

Review

# Intellectual Structure of the Belt and Road Initiative Research: A Scientometric Analysis and Suggestions for a Future Research Agenda

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**Abstract:** China's Belt and Road Initiative (BRI) has attracted increasing attention worldwide since its inception in 2013. Although the research is fast increasing in terms of publications, there is a lack of knowledge about the intellectual structure, research trends, and appropriate theories underpinning. Using bibliometric data from 1583 articles from 2013 to 2019 in the Web of Science and Scopus databases, we used bibliometric techniques and scientometric analyses to identify and analyze the intellectual structure, hotspots, and emerging trends in this field. We identified 18 clusters that we categorized into three groups for thematic discussion. Research gaps and future research directions were identified and proposed after qualitative content analysis. By providing the big picture of the latest research on BRI since it was initiated, this paper serves as a one-stop shop for multi-disciplinary research on the topic.

**Keywords:** China; Belt and Road Initiative; intellectual structure; global governance; emerging economies; bibliometrics; scientometrics; content analysis

## 1. Introduction

During his two state visits to Kazakhstan and Indonesia separately in September and October 2013, Xi Jinping, the President of the People's Republic of China, formally unveiled the broader vision that is known as the Belt and Road Initiative (hereafter called "BRI") [1,2]. On 28 March 2015, the first official blueprint was released jointly by the National Development and Reform Commission, the Ministry of Foreign Affairs, and the Ministry of Commerce, with the authorization of the State Council of the People's Republic of China [3]. It signified that the BRI had entered the actual planning and implementation stage. China thereby undertook potentially the most significant international programme of the twenty-first century [4,5]. By the end of 2015, the Asia Infrastructure Investment Bank (AIIB) was founded as a major means of financing the BRI, and China's state-run development banks began devoting vast resources to the initiative [6,7]. The initiative is comprised of two components: the "Silk Road Economic Belt", an overland Eurasian economic network linking China with Asian, European, and Middle Eastern countries (the Belt), and the "21st Century Maritime Silk Road", a maritime economic network running from Chinese coastal ports to the South China Sea, the Indian Ocean, Southeast Asia, the South Asian subcontinent, Africa, the Middle East, and Europe (the Road).

Official Chinese descriptions of the BRI mention five major goals: coordinating policy, connecting facilities, unimpeded trade, integrated finances, and creating people-to-people bonds [3]. The economic area that the BRI aims to stimulate covers about 65 per cent of the world's population and 40 per cent of the global GDP [8]. The official list of BRI countries has grown from 65 in 2013 to 126 as of 15 December, 2018 through the addition of 61 more countries in Africa, Latin America, and Europe (The updates

are available from the official Chinese Belt and Road Portal at <https://eng.yidaiyilu.gov.cn>). As of September 2018, more than 130 countries have signed deals worth US\$575 billion to build railways, roads, ports, and other projects in the more than 65 economies along its route [9].

Thus, to date, BRI's reach has extended far beyond the ancient silk routes, making it among the most ambitious global initiatives of our time [10]. Correspondingly, the BRI has received increasing attention from the media, national governments, international institutions, and researchers worldwide since it was initiated. A large number of academic research results related to BRI have emerged, covering more than 100 disciplines in the Web of Science database, and involving over 100 countries and international organizations. The global economic rise of China [11,12] and its model of development [13,14], and the policy priorities of the government of China [15,16] have increased the popularity of BRI. Therefore, a systematic review of the body of academic knowledge on BRI is needed to explore the current state of the research, its trends, and its gaps.

There are few such reviews in peer-reviewed journals. Thüerer et al. [17] conducted a review of BRI with respect to global supply chain management. Lee et al. [18] researched BRI with a focus on maritime transport. Zhang [19] reviewed the main aspects of China's approach in drafting Investor-State arbitration (ISA) clauses in the context of BRI. Nevertheless, to the best of our knowledge, there is no comprehensive review of BRI in the English language in high-quality, peer-reviewed journals using bibliometric and visual knowledge map methodologies.

To fill this gap, we combine three methodological approaches—bibliometric analysis [20], visual knowledge mapping with scientometrics [21], and content analysis [22]—to conduct a systematic review of the BRI literature from 2013–2019. We search two academic databases, the Web of Science and Scopus, to identify articles on the subject during this time period. Bibliometric and scientometric techniques help us map the field and direct scholarly attention to specific researchers, papers, journals and locational hotspots [23–26]. Visual knowledge mapping is a recognized method for understanding the intellectual structure of a field [27], especially when exploring the frontiers of disciplines, scientific discoveries, and scientific cooperation [28]. Visualization and analysis of knowledge networks can effectively assist in the discovery of new knowledge, and in the management and use of existing knowledge resources [29,30].

We explore three research questions: (1) What is the intellectual structure of the English-language literature on BRI, based on bibliographic results? (2) What are the research hotspots, streams, and trending topics, based on the scientometric results? (3) What are the areas that require further investigation, providing future research opportunities?

The findings should provide researchers, policymakers, and practitioners with a panoramic description and in-depth understanding of BRI research. Understanding the intellectual structure of the field will improve our ability to collect and analyze information about it and expand exploration of it for international business and policy research.

The remainder of this paper is organized as follows. Section 2 presents the methodology, followed by the data collection in Section 3. Section 4 provides an overview of BRI research through bibliometric and scientometric experiments. Section 5 discusses the themes that emerge from our analyses. Section 6 presents thematic discussion, identifies gaps in research, underlying theory, and proposes future Research Directions. Final conclusions are provided in Section 7.

## 2. Materials and Methods

BRI studies is a new multidisciplinary field. We present a quantitative and qualitative assessment of the BRI literature. Quantitatively, we conducted a bibliometric and scientometric analysis. In addition, we used content analysis to analyze the top-ranking articles in terms of citations and co-citations, and the trending articles in terms of frequency and centrality of keywords, and categorized them into streams. Finally, we identified the gaps in the research and proposed future research directions.

### 2.1. Bibliometric, Scientometric, and Content Analysis

The term “bibliometrics” was first proposed by Otlet [31], as recalled by Rousseau [32]. It is “the application of mathematics and statistical methods to books and other media of communication” [33] (p. 349). Using bibliometrics, scholars can create a systematic, transparent, reproducible review process based on statistical measurements [34,35]. Nalimov and Mulcjenko [36] first developed the field of scientometrics, defined as, “the quantitative methods of the research on the development of science as an informational process” (p. 2). Scientometric analysis is a quantitative method, one of the functions is creating visual representations by assessing, mapping, and clustering the quality and relevance of articles through mathematical models and algorithms [37].

Four types of bibliometric techniques were applied in the scientometric analysis: (i) citation analysis [37], (ii) Document Co-citation Analysis (DCA) [38], (iii) Author Co-citation Analysis (ACA) [38], and (iv) Bibliographic Coupling [39].

In addition, we incorporated qualitative content analysis with the above quantitative analysis. Content analysis is an effective tool for examining a sample of documents in a systematic way [40]. One of the most important rules of content analysis is that the dimensions and related analytic categories can be classified based on deductions or inductions [41]. We utilized the clusters of keywords from our co-occurrence analysis to code the articles and then adopted an inductive approach to identify sub-themes within each cluster by synthesizing the findings of the articles.

### 2.2. Tools and Software

It is challenging to digest the vast volume of data from multiple sources manually. Data collection and analysis is a large labor consuming job. Fortunately, some software and tools, which were developed in recent years, could help us to improve the efficiency and avoid subjective bias. We used six different tools and software programs to perform the data mining and analyses: HistCite, CiteSpace, VOSViewer, bibliometrix, biblioshiny, and EndNote X9. We utilized EndNote X9 for data mining, removing duplicates, and classifying the articles [42], HistCite to conduct the bibliometric citation meta-analysis [25,43], CiteSpace to investigate and map the knowledge network [44], and VOSViewer to cluster the keywords, as well as a robustness test to cluster the results obtained from CiteSpace and those we grouped manually. Developed by van Eck and Waltman [45], VOSviewer is a comprehensive bibliometric analysis tool based on the Visualization of Similarities (VOS) technology, which has unique advantages in clustering fragmented knowledge from different domains according to their relatedness and similarity. To conduct the coupling analysis, we utilized the bibliometrix software package developed by Professor Massimo Aria in 2017 based on R language. We created the author and institution collaboration networks with Biblioshiny, which was developed by Massimo Aria, based on a secondary development of bibliometrix. It allows users to perform bibliometric and visual analyses through an interactive web interface [46].

### 2.3. Statistical Equations of Social Network Analysis

We performed a social network analysis to create networks indicating author collaborations, collaborations between institutions, and keyword co-occurrences (a basic introduction to networks, in particular in a bibliometric context, including the definitions included here by the authors can be found, e.g., in Otte and Rousseau (2002) [47]). The results appear in Section 4. We created these networks using the statistical principle of centrality, specifically, degree centrality, closeness centrality, and between-ness centrality.

Degree centrality (DC) of a node in a (unweighted) network is the number of edges directly connected to this node. [48]. In a country collaboration network, degree centrality is the number of countries with which country  $i$  collaborates.

$$CD(i) = \sum_{j=1}^N a_{ij}, \quad (1)$$

where  $a_{ij}$  represents an adjacency matrix,  $a_{ij} = 1$  when a tie exists between country  $i$  and country  $j$ , and  $a_{ij} = 0$  otherwise.

Closeness centrality (CC) measures the average shortest distance between node  $i$  and all other nodes [46]. In a network, closeness centrality is the topological distance from one country to all other countries.

$$CC(i) = \frac{N-1}{\sum_{j=1, j \neq i}^N a_{ij}} \quad (2)$$

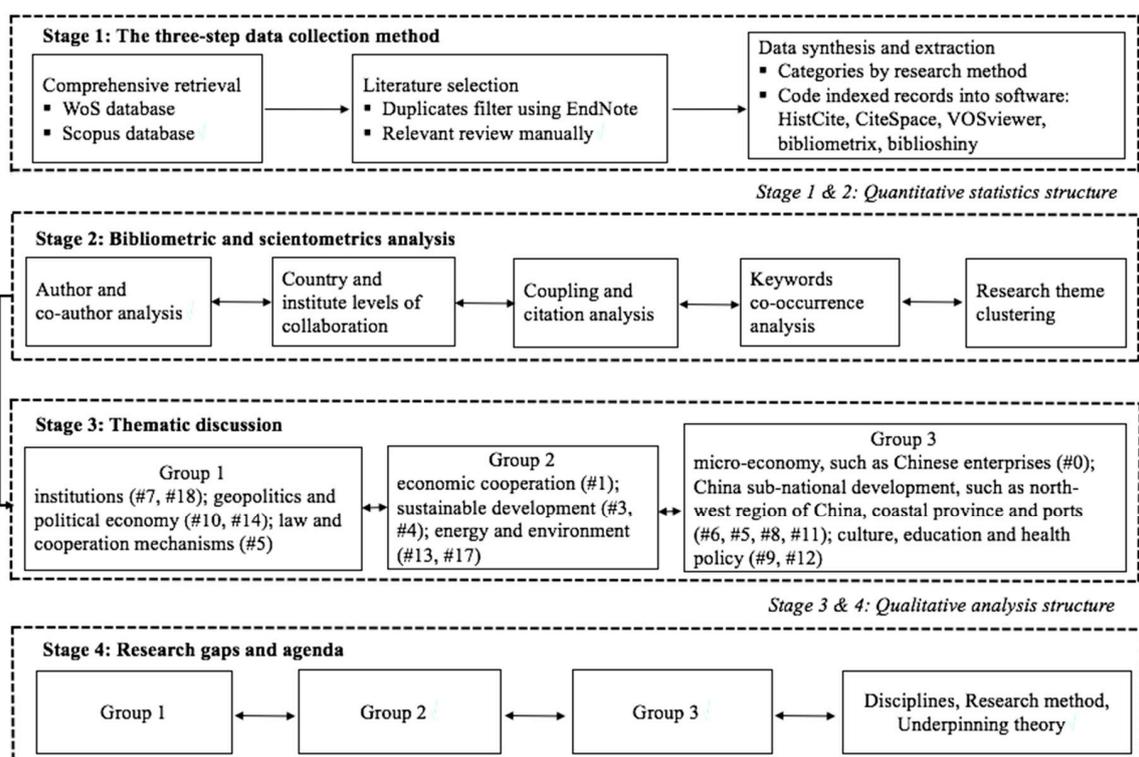
Between-ness centrality (CB) refers to the proportion of all geodesics between pairs of other nodes that pass through this node [49].

$$CB(i) = \sum_{j=1, j \neq k \neq i}^N \frac{N_{jk}(i)}{N_{jk}}, \quad (3)$$

where  $N_{jk}$  is the number of shortest paths between  $V_j$  and  $V_k$  and  $N_{jk}(i)$  is the number of shortest paths that pass through  $V_i$ .

