

Review Article

Research Hotspots and Frontiers of Language Studies in China in the Context of the Belt and Road Initiative —— Bibliometrics Analysis Based on CiteSpace

Chen Xi

English Language and Literature, the School of Translation Studies, Shandong University, Weihai, China

Email address:

201816362@mail.edu.sdu.cn

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Abstract: The Belt and Road Initiative was proposed in 2013, which develops economic partnerships with countries along the route actively, and builds a community of shared future, interests and responsibility, borrowing the historical symbol of the ancient Silk Road. Language plays an important role in serving the construction of the Belt and Road Initiative. Therefore, by means of bibliometrics analysis, the research tool, CiteSpace, was used to analyze the annual output, authors, keywords, institutes, and hotspots of 1430 papers related to the field of language studies in the context of the Belt and Road Initiative by CNKI database from 2014 to 2018. This paper adopts research methods of co-word analysis and co-word cluster analysis, and more specially, uses research yield analysis, cooperation diagrams analysis and strategic diagram analysis methods. The aim of this research is to sort out the relevant research comprehensively and systematically, outline the overall situation and development trend of these researches, summarize and analyze the hotspots and frontiers. The research shows that the overall trend of language studies in the context of the Belt and Road Initiative has rapid and linear growth. In recent years, the focus of research has been on personnel training, translation strategy, education reform, foreign language talents and so on.

Keywords: The Belt and Road Initiative, CiteSpace, Language Studies, Bibliometric Analysis

1. Introduction

The Silk Road is an ancient land commercial trade route starting from ancient China and connecting Asia, Africa and Europe. The original role was to transport silk, porcelain and other commodities produced in ancient China, and later became the main road for exchanges between the East and the West in economic, political, cultural and other aspects. The Belt and Road Initiative is the abbreviation of “Silk Road Economic Belt” and “21st Century Maritime Silk Road”. When visiting Kazakhstan and Indonesia in September and October of 2013, Chinese President Xi Jinping raised the initiative of jointly building the Silk Road Economic Belt and the 21st Century Maritime Silk Road (hereinafter referred to as the Belt and Road, or B&R). The Belt and Road upholds the principles of extensive consultation, joint contribution, and shared benefits. It

follows the Silk Road spirit featuring peace and cooperation, openness and inclusiveness, mutual learning and mutual benefit. It focuses on policy coordination, connectivity of infrastructure, unimpeded trade, financial integration, and closer people-to-people ties.

Bibliometric analysis is a well-known quantitative analysis method based on mathematics and statistics, which is a branch of Library and Information Science. It takes the external characteristics of various scientific literatures as the research object. The mathematical and statistical methods are used to describe, evaluate and predict the current status and development trend of science and technology [1]. Therefore, bibliometrics has become an interdisciplinary subject which integrates mathematics and statistics. Through the analysis of the distribution structure, changing rules and the quantitative relationship of a subject's literature, it illustrates the knowledge network structure, characteristics and rules of the

subject. The main methods are visual knowledge maps analysis, strategic diagram analysis, co-citation and co-word analysis [2].

Nowadays, under the background of “going global” strategy for Chinese culture development, it is necessary to sort out the studies in the field of language in the context of the Belt and Road, grasp the research status and hotspots and predict the future development trend, so as to provide references for readers and researchers.

2. Literature Review

This section reviews important documents of the Belt and Road and the main research directions in the field of language studies suggested by the national policy. It also summarizes the concept, classification and significance of visual analysis, as well as the research status of using the visual analysis tool—CiteSpace. These prove the importance and necessity of this research.

2.1. Relevant Policy Documents & Current State of Research

China has issued a number of relevant policy documents in administrative, diplomatic, economic and cultural aspects in order to promote the development of the Belt and Road. This paper mainly sorts out cultural related policies, because language and culture are closely related.

In July 2016, the Ministry of Education issued the Education Action Plan for the Belt and Road Initiative, which encourages China and other countries along the route to carry out the cooperation in education, develop the talent training and jointly build the cooperation mechanism for ideas. In December of the same year, the Ministry of Culture issued the Ministry of Culture’s Action Plan on Belt and Road Culture Development (2016-20). The document pointed out that it is important to improve the cooperation mechanism and platform, build the cultural brand, and promote the development of cultural industry and the cooperation of cultural trade. In May 2017, the General Office of the CPC Central Committee issued Deepening Reform Program of China’s Writers Association, which called for strengthening literary exchanges with countries along the Belt and Road; in September of the same year, Beijing took the lead in setting up a national education base for talents of the Belt and Road. In summary, judging from the Belt and Road’s official documents related to culture, it focuses on three aspects: cultural education, language, and talent training.

In actual research, Cui (2014) conducted a preliminary discussion on the transmission and exchange of Chinese culture in the context of the Belt and Road [3]. Li (2016) and Zhou (2016) summarized the development path of China’s higher education in the context of the Belt and Road and the dilemmas it faces [4, 5]. Liu et al. (2016) conducted an in-depth research on the progress and trends of higher education popularization in countries along the Belt and Road [6]. Yang (2015) and Wen (2016) analyzed the problems faced by language talents during the Belt and Road

construction and listed their countermeasures [7, 8]. Huang (2015) comprehensively enumerated and compared languages shared by the four countries in Central Asia and four in Southeast Asia with Chinese, which included the language identity, language status and the composition of the writing system [9].

