(MOBILE ACCESSIB*)))) OR TS=(MOBILE ACCESSIB*)))) OR TS=(LEISURE ACCESSIB*))))))	101.588
Web of Science (Main collection)- Search date: 05/08/2022		
Web of Science (Main collection)—including the term “AND Touris*”—Search date: 05/08/2022	((((((((((((((TS=(WEB ACCESSIB*) OR TS=(WEBSITE* ACCESSIB*) OR TS=(ICTs ACCESSIB*) OR TS=(DIGITAL ACCESSIB*) OR TS=(INFORMATION ACCESSIB*) OR TS=(APP ACCESSIB*) OR TS=(APPLICATION* ACCESSIB*) OR TS=(MOBILE ACCESSIB*)))) OR TS=(LEISURE ACCESSIB*)))) AND TS=(TOURIS*))))))))))	1.055
Web of Science (Main collection)—including the term “AND Touris*”—Search date: 05/08/2022	Filter by: Document types: articles / NO document types: Early access o Proceedings o Book chapters o Data documents	692

Fig. 1 Number of documents by year of publication. Source: Own elaboration (2023)

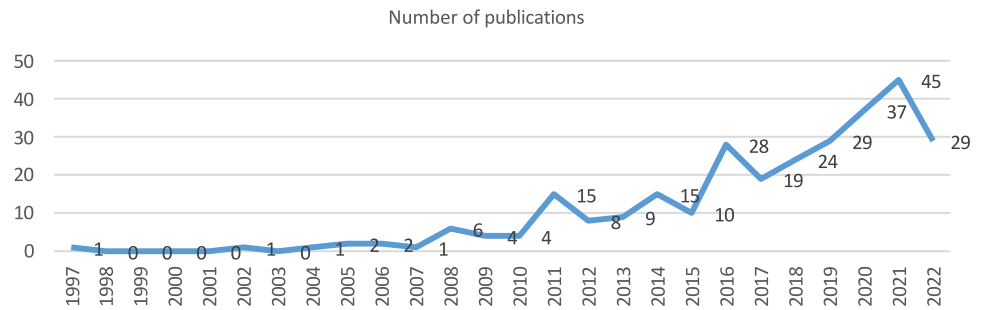


Fig. 2 Citation of registered publications. Source: Own elaboration [25]

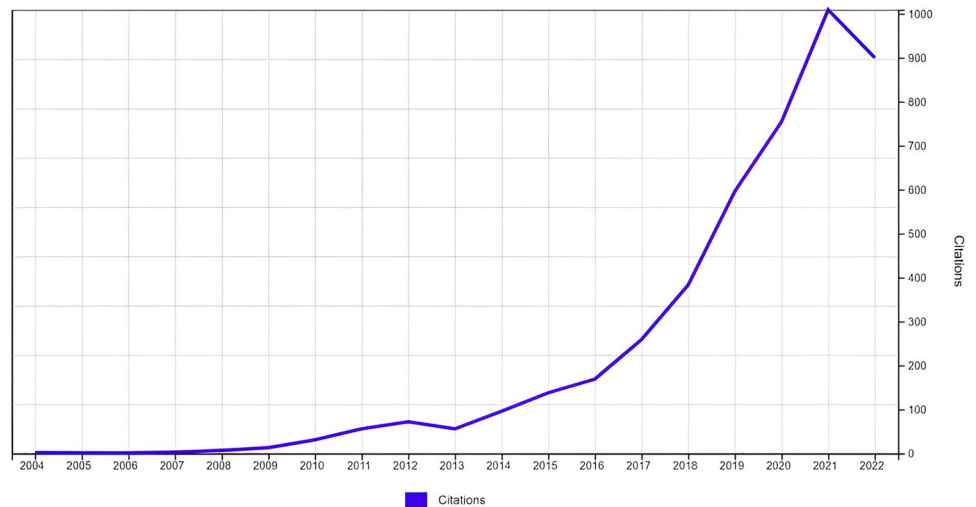


Table 2 Citation report. Source: Own elaboration [25]

Publications	290
Number of citations	4554
Average citations per article	15,7
h-index	33

4 Results

4.1 Evolution of literature

A total of 290 articles published between 1997 and 2022 were analysed. From 2017 onwards, the publication of articles increased, with a decrease in 2018, which progressively recovered again to obtain the best publication figures during the years 2019–2021, and surpassed in 2022 (Fig. 1).

If we take into account the evolution of citations, a greater growth is recorded from 2016 onwards (Fig. 2). The citation report is summarised in Table 2.

4.2 Geographical distribution

Analysing the geographical areas, Spain is the country with the highest scientific production in this field (46), followed by China (34), USA (34), Italy (29), England (25), Australia (24), Portugal (24), Poland (12), Austria (11) and Turkey (10). The remaining countries have less than 10 documents published (Fig. 3).

In relation to the visualisation in the time series provided by VOSviewer, it can be seen in the results that Australia, England and the USA are the countries that started publishing earlier on this topic, and the most recent newcomers are Spain, China, Italy and Portugal.

Of the total number of organisations with regard to the number of documents, Table 3 shows that it is led by an Australian university, followed by two other universities from China and Spain. The Spanish and American presence is stronger with two universities each. However, the ranking with respect to the number of citations varies substantially, as the English and Australian universities have the greatest presence, with the University of Technology Sydney once again leading the ranking (Table 4).

In relation to the connections between the different organisations with respect to the number of documents, only 5 clusters have been created (Fig. 4), so that despite

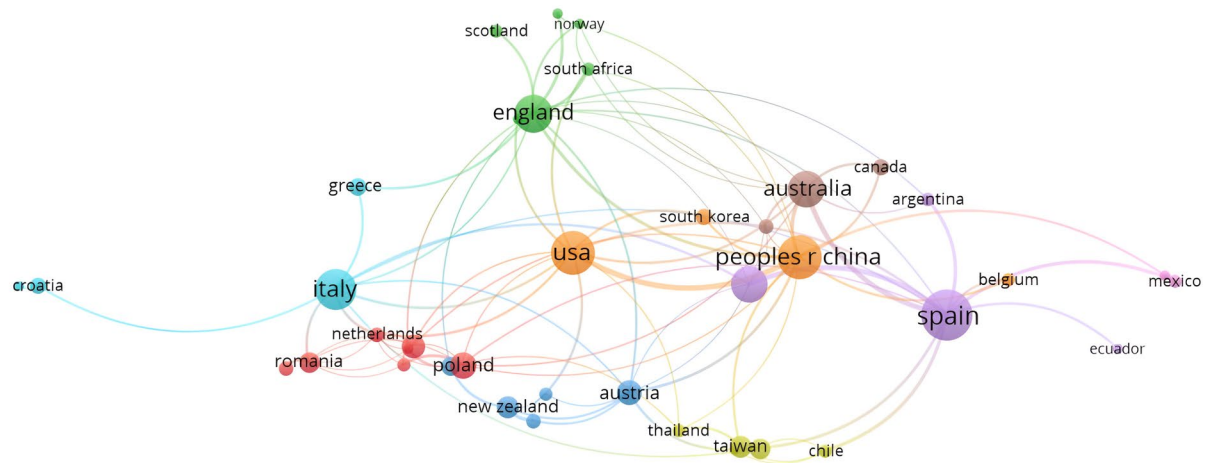


Fig. 3 Map of collaborative networks between countries. Note: Considering a minimum number of 2 documents, the figure shows 40 of the 58 countries as these are the ones that are connected to each other. *Source:* Own elaboration [26]

Table 3 Ranking of organisations in terms of number of documents. *Source:* Own elaboration [26]

Organisation	Documents	Citation
univ technol sydney (Australia)	10	440
hong kong polytech univ (China)	7	118
univ Vigo (Spain)	7	91
univ Aveiro (Portugal)	6	87
univ Innsbruck (Austria)	6	95
ournemouth univ (England)	5	205
indiana univ (United States)	5	28
adam mickiewicz univ (Poland)	4	30
florida atlantic univ (United States)	4	77
univ Extremadura (Spain)	4	20

Table 4 Ranking of organisations in terms of number of citations. *Source:* Own elaboration [26]

Organisation	Documents	Citation
univ technol sydney (Australia)	10	440
north carolina state univ (United States)	3	221
middlesex univ (England)	3	209
ournemouth univ (England)	5	205
univ surrey (England)	3	155
univ queensland (Australia)	3	148
hong kong polytech univ (China)	7	118
univ innsbruck (Austria)	6	95
univ vigo (Spain)	7	91

the fact that there are more than 400 organisations, the level of collaboration between them is low compared to the total. Among the most connected collaborations where two different clusters come together are Universities from Spain, Portugal, Austria and England. There is also another cluster with an important connection between Spanish and Australian universities (Fig. 4).