#### 2.4. The Four-Step Workflow for Reviewing the Literature

The standard workflow consists of five stages [20]: (1) study design, (2) data collection, (3) data analysis, (4) data visualization, and (5) interpretation. Based on this format, we conducted a further systematic review of the BRI literature using the four-stage workflow illustrated in Figure 1.



**Figure 1.** A four-stage workflow for systematic reviewing the Belt and Road Initiative (BRI) literature. Source: Own elaboration.

Stage 1 is data collection, consisting of three steps, comprehensive data retrieval, literature selection, and data synthesis and extraction. Stage 2 is bibliometric and scientometric analysis. Stages 1 and 2 involve quantitative assessments. Stages 3 and 4 use qualitative methods to content analyze the literature. Stage 3 deals with thematic discussions and Stage 4 identifies gaps in the research and

suggests future research agendas. We followed Börner et al.'s [26] general science mapping workflow. Cobo et al. [50] compared software tools for mapping science using a similar workflow.

### 2.5. Citation Measurements

Five measurements for citations were used in our study: the total local citation score (TLCS), the total global citation score (TGCS), total local citation score per year (TLCS/t), total global citation score per year (TGCS/t), and local cited references (LCR) [23–25]. The TLCS represents the total citations received by an article from the articles in retrieved samples in the same database. The TGCS represents the total number of citations not only in retrieved samples but also other articles based on the same database. TGCS reflects the interdisciplinary nature of the research paper, as well as its overall impact on academic research [23]. The LCR shows the number of citations in a paper's reference list compared to other papers within the collection.

In conjunction with TLCS and TGCS, we also used TLCS/t and TGCS/t [23–25]. TLCS/t is the total local citation score per year from the time the research papers' publication to the end of the sample period. And, TGCS/t facilitates the frequency of the annual citation based on the database (WoS or Scopus) reckoned at the moment when the data was downloaded [51]. In this study, we used HistCite software to calculate the mentioned scores.

## 3. Data Collection

We used two online databases—Thomson Reuters' Web of Science (WoS) and Elsevier's Scopus—as our data sources. For WoS, we used its Core Collection (WOSCC), including six citation indexes: Science Citation Index Expanded (SCI-EXPANDED), Social Sciences Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI), Conference Proceedings Citation Index- Science (CPCI-S), Conference Proceedings Citation Index- Social Science & Humanities (CPCI-SSH), and Emerging Sources Citation Index (ESCI) (refer to the website, <https://apps.webofknowledge.com>).

The important feature of these databases is that they include all article types and index all authors, institutional addresses, and bibliographic references for each article [52]. Archambault et al. [53] have shown a high correlation between the number of papers and the number of citations received by country calculated with WoS and with Scopus, and thus concluded that both databases are suitable tool for scientometric analyses. The WoS has traditionally been the main source of scientific evaluation for its high quality and long history coverage [23–25,52,53]. However, Scopus has become a good alternative to the WoS because it has been designed for both literature search and citation analysis [54,55] and has greater coverage of exclusive journals compared to the WoS, particularly suitable for emerging topics [52,56]. Thus, we combined both databases to achieve the best coverage in both quality and wideness.

The search scope was restricted to the "topic", which included the field of "title, abstract, and keywords". We chose to use peer-viewed papers, including articles, reviews, and early access papers published in academic journals, and hence excluded other document types, i.e., editorials, book chapters, proceedings, letters, and reports, following prior bibliometric studies [23–25,46,57], because peer-viewed papers can be considered "certified knowledge" [58,59].

We also limited the parameters of the search to English-language papers during 2013–2019 and extracted the data on 16 February 2020. We set the starting year as 2013 because the BRI was launched in that year. We limited the language to English, considering the international interests in BRI research, and English is an international language. The search results also favored that English has the largest publications in both databases in the search period. For instance, the top five languages in terms of publications in the WoS are English (2089), Russian (80), Chinese (34), Spanish (14), and French (6), and in Scopus are English (1990), Chinese (161), Russian (59), Czech (12), and German (10).

Table 1 lists the logic statements we constructed and the number of papers in the two databases resulting from them. Initially, with the only limit the period 2013–2019, in the WOSCC we found 2241 results. After applying the filter "limit to" mentioned above, we got 1187 results. Then, we screened

the results manually for relevance, when one scholar removed one record, it was verified by another scholar inside the research team, we obtained 1144 papers that fit our criteria. Using the same process with Scopus, we got 2253 initial results, 1349 results after filtering, and finally yielded 1355 valid results. We imported these 2499 papers into EndNote X9 to eliminate the duplicates. We removed 916 duplicates which were common in both databases, leaving us with 1583 records for further assessment. Inside the 1583 samples, we reserved the 1144 samples from the WOSCC, the remaining 439 samples were from Scopus. In correspondence, the source the citation data of each document in Section 4, 1144 documents were from the WoS, and the remaining 439 documents were from Scopus. For the interest of future reproducibility, the list of the documents from the two databases is in the Supplementary Data File.

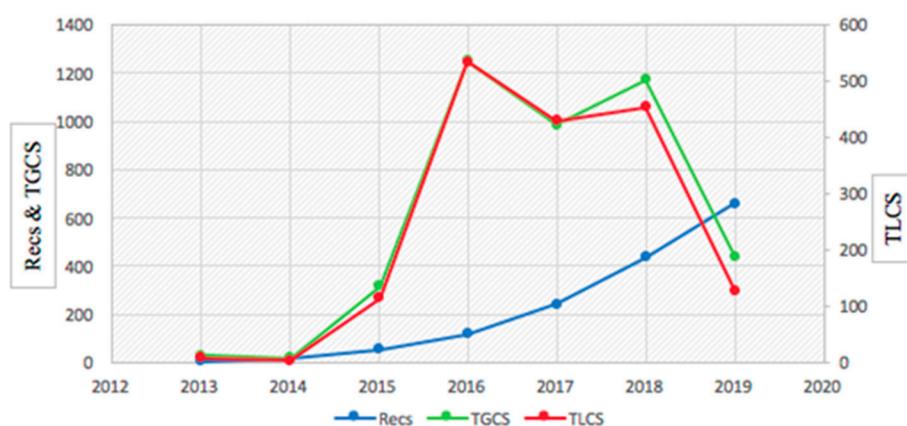
**Table 1.** Comprehensive retrieval outcomes. Source: Own elaboration.

Database	Initial Results (2013–2019)	Filtering Results	Valid Results	Results After Merge and Remove Duplicate
WOSCC	2241	1187	1144	1583
Scopus	2253	1355	1349	
Logic statement	"Belt and Road" OR "One Belt One Road" OR "OBOR" OR "Belt and Road Initiative" OR "Silk Road Economic Belt" OR "Maritime Silk Road" OR "Asian Infrastructure Investment Bank" OR "Silk Road Fund" OR "New Silk Road" OR "New Silk Route"			

#### 4. Overview of BRI Research through Bibliometric and Scientometric Experiments

##### 4.1. Overview of Selected Literature

To obtain an overview of the literature, we mapped the articles based on their total global citation score (TGCS) and total local citation score (TLCS) on one map that appears in Figure 2. As the map indicates, since 2013, the amount of research has tended to increase year by year, with particularly high growth rates in the past three years (2016–2019), except for the first year when BRI was launched. Thus, we moved from seven published articles in 2013 to 658 in 2019. The total global citation scores and total local citation scores increased quickly, peaking in 2016 at 1251 and 534, respectively, before declining a bit in 2017. However, these numbers increased again to another peak in 2018 to 1171 and 454, respectively.



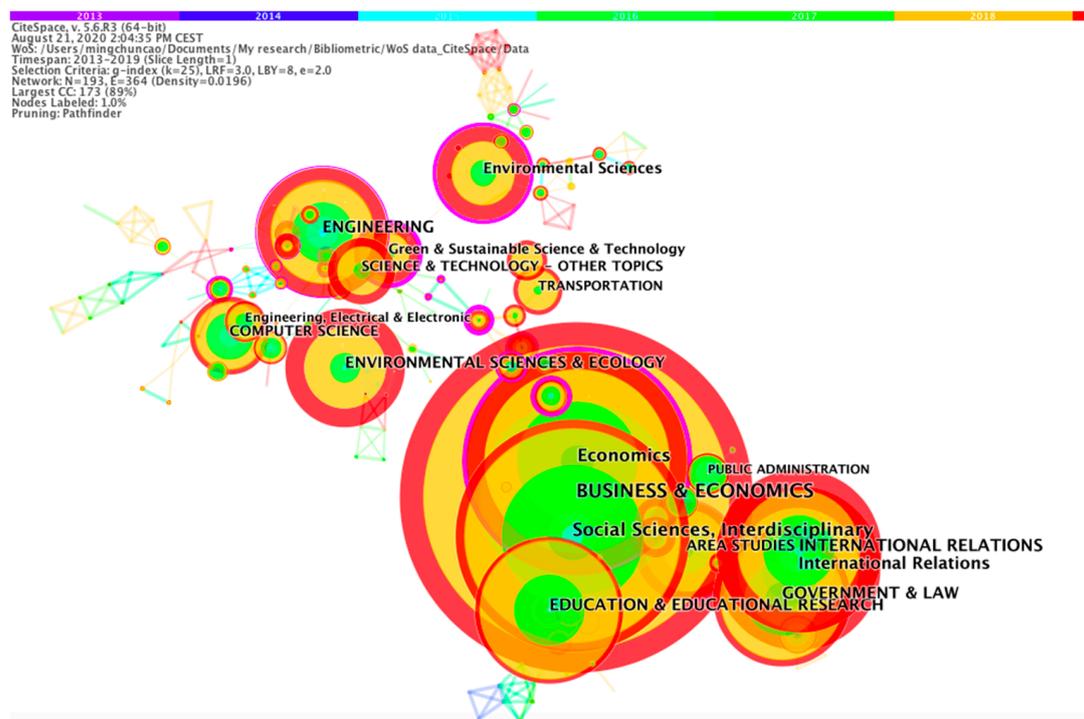
**Figure 2.** Overview of bibliography data (Recs = Number of publications, TGCS = Total global citation score, TLCS = Total local citation score) Source: Own elaboration. TGCS and TLCS were calculated by HistCite software.

##### 4.2. Distribution of Research Disciplines

In what fields were these papers published? To answer that question, we created a visual representation of the results through the “category” option in CiteSpace. Pruning and merging the

data with the same subject yielded 193 nodes and 209 lines. The WoS data were used to create the visual map, not combined with Scopus data, due to the category difference between them.

We then conducted a betweenness-centrality analysis, the results of which appear in Figure 3. This analysis showed that BRI is the subject of studies in more than 100 disciplines. The top five, accounting for 1299 articles, are in the areas of business and economics, the social sciences, interdisciplinary social sciences, economics, and international relations. The betweenness-centrality value exceeded 0.1 (betweenness-centrality value  $\geq 0.1$  indicates that the node is of great importance in the network) in 30 disciplines, such as green and sustainable science and technology, industrial engineering, environmental sciences engineering, transportation science and technology, business, and multidisciplinary sciences. Although there were only a few publications in some disciplines, such as interdisciplinary computer science applications, soil science, agriculture, and multidisciplinary engineering, the betweenness-centrality value was relatively high, reflecting that these disciplines play a pivotal role in the construction of the interdisciplinary collaboration and research system. In addition, according to the intensity value of the connection lines, international relations are strongly connected with similar fields, such as political science, and government and law, as well as having close interdisciplinary relationships with other subjects such as geography, social issues, health policy and services. Business and economics have strong connections with similar fields, such as business, management, economics, and finance, as well as having close interdisciplinary relationships with other subjects, such as education, area studies, and arts and humanities.



**Figure 3.** Distribution of main research disciplines. Source: CiteSpace—own elaboration.

#### 4.3. Most Influential Journals

Table 2 summarizes the most productive and influential journals. We ranked by using the method sorted by TLC/t with the HistCite software, and also considered the other three parameters—journal impact factor (JIF), TGCS/t, and Recs (number of publications). Referring to the ranking by TLC/t, *Journal of Contemporary China* (JCC) was found to have the largest score of 34.08, ranking in the first position. It was followed by *Transportation Research Part E-Logistics and Transportation Review* (TR-LTR) (20.33), *China Economic Review* (18.87), *Pacific Review* (17.82), and *International Affairs* (16.53).

In terms of publication number, nine journals were found to have published 12 or more articles related to BRI during our period of study: *Journal of Contemporary China* (JCC) (30 articles), *Global Policy* (22), *Pacific Review* (20), *Asia Europe Journal* (17), *Transportation Research Part E-Logistics and Transportation Review* (TR-LTR) (14), *Environmental Science and Pollution Research* (14), *Maritime Policy & Management* (13), *Journal of Geographical Sciences* (13), and *China & World Economy* (12).

**Table 2.** Top 20 most productive and influential journals (sorted by TLC/t). Source: HistCite—Own elaboration. \* Based on Journal Citation Reports 2019.