Chen Mingming, the former Director of the Translation Office of the Ministry of Foreign Affairs of the CPC, acclaimed that the construction of the Belt and Road must give priority to language, and that the status and role of language service should not be ignored in the cultural exchange and cooperation. Therefore, the research on the language field is very important in the context of the Belt and Road.

2.2. The Bibliometrics Research

Based on bibliometric method, visualization analysis can map abstract data in 2D or 3D graphics, and reveal the overview of the development in a field or discipline from the macro, meso, and micro levels.

Visualization is the process of transforming data, information and knowledge into visual representations [10]. Hou et al. (2006) believed that visual analysis is a comprehensive application of various methods like co-word analysis, clustering analysis and multidimensional scaling, aiming to study the visual presentation of large-scale non-numerical information resources, such as the development and evolution of discipline, the diffusion and dissemination of scientific knowledge, and the relations between authors’ productivity and production [11].

At present, the main branches of visualization include four categories: data visualization, scientific visualization, information visualization, and knowledge visualization. CiteSpace is the software developed by the Java language. It analyzes keywords with the word frequency statistics. Keywords represent the core content of an article. If a keyword repeatedly appears in multiple documents in a certain field, it can be regarded as a research hotspot in this field. The median centrality is also an indicator of the importance of keywords in the scientific knowledge map, which reflects the ability of a keyword to act as a “media” in the entire network. The higher the median centrality of a keyword, the more information it contains between the keywords [12]. Co-word clustering forms closely related keywords into clusters, and each cluster represents a different research topic. The composition and evolution of clusters represent the development of research topics [13].

Hou and Hu (2013), who started using CiteSpace earlier in China, analyzed the disciplinary distribution and functions of papers that used CiteSpace in WOS and CNKI [14]. Nowadays, the visual analysis tool—CiteSpace is widely used in various research fields in China: scientometrics, informatics, economics, education, etc. However, there has been less research on the Belt and Road with applying the CiteSpace software. Among them, Sun & Xu (2015), Liu et al. (2017), Chen et al. (2017) reviewed the research status of the Belt and Road [15-17]. Pan & Fan (2017) focused on the

Belt and Road under the discipline of custom [18]. Therefore, the application of visualization analysis with the CiteSpace software to the researches in the field of language studies in the context of the Belt and Road is necessary.

3. Study Design

3.1. Data Sources and Results

The data in this study are selected from the CNKI (China National Knowledge Infrastructure) database created by Tsinghua University and Tsinghua Tongfang Co., Ltd. The CNKI database is updated each year and the Belt and Road was raised in September of 2013, so the data range for the literature was set to be 2014-2018. The source literature search in this database was used to download all literature using the keywords The Belt and Road Initiative OR 21st Century Maritime Silk Road OR Silk Road Economic Belt and using the classification limited to language studies. A total of 2280 records were obtained, and nonacademic literature such as reports, meetings, and repeated literature was manually removed, resulting in 1430 literature records, including information on the literature such as the subject, author, institution, key words, publication date, and referenced works.

3.2. Study Method

We mainly used methods of co-word analysis and co-word cluster analysis to process the literature. Co-word analysis is a kind of content analysis method, which mainly includes word frequency analysis, cluster analysis and association analysis. This method mainly performs cluster analysis by counting the co-occurrence frequency of keywords or subject word pairs in the same literature. In a co-word network, the distance between nodes can reflect the degree of relevance between high-frequency or low-frequency keywords or subject words [19]. By using research tools to draw a map of the knowledge network, it can visualize the correlation between keywords or subject words, and the evolution of the subject structure represented by these keywords or subject words.

Based on methods of co-word analysis and co-word cluster analysis, the knowledge-mapping software CiteSpace V can fulfill the three functions, cooperation analysis, co-occurrence analysis and strategic diagram analysis. We used institutional cooperation analysis to determine the distribution and influence of core research institutions, keyword co-occurrence analysis to determine current research “hot topics” and strategic diagram analysis to explore research forefronts

3.3. Research Tools and Setup

We used CiteSpace V software to draw a knowledge map of language studies in China in the context of The Belt and Road. CiteSpace is a scientific literature analysis tool jointly developed by Dr. Chaomei Chen from Drexel University and WISE Lab of Dalian University. In principle, CiteSpace is

similar to a camera, and its subject is a scientific literature network [20].

The CiteSpace is currently one of the most widely used knowledge-mapping software program, and it is mainly based on co-citation analysis theory, co-word analysis theory and pathfinding network calculations. It calculates metrics for the literature in a certain field to find key paths and knowledge turning points in its evolution, and it draws a series of maps to form an analysis of the latent driving mechanism of scientific changes and explore the forefronts of scientific development.