4.3 Most influential authors, journals and articles in the field

In relation to the number of documents published per author, Darcy, Simon stands out with a total of 12 publications compared to the rest who have between 3 and 4 publications (Table 5). In terms of the number of citations (more than 150), the ranking varies with respect to the number of documents, as can be seen in Table 6.

Figure 5 shows the map of collaboration between authors based on the number of papers published (minimum 2), highlighting the cluster led by Darcy, Simon with a strong connection to Alen Gonzalez, Elisa; Dominguez Vila Trinidad; Clara Rucci, Ana; Pegg, Shane and Mcercher, Bob.

With regard to the main publications according to the number of documents hosted, there is one publication that stands out slightly above the rest, which is the journal “Sustainability” (20), followed by “Tourism Management” (16).

The rest have less than 10 documents (Fig. 6). However, when compared with the number of citations, the most cited

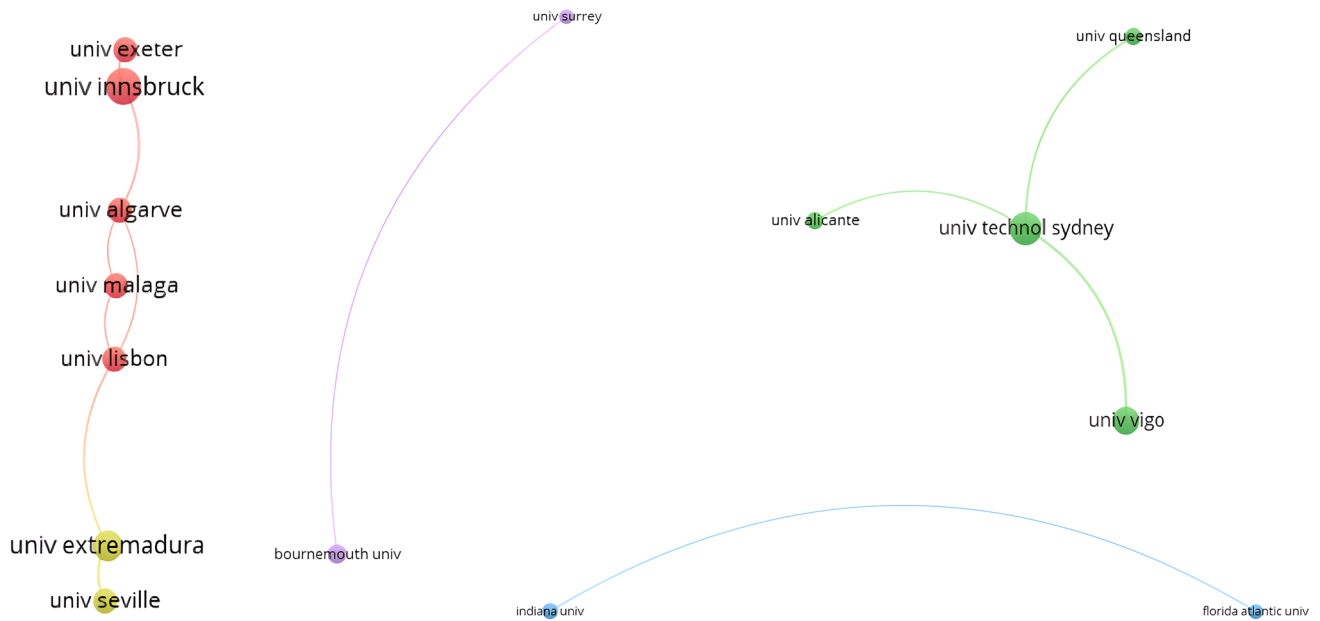


Fig. 4 Map of organisations with the highest number of documents that have a connection between them. Note: Considering a minimum number of 3 documents, the figure shows 15 of the 420 organisations as these are the ones connected to each other. Source: Own elaboration [26]

Table 5 Ranking of authors with respect to number of published papers. Source: Own elaboration [26]

Authors	Publications	Citation
Darcy, Simon	12	582
Alen Gonzalez, Elisa	4	84
Eusebio, Celeste	4	56
Buhalis, Dimitrios	3	202
Cappelletti, Giulio Mario	3	22
Cole, Shu	3	16
Dominguez Vila, Trinidad	3	54
Michopoulou, Eleni	3	202
Zhang, Ye	3	15

Table 6 Ranking of authors with respect to the number of citations. Source: Own elaboration [26]

Authors	Publications	Citation
Darcy, Simon	12	582
Guttentag, Daniel A	1	489
Buhalis, Dimitrios	3	202
Michopoulou, Eleni	3	202
Priporas, Constantinos-Vasilios	2	187
Stylos, Nikolaos	2	187
Smith, Jordan W	2	171
Meentemeyer, Ross K	1	156
Tieskens, Koen F	1	156
Van Berkel, Derek B	1	156
Van Zanten, Boris T	1	156
Verburg, Peter H	1	156

journal is *Tourism Management* (1103), followed by *Current Issues in Tourism* (285). *Sustainability* (95) is ranked as the sixth most cited journal, despite having the highest number of papers (Fig. 7).

Table 7 shows the 20 published articles with the highest number of citations (more than 50) in all WoS databases, not only in the main collection.

4.4 Main research areas

In relation to the main areas of research according to the indexing of publications provided by WoS, the main ones include: *Social Sciences Other Topics* (119 records and 41.03% of 290 papers), *Business Economics* (57 records and 19.65% of 290 papers), *Environmental Sciences Ecology* (54 records and

18.62% of 290 papers), *Computer Science* (33 records and 11.37% of 290 papers), *Science Technology Other Topics* (32 records and 11.03% of 290 papers), *Engineering* (19 records and 6.55% of 290 papers), *Geology* (14 records and 4.82% of 290 papers), *Geography* (11 records and 3.79% of 290 papers) and *Archaeology* (9 records and 3.10% of 290 papers) (Fig. 8).