Rank	Journal	TLCs/t	TGCS/t	Recs	Impact Factor (2018) *
1	<i>Journal of Contemporary China</i>	34.08	61	30	1.867
2	<i>Transportation Research Part E-Logistics and Transportation Review</i>	20.33	43.83	14	4.253
3	<i>China Economic Review</i>	18.87	27.4	3	2.106
4	<i>Pacific Review</i>	17.82	35.14	20	1.970
5	<i>International Affairs</i>	16.53	50.35	7	3.748
6	<i>Area Development and Policy</i>	14.63	26.97	6	1.027
7	<i>Third World Quarterly</i>	14.6	24.2	4	2.156
8	<i>Maritime Policy &amp; Management</i>	12.17	31.83	13	3.410
9	<i>China &amp; World Economy</i>	12	18.67	12	1.066
10	<i>Eurasian Geography and Economics</i>	10.17	18.47	7	2.088
11	<i>Science of The Total Environment</i>	8.25	25.17	5	5.589
12	<i>Global Policy</i>	8.17	16.6	22	1.197
13	<i>Geopolitics</i>	8	14.51	6	2.756
14	<i>International Spectator</i>	7.2	12	3	0.870
15	<i>Environmental Science and Pollution Research</i>	6.5	33.08	14	2.760
16	<i>Journal of Geographical Sciences</i>	6.25	15.17	13	2.982
17	<i>Asia Europe Journal</i>	6.17	12.33	17	1.350
18	<i>Journal of World Business</i>	0.5	1.5	1	5.789
19	<i>China Quarterly</i>	0.5	0.5	1	2.236
20	<i>Journal of International Business Studies</i>	-	-	1	7.724

Note: TLC/t = Average local citations received per year; TGCS/t = Average global citations received per year; Recs = Number of publications.

In terms of the relative importance of a journal within its field, using JIF as a proxy, BRI articles were found to be published in some prestigious journals in their fields—*Journal of International Business Studies* (JIF: 7.724), *Journal of World Business* (5.789), *Science of The Total Environment* (5.589), *TR-LTR* (4.253), *International Affairs* (3.748), *Maritime Policy & Management* (3.410), *Geopolitics* (2.756), *China Quarterly* (2.236), *China Economic Review* (2.106), and *Eurasian Geography and Economics* (2.088).

#### 4.4. Distribution of the Articles by Country and Region

We used WoS data to analyze the distribution of the articles by country and region. As Table 3 indicates, 1157 articles were published by 12 countries and regions, each of which published 20 or more articles. China published the largest number of articles (631), followed by the US (124), England (79), Australia (68), and Singapore (56). Figure 4 illustrates the cooperation network of countries and regions and depicts 62 nodes and 58 lines connecting the nodes. The betweenness centrality in 22 countries and regions was more than 0.1. Switzerland, Italy, Japan, Finland, and Sri Lanka ranked in the top five.

**Table 3.** Country and region distribution of publications. Source: CiteSpace—Own elaboration.

Rank	Country or Region	Freq.	Centrality	Country or Region	Centrality	Freq.
1	China	631	0.29	Switzerland	0.87	13
2	USA	124	0.19	Italy	0.62	19
3	UK	79	0.15	Japan	0.58	17
4	Australia	68	0.1	Finland	0.4	10
5	Singapore	56	0	Sri Lanka	0.39	2
6	Pakistan	33	0.36	Mongolia	0.39	2
7	South Korea	33	0.05	Pakistan	0.36	33

Table 3. Cont.

Rank	Country or Region	Freq.	Centrality	Country or Region	Centrality	Freq.
8	Russia	33	0	Austria	0.34	2
9	Taiwan	32	0.22	China	0.29	631
10	Canada	24	0.05	Taiwan	0.22	32
11	Germany	24	0.15	Sweden	0.22	7
12	India	20	0.1	Norway	0.22	4
13	Belgium	19	0.19	Slovenia	0.2	1
14	Italy	19	0.62	USA	0.19	124
15	Poland	19	0.05	Belgium	0.19	19

Notes: Freq. = Frequency, present the numbers of publications.

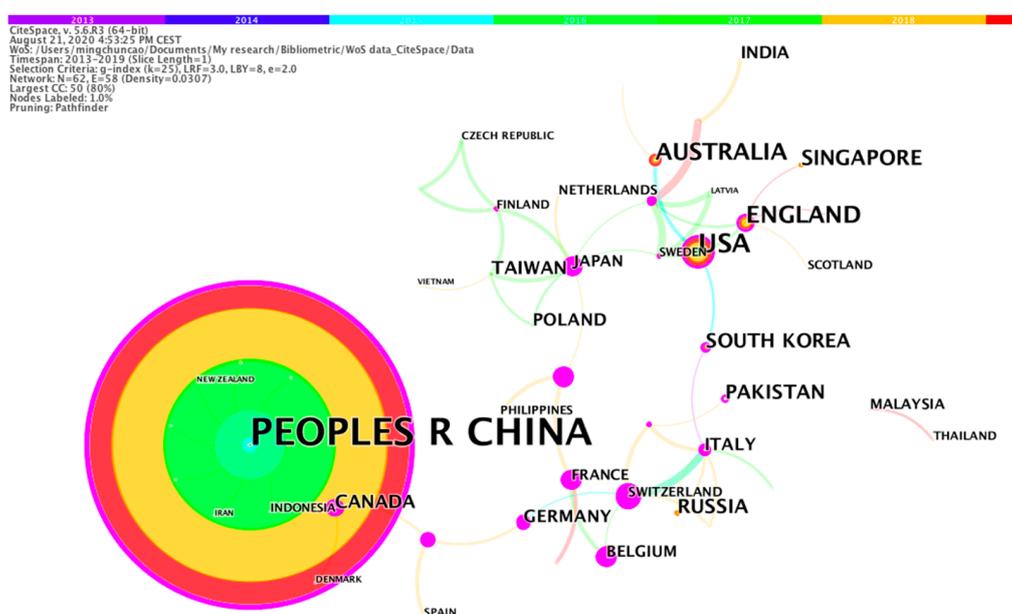


Figure 4. Main country and region of articles’ origin. Source: CiteSpace—Own elaboration.

#### 4.5. Research Institutions and Collaboration Analysis

Table 4 lists the most relevant institutions that published research on BRI. We present the ranking by both the number of publications (Recs) and the total global citations score (TGCS). In terms of the number of publications, the top four institutions accounted for 181 articles (11.8% of the total sample): the Chinese Academy of Sciences with 73, the University of Chinese Academy of Sciences with 44, and the National University of Singapore and Zhejiang University, both of which produced 32 articles. Out of the top 10 institutions ranked by the number of publications, eight of them are universities from China. Only two of them are universities outside of China: The National University of Singapore ranked number three, and Australian National University ranked number ten. As ranked by total global citations, the top three institutions are the Chinese Academy of Sciences with 319, Chang’an University with 289, and University of Toronto Scarborough with 196. Comparing the two rankings, three institutions are ranked in the top 10 by both measures: the Chinese Academy of Sciences, University of Chinese Academy of Sciences, and National University of Singapore.

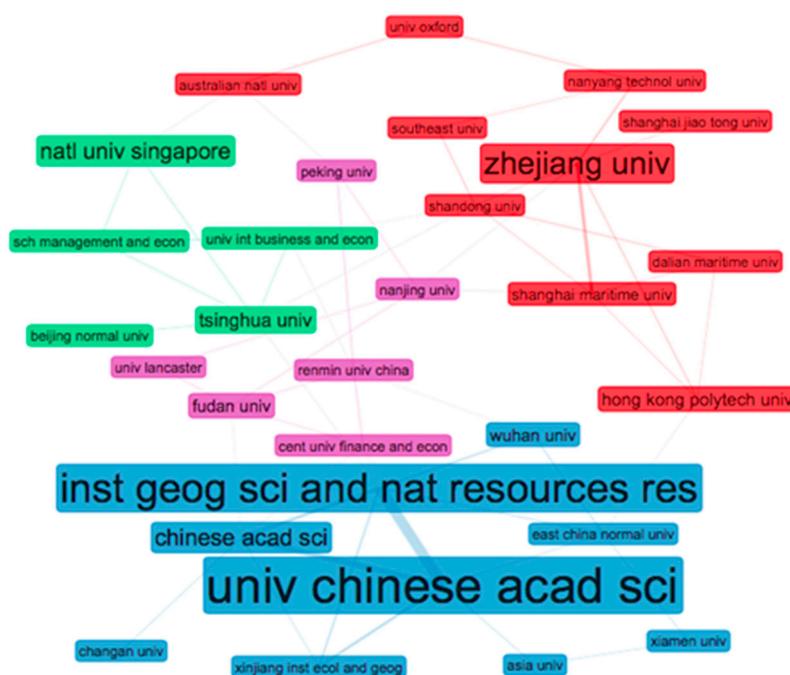
**Table 4.** Most relevant institutes. Source: HistCite—Own elaboration.

<b>* Ranked by Recs</b>					<b>** Ranked by TGCS</b>			
<b>Rank</b>	<b>Institution</b>	<b>Recs</b>	<b>TLCS</b>	<b>TGCS</b>	<b>Institution</b>	<b>TGCS</b>	<b>TLCS</b>	<b>Recs</b>
1	Chinese Academy of Sciences	73	96	319	Chinese Academy of Sciences	319	96	73
2	University of Chinese Academy of Sciences	44	30	145	Chang'an University	289	35	13
3	National University of Singapore	32	103	191	University of Toronto Scarborough	196	33	2
4	Zhejiang University	32	59	119	National University of Singapore	191	103	32
5	Tsinghua University	20	19	41	Chinese University of Hong Kong	159	98	12
6	Hong Kong Polytech University	18	50	86	Peking University	148	92	13
7	East China Normal University	17	60	109	University of Chinese Academy of Sciences	145	30	44
8	Fudan University	17	36	76	Sichuan University	145	17	11
9	Wuhan University	17	14	30	Southeast University	132	12	11
10	Australian National University	15	50	87	Chatham House	127	60	2

\* Ranked by Recs. \*\* Ranked by TGCS. In cases of equal Recs or TGCS, we present articles with higher TLCS. (Recs = Number of publications, TGCS = Total global citations score, TLCS = Total local citations score).

It is worth mentioning that Chatham House—an International Affairs Think Tank based in London—ranked in the top 10 list, as measured by total global citation scores, as this happens very rarely among leading institutions (usually universities or academies). According to its official website, Chatham House, also known as the Royal Institute of International Affairs, aims to promote debate on significant developments in international affairs and policy responses. Its independent research and analysis on global, regional, and country-specific challenges is intended to offer new ideas to decision-makers on how these can best be tackled in the near to long term [60]. This is also evidence of the BRI's influence on policies.

Figure 5 depicts the network of the collaborations between the institutions. A bibliometric network consists of nodes and edges. Here, the nodes are 30 universities and the edges indicate relationships between pairs of nodes by research collaborations. The size of the node indicates the number of publications, the more publications the larger the node. The presence of a number of dispersed university clusters indicates that BRI is an emerging research domain. The red cluster (10 universities) is the largest and strongest. This cluster is also the most diverse and includes universities from mainland China (Zhejiang University, Shanghai Jiao Tong University, Southeast University, Shandong University, Nanyang Technology University, Shanghai Maritime University, and Dalian Maritime University), Hong Kong, China (Hong Kong Polytech University), the UK (University of Oxford), and Australia (Australian National University). The other three clusters are the blue cluster (nine universities), purple cluster (six universities), and green cluster (five universities).



**Figure 5.** Institutes collaboration network (30 nodes, 1 minimum edge, Kamada and Kawai layout, Walktrap clustering algorithm, association normalization). Source: Biblioshiny—Own elaboration.

#### 4.6. Analysis of the Most Impactful Authors and Co-authors

Table 5 lists the most impactful authors in BRI research, all of whom have published at least six papers on the topic. Li Y, Lee PTW, and Wang Y are the top three authors. Combined, they have contributed 34 studies. Moreover, Zhang L and Yang Y have contributed nine studies each. In terms of total local citation records, Liu WD, Lee PTW, and Wang Y are the forerunners, while Liu WD leads in terms of total global citation records. Liu WD is the most influential author, with 112 total global citation records and 58 total local citation records, both ranked the highest. He also has the highest

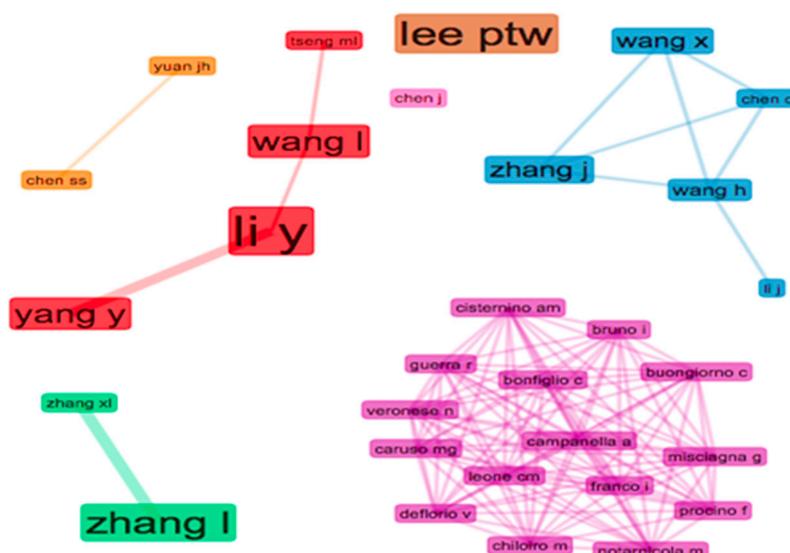
number of yearly total global citation records (27.1). In terms of trending, Sheu JB and Lee PTW are the forerunners, with 52 and 48 total local citation records, respectively.

