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The Academic Influence of the Camino de Santiago: A Bibliometric Analysis of Doctoral Research and Indexed Manuscripts

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Cover Page Footnote

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The Camino de Santiago is one of the most recognised cultural pilgrimage routes in the world. Notably, its current influence transcends the strictly inspirational and religious aspects, constituting also a socio-economic, cultural, historical, heritage and tourism cornerstone. This paper analyses, from an innovative bibliometric perspective, the influence of the Camino de Santiago on the academic literature in the period from 1980 to the present. For this purpose, two data sources have been used comparatively: manuscripts indexed in *Scopus* and doctoral theses. The results reveal a growth of its academic relevance in the last decade, especially in indexed publications. The analysis also reflects the leading sources, authors, countries and institutions, as well as their patterns of scientific collaboration, thus being extremely useful to improve both our knowledge of the Camino and its management, preservation and dissemination. The conceptual structure of the academic field, which differs between theses and indexed papers, also confirms the Camino as a crossroads not only of people but also of academic disciplines and scientific perspectives.

Key Words: Camino de Santiago, bibliometric analysis, academic influence, scientific mapping, network analysis, pilgrimage, management, preservation, dissemination

Introduction

Religious tourism and pilgrimage are considered some of the oldest forms of tourism (Rinschede, 1992; Timothy & Olsen, 2011; Collins-Kreiner, 2016). Today, they constitute a phenomenon of transcendental relevance to explain the movement of people not only for religious reasons but also for secular and profane purposes (Raj & Griffin, 2015; Griffin & Raj, 2017). In this regard, pilgrimage is currently both a relevant local economic driver and an unparalleled tool for heritage dissemination, as it promotes local development while raising awareness of heritage, helping as well to enhance and preserve it

(Rifai, 2015). Consequently, several recent bibliometric studies have focused on the evolution of religious tourism and pilgrimage in an attempt to shed light on their dynamics and implications (Durán-Sánchez *et al.*, 2018; Iliev, 2020).

One of the oldest and most important pilgrimage routes within the Christian religion is the Camino de Santiago (Cazaux, 2011; Roszak, 2019). The Camino winds through different parts of Europe, with the ultimate goal of reaching Santiago de Compostela in Spain, where the remains of the apostle St. James (Santiago in Spanish) are believed to be located.

Notably, interest in the Camino de Santiago did not remain stable throughout history but instead presented discontinuous cycles of popularity and historical relevance (Gracia Lería, 2005). Among its most important historical moments are the Middle Ages and the period from the second half of the twentieth century to the present. In the Middle Ages, the Camino was relevant for its historical, cultural, and symbolic repercussions (Carvajal, 2015; Lazcano, 2017), constituting a critical melting pot of cultural exchange and knowledge (Lazcano, 2017; Mencos, 2018). On the other hand, since 1950, the Camino de Santiago has experienced a marked revitalisation due to various measures and actions, such as the emergence of Associations of Friends of the Way of St. James, its declaration in 1987 as the first ‘European Cultural Itinerary’, the celebration in 1989 of the first World Youth Day in the city of Santiago de Compostela, the involvement of local and regional institutions in the development of tourist infrastructure (accommodation and transport) and, above all, the promotion of the Holy Year of Compostela in 1993 (‘Xacobeo 93’), which marked a turning point in the development of tourism in Galicia in general, and in the Camino de Santiago in particular (Santos Solla, 2006; Andrade Suárez & Caamaño Franco, 2016; Mencos, 2018).

Today, the Camino remains one of the main pilgrimage routes in the world, standing out for having gathered in recent years, thousands of annual visitors from more than 180 countries (Mróz, 2021b), and for its extraordinary heritage value (Rivera Blanco, 2013; Mencos, 2018). As for its influence, it is nowadays regarded as a holistic and multidimensional phenomenon, affecting aspects of culture, heritage, tourism, economic development and spirituality, among many others. However, up to the present, the relative influence of these different elements in the scientific literature remains unknown. Therefore, this work aims to quantitatively analyse the academic literature of the last four decades directly related to the Camino de Santiago (studying comparatively doctoral theses and indexed manuscripts) using bibliometric techniques.

Bibliometric analysis provides a structured overview of a scientific field from a quantitative and macroscopic perspective. More precisely, formally mapping a research area helps to understand its structure and dynamics, thus

making it possible to identify areas of development, emerging trends, knowledge gaps or the boundaries of current analyses of the field (Moral-Muñoz *et al.*, 2020; Donthu *et al.*, 2021). Consequently, a bibliometric analysis of a given research field constitutes a valuable starting point to better orientate the future scientific strategy of scholars and researchers, both from a thematic and social perspective. Specifically, in this work, we use bibliometric analysis to answer several questions of interest:

- i) what are the most relevant sources of literature related to the Camino de Santiago?;
- ii) who / what are the leading authors, countries and institutions in terms of indexed documents and doctoral theses?;
- iii) how is the conceptual and thematic structure of the scientific literature organised?;
- iv) are there differences between the different scientific outputs (i.e., papers vs doctoral theses)?; and
- v) what are the collaborations and social structures of this research field?

The paper is organised as follows: In the next section, we describe the methodology used in this work, the type of analyses performed, how the databases were obtained, and how the information was pre-processed to get the results. Afterwards, we show the results and discussion. Finally, we present the main conclusions and mention the possible limitations of this contribution.

Methodology

Bibliometric Analysis - PRISMA Method

Bibliometric analysis encompasses a set of quantitative techniques aimed at processing and obtaining knowledge from bibliometric data (Donthu *et al.*, 2021). In recent years, this type of analysis has experienced a significant improvement due to the proliferation of better scientific databases, the emergence of more sophisticated processing and analysis algorithms, and the development of different software tools focused on the treatment of bibliometric information.

The main objectives of bibliometric analysis are typically twofold: (i) science mapping, aimed at extracting the

structural elements of a given scientific field and the patterns present; and (ii) performance analysis, aimed at identifying and evaluating the role of the different scientific actors (academics, research groups, institutions, countries, etc.) in a given scientific field or activity (Cobo *et al.*, 2011).

The databases used in this study have been created following the workflow proposed by the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement guidelines and their subsequent updates (Moher *et al.*, 2009; Page *et al.*, 2021). These guidelines establish reference processes for the compilation and reporting of systematic literature reviews to avoid bias, increase the transparency of the selection and favour the replicability and rigour of the studies. Specifically, the source selection phase establishes four stages: (i) identification, (ii) screening, (iii) eligibility and (iv) inclusion, which are detailed below for the case of our analyses.

Databases

A differential feature of our work is the parallel and comparative analysis of two different types of scientific outputs. On the one hand, we analyse manuscripts indexed in the international reference scientific database *Scopus*. Note that we use *Scopus* instead of the *Web of Science* because of its slightly higher coverage (Martín-Martín *et al.*, 2018; Singh *et al.*, 2021). These indexed documents (articles, reviews, letters, indexed book chapters, etc.) are the scientific publications most commonly used in bibliometric analysis, as they accurately reflect the frontier research topics at a given time, the role of each line and niche of research within the field, and their dynamics and evolution.

On the other hand, we also study doctoral theses which have been successfully defended in the scientific field, since they constitute a scientific product with certain particularities that complement the view provided by the indexed manuscripts found in *Scopus* (Repiso-Caballero, Torres-Salinas & Delgado-López-Cózar, 2011; Díaz-de la Fuente *et al.*, 2022; Olivares-Gil *et al.*, 2022; Garrido-Labrador *et al.*, 2023). In particular, since the effort and commitment required to produce a doctoral thesis are generally higher than those required for other scientific

endeavours, doctoral theses reflect more robust scientific trends and a more solid grounding in certain lines of research. In addition, it is important to note that some of the research conducted on the Camino de Santiago — especially if associated with the humanities and social sciences — is sometimes conducted outside the scope of the documents indexed by the usual scientific databases (Aksnes & Sivertsen, 2019). Hence, including doctoral theses in the analysis serves to partly palliate the above deficit of information by offering an alternative and more integrative perspective.

Search Queries and Dates of Data Extraction

The database of doctoral theses has been built throughout the year 2023, including records up to the year 2022. The choice of 2022 as the time limit was made to ensure the internal consistency of the database as it includes several sources that are not necessarily synchronous in updating the information. Concretely, the sources used for the identification of theses were:

- TESEO database, compiled by the Spanish Ministry of Education, Culture and Sports (<https://www.educacion.gob.es/teseo>). This database includes—in a unified manner—all the doctoral theses defended in Spanish institutions from 1976 to the present.
- OATD. Open Access Theses and Dissertations (<https://oatd.org/>). This database includes more than six million dissertations from international institutions.
- DART-Europe E-theses Portal (<https://www.dart-europe.org/>). Platform founded in 2005 with the aim of improving global access to European research theses.
- Networked Digital Library of Theses and Dissertations (NDLTD) (<https://ndltd.org/>). NDLTD is an international organisation whose objectives include the dissemination and preservation of electronic theses and dissertations and indexes a multitude of national thesis databases.