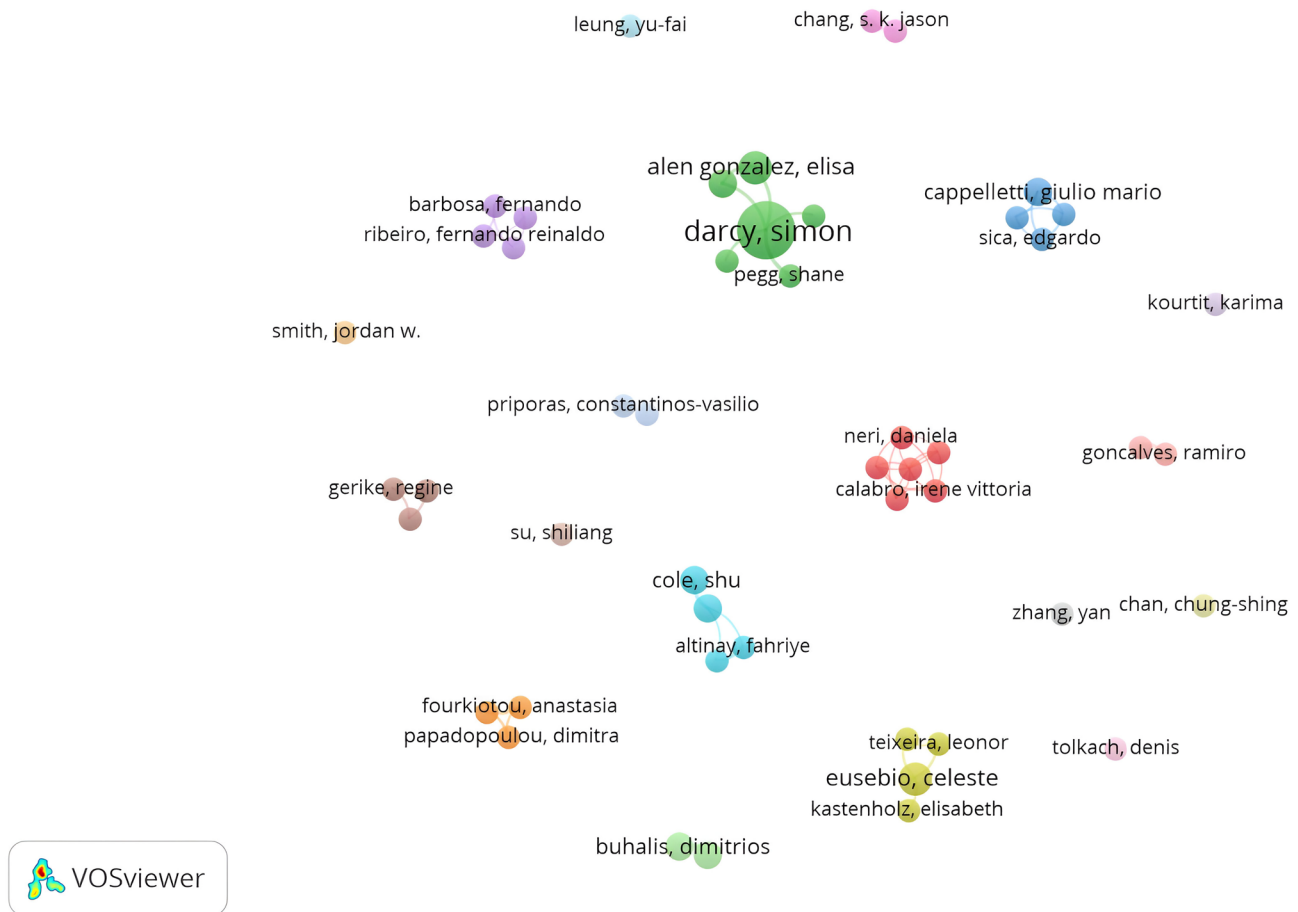


Fig. 5 Map of collaboration networks between the most relevant authors. *Note:* Considering a minimum number of 2 papers, the figure shows 49 of the 823 authors. *Source:* Own elaboration [26]

4.5 Conceptual and thematic structure

4.5.1 Conceptual and thematic analysis by VOSviewer

Figure 9 shows a visual representation of the key words that authors choose for their publications, indicating the predominant themes in the scientific literature, as well as the relationship between the number of terms or clusters. A total of 11 clusters are shown, for 75 items that are connected to each other. Cluster 1 with the highest number of connected items (12) corresponds to the keywords “virtual reality”, “cultural tourism”, “website”, “cultural heritage”, “sustainable tourism”, “consumer behavior”, “museums”, “people with disabilities”, among others. Cluster 2, with a total of 10 connected items, has the highest number of occurrences of the keywords “accessible tourism” and “disability”, connected in turn with other terms such as “information provision”, “mobile application”, “wcag 2.0”, “visual impairment”, “communication”, “social sustainability”, among others. Cluster 3, with a total of 9 items, shows related terms such

as “virtual tour”, “web accessibility”, “heritage tourism”, “mexico”, among others. Cluster 4, with 9 items, shows the following terms: “flickr”, “big data”, “text mining”, “social media”, “sentiment analysis”, among others. The rest of the clusters show other important terms such as “hotels”, associated with “accessibility”, “website accessibility”, “american with disabilities act”, and tourist satisfaction, closely associated with “smart destination”. Others such as “tripadvisor”, “Airbnb”, “marketing” are also shown. And finally, other smaller clusters formed by “digitalization”, “3d modelling”, “archaeological and heritage” (Fig. 9).

Taking into account the words related to the WCAG, a more in-depth analysis was made of the total number of articles that focus on analysing digital accessibility but from the perspective of the guidelines set by the World Wide Web, and it was found that only 13 of the 290 articles analysed comply with this international analysis profile set by the World Wide Web Consortium. Table 8 shows the list of articles that have investigated this modality. Most of them focus on analysing official websites of tourist information

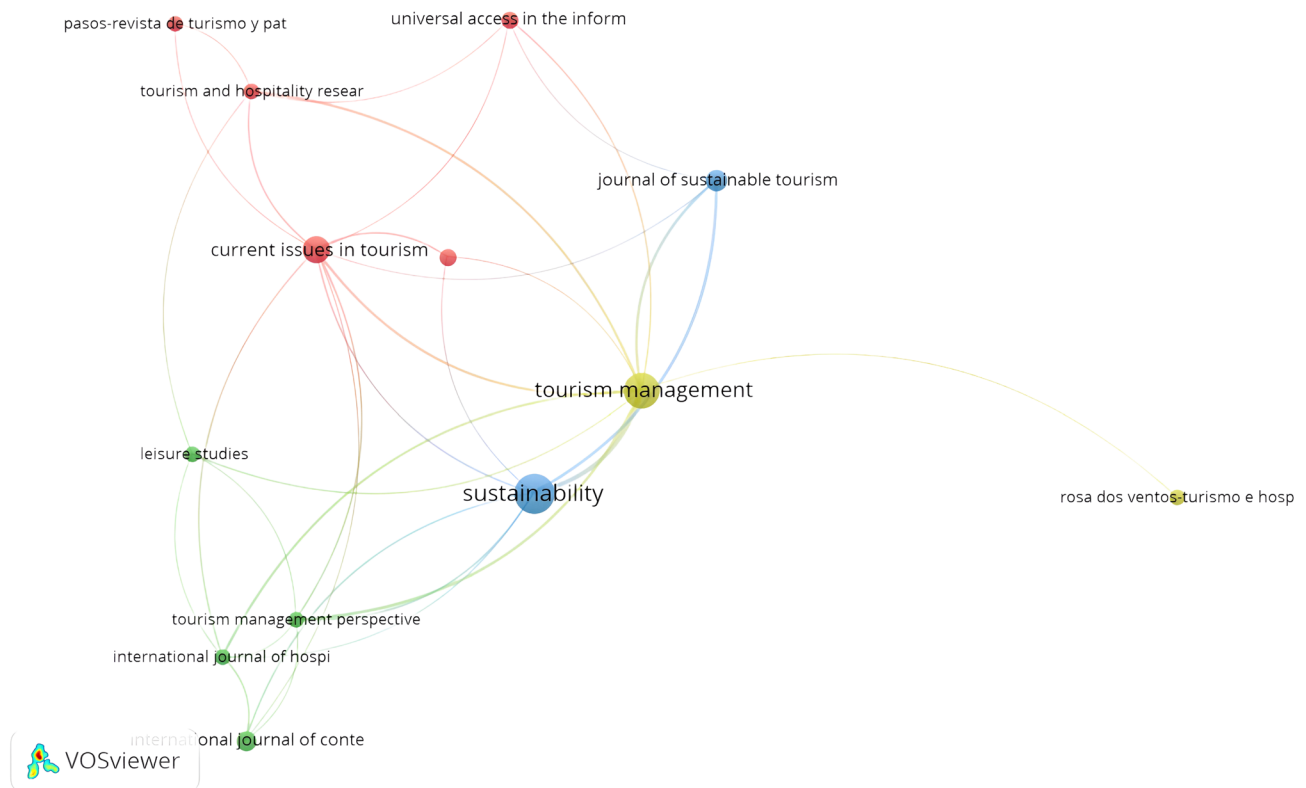


Fig. 6 Journal collaboration network map. Note: Considering a minimum number of 3 documents, the figure shows 18 out of 175 journals. Source: Own elaboration [26]

centres and institutional websites of heritage monuments; very few studies focus on other aspects such as the analysis of the digital accessibility of mobile applications.