**Table 5.** Most impactful authors. Source: HistCite—Own elaboration.

Rank	Author	Recs	Percent	TLCS	TLCS/t	TGCS	TGCS/t	TLCR
1	Li Y	13	1.1	12	3.92	27	9.17	16
2	Lee PTW	12	1	42	14	70	23.58	48
3	Wang Y	9	0.8	39	8.5	83	19.83	12
4	Zhang L	9	0.8	5	1.75	22	6.08	12
5	Yang Y	9	0.8	4	1.33	10	4	2
6	Chen J	8	0.7	0	0	43	14.17	7
7	Yuan JH	7	0.6	2	1	11	5.33	10
8	Liu WD	6	0.5	58	13.6	112	27.1	16
9	Wang H	6	0.5	2	0.67	93	20.5	10
10	Sheu JB	6	0.5	37	13.33	64	22.5	52
11	Zhao H	6	0.5	1	0.25	37	10	6
12	Chen SS	6	0.5	6	3	21	9.25	8
13	Zhang J	6	0.5	1	0.33	14	5	24
14	Tseng ML	6	0.5	2	1	7	3	3
15	Wang L	6	0.5	0	0	1	0.5	4

\* Ranking by Recs. We present authors with a minimum of six relevant publications. In cases of equal Recs, we present articles with higher TGCS. (Recs = Number of publications, TGCS = Total global citation score, TLCS = Total local citation score, TLCR = Total local cited reference).

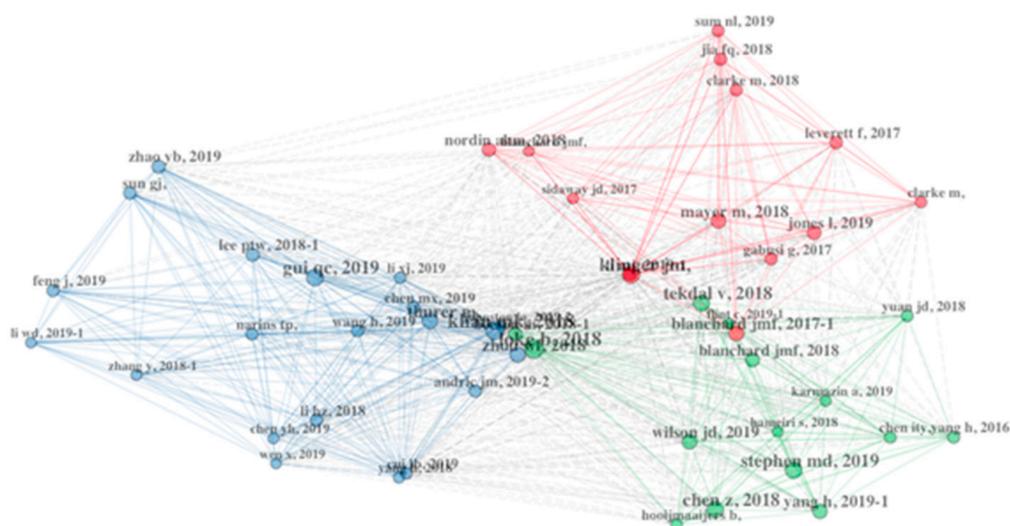
Figure 6 illustrates the authors' collaboration network with 30 nodes and one minimum edge. Each node represents an author. Edges indicate co-authorship relationships among them. With 15 authors, the purple cluster shows the most influential and significant author collaboration networks. The blue cluster consists of five authors and the red cluster has four authors. The green and orange clusters consist of only two authors, indicating a weaker collaboration compared to the other three clusters. There are another two clusters that consist of only one author, indicating single authorship. Only two of the leading clusters—purple and blue—are interconnected. From these results we can conclude that there is enough room to improve the overall author collaboration on BRI research.



**Figure 6.** Author collaboration network (30 nodes, 1 minimum edge, Kamada and Kawai network layout, Walktrap clustering algorithm, association normalization) Source: Biblioshiny—Own ebaloration.

#### 4.7. Highlights of the Most Influential Research

We used bibliographic coupling to get an overview of the publication landscape. Doing so revealed three leading clusters, illustrated in Figure 7. Bibliographic coupling [39] uses the number of references shared by two documents as a measure of the similarity between them. The more the bibliographies of two articles overlap, the stronger their connection. Bibliographic coupling, which examines authors of source papers rather than authors of cited references, does not need to be limited to first authors in the study of author knowledge networks, and can therefore provide more thorough views of the structure, characteristics, and development of knowledge networks [61]. Researchers maintain that bibliographical coupling is more accurate than co-citation analysis in representing the research front [29,62].



**Figure 7.** The Cluster map of the influential documents by bibliographic coupling. Source: Bibliometrix in R software—Own elaboration. [Bibliometrix R code: `NetMatrix <- biblioNetwork(M, analysis = "coupling", network = "references", sep = ";"); Net = networkPlot(NetMatrix, type = "mds", normalize = "association", cluster = "louvain", n = 50, size = 4, size.cex = T, labelsize = 2, label.cex = T, remove.isolates = T)`].

Using the 50 most bibliographically-coupled studies, we built a co-cited visual network map, as shown in Figure 7. For robustness, we tested various numbers of studies (e.g., 100, 150, 200, 300), but obtained the same three clusters. Ultimately, we chose to proceed with 50 studies to make the visual representation easier to read. The nodes in the map denote the documents, and the links represent the time and the publication year. The colors of the nodes and the links represent the three different clusters. The co-occurrence of the literature exhibits an obvious type of “local concentration and overall dispersion” pattern, indicating that some BRI studies are widely recognized and have produced some common ideas and results. The most cited documents with overlapping bibliographies appeared in the recent three years of 2017, 2018, and 2019, which shows that BRI is a trending topic.

The top 10 most-cited papers in WOSCC are presented in Table 6, which lists the author, publication year, title, GCS (global citation score), LCS (local citation score), and topics. The most cited study was by Li et al. [63], who focuses on the economic belt. The second was by Ferdinand [15] whose main contribution is on foreign policy. The third was Yu [7], whose focus is on the motivation behind the BRI and the AIIB. The main topics of other highlighted documents involve: (1) the conceptual understanding of BRI from different perspectives [64–66]; (2) assessments of investment risk [67]; (3) BRI and Eurasia [68]; (4) Western China [69]; and (5) environmental protection [70].

**Table 6.** Most influential articles. Source: HistCite—own elaboration.

Article *	Title	GCS	GCS/t	LCS	LCS/t	Topic Related to BRI
Li et al. (2015) [63]	Building a new and sustainable “Silk Road economic belt”	156	26	33	5.5	Economic belt
Ferdinand (2016) [15]	Westward ho—the China dream and ‘one belt, one road’: Chinese foreign policy under Xi Jinping	127	25.4	60	12	Foreign policy
Yu (2017) [71]	Motivation behind China’s “One Belt, One Road” Initiatives and Establishment of the Asian Infrastructure Investment Bank	93	23.25	59	14.75	Motivation
Liu and Dunford (2016) [64]	Inclusive globalization: unpacking China’s Belt and Road Initiative	88	17.6	48	9.6	Conceptual understanding
Zhang et al. (2016) [67]	Consistency-based risk assessment with probabilistic linguistic preference relation	80	16	0	0	Investment risk assessment
Summers (2016) [65]	China’s ‘New Silk Roads’: sub-national regions and networks of global political economy	79	15.8	52	10.4	Conceptual understanding
Fallon (2015) [68]	The New Silk Road: Xi Jinping’s Grand Strategy for Eurasia	65	10.83	35	5.83	BRI and Eurasia
Li (2016) [69]	Groundwater Quality in Western China: Challenges and Paths Forward for Groundwater Quality Research in Western China	64	12.8	2	0.4	Western China
Wang (2016) [66]	Offensive for defensive: the belt and road initiative and China’s new grand strategy	63	12.6	35	7	Conceptual understanding
Cai et al. (2016) [70]	Evaluating CO <sub>2</sub> emission performance in China’s cement industry: An enterprise perspective	54	10.8	2	0.4	Environmental protection

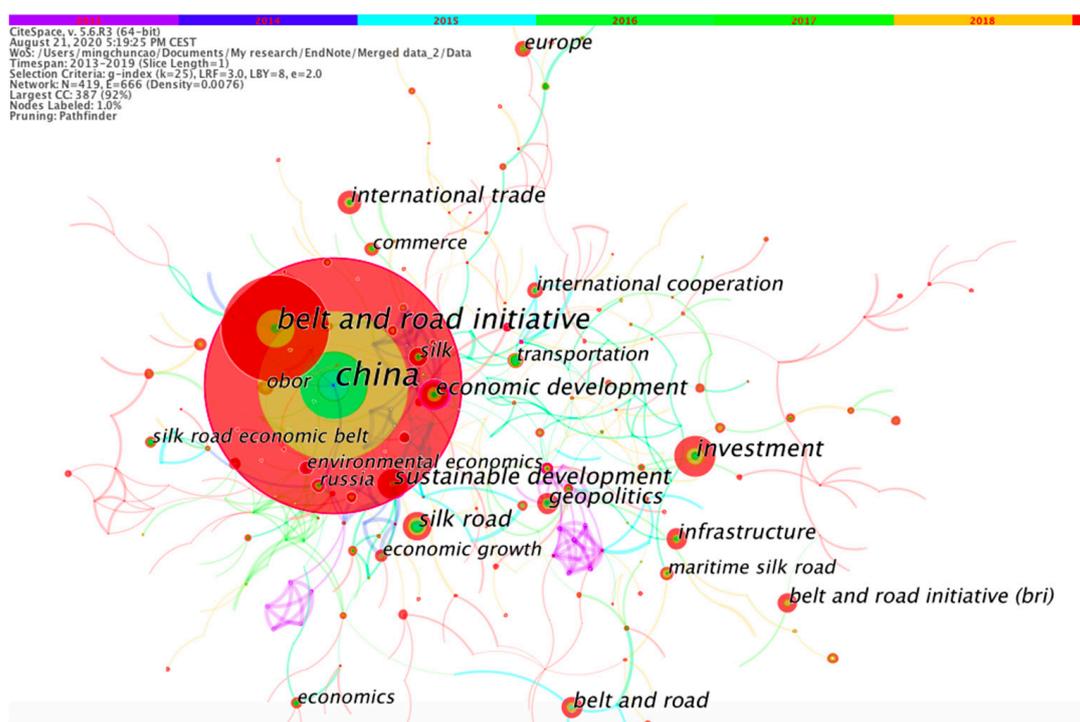
\* Ranked by GCS. In cases of equal GCS, we present articles with higher LCS. (GCS = Global citations score, GCS/t = Average global citations received per year, LCS = Local citations score, LCS/t = Average local citations received per year).

## 5. Themes and Hotspots in BRI Research

We used the topics and keywords in the literature to explore the hot topics and hotspots in the field of BRI. A keyword is a noun or phrase that not only reflects the meaning or core content of a paper, but also reveals the long-term development of a specific research field [72]. Therefore, it is generally believed that keyword co-occurrence experiments can reveal current research hotspots. Using the knowledge map of co-occurring keywords created by CiteSpace, we were able to determine the structure, network distribution, and frequency of the co-occurrence of related keywords in the literature to clarify the research hotspots in the field [57]. We also conducted an additional clustering analysis of keyword co-occurrence and drew a timeline clustering map with CiteSpace. Furthermore, to ensure the accuracy of the categories we created using the co-occurring keywords, we performed a robustness test with VOSviewer. We used the merged data of WoS and Scopus to create visual maps for all the following keyword networks.

### 5.1. Keyword Co-occurrence Network

A keyword co-occurrence network is a static expression of a particular field that does not take into account changes over time in the manner in which the terms are used [73]. The frequency with which the keywords occur and their centrality are important parameters. Figure 8 illustrates the high-frequency keywords in BRI and the time map for the bursts, yielding 419 burst terms and 1042 links reflecting the co-occurring keywords. In the visualization process, terms with similar meanings were merged, such as “belt and road initiative”, “the belt and road initiative”, “belt and road initiative (BRI)” and “BRI”, “road and street”, “infrastructure” and “infrastructure development”, “one belt one road” and “OBOR”. The value of the modularity and mean silhouette resulted in  $Q = 0.8172 (> 0.5)$ , and  $S = 0.6182 (> 0.3)$  ( $Q > 0.5$  and  $S > 0.3$  indicate that the clustering reliability of the graph is quite high and the result is reasonable, respectively), respectively. Different colored annular rings on the nodes symbolize the time when the keywords appeared, and the link between the two nodes indicates that the two keywords appeared in the same document.