The database of indexed documents was obtained from the *Scopus* database, as previously mentioned. The time limit was established again up to 2022. The search string was the same for both theses and manuscripts. The query terms constituted those appearing in titles, keywords and abstracts in different combinations. It is important

Table 1: Search Filter Used to Obtain Database

(Each row represents the logical operator 'OR', except for the final line, which focuses on bibliographic production up to the year 2022 without including works from later years)

Search Field	Search Term
TITLE-ABS-KEY	Camino de Santiago
	Caminos de Santiago
	Camiño de Santiago
	Jacobeo
	Xacobeo
	Saint James Path
	Way to Santiago
	Way of Saint James
	Saint-Jacques-de-Compostelle
	Saint Jacques de Compostelle
	Way of St. James
	Camino to Santiago
	route to Santiago
	pilgrimage to Santiago
	pilgrimage Santiago
	Camino Lebaniego
	way of santiago
	Santiago de Compostela pilgrimage
	Santiago Ways
	pilgrim AND Camino
	santiago AND due AND composted AND sacred AND places
KEY	pilgrimage AND santiago AND de AND compostela
	camino AND pilgrimage
TITLE	pilgrimage AND way
	pilgrimage AND Camino
KEY	Camino de Santiago de Compostella
	Camino de Santiago
ABS	Santiago de Compostela Camino
AND EXCLUDE	PUBYEAR, 2023
Specifically, the search filter is as follows: TITLE-ABS-KEY (“Camino de Santiago” OR “Caminos de Santiago” OR “Camiño de Santiago” OR “Jacobeo” OR “Xacobeo” OR “Saint James Path” OR “Way to Santiago” OR “Way of Saint James” OR “Saint-Jacques-de-Compostelle” OR “Saint Jacques de Compostelle” OR “Way of St. James” OR “Camino to Santiago” OR “route to Santiago” OR “pilgrimage to Santiago” OR “pilgrimage Santiago” OR “Camino Lebaniego” OR “way of santiago” OR “Santiago de Compostela pilgrimage”) OR TITLE-ABS-KEY (pilgrim AND Camino) OR KEY (pilgrimage AND santiago AND de AND compostela) OR KEY (camino AND pilgrimage) OR TITLE-ABS-KEY (santiago AND due AND composted AND sacred AND places) OR TITLE (pilgrimage AND way) OR TITLE (pilgrimage AND Camino) OR KEY (Camino de Santiago de Compostella) OR KEY (Camino de Santiago) OR ABS (Santiago de Compostela Camino) OR TITLE-ABS-KEY (“Santiago Ways”) AND (EXCLUDE (PUBYEAR, 2023)).	
Source: Authors’ own elaboration	

to note that several queries can seem redundant, but the terms used to refer to the Camino are used in different combinations and languages and sometimes with only partial translations. Specifically, the search was performed with the filters outlined in Table 1.

Inclusion and Exclusion Criteria

A manual screening process was carried out on the results of the above queries to determine whether the search results were included in our database. In the case of *Scopus* data, no duplicate documents were found.

Table 2: Exclusion Filter (Search filter used to exclude those documents that after manual screening of each document were identified as false positives, not directly related to the Camino de Santiago. Each row represents the logical operator 'OR')	
Search Field	Search Term
NOT TITLE	Arba'een
	Jiuhua
	Mecca
	Walsingham
	John Muir Trail
	Adomnán
	Imvros
	Shikoku
	Pilgrimage tourism to Palestine
	Landscapes and destinations
	Faculty of Pharmacy
	José de Anchieta
	Camino Real de Tierra Adentro
	High hurdles
	Giovenale of Orvieto
	Social remarks on the history of Spanish
	William of Aquitaine
	international symposia on the history of anaesthesia
	The way to Monte Carmine
	El camino de los ayes
	Pilgrims for progress. El Camino Hospital
	A new approach towards town-country relations in Galicia
Specifically, the search filter is as follows: NOT TITLE ("Arba'een" OR "Jiuhua" OR "Mecca" OR "Walsingham" OR "John Muir Trail" OR "Adomnán" OR "Imvros" OR "Shikoku" OR {Pilgrimage tourism to Palestine} OR {Landscapes and destinations} OR {Faculty of Pharmacy} OR {José de Anchieta} OR {Camino Real de Tierra Adentro} OR {High hurdles} OR {Giovenale of Orvieto} OR {Social remarks on the history of Spanish} OR {William of Aquitaine} OR {international symposia on the history of anaesthesia} OR {The way to Monte Carmine} OR {El camino de los ayes} OR {Pilgrims for progress. El Camino Hospital} OR {A new approach towards town-country relations in Galicia}).	
Source: Authors' own elaboration	

Notwithstanding, twenty documents were excluded according to the filters defined in Table 2.

The excluded terms are often related to other pilgrimage routes / phenomena without a comparative analysis with the Camino de Santiago, or, in other cases, they only focus on factors related to the City of Santiago but are not associated with the pilgrimage route. Furthermore, an additional review was carried out to eliminate duplicates. In the case of reprints of the same book, even if they have different dates, they have been considered the same work and the later one has been eliminated.

As for the compilation of the doctoral thesis database, all duplicate entries were discarded. Duplicates appeared

quite frequently since many of the information sources used index shared repositories. In addition, we also eliminated all search results which were not doctoral theses but Master's theses, theses presented in partial fulfilment of the requirements for a Master's Degree in arts, architecture, religious sciences, or even Bachelor's theses.

Likewise, as in the case of the indexed manuscripts, theses that contained the search terms but were not related to the Camino de Santiago or the Jacobean phenomenon were excluded, such as doctoral theses on the novel 'El Camino' by Miguel Delibes, on the bird of prey *Falco Peregrinus*, on Santiago de Chile or on the Camino al Rocío, to give some examples.

It should also be recalled that, from now on, we will use the terms *indexed manuscripts database* and *doctoral theses database* to refer to the databases obtained after applying our inclusion and exclusion criteria (detailed in previous sections), i.e., to denote the post-exclusion datasets.

Harmonisation and Clustering

Doctoral theses registered in repositories typically contain information on the title, abstract, author, supervisors, institution and country of defence, as well as the UNESCO codes associated with the subject of the doctoral thesis. The UNESCO nomenclature for the fields of science and technology is an international effort to unify the terminology of scientific fields that culminated in 1988, creating a standardised and global system (UNESCO, 1988). This nomenclature is structured numerically in three hierarchical levels. The first level corresponds to the scientific field (2-digit code), the second to the scientific discipline (4-digit code), and the third (6-digit code) is associated with the subdiscipline level. In the described databases, most theses are assigned to one or more UNESCO codes for classification purposes. Remarkably, in most of the records analysed, all the above-mentioned fields were complete. In the cases where certain information was missing, we contacted the authors or supervisors of the doctoral theses directly to obtain the most detailed and complete information possible.

Several bibliometric methods use keywords in manuscripts as fundamental elements to establish thematic maps of the scientific fields analysed (Cobo *et al.*, 2011; Li *et al.*, 2016). Currently, the two most popular sources of bibliometric information (the scientific databases WOS and *Scopus*) include two different types of keywords: (i) Author Keywords, provided directly by the authors in the original manuscripts; and (ii) Keywords Plus, Keywords+ or Indexed Keywords, established by professionals of the indexing repositories. In the case of *Scopus*, these indexed keywords are standardised to vocabularies obtained from thesauri owned or licensed by Elsevier. This effort is made to try to unify synonyms, different spellings, the same words in plural or singular, etc. Notably, both types of keywords are complementary. Author-provided keywords place more emphasis on the

differentiating elements of the work, while keywords plus offer descriptions with a broader scientific context (Zhang *et al.*, 2016). Nevertheless, in spite of the above efforts, when considering both types of keywords in the indexed-manuscripts database (post-exclusion), we identified inconsistencies, dual language words and proximity of terms that needed processing to harmonise the information better. Consequently, data pre-processing was performed using different similarity-based string clustering algorithms, namely the Jaro-Winkler algorithm (Jaro, 1989; Winkler, 1990), the Damerau-Levenshtein algorithm (Zhao & Sahni, 2019) and the Optimal String Alignment algorithm (Powell, Allison & Dix, 1999).

The analysis databases compiled and used in this work, as well as the clusters of keywords used for both author keywords and keywords plus, are publicly available at: <http://hdl.handle.net/10259/7166> (Díaz de la Fuente *et al.*, 2022).

With regard to the software tools used in this contribution, we used bibliometrix software (Aria & Cuccurullo, 2017), network analysis software Gephi (Bastian, Heymann & Jacomy, 2009) and the R programming language to develop *ad hoc* scripts and to make use of pre-existing packages such as the *stringdist* R package (Loo, 2014), which was used for the calculation of similarity measures between character strings.

Results and Discussion

Descriptive Analysis

The databases collected and analysed in this contribution were intended to be as complete as possible from a temporal perspective, i.e., to cover the longest possible time span from the sources. Specifically, for indexed documents (Table 3), the selected timeframe is from 1916 (although there are only three documents before 1979, and for most of the analysis, we will focus on this last range) to the end of 2022, and for the doctoral theses (Table 4), from 1979 to 2022.