In Fig. 10, with regard to the time series of the different items associated with the clusters formed by the author keywords that are most connected, it is worth noting that clusters 1 and 2 are where the largest number of terms that have been developed in a more recent theme in the last 2 years are concentrated, such as: “virtual reality”, “social media”, “responsible tourism”, “mobile application”, “covid 19”, “wcag 2.0”, “smart destination”.

In relation to the topics most frequently dealt with in the title and abstract of the 290 articles analysed (Fig. 11), a total of 178 items were obtained, grouped into 4 main clusters. Cluster 1 (55 items), with “cultural tourism”, “heritage”, “museum”, “monument”, “smartphone”, “app”, “Italy” and “Spain” standing out. In cluster 2 (53 items), the following terms stand out: “tripadvisor”, “hotel”, “website”, “marketing”, “customer”. In cluster 3 (38 items), the following terms stand out: “accessible tourism”, “tourism industry”, “Portugal”, “mobile application”, “communication technology”. And finally, cluster 4 (32 items), shows terms such as: “tourism destination”, “Europe”, “tourism development”, “government”, “official website”, “transport”, “sustainable development”.

Once the main clusters obtained from the words in the abstracts (Fig. 11) had been analysed, we proceeded to analyse each one of them with their main sub-areas, and in turn we analysed in depth the main topics found in the published articles (Table 9).

In cluster 1 (Table 9), which is where most of the items are concentrated, ‘museum’, ‘cultural heritage’, ‘smartphone’, ‘virtual reality’, ‘video’, ‘photograph’ and ‘app’ have been detected. In the ‘Museum’ and ‘Virtual Reality’ section, projects related to the experience of tourism in museums using this technology stand out [46, 47], by combining it with virtual assistants with artificial intelligence [48], augmented reality [49], accessibility of museum content, as well as other projects related to mobile applications and audio guide to improve the user experience, especially with practical implications for visually impaired people [50]. Among the case studies on digital accessibility in museums, the following stand out in particular in case studies in Italy [48, 51–53] and Spain [54, 55], followed by others such as Portugal [56], Egypt [57], or France, for example, an audio guide app developed for visiting Notre Dame Cathedral [50]. Another aspect to highlight among the study themes within museums is the development of 3D modelling to improve the experience of blind users during the visit [54], mainly focused on archaeological museums, which in



Fig. 7 Most cited journals represented in the density map. Source: Own elaboration [26]

turn are combined with the topic ‘cultural heritage’. This is mainly influenced by studies related to interactive guides, as well as virtual reality and accessible underwater cultural heritage, spatially highlighting a project developed with augmented reality, called ‘MeDryDive’, which is applied in Greece, Italy, Croatia and Montenegro [58]. This section also includes analyses of the compliance of official websites of UNESCO heritage monuments with the WCAG, as in the case of the analysis of Mexican World Heritage information on the web [59]. Continuing with the ‘smartphone’ topic, projects are being developed to facilitate digital accessibility with applications to facilitate the recognition of monuments by means of photographs, as is the case of ‘VISITO Tuscany’ [60] and Intelligent Tourism Information System for uploading photos to social networks [61]. This topic is directly related to virtual and augmented reality as well as facilitating tour guiding. Continuing with topics like ‘video’ and ‘photograph’ it is worth mentioning projects combined with Virtual 3D tour [62], artificial intelligence technology and social networks [63] as well as social platforms for sharing photos on the Internet (e.g. Flickr) [64]. Finally, within this cluster 1, in reference to the topic ‘app’, mainly projects and case studies are developed to improve the tourism experience of visually impaired people [65], as well as mobile

applications for accessible beach tourism information [66] or to provide tourist information in general, as in the case of ‘EasenAccess’ in New Delhi (India) [67] and the accessible tourist app in Tenerife (Spain) [68].

Regarding cluster 2 (Table 9), it is worth noting that this is where the largest volume of studies on digital accessibility in hotels is concentrated, based on TripAdvisor reviews [69], carrying out accessibility compliance analysis of hotel websites [70–72] and even studies related to Airbnb accommodation [31, 73], as well as satisfaction analysis of people with disabilities [74] and even the level of manager's knowledge and awareness towards accessible tourism and its importance to their consumers [75]. Within this cluster, there is also a significant volume of case studies from China, related to geotagged social media data [76, 77], other social media studies such as Tik Tok [78], as well as travel blogs to facilitate digital accessibility for tourists [79]. In terms of content analysis, there is also a study on text mining to track changes in travel destination images, also in a case study from China [80], as well as a study from Shanghai on the evaluation of transportation accessibility [81] based on mobile phone data.

Cluster 3 (Table 9) is directly related to communication and tourism information, with studies on perceptions

Table 7 Publications with the highest number of citations. *Source:* Own elaboration [25]

Authors	Title	Publication	Citation of all data-bases
Guttentag [27]	Virtual reality: Applications and implications for tourism	Tourism Manage.	497
van Zanten et al. [28]	Continental-scale quantification of landscape values using social media data	Proc. Natl. Acad. Sci. U. S. A.	159
Darcy [29]	Inherent complexity: Disability, accessible tourism and accommodation information preferences	Tourism Manage.	149
Pastur et al. [30]	Spatial patterns of cultural ecosystem services provision in Southern Patagonia	Landsc. Ecol.	128
Priporas et al. [31]	Unraveling the diverse nature of service quality in a sharing economy A social exchange theory perspective of Airbnb accommodation	Int. J. Contemp. Hosp. Manag	120
Russo and van der Borg [32]	Planning considerations for cultural tourism: a case study of four European cities	Tourism Manage	111
Jovicic [33]	From the traditional understanding of tourism destination to the smart tourism destination	Curr. Issues Tour	103
Small et al. [34]	The embodied tourist experiences of people with vision impairment: Management implications beyond the visual gaze	Tourism Manage	101
Darcy et al. [35]	Accessible tourism and sustainability: a discussion and case study	J. Sustain. Tour.	88
de Grosbois [36]	Corporate social responsibility reporting in the cruise tourism industry: a performance evaluation using a new institutional theory based model	J. Sustain.2010 Tour.	82
Buhalis and Michopoulou [37]	Information-enabled tourism destination marketing: addressing the accessibility market	Curr. Issues Tour.	79
Grinberger et al. [38]	Typologies of tourists' time-space consumption: a new approach using GPS data and GIS tools	Tour. Geogr.	79
Eichhorn et al. [39]	Enabling access to tourism through information schemes?	Ann. Touris. Res.	77
Pantano et al. [40]	'You will like it!' using open data to predict tourists' response to a tourist attraction	Tourism Manage.	71
Yoo et al. [41]	Improving travel decision support satisfaction with smart tourism technologies: A framework of tourist elaboration likelihood and self-efficacy	Technol. Forecast. Soc. Chang.	65
Darcy and Pegg [42]	Towards Strategic Intent: Perceptions of disability service provision amongst hotel accommodation managers	Int. J. Hosp. Manag.	61
Reitsamer et al. [43]	Destination attractiveness and destination attachment: The mediating role of tourists' attitude	Tour. Manag. Perspect.	58
Kastenholz et al. [10]	Contributions of tourism to social inclusion of persons with disability	Disabil. Soc.	53
Walden-Schreiner et al. [44]	Digital footprints: Incorporating crowdsourced geographic information for protected area management	Appl. Geogr.	56
No and Kim [45]	Comparing the attributes of online tourism information sources	Comput. Hum. Behav.	50

of tourist destination online content (TDOC) [82], as well as mobile applications focused on removing digital barriers to travel for people with disabilities [83] with the aim of improving accessible tourism [84]. Finally, cluster 4 is mainly based on sustainable tourism, with studies on smart tourism destinations [85] and virtual accessibility [86] considering inclusivity and responsible tourism [87] as well as studies on sustainable transport [88–90].