**Figure 8.** Network of co-occurring keywords. Source: CiteSpace—Own elaboration.

The size of the node indicates the co-occurring frequency of the keyword. The top 10 high-frequency keywords were “China” (Freq. = 522), “belt and road initiative” (Freq. = 331), “infrastructure” (Freq. = 196), “one belt one road” (Freq. = 92), “investment” (Freq. = 90), “sustainable development” (Freq. = 69), “economic development” (Freq. = 66), “silk road” (Freq. = 64), “central Asia” (Freq. = 62), and “development strategy” (Freq. = 54). In addition, the nodes with a purple rim indicate a high degree of centrality. The top 10 nodes that scored high in centrality were “central Asia” (centrality = 0.4), “international relation” (centrality = 0.35), “Russian Federation” (centrality = 0.31), “economic development” (centrality = 0.25), “foreign policy” (centrality = 0.25), “sustainable development” (centrality = 0.2), “environmental protection” (centrality = 0.19), “economic and social effect” (centrality = 0.18), “Beijing [China]” (centrality = 0.18), and “environmental impact” (centrality = 0.16). These keywords play a crucial role in identifying the leading BRI research topics and connecting major branches of knowledge in the area.

## 5.2. Trending Topics on BRI

Figure 9 depicts the keywords with strong burst strength and the corresponding burst durations automatically output by CiteSpace. Among them, five keywords have a burst strength above 5: “transportation”, “silk road”, “silk road economic belt”, “Central Asia”, and “one belt”. In terms of time and duration, studies earlier than 2013 raised topics related to “Central Asia”, “Afghanistan”, and “Eurasian economic union”. After that period, new topics appeared, including “transportation”, “silk road”, and “Asian Infrastructure Investment Bank”. Interestingly, “Xi Jinping” became a burst term, which indicates that the government and the leader played an important role in the venture. Since 2016, other new terms have emerged, such as “one belt”, “one road”, and “Indian Ocean”. The most recent topics are “leadership” and “finance”.

## Top 15 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2013 - 2019
transportation	2013	9.8191	2015	2017	
silk road	2013	7.2208	2015	2016	
silk road economic belt	2013	5.9278	2016	2017	
central asia	2013	5.3128	2013	2015	
one belt	2013	5.2576	2016	2017	
xinjiang uygur	2013	2.9948	2015	2016	
one road	2013	2.985	2016	2019	
eurasian economic union	2013	2.9032	2014	2016	
indian ocean	2013	2.8237	2016	2017	
afghanistan	2013	2.5838	2013	2014	
leadership	2013	2.4574	2017	2019	
xi jinping	2013	2.3951	2015	2016	
asian infrastructure investment bank	2013	2.3653	2015	2016	
one belt one road	2013	2.3353	2015	2016	
finance	2013	2.1837	2017	2019	

**Figure 9.** Top 15 keywords with the strongest citation bursts (sorted by strengths of burst).  
Source: CiteSpace—Own elaboration.

### 5.3. Clustering Analysis of Keyword Co-occurrence

Clustering analysis is an exploratory data mining technique that aims to depict patterns by grouping sources that share similar words or attribute values [74]. Using CiteSpace, we adopted the log-likelihood ratio to cluster and analyze keyword co-occurrence. Figure 10 presents the timeline map of 18 noticeable clusters with cluster IDs from #0 to #18. The nodes in circle on the timeline represent the earliest year in which a keyword appeared in the reviewed literature. Based on these results, we identified 18 hotspots. New keywords burst in different time periods. From 2013 to 2016, a few new keywords appeared, followed by more keywords in the literature during 2016–2019.

Combining Figures 8 and 10 produces an illustration of the distribution of hotspots in BRI research. It has several clear features. First, there are different terms used to refer to BRI, such as “belt and road initiative” (Freq. = 265) and its abbreviation “BRI” (Freq. = 66), “silk road” (Freq. = 64), “one belt one road” (Freq. = 56) and its abbreviation “OBOR” (Freq. = 36), “belt and road” (Freq. = 46). When we reviewed the papers manually, we noticed that “B&R” also appeared, which was not recognized by the software. Second, the total frequency of the term “economic belt” was similar to that of “maritime road”. For example, compare the frequency between mentions of “silk road economic belt” (Freq. = 29), “one belt” (Freq. = 22), and “maritime silk road” (Freq. = 32), “21st century maritime silk road” (Freq. = 2), “one road” (Freq. = 15). However, the frequency of the regions in the “economic belt” is much more than the number in the “maritime silk road”. For example, the one region associated with “maritime silk road” is “ASEAN” (Freq. = 21) (It’s the abbreviation of “Association of the Southeast Asian Nations”, has 11 members.), whereas those associated with “economic belt” include “Central Asia” (Freq. = 66), “Eurasian” (Freq. = 45), and “Russia” (Freq. = 60). Third, the timeline clarified the level of research regarding BRI. Initially in 2013, the research was mainly focused on general topics, such as “geopolitics” (Freq. = 51), “international relations” (Freq. = 52), “international cooperation” (Freq. = 41), “development strategy” (Freq. = 54), and “regional economy” (Freq. = 19). Since 2016, there have an increasing number of studies in specific fields, such as “investment” (Freq. = 90), “FDI” (13), “energy related” (Freq. = 46), “environmental economy” (Freq. = 21), “environmental protection” (Freq. = 17), “Asian Infrastructure Investment Bank” (Freq. = 26), and “connectivity”

(Freq. = 17). Fourth, there has also been some research on China’s domestic regional development, especially regarding those areas with a geographic connection to BRI, such as “Xinjiang” (Freq. = 2) connecting with the economic belt, “coastal zone” (Freq. = 4) connecting with the maritime road, and “border region” (Freq. = 10).

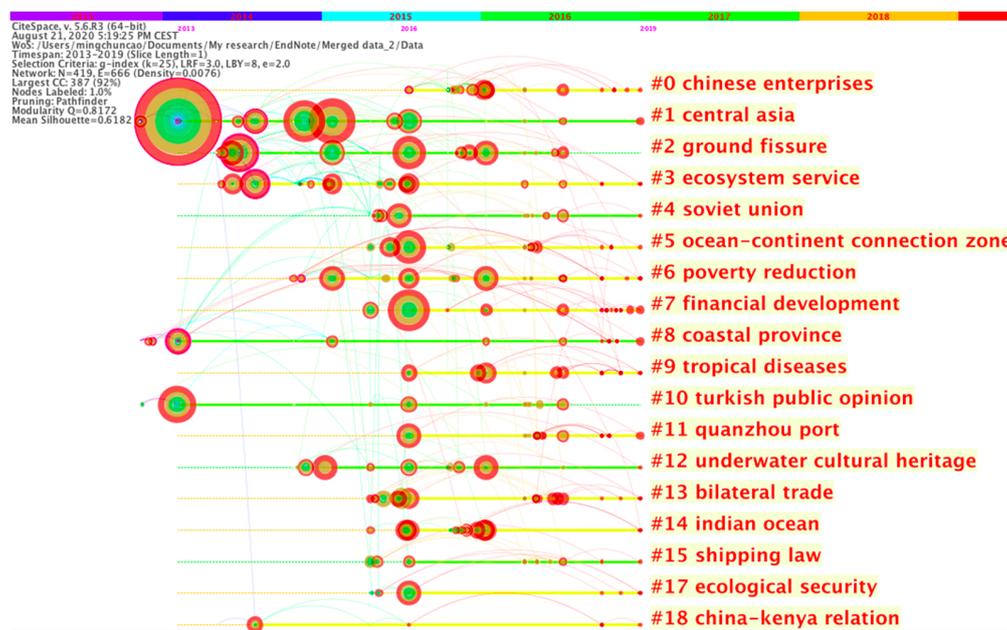


Figure 10. Timeline clustering map of research themes in BRI. Source: CiteSpace—Own elaboration.

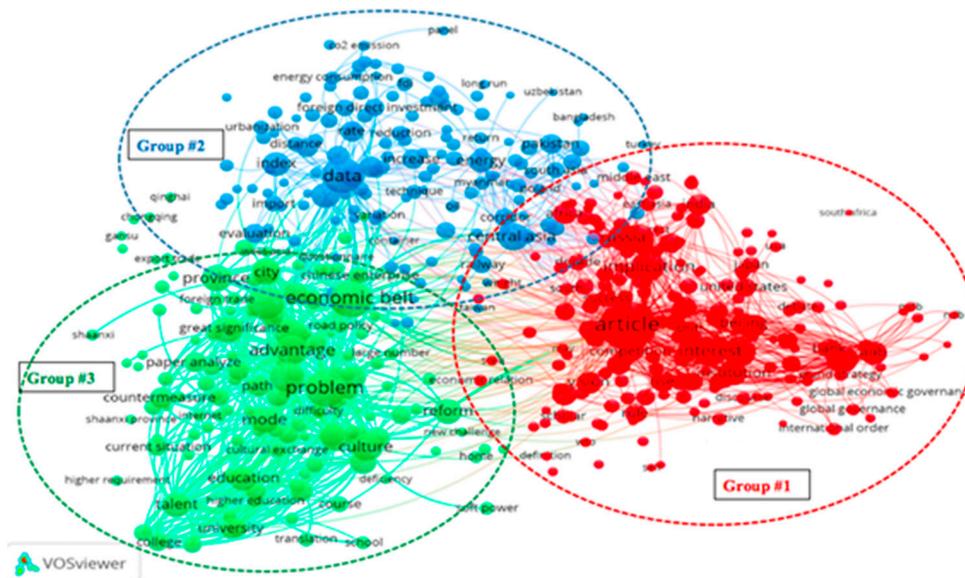
To identify the major themes, we manually classified the 18 clusters into three groups with common topics. Table 7 lists the classification results in detail. The cluster’s size indicates the number of keywords clearly associated with the cluster, based on the CiteSpace visualization in Figure 9. We labeled the three groups: “China’s institutional power (e.g., foreign policy, global governance, financial diplomacy), geopolitics and political economy, law and cooperation mechanisms (G1)”, “Territorial economic cooperation, sustainable development, energy, and environment (G2)”, and “Social impact (culture, education, and health policy), micro-economy, and China’s sub-national development (G3)”.

Table 7. Categories of BRI keywords clusters (2013–2019) Source: CiteSpace—Own elaboration.

Topic Group	Cluster ID	Size	Cluster Label (LLR)	Time Span
Group 1	#7	29	financial development	2016–2019
	#10	27	Turkish public opinion	2013–2018
	#14	28	Indian ocean	2016–2019
	#15	29	shipping law	2016–2019
	#18	29	China-Kenya relation	2014–2019
Group 2	#1	29	Central Asia	2013–2019
	#3	29	ecosystem service	2014–2019
	#4	28	Soviet Union	2016–2019
	#13	29	bilateral trade	2016–2019
	#17	28	ecological security	2016–2019
Group 3	#0	30	Chinese enterprises	2016–2019
	#5	29	ocean-continent connection zone	2016–2019
	#6	29	poverty reduction	2015–2019
	#8	28	coastal province	2013–2019
	#9	29	tropical diseases	2016–2019
	#11	28	Quanzhou port	2016–2019
	#12	28	underwater cultural heritage	2015–2019

#### 5.4. Robustness Test

To check the validity of our classification of the groups based on the keywords, we used VOSviewer to conduct a robustness test on co-occurring keywords. Figure 11 displays the results.



**Figure 11.** Mapping of co-occurred keywords into categories (robust test) Source: VOSviewer—Own elaboration.

VOSviewer classified the keywords into three groups and distinguished among them with different colors. Group #1 (red) contains 189 items covering topics on the implications of BRI, geopolitics, financial diplomacy, global governance, and foreign policy. Group #2 (blue) covers 150 items covering topics related to BRI's economic and environmental impact, such as economic corridors, foreign direct investment (FDI), transportation, energy, and sustainable development. Group #3 (green) contains 154 items covering topics such as education, culture, regional development, enterprises, and industry. VOSviewer's automatic classification of the groups matched the groupings we created manually based on the data extracted by CiteSpace and displayed in Table 7.

### 6. Thematic Discussion, Underlying Theory, Gaps in Research, and Future Research Directions

We first conducted a content analysis of the identified articles and organized a thematic discussion about the identified clusters and groups we created in Section 5. Table 8 lists the BRI studies we used for content analysis. Gaps in research and future research directions were identified and proposed in each sub-theme. In addition, we identified various gaps in research methods, research disciplines, and underlying theory.