A general summary of the information contained in the indexed manuscripts database is presented in Table 3. The number of documents is 407, most of which correspond to scientific articles; however, there are also a significant

Table 3: General Summary Information of Database 0 indexed manuscripts. (Table represents the final set of records analysed in study, post-exclusion)	
Description	Results
Main data information	
Timespan	1916:2022 (1979:2022)
Sources (Journals, Books, etc.)	240 (237)
Documents	407 (404)
Annual Growth Rate %	3.68 (9.31)
Document Average Age (2022)	7.54 (7.03)
Average citations per doc	6.929 (6.98)
References	16553 (16553)
Document contents	
Keywords Plus (ID)	710
Author's Keywords (DE)	990
Authors	
Authors	627 (624)
Authors of single-authored docs	194 (191)
Authors collaboration	
Single-authored docs	229 (226)
Co-Authors per Doc	1.93 (1.94)
International co-authorships %	10.57 (10.4)
Document types	
Article	257 (255)
Book	6
Book chapter	52
Conference paper	22
Editorial	5
Letter	4(3)
Note	7
Review	53
Short survey	1
This table reflects only those papers that met all our selection and exclusion criteria and were thereby included in the final analysis.	
Source: Authors' own elaboration	

number of book chapters and reviews. The publication sources are diverse, with up to 240 different sources identified. In terms of authorship and collaboration, the field under study is characterised by two distinctive features: the number of papers written by a single author is very high —above 50%— and, in the cases of collaboration, it is not internationalised. International teams account for only 10% of co-authorships.

Regarding the general summary of the doctoral theses database, the number of documents identified is 150, coming from 79 institutions in 16 different countries. According to the UNESCO codification and nomenclature, on average, each thesis is identified with

2.17 disciplines and 2.73 subdisciplines to establish a total of 69 different disciplines and 145 subdisciplines (Table 4).

The first relevant aspect of the analyses is the growth of the academic influence of the Camino de Santiago over time and according to the different types of scientific contributions. Figure 1 shows the time series of the number of documents. In terms of doctoral theses, there is a slow-growing trend from sporadic activity until the beginning of the 21st century to regular but limited research at present (with an interesting peak in the middle of the previous decade). On the other hand, the behaviour of indexed manuscripts shows a very different pattern. Until

Table 4: General Summary Information - Doctoral Theses

Description	Results
Main data information	
Timespan	1979:2022
Number of theses	150
Number of countries	16
Number of institutions	79
Supervisors/Co-supervisors	186
Evaluation committee members	541
Linear Annual Growth	0.198
Document Average Age (2023)	13.12
Discipline information	
Disciplines	69
Subdisciplines	145
Average disciplines per thesis	2.17
Average subdisciplines per thesis	2.73
Source: Authors' own elaboration	

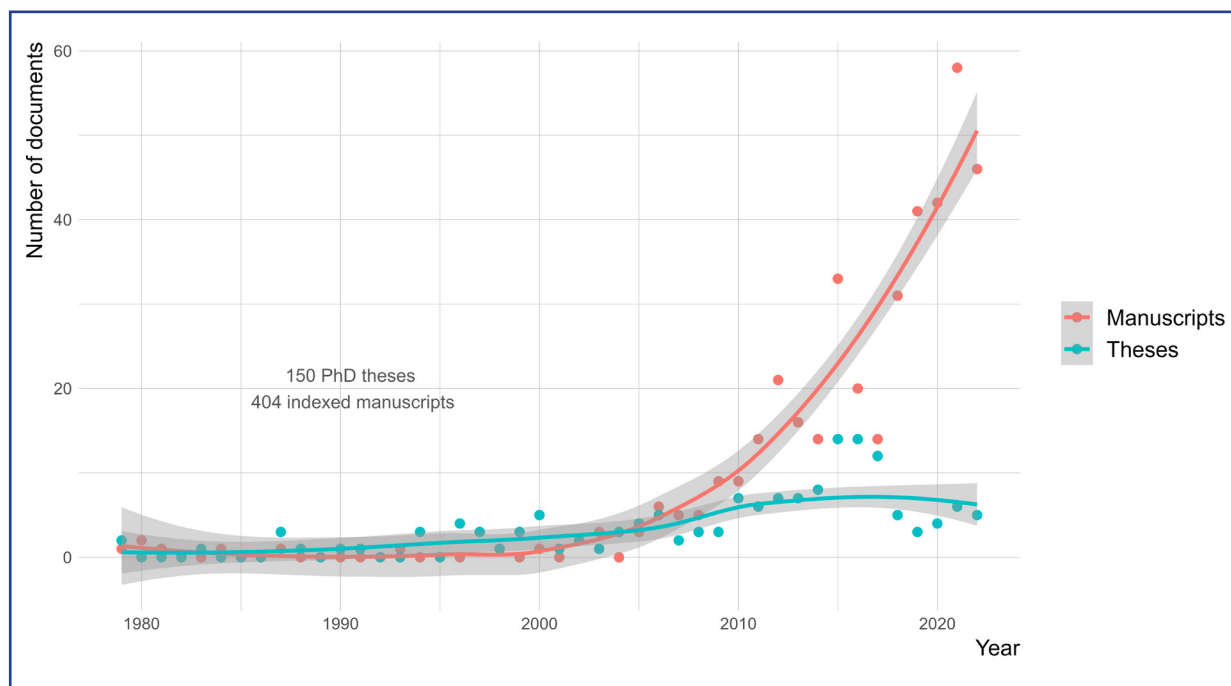
the beginning of the 21st century, the academic relevance was limited. Since then, however, academic interest in the Jacobean topic, and the consequent number of academic products related to it, has followed an exponential trend, with an annual growth of almost 8%.

Sources

With regard to the database of indexed documents, the 407 contributions selected were published in more than 200 different media and publication sources. This gives some idea of the potential variety of sources and thematic approaches. Table 5 shows the top publication sources, specifically, the 10 journals or collections with at least three published contributions in the thematic area of interest. At first glance, the prominent importance of the *International Journal of Religious Tourism and Pilgrimage* becomes evident with more than 40 contributions. It is followed by the journal *Ad Limina*, also explicitly oriented to the Camino, the journal *Religions*, and a specific book of chapters on the Camino de Santiago.

Despite the diversity of origins and approaches, the distribution of publication sources seems to follow a pattern similar to that postulated by Bradford's law (Bradford, 1934), showing exponentially diminishing returns in the search for references in academic journals indexed in Scopus.

Figure 2 plots the number of articles published in each source against the logarithm of the ranking by the number

Figure 1: Time Series of Scientific Contributions on the Camino de Santiago over time (from 1979 to 2022)

Source: Authors' own elaboration

Table 5: Top-10 Sources with Highest Number of Indexed Manuscripts
(Inclusion criteria: at least four publications)

Sources	Documents
International Journal of Religious Tourism and Pilgrimage	43
Ad Limina	26
Religions	11
The Camino De Santiago in the 21st Century: Interdisciplinary Perspectives and Global Views	11
Revista Galega De Economía	9
Carreteras	8
Sustainability (Switzerland)	8
Geojournal Library	7
Boletín de la Asociación de Geógrafos Españoles	5
Handbook of Research on Socio-Economic Impacts of Religious Tourism and Pilgrimage	4

Source: Authors' own elaboration

of publications. This analysis has a twofold result: (i) it shows that the structure in our data is compatible with Bradford's law, and (ii) it allows us to identify the six or seven sources that constitute the fundamental core of the research in this field and which are detailed in the first positions of Table 5.

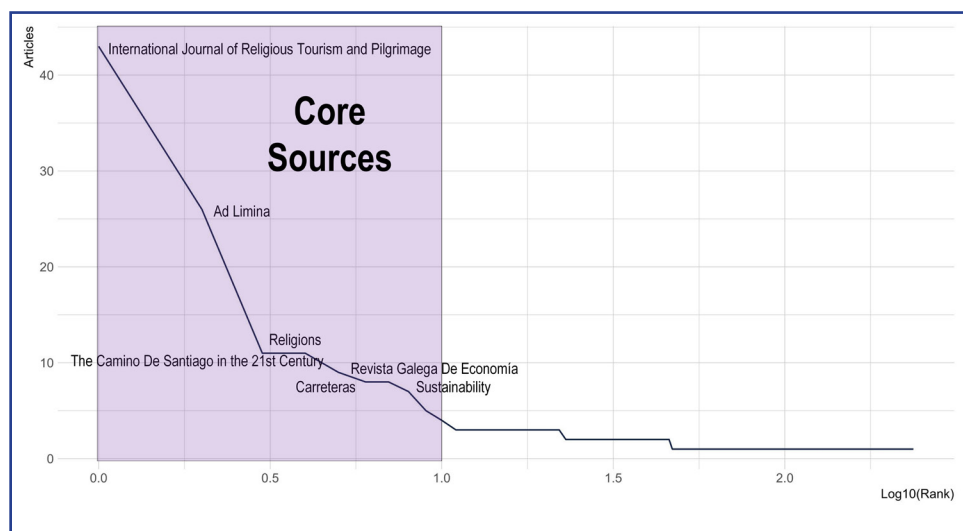
Leading Authors, Countries and Institutions

The 11 authors with the highest scientific production in the database of indexed manuscripts (with at least four documents within the period considered) are shown

in Figure 3. They are sorted from the highest to the lowest number of articles (from 16 to 4) without taking co-authorship into account. If the manuscripts were fractionalised by the number of authors, the ranking would vary only slightly. Figure 3 shows the total number of articles and how they have been distributed over the years according to the chronogram on the abscissa axis. The larger the circle, the more articles published by the author in a given year. The darker the circle, the more citations per year obtained according to the articles published that year.