To conclude this analysis of cluster 4 (Table 9), another concept of great relevance detected is that of 'official

websites' where studies are found on compliance with digital accessibility in official websites as part of promoting sustainable tourism from the digital point of view, hence it is found within this cluster [91–93], among others.

4.5.2 Conceptual and thematic analysis using SciMAT

In this study, the SciMAT programme has made it possible to carry out a co-word analysis to find out the topics of greatest interest to academics and how they are related.

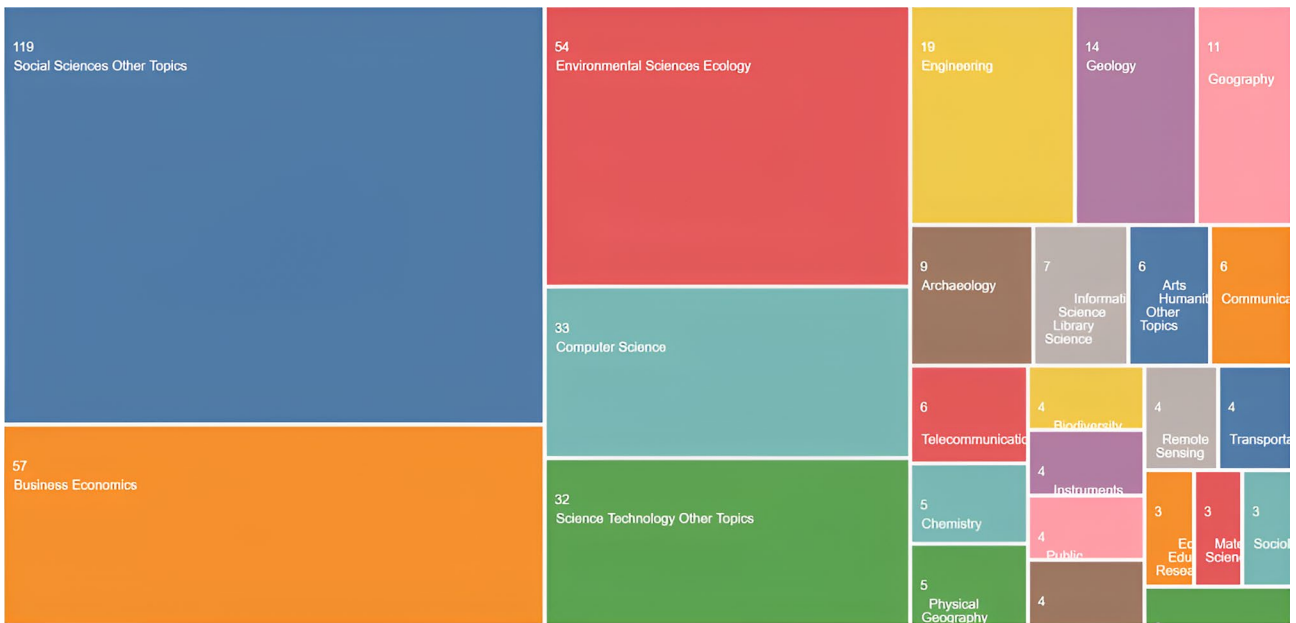


Fig. 8 Top research areas. Source: Own elaboration [25]

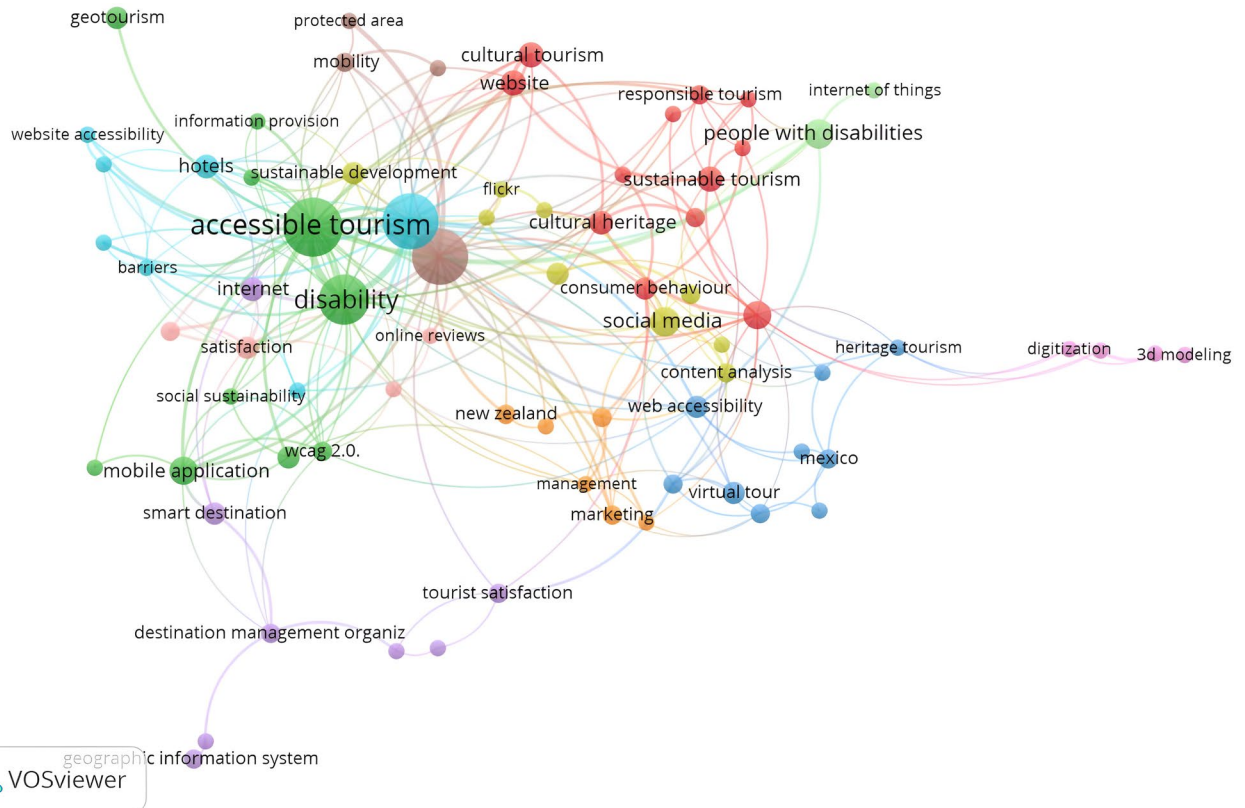


Fig. 9 Map of co-occurrence of authors' keywords. Note: Considering a minimum number of 3 documents, the figure shows 76 out of 1053 words. Source: Own elaboration [26]

Table 8 Total number of WoS articles analysing accessibility using the Web Content Accessibility Guidelines. Source: Own elaboration (2024)