#### 6.1. China's Institutional Power (e.g., Foreign Policy, Global Governance, Financial Diplomacy), Geopolitics and Political Economy, Law and Cooperation Mechanisms (G1)

The articles in G1 focused on three themes: institutions (#7, #18), geopolitics and political economy (#10, #14), and law and cooperation mechanisms (#5). In this section, we present some representative works of each stream.

##### 6.1.1. China's Institutional Power (e.g., Foreign Policy, Global Governance, Financial Diplomacy)

BRI strengthens the awareness of building a community of common destiny for mankind, promotes the evolution of epistemology, and combines the top-down and bottom-up approaches to encourage voluntary actions in global governance [75]. Chaisse and Matsushita [76] discussed the strategic implications of BRI:

“For the first time in its modern history, China is attempting to export its development model, that is, China is relying on massive investment in infrastructure, roads, ports, and railways, at home and abroad, to accelerate industrial development throughout the region.”

Institutional power was a hot topic, in which the hotspots included, but were not limited to, foreign policy, financial diplomacy, and global governance. Three foreign policy initiatives under President Xi Jinping have considerably enhanced China’s global influence: partnership diplomacy, the Silk Road’s economic diplomacy, and the new financial diplomacy [77]. Nie [78] utilized the elements of leadership, political performance, and national interests to understand China’s foreign policy decision-making process, and concluded that the supreme leadership’s view of political performance is the most important factor. China has also been using very skillful and proactive diplomacy to create a new financial order to support the Silk Road project. China’s economic diplomacy includes but is not limited to the establishment of the much-vaunted AIIB [15]. Some scholars [79,80] argued that China has become more proactive in regional and global institution building. Evron [81] found that realizing connectivity projects—the five goals of the BRI vision—will require China to increase its regional engagement, a shift that it has so far avoided.

Global governance includes global economic governance and global financial governance [79,82]. China is seeking to form a bargaining coalition through the BRI and AIIB to reshape global governance and transform the existing international system in a way that reflects its values [83]. Some scholars discussed whether China is challenging the existing global governance and has invested China’s institutional power in that role [84–86]. Yin [87] reviewed the implications and challenges of a Chinese model.

The AIIB was established in 2013 to provide financial support for BRI [68]. Scholars debated AIIB from different perspectives, such as motivation [71], multilateralism [88–90], institution builder [85], global economic governance [91–93], global financial governance [94,95], evolution [96], geoeconomics and geopolitics [97,98], financial support for BRI [99], soft power, and innovative capacity [100–102]. Other scholars [103,104] argued that China might intend to internationalize its currency, CNY (also called “RMB”), to create a new financial order.

From late 2019 to the first half of 2020, the world witnessed the epic spread and destruction of COVID-19. The pandemic brought new challenges to the world in at least three ways: first, the public healthcare system of each country and the world [105]; second, the virus puts pressure on the global value chains (GVCs) [106]; third, the digital connectivity and people-to-people connectivity [107]. The pandemic issue relates to global public health governance, it also has impact on BRI implementation. Coronavirus brought both a demand and a supply shock to the global economy. The BRI focuses largely on physical infrastructure that is declining, where digital connectivity can substitute for physical contact [106]. In short terms, The Economist [108] argued that some host countries may react to the downturn by seeking to cancel BRI contracts. The middle-term impact of the pandemic on BRI will depend greatly on the flexibility that China is able to build into the BRI, such as pivoting to a “health silk road” and a “digital silk road” being crucial [109,110]. The pandemic may also have a potential long-term impact on BRI, as the coronavirus put pressure on extended GVCs [106]. This has happened already, the export proportion of value chains has been declining and higher value-added activities increasingly reshored in home countries [111]. An updated focus on the international trade and investment regime will be required post-pandemic.

Protectionism and de-globalisation have nowadays become popular themes for discussions about international business policy [112]. Some countries and regions around the world are riding a wave of nationalism, which is becoming serious, particularly, after Donald Trump’s administration pursuing “American First” policy [113]. The GVCs were under challenging since the trade war between US and China since 2018 and the pandemic brings new challenges [114]. The discussions about influence of GVCs on international business on firm-level become a hotspots [115,116].

RESEARCH GAP 1A: Research on China’s institutional power should explore the Chinese philosophy of governance, the empirical impact of the foreign policy, and the theoretical foundations

for institution building. The initiative has its roots in the ancient Chinese philosophy of the “silk road spirit” and Chinese characteristics. However, the philosophy may not be interpreted well, leading to possible misunderstandings.

RESEARCH GAP 1B: It was one of the major points of criticism in the pre-pandemic period that the BRI massively depends on the international transfer of Chinese personnel and managers to execute the projects, which limits the direct employment of local personnel and the spill-over gains to the host country. Thus, during and post the pandemic period, what are the new strategies of Chinese government to deal with the new challenges of the global governance? What are the impacts on the microeconomic level?

### 6.1.2. Geopolitics and Political Economy

The massive infrastructure investments involved in creating BRI have generated heated discussion about their potential to transform the global geopolitical landscape [117]. Ferdinand [15] reviewed the geopolitical implications and economic dimensions of BRI. As Table 7 indicates, there have been more specific area studies. One stream of studies focused on the maritime silk road, the countries and regions along the “Road”, ASEAN, and new ports in the Indian Ocean. Many of these studies were concerned with the implications for transportation and supply chain management. Scholars investigated the shipping network along the “Road” [118,119], the logistical infrastructure [120], and the evolution of hub ports [121].

The other stream concerned the countries and regions related to the economic belt, such as Central Asia, Eurasia, and Russia. The European Union (EU) was a hotspot due to Eurasia-China relations. Interestingly, inside the European region, Central and Eastern Europe (CEE) received a great deal of attention because of the “16 + 1” framework, where “16” stands for the CEE countries, “1” stands for China. The “16 + 1 framework” was created in 2012, and made part of the BRI framework after the latter was initiated. Additionally, Greece joined this framework on 16 April 2019, and upgraded it to the “17 + 1 framework” [122]. Scholars discussed the role, opportunities, and challenges of BRI [123–125], which is used as a mechanism for dialog and cooperation between China and CEE countries. Africa, the Middle East, Russia, and Southeast Asia have also received a great deal of attention. Due to space considerations, we discuss the debates relating to the EU, the US, and the Indian Ocean.

Even though there were some misunderstandings or incorrect perceptions due to lack of transparency, European countries, in general, took a more favorable view of the BRI [10]. Duchâtel [126] argued that China’s “Belt and Road” initiative has certain geopolitical considerations, and is a response to the ongoing development of Sino-US competition and regional cooperation. Okano-Heijmans and Lanting [127] maintained that China’s emphasis on the BRI network is, at least in part, from its response to other competitive multilateral initiative networks in the Asian region. In addition, some scholars claimed that the BRI brings development opportunities and challenges to the EU. Examples of the opportunities include stimulating economic development and creating more jobs [128], solving regional conflicts [129], and ensuring the EU’s security [130]. Examples of the challenges include the reshaping and changing of the EU’s foreign relations and decisions [131], the possible impact on its investment standards and international economic status [132], and the possible change in the interactions between member states within the EU [126].

As an emerging global power, China has both conflictual and cooperative relations with the U.S. Some scholars predicted the negative consequences of the likelihood of a trade war between China and the U.S. [133–135]. Grossman [136] considered the possibilities for a collaborative relationship and the costs of the alternatives as both nations present a vision for a new silk road. On the diplomatic front, China is also enthusiastic about creating a “new type of great power relationship”, with the key international players including the U.S. [137]. The BRI was unveiled at a time when the U.S. was advancing its own economic vision of the region, the Trans-Pacific Partnership (TPP), and its own regional security strategy, the “pivot” or “re-balance”. Using Antonio Gramsci’s theory of geopolitical

economy and the production of territory, Lee et al. [18] examined U.S.–China hegemonic competition in regional, geoeconomic strategies. China makes use of the BRI as a vehicle of soft balancing to frustrate America’s attempt to contain and encircle China, and undermine its dominance in Eurasia and beyond [83]. Chen et al. [138] argued that the U.S.–China trade war is not about trade, but about technological dominance. He warned that both sides might fall into “Thucydides’s Trap”, the pattern of large-scale conflict when a rising power challenges a dominant one.

“Indian Ocean” is a high-frequency keyword that appears in articles such as Johnston [139]. Most of the debates about it focus on building ports on this ocean and building the Djibouti base. Beijing argues that building ports there is part of its “peaceful rise”. Chinese companies are building ports and free trade zones in the Indian Ocean region for the economic benefit of all concerned. Examples of these benefits include infrastructure construction and financing. China will play a role in coordinating customs, supervising quality, e-commerce, and other agencies to facilitate the program [140]. As for the Djibouti base, according to Chinese spokespersons, the base will provide a “crew-rest facility for replenishing soldiers and resupplying food and fuel” for ocean-patrolling and peacekeeping missions [141]. In contrast, some scholars and politicians have different arguments. Alfred Thayer Mahan, whose influence long ago receded in the West, was a strong advocate of the connection between naval power and status as a great power. Mahan now tends to be associated with outdated and self-fulfilling ideas of a “zero-sum naval rivalry” between competing empires [142]. That is quite different from the Chinese philosophy of a “win-win partnership”, “mutual benefit”, and “common destiny for mankind”. Although most European states, for example, now regard their navies primarily in terms of providing maritime security on a cooperative or collective basis rather than primarily as instruments of power projection, there are still people who see control over access to the Indian Ocean, either by land or by sea, through an intensely securitized lens [143]. Some security analysts have claimed that Chinese-sponsored port projects are part of a concerted plan by Beijing to develop a so-called “String of Pearls” or naval bases across the Indian Ocean—essentially a Mahanian strategy of building a chain of naval bases across the northern Indian Ocean that would be used by the Chinese navy to protect China’s trade routes and potentially dominate the Indian Ocean [144]. The Djibouti base is likely to further supplement China’s peacekeeping efforts in Africa [145], as China did before by deploying frontline combat troops in the conflict zones of South Sudan and Mali [146]. While China’s naval capabilities in the Indian Ocean are growing, there is yet little evidence that it is pursuing a naval strategy of sea control in that theater in the manner we have seen the United States or Britain exercise [143].

RESEARCH GAP 2: Very few studies have focused on the cooperation between the ports along the 21st century maritime silk road with regard to whether both the Chinese port enterprises and those of the host countries along the route are upholding the values of fairness and reciprocity, and are mutually beneficial. Future research should verify the rules governing the evolution of the investment cooperation pathways, and explore the port cooperation frameworks emerging along the route as a result of that cooperation. Additional investigation of the characteristics of the port cooperation, risk classifications, trend forecasts, and the mechanisms affecting the cooperative game choices would also be beneficial.

### 6.1.3. Law and Cooperation Mechanisms

The process of building the BRI will face legal challenges, including issues about sovereignty and territorial integrity, maritime disputes, international trade and investment risk, the Sino-European market’s economic status, and overlapping and conflicting bilateral and multilateral treaties [147]. The BRI needs a mechanism for settling the disputes that will arise among BRI countries [148].

There are two streams in the literature about law along the BRI. The first focuses on bilateral relations. Zeng [71] discussed the legal structure of the BRI and how it relates to other forms of bilateral agreements. Legal guarantees for Chinese maritime shipping are required [149]. Wang [150] examined the existing mechanisms for resolving such disputes by pointing out their shortcomings and

room for improvement. Another stream of literature deals with the legal system in China. Xiao and Yu [151] explored approaches to improving the international credibility of the Chinese judiciary system, while Yu [7] discussed China's legal service industry in the context of the BRI. It is an important topic in the context of supply chain management, given the importance of legal stability in global supply chains. Li [152] investigated the evolution and issues of marine pollution law in China.

Besides new business-government interactions, the BRI involves multiple bilateral agreements with individual countries along its routes. Approaches to dealing with these issues include signing cooperation Memorandum of Understandings (MOUs) and developing a number of bilateral cooperation pilot projects [153]. In addition, as stated in the Chinese government's official document, "China will take full advantage of the existing bilateral and multilateral cooperation mechanisms to push forward the building of the BRI and to promote the development of regional cooperation" [3]. The "16 + 1 framework" in the CEE is one of the cases using existing mechanisms. China is using a hybrid model of cooperation and development that is different from traditional modes involving cooperation between firms [154]. There are also concerns about China's ability to establish multilateral collaborations on finance, trade, and infrastructure projects in the BRI realm [155,156].

RESEARCH GAP 3A: With regard to research on the law, the BRI needs a legal mechanism for resolving disputes among the BRI countries. Achieving this goal requires integrating China's domestic law and international law. Research in this field is in its infancy. Future studies should explore both the theoretical and practical aspects of this legal mechanism.

RESEARCH GAP 3B: With regard to research on cooperation, BRI focuses on signing multiple bilateral agreements with individual countries instead of firms, while existing studies have largely focused on bilateral cooperation cases. Future research should explore the logic behind this governance pattern, and the implications for international business and international relations.