Figure 2: Number of Manuscripts from Each Source as a Function of the Logarithm of the Rank in Base 10

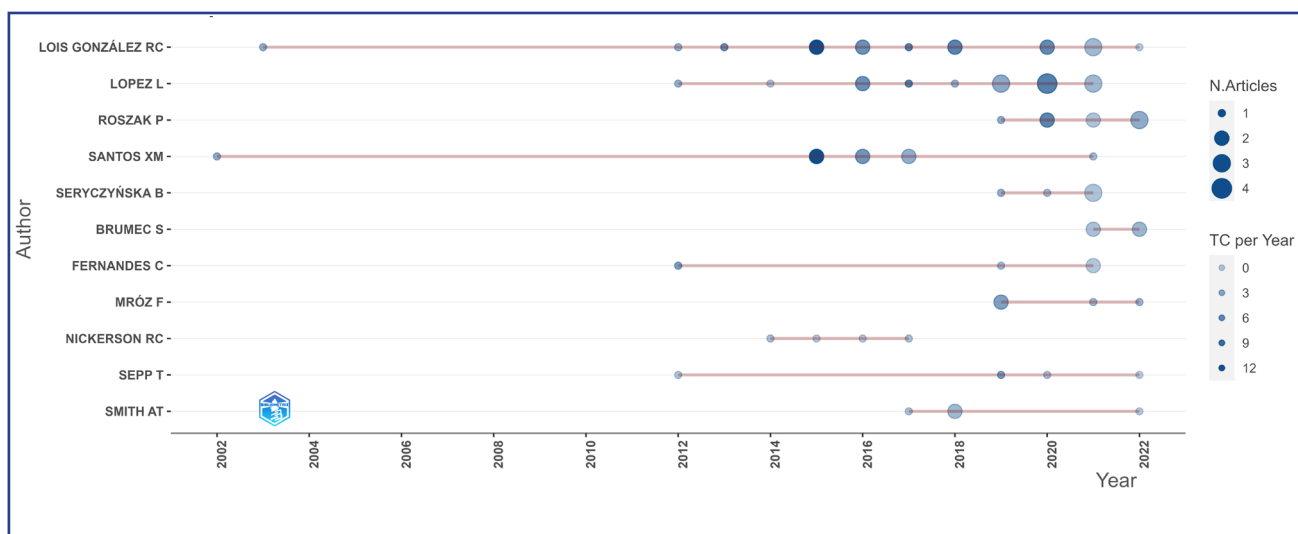
(Figure shows a pattern compatible with Bradford's law, in which a small set of core sources account for most of the documents)



Source: Authors' own elaboration

Figure 3: Top-Authors' Production Over Time.

The top-11 researchers with at least four published manuscripts since 1980 are included, ordered from highest to lowest by the number of papers. The plot shows the distribution of the papers over time (the bigger the circle, the more articles published by the researcher that year) and the number of total citations per year received in each of them (the darker the circle, the more citations received per year)



Source: Authors' own elaboration

The most prolific authors and those with sustained research production over time are Rubén C. Lois González (Universidad de Santiago de Compostela, Spain) and Lucrezia López (Universidad de Santiago de Compostela, Spain) —usually working together. Their research focuses on the Camino de Santiago as a tourist and geographic phenomenon, as well as on pilgrims' motivations, sustainability and other related aspects such as the effect of the covid-19 pandemic in the route (González & Medina, 2003; Lois González & López, 2012; Lois González, 2013; Lopez, 2014, 2019, 2020a, 2020b; Lois-González & Santos, 2015; Lois-González *et al.*, 2015; Castro Fernández, Lois González & Lopez, 2016; Lois González, Castro Fernández & Lopez, 2016; Lopez, Nicosia & González, 2018; Pérez Guilarte & Lois González, 2018; Lopez, Antelo & Gusman, 2019; Lopez, Otón & Pineiro Antelo, 2019; Lois González & Lopez, 2020, 2021; Moscarelli, Lopez & Lois González, 2020; Lopez & Lois González, 2021; Lopez & Pérez, 2021; Lois-González & Somoza-Medina, 2022).

Although his scientific output is more recent, from 2019 to 2022, Piotr Roszak (Nicolaus Copernicus University in Toruń, Poland) is currently the third most prolific author on the Camino de Santiago. His research explicitly connects pilgrimage and the Camino itself with the religious,

sacred and folklore aspects of pilgrimage (Roszak, 2019, 2020, 2021; Roszak & Serczyńska, 2020; Serczyńska, Roszak & Duda, 2021; Mróz, Rucquoi & Roszak, 2022; Roszak & Huzarek, 2022; Roszak & Tanco Lerga, 2022). In addition, he collaborates in several works with Beneika Serczyńska (also from Nicolaus Copernicus University) who is in fifth position in the ranking (Serczyńska, 2019, 2021; Serczyńska & Duda, 2021).

Tied for third place is also the work of Xose M. Santos, also from the Universidad de Santiago de Compostela. His research in relation to the phenomenon of tourism and pilgrimage routes to the Apostle is very dispersed in time (Santos, 2002, 2016, 2017, 2021; Blom, Nilsson & Santos, 2016; Santos & Trillo-Santamaría, 2017), with occasional joint collaboration with Lois Gonzalez and Lopez, as previously indicated.

There are several other authors with four publications, such as Tiina Sepp (University of Tartu, Estonia). Her work, based on extensive fieldwork in Spain and multiple pilgrimages, examines pilgrim narratives and the intersection of tradition and creativity (Sepp, 2012). She has studied the phenomenon of 'Caminoisation' across Europe (Bowman & Sepp, 2019) and investigated the evolving pilgrimage landscape in Estonia (Sepp &

Rommel, 2020). Recently, Sepp expanded her research to include English cathedrals, examining their role as sacred spaces and analysing visitor experiences (Sepp, 2022).

Snežana Brumec (University of Maribor, Slovenia) approaches and analyses the Camino by focusing on the psychology of spirituality and values (Brumec, 2021, 2022; Brumec & Aracki Rosenfield, 2021; Brumec, Lavrič & Naterer, 2022); while Franciszek Mróz (Pedagogical University of Krakow, Poland), analyses from both historical and contemporary perspectives, the impact of the Camino on religious tourism in Poland (Mróz, 2019, 2021a, 2022; Mróz, Mróz & Krogmann, 2019).

Also with four contributions Robert Nickerson (San Francisco State University, USA) has studied mobile technology and smartphone applications in the context of the Camino. He has explored pilgrims' use of such technology, its impact on their experience, and analysed the stored data components of mobile apps (Nickerson, Austreich & Eng, 2014; Nickerson & Mourato-Dussault, 2015, 2016; Nickerson & Eng, 2017).

Carlos Fernandes (Instituto Politécnico de Viana do Castelo, Portugal) has developed research related to the Camino focusing specifically on the Portuguese Way to Santiago (Fernandes *et al.*, 2012; Ambrósio & Fernandes, 2021). His work encompasses the creation of a diagnostic model to assess routes, application of this model across various municipalities, and study of pilgrims' motivations and consumption patterns (Ambrósio *et al.*, 2019; Griffin, Raj & Fernandes, 2021).

Finally, Alison T. Smith's (College of Charleston, USA) contributions include addressing safety challenges, promoting inclusivity through feminist campaigns (Smith, 2022), suggesting walking meditation and digital mapping tools for a more mindful experience (Smith, 2018a, 2018b), and exploring the transformative nature of time during pilgrimages through cinematic analysis (Smith, 2017).

This brief analysis of the most prolific researchers on the topic already illustrates how the scientific influence of the Camino, articulated around the central and transversal theme of pilgrimage, brings together different

complementary perspectives, which we will examine in more detail later in this paper.

As for the role of institutions and countries in the academic activity related to the Camino de Santiago, we decided to use different *treemaps* to explore it. In the *treemap* plots, the area is proportional to the number of scientific products from each institution and country (adjusted by the number of authors of each publication).

Figure 4 shows the number of theses defended. In this type of scientific enterprise, there is a large preponderance of Spain, led, as expected, by the Universidad de Santiago de Compostela. In addition, there is also a higher number of dissertations in the universities closest to the routes of the Camino. However, this behaviour cannot be generalised to international activity outside Spain. Although the activity in France and Portugal is relevant, more distant countries such as the United States of America, Australia, United Kingdom, Netherlands, or Brazil also have a substantial weight. Besides, in international research on the Camino, there is significant fragmentation among the scientific institutions where it is conducted.

The results of the countries-institutions analysis conducted on the *Scopus* database, while confirming the importance of the Spanish node and the University