	Authors	Year	Title
wcag/web content accessibility guidelines	Park, K and Jung, S	2022	Designing inclusive websites for people with disabilities as part of an event tourism strategic planning process
	Teixeira, P; Eusébio, C and Teixeira, L	2022	How diverse is hotel website accessibility? A study in the central region of Portugal using web diagnostic tools
	Fernández-Díaz, E; Correia, MB and de Matos, N	2021	Portuguese and Spanish DMOs' Accessibility Apps and Websites
	Madeira, S; Branco, F; (...); Martins, J	2021	Accessibility of mobile applications for tourism-is equal access a reality?
	Boo, S and Kim, M	2020	Disability accommodations at meetings and events: Text mining and document analysis
	Vila, TD; González, EA and Darcy, S	2019	Accessibility of tourism websites: the level of countries' commitment
	Macedo, CF and Sousa, BM	2019	The accessibility in etourism: a study from the perspective of people with specific needs
	Vila, TD; González, EA and Darcy, S	2019	Accessible tourism online resources: a Northern European perspective
	Vila, TD; González, EA and Darcy, S	2018	Website accessibility in the tourism industry: an analysis of official national Tourism organization websites around the world
	García-Santiago, L and Olvera-Lobo, MD	2018	Mexican World Heritage information on the web: Institutional presence and visibility
	Mills, JE; Han, JH and Clay, JM	2008	Accessibility of hospitality and tourism websites—A challenge for visually impaired persons
	Shi, YQ	2006	The accessibility of Queensland visitor information centres' websites
	Williams, R and Rattray, R	2005	UK hotel web page accessibility for disabled and challenged users

Firstly, the keywords were normalised, and then two main periods of analysis were identified based on the evolution of the scientific production detected in both periods: (1) 1997–2016. (2) 2017–2022. Using the overlay map (Fig. 12), the circles represent each period, and the number of each circle represents the associated keywords in that period. The outgoing top arrow represents keywords that have disappeared from one period to another, and the incoming top arrows indicate keywords added to the new period. The arrows linking the periods indicate the number of keywords shared between them, including the stability index between them. The first period (1997–2016), although covering a period of 20 years, was characterised by a smaller number of keywords than the second period, 107 compared to 183 in the second period. There were 290 keywords, of which only 3 ceased to be used in the following period. Only 12 keywords from the first period were carried over to the second period. Both periods share a large number of keywords, so there has not been a major update in this respect.

Figure 13 shows the thematic evolution map where the columns of the different periods of the sample can be seen under which the most relevant themes can be found connected in clusters. These clusters are connected through the periods by lines, which represent the punctual evolution of the themes. If two clusters are connected by a continuous line, they share a main theme, but if two clusters are connected by a discontinuous link, they share elements but not a main theme. Some clusters may not be connected by lines, in that case, they are emerging or isolated themes that have no connection to any other cluster at the moment and whose evolution over the different periods has to be followed. The size of each cluster depends on the selected performance measures. In the case of our study, we have considered the number of sum of documents. Regarding the evolution of the themes by periods, as can be seen in Fig. 13, it was found that the concept “experience” has evolved towards other concepts such as “disability” and “motivation”. In the case of “perceptions”, it continues to maintain a strong presence in the second period, and the terms “disability” and “cities”

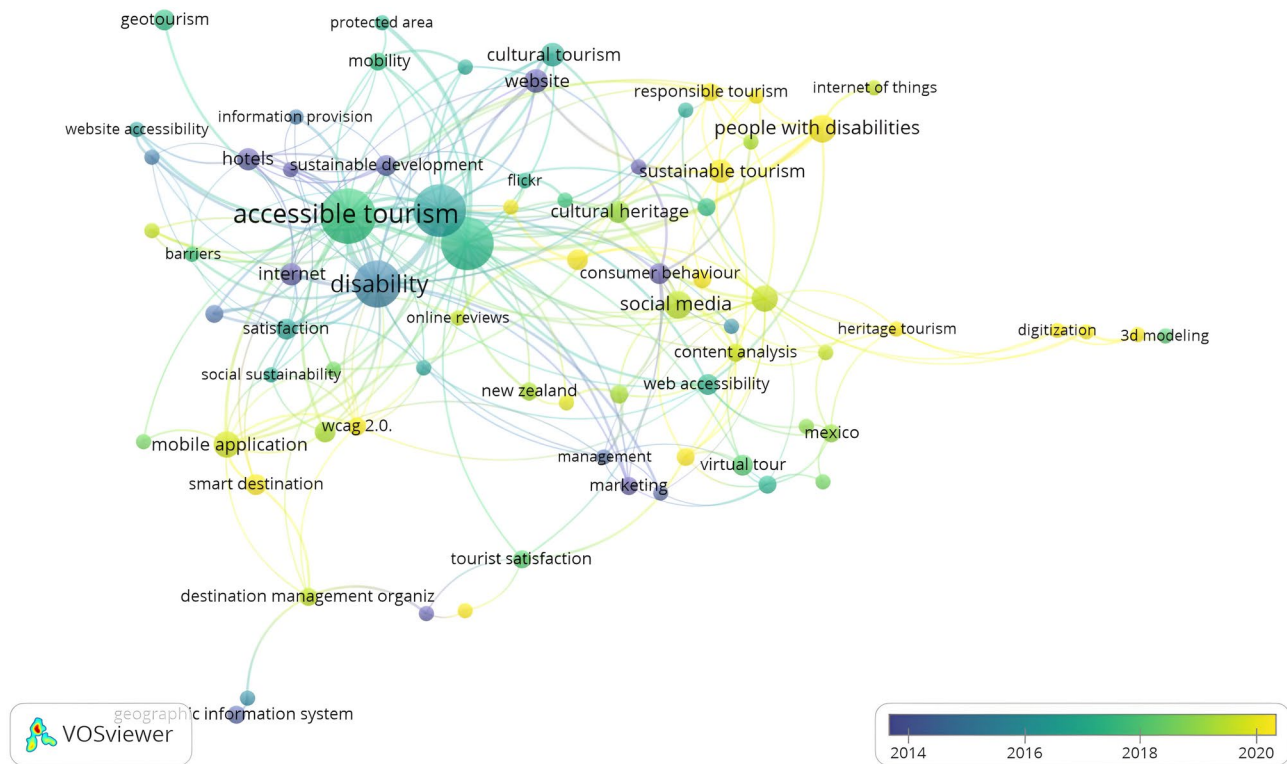


Fig. 10 Time series map of author keywords. Note: Considering a minimum number of 3 documents, the figure shows 76 out of 1053 words. Source: Own elaboration [26]

evolve to “intention” and “motivation” respectively. It is worth noting that the terms of the first period (except perceptions) evolve slightly towards “smart-tourism-technologies”.

In relation to the strategy map and thematic network, the longitudinal analysis has made it possible to determine the evolution of the concepts between periods, taking into account the sum of documents. The following subsections analyse the importance of each theme in the field of research for each of the periods. The strategic diagram (Fig. 14) shows the driving themes (upper right quadrant). In the case of the first period (Fig. 14a), “experience” remains in the centre line but as shown in the thematic evolution map it evolves to the driving theme “disability” in the second period (Fig. 14b), together with the other driving themes of the second period “perceptions” and “smart-tourism-technologies”. In Fig. 14a, the basic theme in the first period is “disability” located in the lower right quadrant, which was a cross-cutting theme throughout the scientific output of this period. In the case of the second period. In Fig. 14b, no specific cross-cutting theme is shown, but the word “intention” is shown right at the bottom vertical density line and it is unknown where it will evolve. Regarding the upper left quadrant in Fig. 14a of the first period, the term “cities” is shown as more developed or isolated themes with relevance to the field of study. In the case of “perceptions” it is right

at the top line of density and becomes a driving theme in the second period, and in the case of Fig. 14b for the second period, the only term shown in the middle line of this quadrant is “motivation” and therefore it is unknown whether it will evolve into the quadrant of emerging or declining themes. Finally, in relation to the lower left quadrant, Fig. 14a does not show any emerging themes. In the case of Fig. 14b, the term “smart destination” is shown, which is also expected to become a driving theme along with “smart-tourism technologies”.

As for the analysis of the thematic network of the strategic diagram of the first period (Fig. 15), in the absence of a driving theme, the cross-cutting theme is “disability” with studies on “websites”, “tourism-destination”, “technology”, “intention” and “attitude”.