## 6.2. Territorial Economic Cooperation, Sustainable Development, Energy and Environment (G2)

The articles in the G2 category focused on economic cooperation (#1), sustainable development (#3, #4), energy and the environment (#13, #17). In this section, we present some of the representative works on each theme.

### 6.2.1. Territorial Economic Cooperation

The BRI is a major feature of the current world economic system. Ahmad [157] mentioned that the estimated cost of the BRI is approximately \$2.1 trillion and it will affect the lives of about 80% of the global population. This regional connectivity will complement the shared industrial, supply, and value chains, and promote Eurasian and Pan-Asian regional cooperation for shared development [10]. The economic corridors such as the China-Pakistan Economic Corridor and the Bangladesh-China-India-Myanmar Economic Corridor (BCIM-EC) should help China engage regional stakeholders in creating regional and trans-regional connectivity to achieve economic integration [158–160]. We observed a dichotomy in the economic narratives. One stream argued that BRI is mutually beneficial [6,71,161], whereas another maintained that it is China that benefits the most [162]. It is reasonable to assume the latter, given that China has pledged to invest US\$1.25 trillion worldwide by 2025, exceeding any previous investment record made either by the U.S. or the Soviet Union in their past geopolitical rivalry for global domination [163]. However, the majority of the studies in the economic literature regarded the BRI as positive and mutually beneficial. Using a global computable general equilibrium model, Zhai [164] investigated the macroeconomic impact of China's BRI, and predicted it would bring sizable benefits to the world economy. However, China and the other BRI countries need to address several important challenges in order to implement this initiative successfully and realize these benefits.

RESEARCH GAP 4: With regard to research on territorial economic cooperation, past studies have dealt mostly with one or two aspects of the five goals of BRI, particularly facilitating connectivity. Future research should explore the other connectivity goals and multiple connectivity issues.

### 6.2.2. Sustainable Development

BRI is a new form of globalization. World multi-polarization and economic globalization are moving forward, but are also facing increasing risks and uncertainties. There are 17 sustainable development goals that the world seeks to achieve by 2030 [165], and so does the BRI [166]. BRI promotes sustainable development along its length [167]. It will foster infrastructure innovation and development, which will enhance the economic environment of the participating countries and regions. Ecosystem services are important foundations for realizing the sustainable development of the economy and society [168]. Groundwater quality issues are becoming as important as groundwater quantity issues, making groundwater research a hot topic worldwide. Li [69] discussed the challenges faced by contemporary groundwater quality researchers, and Chen et al. [169] investigated the challenges and prospects of sustainable groundwater management in an agricultural plain in northwest China. Finally, Alkon et al. [170] explored the water security implications of coal-fired power plants financed through BRI.

The multibillion-dollar initiative has the potential to fulfill the global, sustainable development goals of creating jobs, reducing poverty, and improving infrastructure and the economy through connectivity between countries, regions, and continents that makes it more universally beneficial and inclusive [171]. Menhas et al. [172] conducted a case study of sustainable development along the China-Pakistan economic corridor. Li et al. [173] studied the micro- and macro-level factors that affect the sustainable development of microfinance institutions from the perspective of inclusive finance and found that their sustainability differs regionally. Howard and Howard [174] highlighted the importance of the sustainable management of Central Asia's trans-boundary water resources.

Another stream of research explores China's regional development model. For example, Khan et al. [175] provided theoretical perspectives on BRI as a beachhead for sustainable regional development. Mohieldin [171] proposed promoting the global sustainable development process and facilitating the implementation of sustainable development goals in the developing countries along the BRI. Khan et al. [175] provided theoretical perspectives on BRI as the basis for sustainable regional development. They argued that BRI is a critical tool for peaceful development. Through its massive investment in infrastructure, it promotes economic development and shared governance.

RESEARCH GAP 5: With regard to research on sustainable development, existing studies have generally used an economic perspective. Few studies have evaluated the impact of BRI from a sustainable development perspective. Future research should use this perspective to explore the relationship between BRI and the 2030 sustainable development goals, because they have many common goals.

### 6.2.3. Energy and Environment

One of the objectives underlying the BRI is to improve energy cooperation in areas such as energy infrastructure and exploration, and the development of energy resources [176]. Some scholars examined China's energy diplomacy, such as the coordinated energy policy of the Eurasian Economic Union [177] and Central Asia [178]. Yu [179] studied the implications for global energy governance, demonstrating that the BRI could change China's energy cooperation in Eurasia into more of a regional and multilateral engagement strategy. Bennett [180] investigated Sino-Russia energy cooperation. Using a global computable general equilibrium model, Zhai [164] investigated the macroeconomic impact of China's BRI. The study argued that, accounting for the externalities of infrastructure development with respect to reductions in trade costs and improvements in energy efficiency, BRI would bring sizable benefits to the world economy in terms of welfare and trade. Shi et al. [181] explored the spatio-temporal patterns of electric power consumption in BRI countries. Many of the studies debated energy consumption, particularly CO<sub>2</sub> emissions [182–186]. For developing countries along the BRI, promoting clean and efficient thermal power is a pragmatic priority for green power development.

Studies also acknowledged that the economic development under the BRI might clash with environmental sustainability goals, given the expansion and upgrading of the transportation

infrastructure in environmentally sensitive areas, and the large amounts of raw materials needed to support that expansion. According to World Wildlife Fund reports [187], the geographical scope of the BRI overlaps with 1739 biodiversity conservation areas, which may have negative environmental impacts. Therefore, the protection of biodiversity should become a core value of the BRI [188]. Studies have also attributed many negative effects on the environment to Chinese activity, both within China and across the globe [189]. However, China has recently launched a policy paradigm known as “ecological civilization” that aims to improve environmental regulations, reduce pollution, and increase the adoption of green technology [190]. If China can match its rhetoric with action [191] and embrace biodiversity conservation at the same time, it could use its geopolitical weight to pursue the conservation agenda in the BRI landscapes.

On a positive note, the new regional integration model proposed by China may also present some opportunities. For example, the model could provide innovative policy tools and more advanced environmental safeguards than those employed by the international environmental frameworks and national governments of the 1970s and 1980s in the West [163]. The BRI could boost environmental research, particularly in remote locations in southeast, central, and western Asia, and map areas of high value for biodiversity and carbon storage [192]. To raise awareness about the possible environmental and social risks of the BRI, there needs to be dialogue among those involved in the decision-making process—governments, financial institutions, developers, non-governmental organizations, and local communities—and researchers investigating biodiversity conservation, human health, and the mitigation of climate change [188]. A growing body of studies calls for international scientific collaboration to support BRI [193]. The Digital Silk Road, as a prime example, including 19 countries and 7 international organizations, will improve environmental monitoring, share big data, extend applications, and promote international collaboration [194,195].

RESEARCH GAP 6A: With regard to research on energy and environment, early studies mainly focused on developed countries and regions. Given that, with the exception of the EU, the BRI involves developing countries, future research should explore its impact on these developing countries. Studies providing theory and empirical evidence about the dynamic relationship between CO<sub>2</sub> emissions, energy consumption, economic growth, and industrial structure among the countries along the Belt and Road would be welcome.

RESEARCH GAP 6B: With regard to research on the environment, existing studies revealed some opportunities, challenges, and risks to environmental protection and sustainable development during the initial planning, construction, and operational phases of infrastructure development along the BRI. Future research should improve the methods for assessing the ecological impact of this infrastructure development and monitoring the efficacy and functioning of the measures put in place.

### *6.3. Social Impact (Culture, Education, and Health Policy), the Micro-Economy, and China’s Sub-National Development (G3)*

G3 focused on three themes: one is culture, education, and public health (#9, #12), the second is the micro-economy, such as Chinese enterprises (#0), and the third is China’s sub-national development in areas such as the northwestern region of China, its coastal provinces, and ports (#6, #5, #8, #11).

#### 6.3.1. Culture, Education, and Public Health

Apart from vague slogans like “win-win cooperation”, “mutual respect”, and “community of common destiny”, there has been no concerted effort to showcase China’s thought culture that is eminently suited to precisely this type of venture. Culture is a soft power, which promotes economic exchanges between countries [196]. Delliós [197] argued that, even more than connectivity, collaboration is the necessary glue for bringing the regions of the BRI together. Therefore, China needs to heed the advice of its own great philosophers. Lin et al. [198] surveyed BRI as an emerging geopolitical culture. Yuniarto [199] maintained that to bridge the gap between those involved in the BRI and enhance mutual understanding, people-to-people exchanges between countries should be accorded greater significance.

In addition, strengthening bilateral cooperation in education, labor, tourism, and culture could have positive spillover effects beyond basic intercultural learning. Xie [200] also claimed that promoting the international influence of its culture would help China find a new source of export growth.

The BRI is promising to extend the cooperation between China and the countries along the belt and road. The five goals laid out by the Chinese government, along with unimpeded trade and financial integration, include people-to-people bonds. This last goal is to be achieved by education and international academic cooperation [201]. Peters [202] attempted to build a philosophical approach to the Chinese Dream through the analysis of narrative and the BRI, highlighting the future significance of education as an emerging culture and evolutionary economic development [203]. Multilingual education and higher education featured prominently in many of the articles [138,204], as did the re-education campaign in the Xinjiang Uyghur region [205], as well as international student education in China [206,207], and China's higher education in countries along the route [208].

Besides promoting trade, infrastructure, and commercial associations with the BRI members in Asia, Africa, and Europe, the initiative contains important health components. Due to social development, particularly economic reforms since the 1980s, China has accumulated experience in reducing poverty. In parallel, China's economic transformation has translated into similar and remarkable reductions in neglected tropical diseases. Indeed, the control of neglected tropical diseases and the reduction of poverty each appear to reinforce each other.

Two streams of studies dealt with health, especially public health. One stream concerned China's national and regional health, such as its national health policy [209] and regional ecosystem health [118,210]. Eziz et al. [211] assessed the health risks of heavy metals in agricultural soil in Xinjiang. Chan et al. [212] proposed a health vulnerability index to reduce the risks of disasters that policymakers could use to increase the capacity to deal with health emergencies in such circumstances. The other stream concerned China's silk road and global health. Examples include public health control, cooperation with regard to health [213,214], and China's formula for success in controlling parasitic and neglected tropical diseases that could be shared with other parts of the world through China's new silk road [215]. China launched an unprecedented overseas intervention against Ebola virus in West Africa. The overseas development assistance provided by China has been increasing by 25% annually, reaching US\$7 billion in 2013. China's response to Ebola, development assistance for health, and new investment funds are complementary and self-reinforcing. China's unique global engagement is having a powerful impact on the contours of global health [216].

**RESEARCH GAP 7A:** With regard to research on the social impact on culture and education, existing studies mostly focused on the changes in Chinese culture and education domestically. Future research should explore the effect of the people-to-people bonds linking both China and other countries.

**RESEARCH GAP 7B:** With regard to research on the social impact on public health governance, existing studies mainly focused on China's national and regional health, and public health controls inside China. Future research should explore the dynamics between health policy inside China, and public health governance and international cooperation along the belt and road countries.

### 6.3.2. The Micro-Economy

In the cluster dealing with Chinese firms "going global", discussions about outward foreign direct investment (OFDI), practice teaching, and personnel training were popular. The studies indicated that China has become an important international investment player and provides a unique domestic business environment. Chinese firms have created an important contextual backdrop for testing the applicability of established multinational enterprise (MNEs) and FDI theories [23]. The studies covered MNEs, state-owned enterprises (SOEs), small-to-medium size enterprises (SMEs), and various types of investment.

The BRI affects where China invests. Geographic information system maps and a risk-opportunity matrix generated to assess environmental risks and explore opportunities in the BRI countries have been

used to determine investment locations [217]. Many studies using BRI as a context have investigated Chinese OFDI from different aspects. Examples include the effects of China's OFDI on exports [218] and the impact of China's OFDI on trade intensity. Lin et al. [219] examined the factors influencing the performance of Chinese enterprises in overseas mergers and acquisitions within the context of the BRI, determining that political connections are a crucial factor. Some scholars investigated Chinese enterprises' investment opportunities and challenges in infrastructure construction [220]. Spillover effects were also studied [221,222]. Environmental responsibility, local embeddedness, and the social responsibility of Chinese enterprises were explored [223,224]. Li et al. [225] investigated the internationalization process of SMEs and argued that BRI has a positive effect on the export performance of the firms targeting the "Belt" countries. Both cultural friction and ethnicity moderated the relationship between the BRI and export performance. Alon et al. [226] discussed China's new silk road as an opportunity for European SMEs to export to the Chinese market. Despite similar perceived risks and challenges to participating in the BRI among private and state-owned firms in China, the latter are much more likely to express a willingness to do so [227]. State-owned firms won about half of the contracts for BRI projects by number and more than 70% by project value [228].

Firms operating in foreign countries face the liability of foreignness, which creates uncertainties [229,230]. Clearly, Chinese firms that move along the BRI routes are faced with increased environmental uncertainties. Chinese cross-border mergers and acquisitions (M&As) are significantly increasing in the OBOR areas, as the BRI enters a new stage of substantive construction [231]. Chinese companies often face specific cross-border problems, because of the cultural and ethnicity distance between their respective institutional environments [226], particularly in developed countries [232–234].