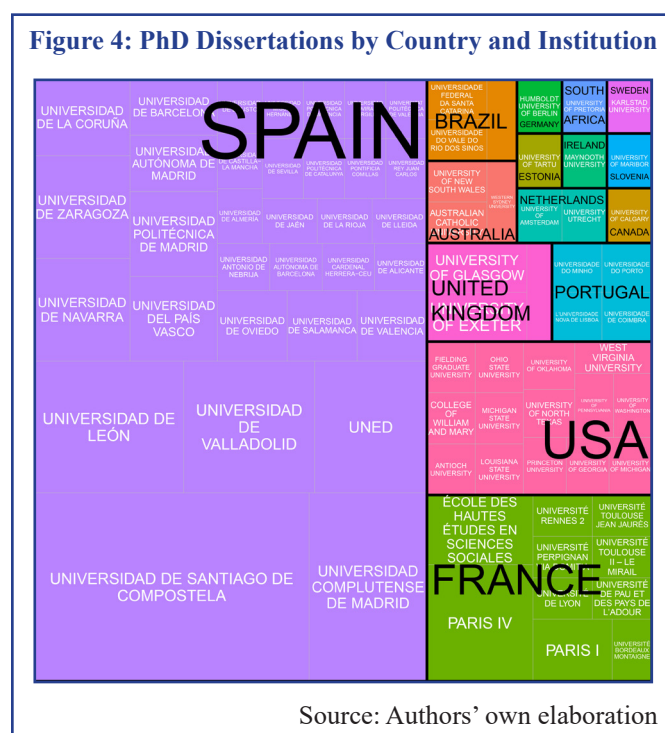
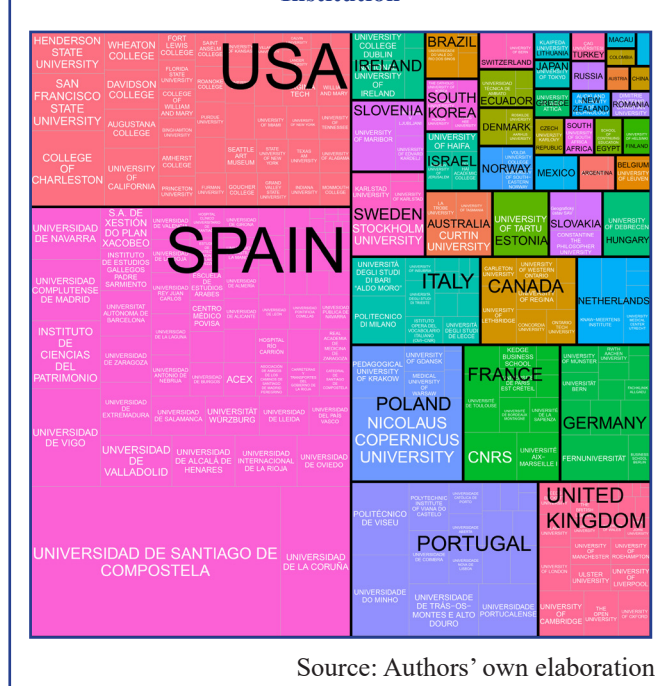


Figure 5: Manuscript Participation by Country and Institution

of Santiago de Compostela, also reflect the relevance of many other scientific actors (see Figure 5). The weight of the United States, Poland and its research on the Polish pilgrimage route, the United Kingdom through its reference universities, Portugal, France, Canada, Germany, Italy or the Netherlands is very significant. Notably, interest in a spatially localised route such as the Camino de Santiago transcends the scientific activity to the geographical space in which it is framed.

Conceptual Structure

The network analysis framework is useful for unravelling relevant information on the relationships and structure of a given scientific field. In our analysis, we have used co-occurrence / semantic networks (Newman, 2018) to map the research topics linked to the Camino de Santiago and explore their structure. This type of network shows the interconnection between terms based on their joint presence in the same unit of analysis. (Recall that semantic network analysis makes the implicit assumption that the keywords in the manuscript or the discipline identification codes to which the thesis is ascribed are representative of the content of the document - Comerio & Strozzi, 2019). Specifically, for the *Scopus* database, the terms used were the keywords provided by the authors and / or the keywords plus. As for the thesis database, we

used the different UNESCO codes associated with the dissertations to build the semantic networks. The units of analysis in both cases are the documents that integrate each database. Under this modelling approach, two terms, represented as nodes in the network, have a link between them if they appear together as keywords or UNESCO codes in the same document. Subsequently, the network was modelled as weighted, where the weight of the link determines the number of co-occurrences between the two terms.

Notably, the semantic networks obtained allowed us to identify relevant structural elements of the field, such as:

- (i) the most frequent terms and their position within the network (whether core or peripheral);
- (ii) the most frequent relationships and associations between terms; or
- (iii) whether the network has a modular structure, i.e., if it has communities, that is, nodes densely connected to each other but weakly connected to the rest of the network (Fortunato & Hric, 2016; Javed *et al.*, 2018).

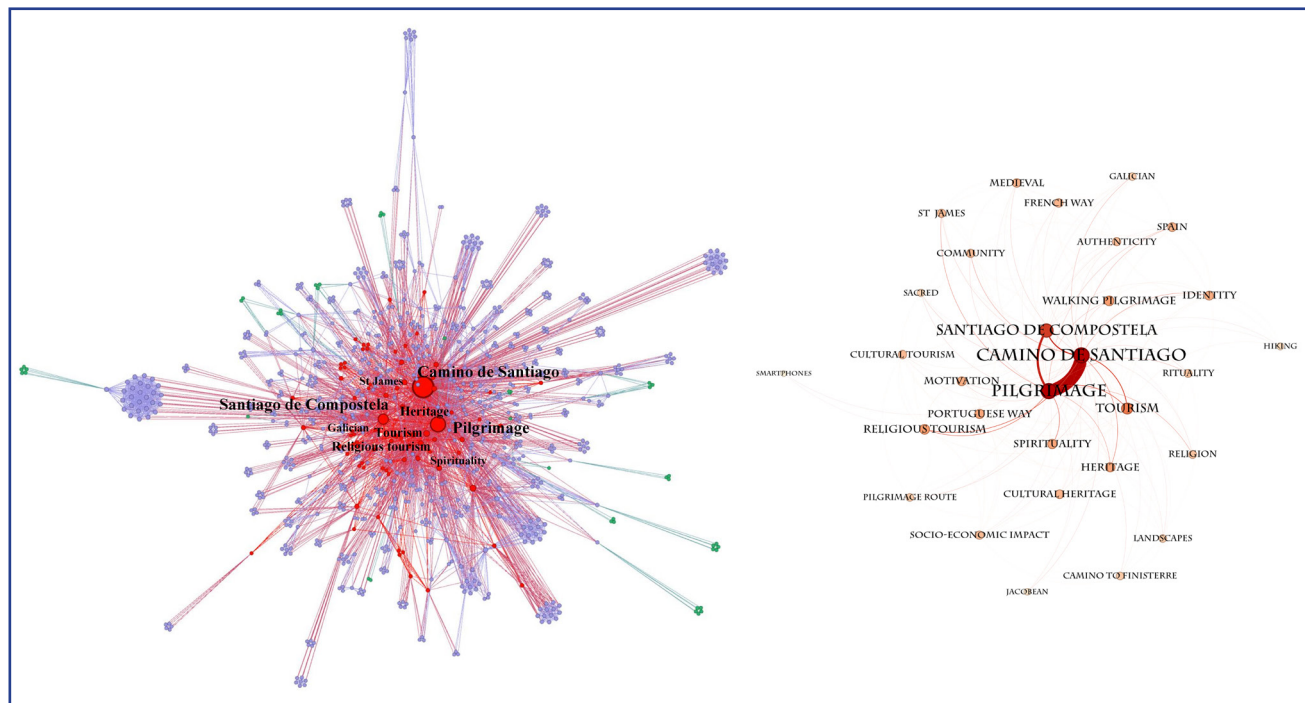
In the context of this work, these communities may be interpreted as different sets or niches of research within the scientific field. Besides, the position of each community within the complete network also helps to determine the role that each cluster of terms plays within the discipline as a whole.

Regarding the community detection technique implemented, from the different existing algorithms, we chose the Louvain method (Blondel *et al.*, 2008), which is based on a modularity optimisation heuristic. More precisely, the algorithm tries to find a partition of the nodes in the network (the assignment of each node to a single community) such that the difference between the number of links running between node pairs in the same community and the expected number of links between them if they had been formed randomly, is maximised (all this while maintaining the total number of links for each node)

Initially, we analysed the semantic network built on the authors' keywords. As a mapping tool, we know that this can be a problem since, as previously mentioned, the authors tend to look mainly for the specificity and

Figure 6: Author’s Keyword Co-occurrence Network and Core Network Detail

(Authors' keyword co-occurrence network is shown in its entirety on the left side of the figure, with the size of each node representing its frequency of appearance and individual colours indicating their respective eccentricities within the network. On the right side, a detailed analysis of the central elements of the network and their interconnections is presented. Here, size of node represents its frequency of occurrence, while the weight of the links between nodes indicates the joint frequency of two terms appearing in the same manuscript)



Source: Authors' own elaboration

differentiation of the article in their keywords. The results are shown in Figure 6. Notably, as the nodes are integral elements of the search terms, the network exhibits a structure akin to an ego-network. The pivotal terms sit at the network's heart, generally maintaining strong interconnections, thereby forming a core/periphery structure. The left side of Figure 6 illustrates the entirety of this network, with nodes colour-coded by their eccentricity; the most central nodes are coloured in red. On the figure's right-hand side, we showcase the most salient terms within the core, alongside their interrelations. In this context, the key and overarching terms that emerge as most prevalent include 'Camino de Santiago', 'Santiago de Compostela', and 'Pilgrimage', as anticipated. Other relevant keywords reference the diverse routes of the Camino and various facets such as tourism, religion, heritage, spirituality, and history.