Regarding the analysis of the thematic network of the strategic diagram of the second period (Fig. 16), taking as a reference the main driving theme “disability”, it is related to studies on web accessibility, experiences and barriers encountered by tourists during the trip. Another driving theme, although with fewer documents than “disability”, is “perceptions”, related to studies based on analysing hotels, tourists, and the community around protected areas. In the case of the third most important driving theme, “smart-tourism-technologies” again relates to studies focusing on

Table 9 Analysis of the main clusters detected in the abstracts of the articles. Source: Own elaboration (2024)

Trends/topics	Area	Main sub-area	Main topics finded
Cluster 1 (55 items): cultural heritage and museum innovation		<p>museum (18), cultural heritage (16), monument (9), spain (19), italy (9), smartphone (10), photograph (11), app (12), innovation (12), video (8), virtual reality (7)</p>	<p>Museum: archaeological heritage, 3D, virtual reality, virtual tours, audioguide, underwater cultural heritage, virtual assistant, artificial Intelligence (AI), intelligent conversational agent, interactive platform, museum accessibility, visitors' experience, virtual museum, guided museum tours, Italian museums</p> <p>Cultural heritage: Unesco, TripAdvisor, hospitality, accessible underwater cultural heritage, augmented and virtual reality applications, artificial intelligence (AI), Flickr data, monuments, digital cities, immersive virtual reality, social media photographs, official websites, cultural tourism</p> <p>Smartphone: design for visually impaired, app, smart tourism, photos uploaded, cultural astronomy, multiplatform guide on mobile devices, interactive guide</p> <p>Virtual reality: text and opinion mining, virtual tourism, covid 19, virtual reality 360° concept, monument</p> <p>Video: ecotourism, sustainable development goal, virtual 3D tour</p>
Cluster 2 (53 items): Barriers for customers in hotels		<p>China (10), content analysis (15), Hong kong (7), hospitality (11), hotel (16), marketing (24), public transport (8), social media (23), tripadvisor (9), website (8)</p>	<p>Photograph: artificial intelligence technology, social media, Social photo sharing platforms, Flickr</p> <p>App: smart tourism experience, people with visual Impairments, heritage, mobile app, mobility-impaired people, accessible tourist app</p> <p>Hotel: website accessibility, Portugal, TripAdvisor site, website, managers knowledge, tourist Preferences, Airbnb accommodation, Perceptions of disability service, visually impaired persons, review sites</p>
Cluster 3 (38 items): communication and tourism information		<p>accessible tourism (31), tourism industry (22) communication technology (9), disability (57), mobile application (9), Portugal (9) tourism information (9)</p>	<p>Social media: machine-learned, sentimental analysis of social media, TikTok, Geotagged Social Media Data, City Image, Travel Blogs, geo-tagged photos</p> <p>Content analysis: text mining, travel destination image</p> <p>Online tourism information: perceptions of tourist, Tourist Behavior, barriers to travel, website, tourism websites</p> <p>Mobile application: audio guide app, accessibility, tourist guide, Accessible Beach Tourism Information for People with Disabilities, tourist app</p> <p>Accessible tourism: visually impaired visitors, destination, barriers to travel</p>

Table 9 (continued)

Trends/topics	
Area	Main sub-area
Cluster 4 (32 items): sustainable tourism	Australia (8), Europe (11), landscape (13), official website (8), social network (14), sustainable development (10), sustainable tourism (12), tourism destination (18), tourism development, transport (14)
Main topics found	
Sustainable tourism: virtual accessibility, inclusivity and responsible tourism, digital cities, digital tourism, (eco)tourism	
Smart tourism destination: smart archaeological tourism, digital cities	
Official website: usability and accessibility, tourism websites, accessible information, tourist websites	
Transport: wheelchair accessibility, travelling with a guide dog, digital tools, people with vision impairment	

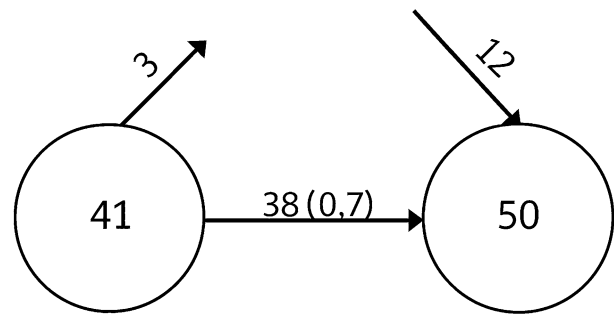


Fig. 12 Keyword overlay graph from 1997 to 2022. Source: Own elaboration [94]

destination”. The most recently incorporated theme is also “3d modelling”, related to studies of interactive 3D representation of cultural heritage [95] and also applied to archaeological heritage [48] to improve accessibility by providing another form of communication and cultural information for tourists. With regard to the topics most covered (Fig. 11), they are mainly concentrated in studies related to museums, hotels, and specific case studies from Spain, Portugal and Italy, as well as sustainable development. The results of this analysis show that virtual reality, augmented reality and interactive experiences have gained special relevance in the field of museums and cultural heritage, especially since the COVID-19 pandemic, since from 2020 onwards scientific research began to proliferate analysing case studies along these lines, enabling the design of more meaningful and inclusive tourism experiences based on the concept accessibility of tourism 4.0 [96]. According to Sustacha et al. [17] when a destination becomes a smart destination, it means that competition will rise and production efficiency will improve. In this way, as concluded Sustacha et al. [17], and in line with our analysis, it promotes an improvement in the quality of life for locals and visitors, a boost to sustainable development, and an increase in the efficiency of production and marketing procedures.

The SciMAT programme has also provided another complementary vision, since the graph of keyword overlapping in the periods between 1997–2016 and 2017–2022 only produces a renewal of 12 keywords that entered in the second period, so there has not been a significant thematic renewal from this point of view. With regard to the thematic evolution map of both periods analysed, it can be seen that “disability” is the one with the most prominent presence, evolving strongly towards “intention” and with less intensity towards “smart-tourism-technologies” and “smart-destination”. The strategy diagram shows “disability”, “perceptions” and “smart-tourism-technologies” as the main driving themes in the second period. Therefore, the combination of studies in this field is related to disability and tourist perception. The thematic network of the main driving theme of the second

Fig. 13 Thematic evolution map. Source: Own elaboration [94]