Thus, how Chinese firms overcome liability of foreignness (LOF) along the BRI routes becomes crucial. A few overcoming LOF studies on Chinese firms are emerging, such as Cao and Alon [235], who developed a new model of overcoming LOF based on empirical data of Chinese MNCs operating in Europe. On the other hand, foreignness may also become an asset (AOFs) [236,237]. Annique [238] argued the advantage of foreignness in innovation. National distance has an important impact on China's OFDI through the interaction of liability of foreignness (LOF) and advantages of foreignness (AOFs) [239].

Following the tenets of micro-foundation of international strategy and international entrepreneurship [240], they also enable an academic transition from the liability of foreignness derived from country-specificity to the liability of outsidership that stresses the relationship specificity implicit in cultural understanding and knowledge [241,242]. Moreover, Chinese companies' liability of foreignness is even more acute because of country-of-origin effects [243–245].

**RESEARCH GAP 8A:** With regard to research on the micro-economy, there are few studies exploring the unique characteristics of each BRI-proposed economic corridor and their varied effects on decisions for export companies located in China. Future research should investigate the varied effects of economic corridors on the decision making of export companies. How do the institutional or government-specific factors at the country-level influence MNEs' firm-specific advantages in project-based coalitions, and how can MNEs take advantage of the institutions to improve their firm-specific advantages?

**RESEARCH GAP 8B:** China's OFDI is increasing along the BRI routes, and Chinese firms are facing opportunities, as well as challenges, such as liability of foreignness, liability of outsidership, and anti-globalization. Thus, what are the threats and opportunities for Chinese firms to engage in globalization of business and the Belt and Road projects? How are Chinese MNCs' management and foreign subsidiary strategies evolving in a time of global change? How do their responses shape the process of globalization?

### 6.3.3. China's Sub-National Development

In advancing the BRI, China is leveraging the comparative advantages of its various regions, adopting a proactive strategy of further opening-up, strengthening interaction and cooperation

among the eastern, western, and central regions, and comprehensively improving the openness of the Chinese economy [3]. Studies have looked at western regions such as Xinjiang, Guangxi, and Yunnan connected with “one belt”. They have investigated renewable and sustainable energy in Xinjiang [246], energy-related carbon emissions in Xinjiang [247], and tourism and environmental pollution in western China [157]. Summers [248] explored the principal responses to the BRI on the provincial level in Yunnan, situated in southwestern China and bordering Laos, Myanmar, and Vietnam. Yunnan is a good case for developing an understanding of the sub-national dynamics of the BRI and how they contribute to understanding the making of foreign policy.

Gong and Ding [249] argued that, as an emerging model of regional and international economic cooperation, the core ideas of the new silk road differ from those of the U.S. China’s BRI is a call for an open, inclusive, mutually beneficial model of cooperative economic, political, and cultural exchanges (globalization) that draws on the deep-seated meaning of the ancient silk roads. It extends the march of modernization and reduction of poverty to emerging countries along the BRI [64,250]. China is one of the largest contributing countries to substantial global urbanization and poverty reduction. Through the BRI, China will endeavor to cooperate extensively and share its experiences with the countries along the Belt and Road Initiative to achieve more progress in global development [251].

RESEARCH GAP 9: With regard to research on China’s sub-national development, current studies mostly focused on its western regions, northwestern regions, and coastal regions. In addition, most of these studies were conceptual or qualitative arguments; few were empirical or quantitative studies. Future research should explore China’s domestic demands for internal rebalancing and its international responsibilities in global governance and the interaction with BRI countries, supported with empirical and statistical evidence.

#### 6.4. Discussion on Research Disciplines and Underlying Theory

RESEARCH GAP 10: With regard to research on research disciplines, existing studies have usually been conducted within an isolated discipline. Future research should explore a cross-disciplinary approach.

As the analysis in Section 4.2 revealed, BRI is a multi-disciplinary subject involving research from more than 100 disciplines, of which 30 have a betweenness-centrality value above 0.1. The relationships between the disciplines are not isolated. Therefore, future research should consider the links among various disciplines. The challenge that BRI poses for research undoubtedly requires an inter-disciplinary agenda, because its implications for political science, international relations, economics, and cultural studies are enormous [252].

RESEARCH GAP 11: With regard to research on underlying theory, existing studies have used a limited number of theories and models. Future research should explore more appropriate theories and models, and choose the correct level of analysis.

Our review of the existing literature revealed that the gravity model, the general equilibrium model, and the Cobb–Douglas production function were frequently used to measure the impact of the BRI on Belt and Road countries, particularly with regard to the five elements of connectivity [164,253,254]. Some researchers used econometric regressions with the system generalized method of moments and feasible generalized least squares [255]. World system theory and social network analysis were applied in studying scientific collaboration networks [256]. Future research should explore more theories and appropriate models for BRI research.

**Table 8.** List of document for content analysis in BRI studies. Source: Own elaboration.

Category	Topic	Representative Documents	#Studies
Basic	Government official blueprint	SCPRC [3]	1
	Review papers	Chan [257], Hermaputi et al. [258], Lee et al. [18], Shahriar et al. [259], Thüerer et al. [17], Zhang [19]	6
	Professional reports	Kohli and Zucher [10]; WWF [187]	2
	Top 20 Articles by GCS (WoS and Scopus)	15 articles are common in both databases, 5 are unique in one database. 25 articles in total after removing duplicates.	25 *
	Top 20 Articles Ranked by LCR# (WoS)	Thüerer et al. [17], Chen et al. [251], Gui et al. [256], Kundu & Sheu [260], Xiao et al. [167]	20 *
General	Silk Road Economic Belt	Clarke [261], Dellis [197], Hofman [262], Howard & Howard [174], Jiang et al. [263], Li et al. [63], Ostrovskii [264], Yeoh et al. [160]	8
	21st Century Maritime silk road	Blanchard [265,266], Chang [267], Chaziza [268], Feng et al. [269], Yang et al. [270], Farooq et al. [271], Lee et al. [18], Malik [272], Peng et al. [273], Blanchard & Flint [274]	11
	Top 15 Influential Papers identified by bibliographic coupling	Blanchard [265,274], Stephen [275], Yang [93], Yuan et al. [276], Clarke [261], Jone & Zeng [277], Leverett & Bingbing [278], Mayer [279], Nordin & Weissmann [280]; Feng et al. [269], Gui et al. [256], Lee et al. [281], Li [147], Zhao et al. [282]	15
	China institutional power (foreign policy, global governance, financial diplomacy)	Chang-Liao [283], Evron [81], Ferdinand [15], Gorbunova & Komarov [154], Nie [78], Zhang [77], Chun [75], Wang [66], Beeson & Li [79]; Hameiri & Jones [84], Loke [85], Wang [95], Yin [87], Cooper [100], Fallon [68], Knoerich & Urdinez [89], Wilson [96], Yu [7], Zhang et al. [104]	20
Thematic Group 1	Geopolitics and political economy	Blanchard & Flint [274], Cai [97], Fallon [68], Holslag [284], Lee et al. [18], Lin et al. [198], Liu & Lim [285], Indian Ocean: Brewster [143], Krupakar [145], Johnston [139]	10
	Law and cooperation mechanisms	Hu & Huang [148], Li [147], Wang [150], Xiao and Yu [151], Zeng [153]; Gorbunova & Komarov [154]	6
	Territorial economic cooperation	Bieliński et al. [123], Chaisse & Matsushita [76], Du & Zhang [286], Liu et al. [287], Tao et al. [218], Flint & Zhu [288]	6
Thematic Group 2	Sustainable development	Chen et al. [169], Fu et al. [168], Khan et al. [175], Menhas et al. [174], Steiner [165], Mohieldin [171], Xiao et al. [167]	7
	Energy and environment	Bennett [180], Hober [176], Kembayev [177], Muhammad, et al. [183], Zhai [164]; Guo [194], Horvat & Gong [193], Lechner et al. [188], Tracy et al. [163], Xiao & Zhao [190]	10
Thematic Group 3	Culture, education and public health	Dellios [197], Yang & Yuan [196], Yuniarto [199], Paliszewska-Mojsiuk [201], Peters [202], Zenz [205]; Chen et al. [213], Su et al. [210], Tang et al. [216], Zhou et al. [209]	10
	Micro-economy	Alon et al. [23], Alon et al. [226], Hu et al. [220], Huang [217], Li, Liu & Qian [225], Li & Zeng [227], Zhang et al. [222]	7
	China sub-national development	Ahmad et al. [157], Chen et al. [251], Gong & Ding [249], Liu & Dunford [64], Qin & Chong [13], Summers [248], Xu et al. [246]	7

# Note: TLR = Local Cited Reference (by HistCite). \* Note: Limited to the length, full list is available in the Supplementary.

## 7. Conclusions

This review-based study of BRI research adopted a holistic approach that included a bibliometric literature search, scientometric analysis, and in-depth qualitative discussion. We used various software programs, such as CiteSpace, Endnote, HistCite, VOSviewer, bibliometrix, and biblioshiny to data mine and analyze the 1583 English-language peer-reviewed papers on the subject of BRI from 2013–2019 that we retrieved from WOSCC and Scopus. Specifically, the initial bibliometric analysis was used to

capture information about the authors, journals, documents, institutions, disciplines, and keywords. The scientometric analysis helped us map the thematic evolution of BRI research over time, and identify current research hot spots and research trends. We content analyzed the papers to identify research gaps and propose future research directions.

The findings of the bibliometric analysis indicate that publications in this area have increased rapidly, with particularly high growth rates in the recent three years (2016–2019). We also determined that BRI is a multi-disciplinary subject that has been studied in more than 100 disciplines, 30 of which have a betweenness-centrality value exceeding 0.1, which indicates these disciplines are of great importance in the network. In terms of the countries and regions in which the publications originated, China, the U.S., the U.K., Australia, and Singapore ranked in the top five by number of publications, while Switzerland, Italy, Japan, Finland, and Sri Lanka ranked in the top five in terms of centrality. We also inferred that there are important research groups on the subject of BRI, including universities in China and other countries.

In addition, the results of the keyword co-occurrence analysis identified the top 15 keywords, of which the top five were “transportation”, “silk road”, “silk road economic belt”, “Central Asia”, and “one belt”. Using a timeline clustering map, we identified 18 clusters that we manually classified into three groups, each with three sub-themes. Group 1 dealt with institutions (#7, #18), geopolitics and political economy (#10, #14), law and cooperation mechanisms (#5). Group 2 focused on economic cooperation (#1), sustainable development (#3, #4), energy and the environment (#13, #17). Group 3 dealt with the micro-economy, such as Chinese enterprises (#0), China’s sub-national development such as the northwest region of China, coastal provinces, and ports (#6, #5, #8, #11), and culture, education, and health policy (#9, #12). Finally, through content analysis, we conducted a thematic discussion, and then identified the research gaps and proposed future research directions for each sub-theme, as well as for research disciplines, research methods, and underlying theory.

Despite these interesting findings and implications, there are also several limitations to the study. First, BRI is an interdisciplinary construct. Therefore, in the bibliometric analysis some topics may appear to be more significant than others because they received more citations. The assumption in bibliometrics is that the more cited the article is, the more important and influential it is. However, some articles may be cited later, and some articles may have received fewer citations at the point when we conducted the search because they had been published fairly recently. We integrated the timeline cluster of themes by the bursts in the keyword co-occurrences. Doing so can reduce the bias to some degree.

Second, we obtained our articles from the WOSCC and Scopus databases, which contain the most prestigious articles. However, we may have missed existing related papers in other databases, and other types of documents, i.e., books, book chapters, professional reports, etc. Future meta-analyses might consider using articles from more journals and more types of documents to capture the impact across a broader spectrum of scholars and disciplines. Third, BRI has not been fully implemented and has been in place for only a short period of time. There is, in fact, no master plan or official long-term strategy that is publicly available, at least yet. Therefore, to some extent, empirical studies are hindered at this stage. Fourth, we limited the literature language to English to obtain the international interests in BRI research, hence exclude other languages, particularly Chinese, and other local languages. Future research could consider to explore the Chinese literature or conduct a comparative study between English and Chinese studies. Area studies could consider to explore the studies in the specific local language to dig the local insights.

Overall, to the best of our knowledge, this article is the first comprehensive study to use both quantitative and qualitative methods to conduct a systematic review of the BRI literature. The findings can help researchers acquire a general understanding of the current status of BRI research. Moreover, the paper could serve as a multi-disciplinary guide for researchers, policymakers, and practitioners alike to link current research areas to future trends.

**Supplementary Materials:** The following are available online at <http://www.mdpi.com/2071-1050/12/17/6901/s1>. 1. List of documents from WOSCC—1144 literature. 2. List of documents from Scopus—439 literature. 3. List of top cited documents by GCS—25 literature. 4. List of top cited documents by LCR—20 literature.

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