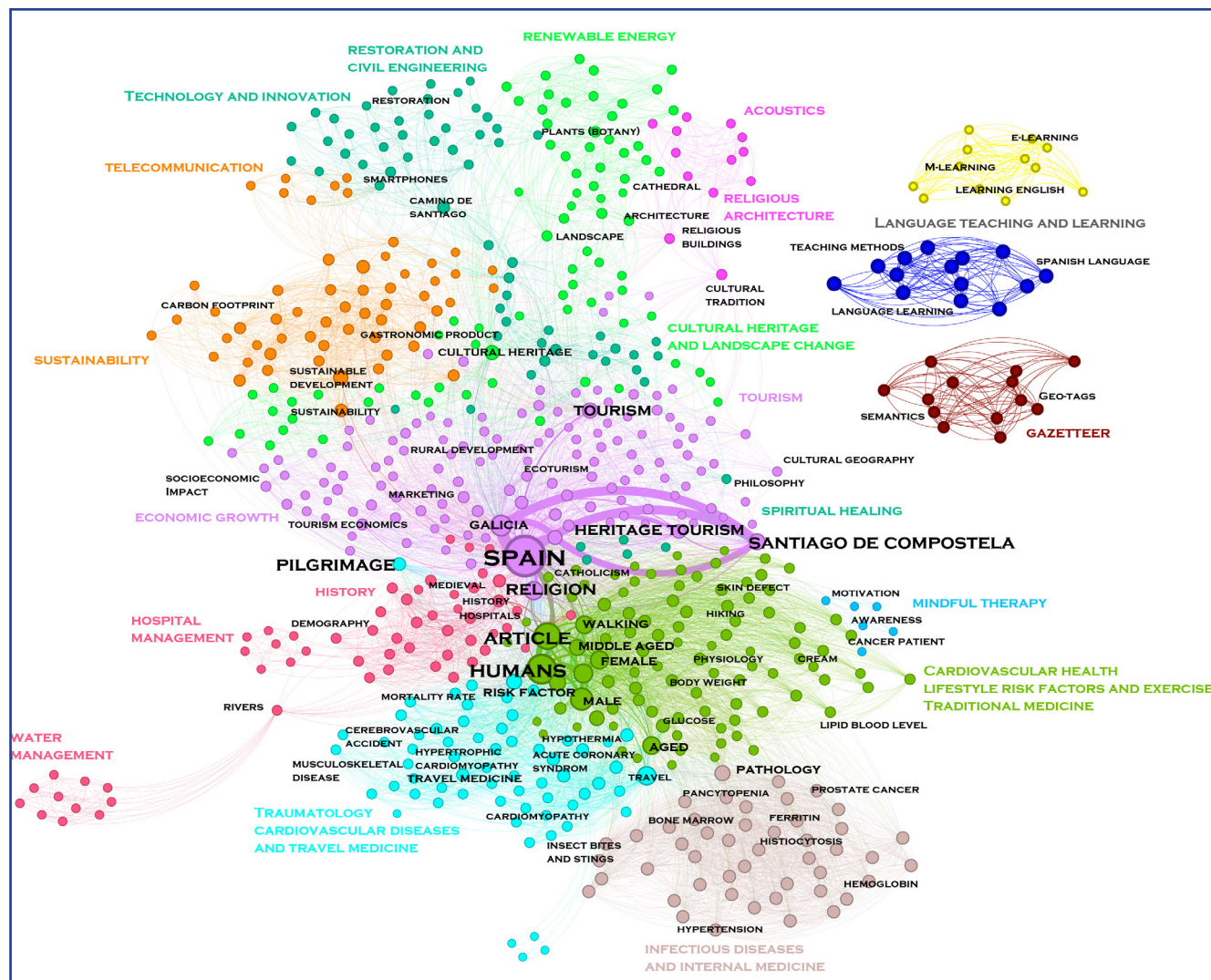
When we take the indexed keywords provided by the *Scopus* thesauri and analyse their co-occurrence network, the structure of academic research on the Camino becomes clearer (see Figure 7). Within this network,

the modular structure is significantly pronounced, with clearly differentiated communities. However, an essential aspect to consider is that all sciences are not uniformly represented in these lexicons. This inconsistency may lead to potential biases in the representation of the various disciplines. The purple community resides at the heart of the network, dedicated primarily to tourism and cultural heritage, key topics in the subject. Central to the network are keywords that traverse the entirety of the field, including pilgrimage, Galicia, medievalism, history, hospitals, and Catholicism. These themes epitomise the cultural heritage and traditions inherent to the Camino.

As we venture leftwards from the network's core, various communities come into view. The light green community, primarily related to cultural heritage, also acts as a cross-cutting hub for field research, bridging tourism, sustainability, and engineering, architecture, and technology elements. The orange community, focusing on economic growth and sustainability, integrates elements like sustainable development, gastronomy, and carbon footprint, having ties with telecommunications.

Figure 7: Indexed Keyword (Keyword+) Co-occurrence Network

(Node size is proportional to the frequency of occurrence. Colours reflect the different communities detected using Louvain's modularity maximisation algorithm. Coloured labels summarise the general topics of each community)



Source: Authors' own elaboration

At the top of the network, there are associated technology and engineering elements.

The emerald-green community intertwines fundamental aspects of tourism with social networks, smartphones, technology and innovation related to the Camino. This community also reflects how restoration and civil engineering impact Camino routes. Finally, the pink community focuses on the architecture of cathedrals and religious buildings, including their constructive characteristics, such as acoustics.

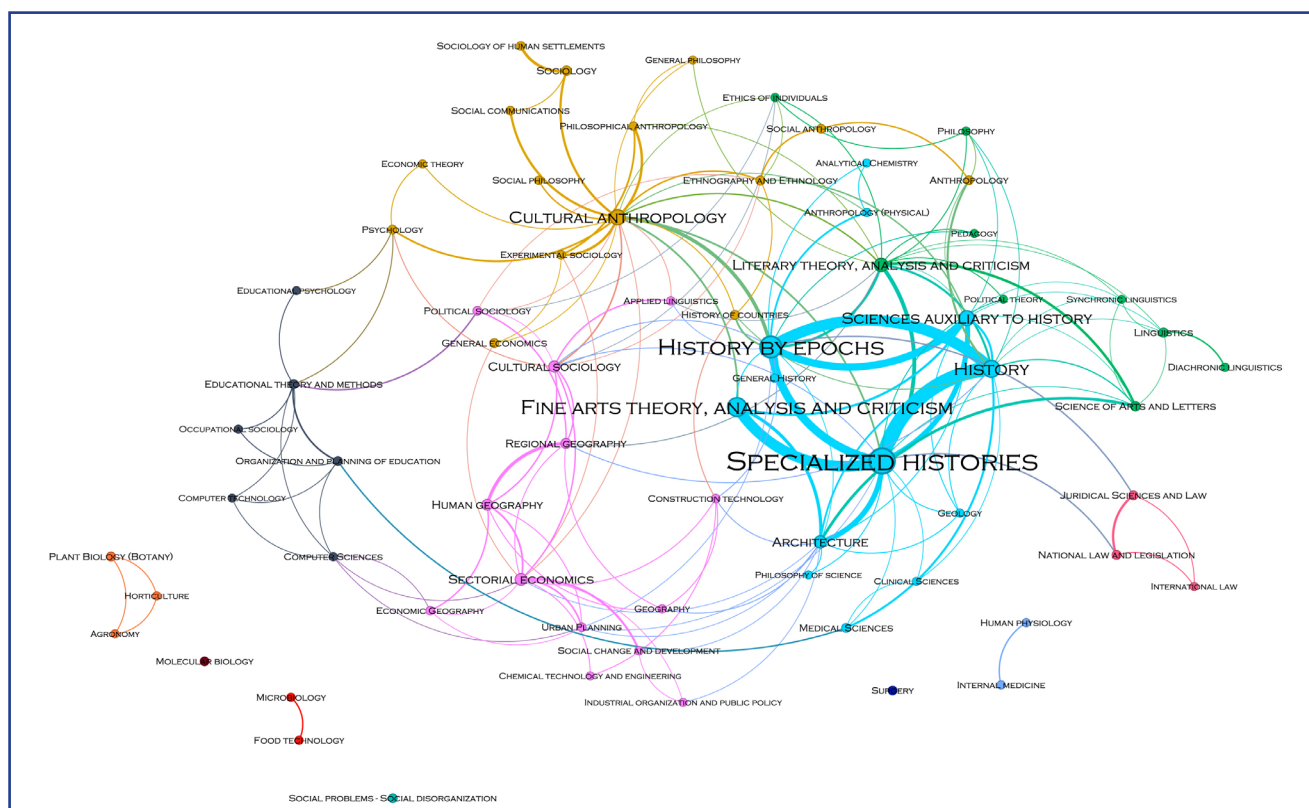
Returning to the network's centre and proceeding left, we find the red community, connecting research related to

history with hospital and water management. Conversely, if we navigate to the right, we encounter two smaller communities (green and blue), the former concerned with philosophy and spiritual healing, the latter with mindful therapy, addressing topics like motivation and awareness in patients.

Descending towards the network's lower section, another significant and distinctive research pole emerges. The olive green, turquoise, and light brown communities amalgamate various aspects tied to the medical elements of human journeys and pilgrimages. For instance, the olive-green community studies cardiovascular health, traditional medicine, exercise, and risk factors associated

Figure 8: Discipline Co-occurrence Network According to UNESCO Code Nomenclature at 4-digit level (doctoral thesis dataset)

(Node size is proportional to the weighted frequency of occurrence. The colours reflect the different communities detected using Louvain's modularity maximisation algorithm)



Source: Authors' own elaboration

with pilgrim lifestyles. The turquoise community encompasses traumatology, cardiovascular diseases, and other travel medicine-related conditions. Meanwhile, the light brown community broadly concentrates on infectious diseases and internal medicine.

Three other isolated components exist beyond the primary component linking the network's overall activity. Although unconnected, the yellow and blue communities are strongly interrelated, covering the utilisation of the Camino de Santiago as a resource in language teaching and learning processes. Lastly, a small community linked to gazetteers and geotagging is also present.