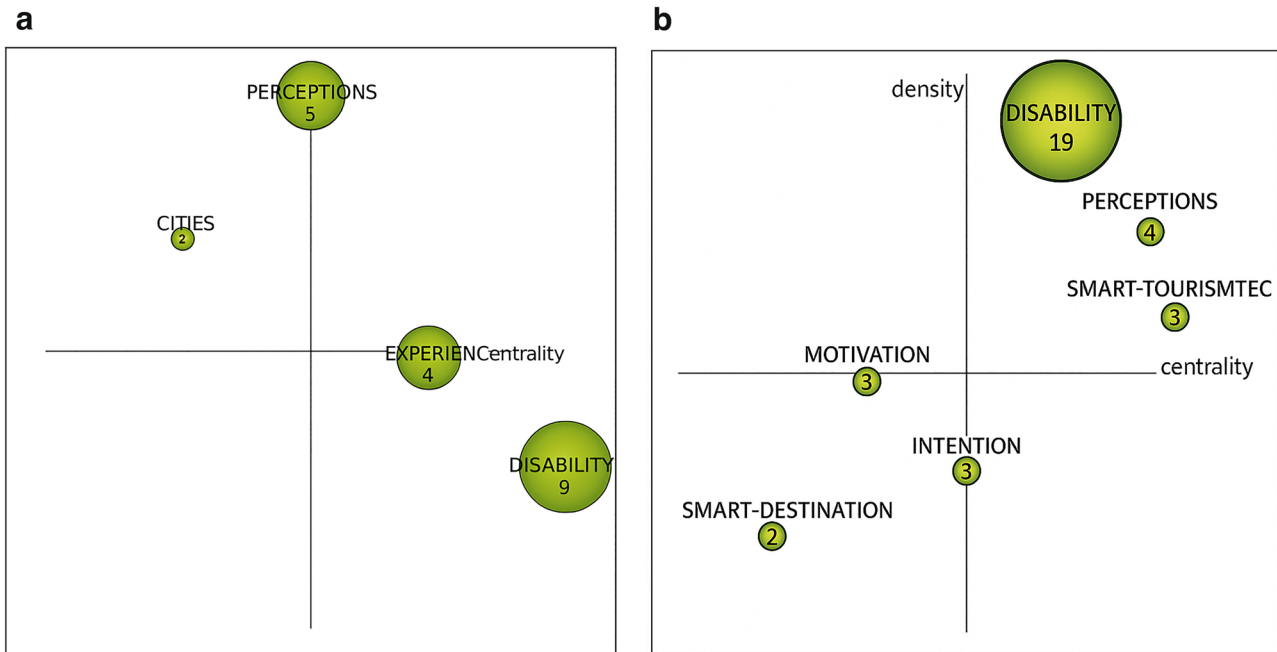
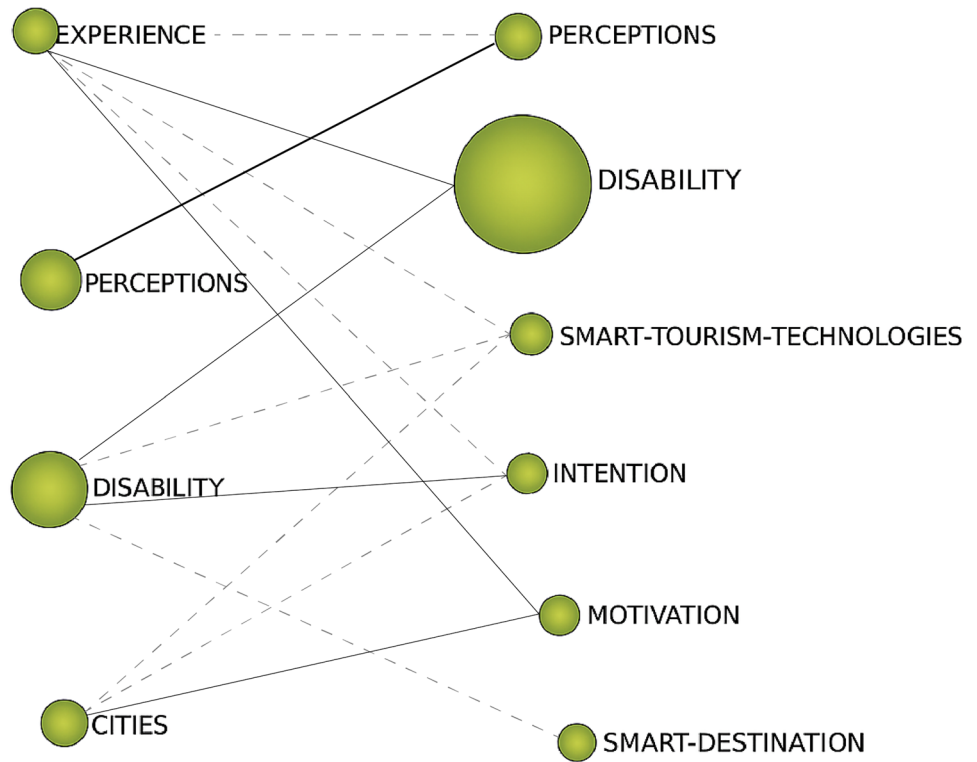


Fig. 14 **a** Strategic diagram 1997–2016. **b** Strategic diagram period 2017–2022 Source: Own elaboration [94]

period, “disability”, shows a strong connection with studies on web accessibility [93, 97, 98], tourist office websites, services, experiences and the main barriers encountered by tourists [74, 99]. The emerging theme of the second period is

“smart destination”, directly related to “tourism destination” and “mobile app”. It is thus estimated that the future theme of the importance of digital information and its channels of communication with tourists will focus on this line.



Fig. 15 Thematic network of the strategic diagram for the first period 1997–2016. Source: Own elaboration [94]

The analyses carried out from the point of view of web accessibility do not contemplate the regulations currently in force and therefore progress continues to be slow in this aspect, since among the keywords detected in this study, the most that has been observed is the existence of the WCAG 2.1. This fact confirms a reality about the importance not only of making information and content accessible to tourists, but also of complying with accessibility regulations, not only physical but also digital, established at the international level. Cities are being integrated into a more sustainable and technological environment and therefore the “smart” concept is very close to the “accessible” content for tourists, as well as the influence of social networks to reach all audiences, as shown in the results of this study.

Furthermore, it is determined that the “phygital” concept takes on special relevance since many studies are aimed at

combining both dimensions so that if a space complies with accessibility regulations, they are also considered from the information point of view in its digital sphere, and in this way it is accessible to tourists not only in the content itself but also in the information itself.

6 Conclusion

This study contributes not only to provide guidance on future lines of research accessible tourism based on what has already been studied, but also raises awareness of the importance of continuing to improve digital accessibility in tourism, whether through the development of new tools to facilitate the work of travellers or by raising awareness among public and private companies in the tourism industry to make tourism for all more inclusive. This research has not been free of limitations, since in the development of the study it has been necessary to apply the standardisation of key words, thus requiring work in which researchers make decisions to create thesauri by grouping synonymous concepts or selecting those whose spelling was more frequent in the scientific literature. Furthermore, only articles from the main WoS collection have been analysed, due to the difficulty of linking databases and subsequently analysing them with the programmes, which is why it is proposed for future lines of research to extend the sample with Scopus databases. It is also proposed to carry out a second phase of this study involving stakeholders in the tourism industry, such as hotel managers and travel agency representatives, to conduct interviews regarding their awareness of digital accessibility and to propose lines of action to raise awareness in this regard.

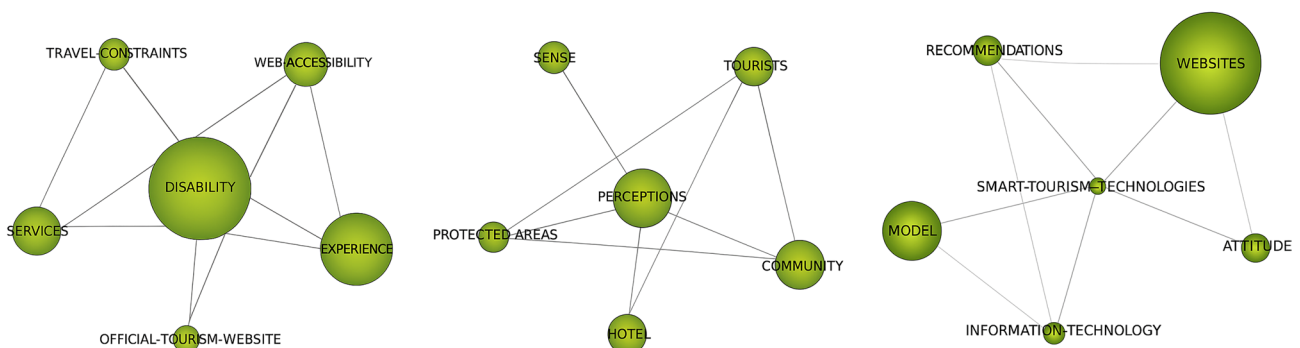


Fig. 16 Main thematic network of the strategic diagram for the second period 2017–2022. Source: Own elaboration [94]

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Author contributions All authors designed the research, collected data, analyzed, and reported it.

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Data availability No datasets were generated or analysed during the current study.

Declarations

Conflict of interest The authors declare no conflict of interest.

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