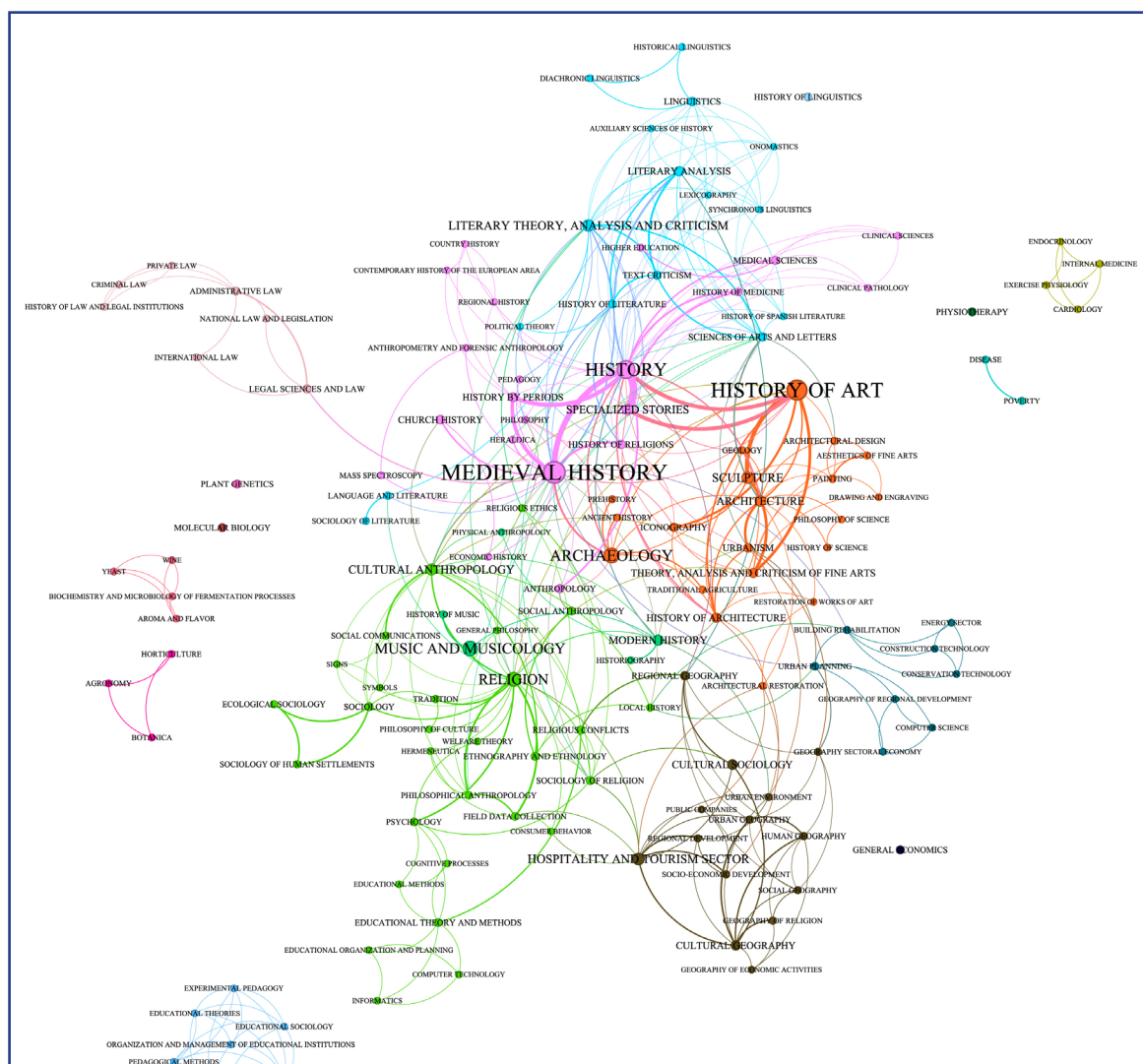
To complement the analysis of the structure of the scientific influence of the Camino, we compared the thematic lines obtained from the *Scopus* documents with the research areas developed through doctoral theses. To do so, we conducted analyses at two levels of resolution. First, we worked at the discipline level,

using the UNESCO 4-digit nomenclature. The results are shown in Figure 8 and reveal a research pattern distinct from that of indexed manuscripts. In particular, medicine has a much more residual role in doctoral research on the Camino. In contrast, social sciences and humanities have a much more dominant weight, with history, literature and fine arts being core disciplines. Noteworthy, there is also a relevant pole associated with human geography and sectorial economics, and a community centred on cultural anthropology.

Secondly, we conducted the analysis at the subdiscipline level using the UNESCO 6-digit nomenclature. The aim of this second analysis was to obtain a more detailed view of the thematic map of doctoral research in the field (Figure 9). For example, at this level of analysis, the cultural anthropology cluster unfolds showing the importance of religion and musicology. Furthermore, the central part of the network reveals the different sub-branches of history, with medieval history and art history

Figure 9: Subdiscipline Co-occurrence Network According to UNESCO 6-digit Code Nomenclature (doctoral thesis dataset)

(Node size is proportional to the weighted frequency of occurrence. The colours reflect the different communities detected using Louvain's modularity maximisation algorithm)



Source: Authors' own elaboration

playing critical roles. In addition, hospitality and the tourism sector appear to be a key subfield within sectoral economics. Small peripheral doctoral research clusters related to aspects of law, medicine, botany and biology, pedagogy or technology also appear explicitly and more clearly.

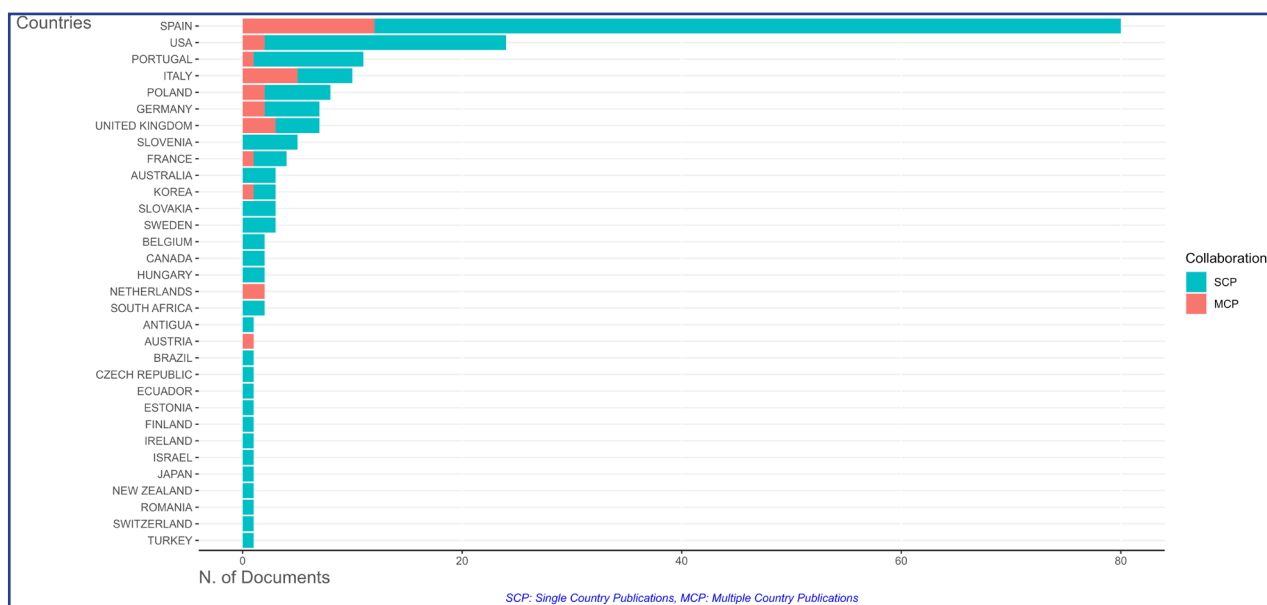
Collaboration and Social Structure

Analysis of scientific collaboration and social structures of research on the Camino show very high levels of fragmentation. Both co-authorship networks and the co-participation in thesis evaluation committees have many components. Several reasons may account for

this phenomenon. On the one hand, scientific volume in the field is relatively low compared to other research fields. On the other hand, the number of topics analysed is remarkably high. Both reasons together contribute to dispersion. In addition, the culture of scientific publication in the social sciences and humanities is less prone to co-authorship. Since these fields have a relevant weight on research in the Camino, their culture of scientific publication is extended to it, thus helping to increase its fragmentation.

For the analysis of scientific collaboration, we used only the *Scopus* database, as collaborative thesis supervision is still rare. Remarkably, almost 60% of the manuscripts

Figure 10: Scopus Collaborative Contributions on Camino by Country of Corresponding Author
(Single-country collaborations in turquoise and multi-country collaborations in red)



Source: Authors' own elaboration

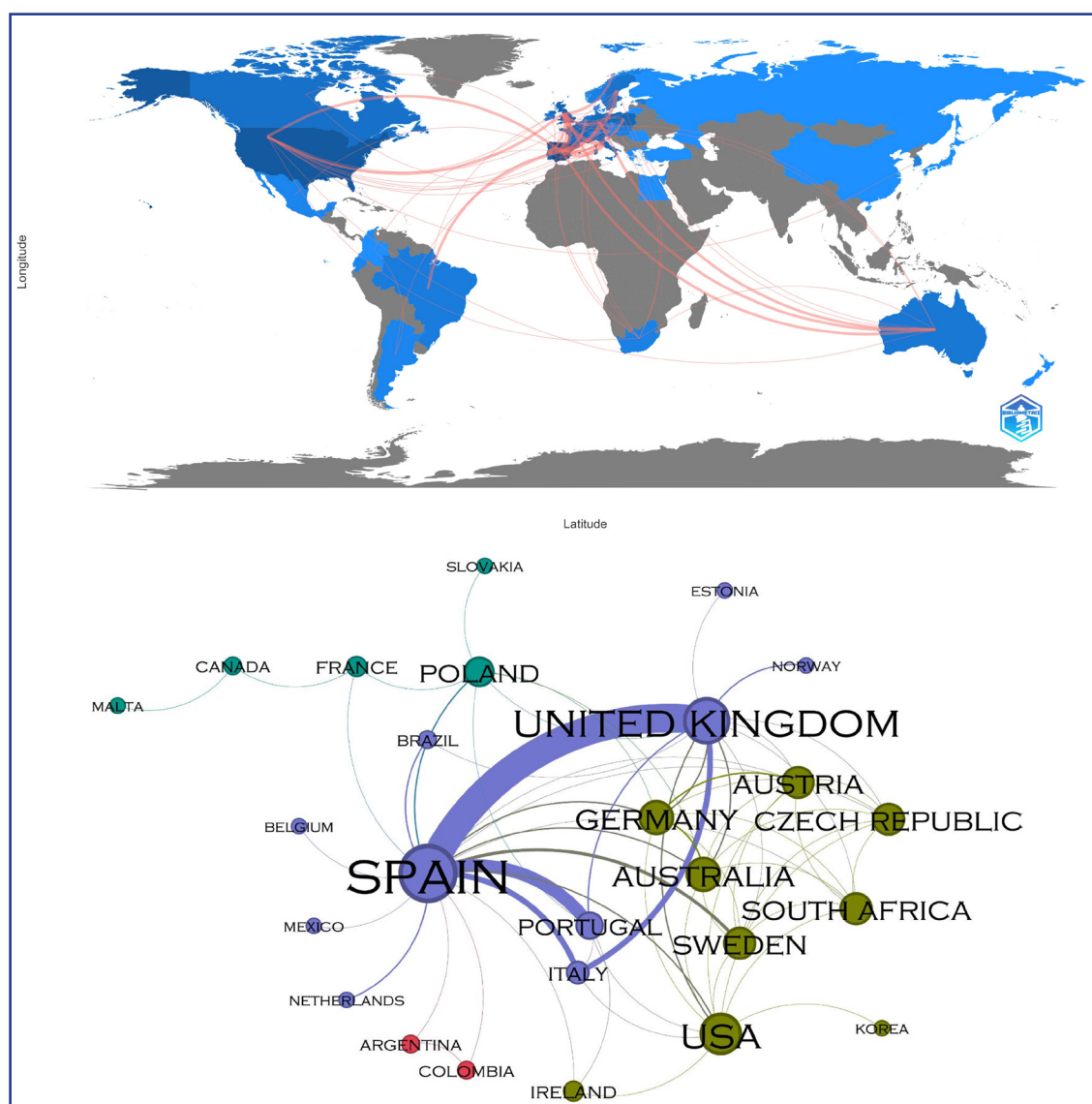
analysed have a single author. In the remaining 40 %, collaboration does occur. Figure 10 shows that most collaborations are between authors from the same country, i.e., international co-authorship is infrequent — accounting for only 10.5 of the total. In this figure, collaborations are assigned to a country according to the nationality of the corresponding author. Spain leads in absolute terms in both multi-country collaborations (MCP) and single-country collaborations (SCP). However, in relative terms, Italy and the United Kingdom (and the Netherlands and Austria, albeit with a low volume of research) stand out in terms of the percentage of international collaborations they lead.

The analysis of international collaboration through the prism of the countries where co-authorship occurs is best conducted by means of a network. Such a network is shown in Figure 11. The top of the figure provides a geographic perspective of the relationships. Conversely, the bottom part reveals an extracted network of a connected component, obtained by excluding countries that lack international collaboration. This network utilises colours to signify various communities identified by the Louvain algorithm. Three prominent collaboration clusters become visible:

- A cluster consisting of Slovakia, Poland, France, Canada, and Malta.
- A larger group that includes Germany, Austria, Czech Republic, Australia, South Africa, USA, Sweden, Ireland, and Korea.
- A central group, where Spain, United Kingdom, Portugal, and Italy are prominent. However, other countries like Estonia and Norway exist in the community's periphery, linked predominantly to the United Kingdom. In addition, there is an interesting mix of countries like Brazil, Belgium, Mexico and the Netherlands, along with a smaller community formed by Argentina and Colombia, which are linked mainly to Spain, which acts as a hub (see Figure 11).

Conclusions and Limitations

The aim of this work was to present a holistic and integrated perspective of the influence of the Camino de Santiago on academic literature. To this end, we selected a bibliometric approach to comparatively analyse —in a quantitative and reproducible way— two relevant scientific products, namely manuscripts indexed in *Scopus* (articles, reviews, book chapters, etc.) and doctoral theses. The main findings are as follows:

Figure 11: Country Collaboration Map (top) and Country Collaboration from Community Perspective (bottom)

Source: Authors' own elaboration

The time series of scientific production related to the Camino de Santiago presents an upward trend, reflecting the increasing scientific interest in this pilgrimage route. In particular, in the last decade, the pattern of growth is especially relevant in the case of indexed manuscripts.

Analysis of the sources of indexed publications shows that the field presents a structure compatible with Bradford's law, in which a small set of sources agglutinates a significant proportion of the scientific activity in the area. Specifically, the most influential publishers are journals such as the *International Journal of Religious Tourism and Pilgrimage*, *Ad Limina*, *Religions*, *Carreteras* or *Revista Galega de Economía*; and monographic books

such as *The Camino De Santiago in the 21st Century: Interdisciplinary Perspectives and Global Views*.

Analysis of the authors allowed identification of the most productive researchers in the domain of the Camino de Santiago. Some relevant aspects of the author-study results are the differentiation of their research approaches and, in many cases, a very recent corpus of scientific activity.

As for analysis of the most relevant institutions and countries, the findings show that the University of Santiago de Compostela and, consequently, Spain constitutes the most important driving force of research

on the Camino. Notwithstanding, especially in *Scopus*-indexed documents, this leadership is not exclusive to a single institution but is shared by a multitude of faculties and countries. In the case of doctoral theses, the weight of Spain is higher, although France or USA also have a remarkable activity.

To understand the conceptual structure of the field, we used a network approach and analysed networks of different types of words: keywords (author keywords and keywords-plus) in the case of indexed documents, and UNESCO codes in the case of theses. These analyses allowed us to identify the Camino de Santiago and pilgrimage as the transversal elements that define the field. The results of the keyword-plus network have provided a very insightful scientific map. This network presents a marked modular structure, with a core occupied by the most traditional aspects linked to the Camino (religion, Catholicism, Santiago de Compostela, heritage, arts and medieval history) but with different peripheral poles outside this core. Among these peripheral poles, we identify structures focused on tourism, economic growth, sustainability and the fields of engineering, architecture, and technologies connected with pilgrimage. We also observe another pole focused on the impact of the Camino on pilgrims from a medical perspective.

Interestingly, comparing the keywords-plus map with that of the doctoral theses (UNESCO codes) reveals substantial differences. In the topics treated in doctoral theses, pilgrim's health and risks have a much less relevant role. Research in this context is centrally dominated by the history of art and medieval history, literature, religion, musicology, hospitality and the tourism sector.

Analysis of the social and collaborative structure of the field reveals a high level of fragmentation. Co-authorship and co-participation network patterns in thesis evaluation committees are highly fragmented and disjointed. A very high percentage of papers have a single author, and the internationalisation level is relatively low in co-authorship cases. Given that co-authorship has been associated with more comprehensive views and publications in higher-impact journals, this finding may offer an opportunity to broaden the overall impact of the field.

It is also important to note that the present study has some limitations. The main limitation comes from the heterogeneous indexing of scholarly fields in global databases of scientific manuscripts. In this regard, it should be recalled that in the humanities and the social sciences indexation is not as deeply rooted as in other research areas; as a result, a significant part of the scientific production in those fields (including publications in languages other than English or with a more local scope) is still not indexed. Consequently, our indexed-document map may be partially distorted or incomplete.

In addition, the different scientific databases have distinct coverage and, hence, the choice of the source database from which to retrieve indexed manuscripts does play a role. On this matter, note that we chose Scopus over Web of Science since its coverage is higher. Thus, even though our study cannot be fully comprehensive because of the above-mentioned reasons, it is as exhaustive as it can be with the information available.

As for the selection of inclusion / exclusion criteria, again, we have tried to be as comprehensive as possible. Nevertheless, we may have missed some keywords which could lead to extra findings. Moreover, given that the analysis has focused on documents that take the Camino as an explicit point of study, there may be further indirect research focused on specific elements of it which have not been reflected in our analyses.

All in all, our work reflects the present situation in terms of the information available and might help to identify possible distortions and reveal other less visible sources.

To conclude, we believe that our overview of the relevance of the Camino de Santiago, presented in this paper shows the influence of pilgrimage routes in general, and of the Camino in particular, as a crossroads not only for people but also as a focus of scientific perspectives and objects of multidisciplinary studies. Moreover, our analysis helps to understand quite precisely the development status of related research, of cross-cutting and emerging topics and of the possible niches, questions and knowledge that may direct future research in the field.

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