We used the latest version of CiteSpace V, 5.3. R4. After importing the data, we created a project in the main menu, selected the data sources, and selected Chinese support in the preferences. We configured the analysis in the right side of the window: the time threshold was 2014-2018, time segment was 1, cosine distance was selected for the continuous threshold default, the node types and node threshold values were selected based on the explanation that follows in the analysis section.

4. Research Results

4.1. Research Yield Analysis

As can be seen from Figure 1, the overall trend shows rapid and linear growth. In September and October of 2013, Chinese President Xi Jinping raised the initiative of the Belt and Road. Therefore, in 2014, the literature mainly focused on policy interpretations or terminology translations. There have been few studies combining the Belt and Road with the field of language studies, with only 10 papers.

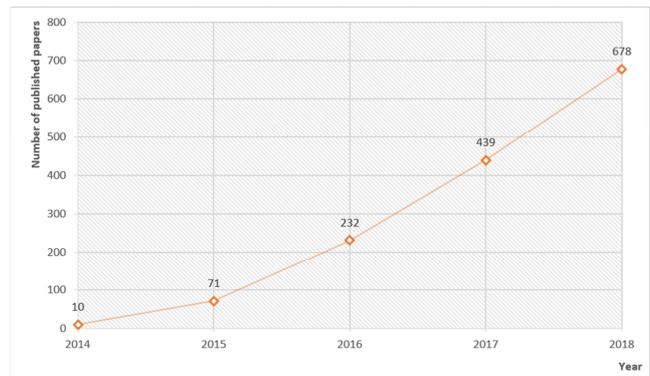


Figure 1. The number of published papers on Language Studies in China in the context of The Belt and Road Initiative (2014-2018).

In 2015, 71 papers were published, but the growth rate is not very high. Judging from the authoritative policy documents issued by China’s Belt and Road Network, the state has officially issued the relevant policy documents since March 2015, and the national policy is still in the early stage of overall planning. Therefore, in the field of language studies, the combination of policy and discipline is still in its infancy.

Beginning in 2016, the volume of research publications has grown rapidly year by year, with 232 papers in 2016, 439

in 2017, and 678 in 2018. The main reason is that the country has issued relevant documents to emphasize the important role of language and culture in the implementation of the Belt and Road. For example, Action Plan on Belt and Road Standard Connectivity (2015-17) mentioned that it is necessary to support geographical advantages and language and cultural advantage; Vision for Maritime Cooperation under the Belt and Road Initiative (Seven language versions)) directly reflects the important role of language in policy release.

4.2. Cooperation Diagrams Analysis

The CiteSpace V software can form cooperation diagrams of research authors and institutes through its cooperation analysis function, and it uses this function to analyze the distribution of research emphasis in the field.

4.2.1. Co-author Network

The co-author network is used to analyze the joint research in a certain research field. In the software interface, the node categories were respectively set to author cooperation analysis, the node threshold value was 3\2\10; 4\3\10; 4\3\10 in terms of annual frequency of appearance—and the other parameters were set to be unchanged. The CiteSpace V software was run, overlapping authors were manually eliminated.



Figure 2. Visualization of the co-author network.

As shown in Figure 2, the CiteSpace analysis results show a total of 79 nodes, indicating 67 highly prolific authors, and 19 cooperative lines, indicating that the collaboration rate between the authors is very low. The larger the nodes are in the figure, the higher the number of publications published, and the thicker the connecting line is, the closer and stronger the collaboration. In terms of papers, the most prolific authors have nine papers published: These authors are Shen Qi and Wang Li.

Shen Qi is a professor at the School of Foreign Languages, Tongji University, an editorial board member of Chinese Journal of Language Policy and Planning, an executive director of the Chinese Language Policy and Planning Research Association and Chinese Educational Linguistics Research Association. He edited Strategic Studies on Language Education and Comparative Studies on the Value of Foreign Language Education Policies under Globalization and etc. Therefore, Professor Shen Qi is authoritative in the

fields of language strategy, language policy and language planning.

Wang Li is an associate professor at Yunnan Normal University Business School, and this is an independent college. Yunnan Province is an important part of B&R, and the talent training of independent colleges or vocational colleges has attracted the attention of many scholars. Therefore, how to combine students' English proficiency with B&R needs has become a hot topic for scholars.

There is a cooperative relationship between the authors, but no relatively stable and large academic teams have been formed. Xing Xin with eight papers from Communication University of China is closely related to several scholars from Xinjiang Normal University, such as Deng Xin (3 papers) and Li Yan (3 papers). Xing Xin combined the study of language needs with the actual status of Xinjiang Province, an important province along the Belt and Road, which forms a small research system and academic team.

4.2.2. Co-institute Network

With "Institution" as the Node Types, by setting thresholds and other parameters remain unchanged, the result of running CiteSpace is a knowledge network map of institutes that productive authors come from (see Figure 3). By adjusting the size of the nodes in the visual map and moving them appropriately, the institutes or institutional department can be clearly displayed. According to Figure 3, the top 10 institutes with the number of published papers are listed (see Table 1).

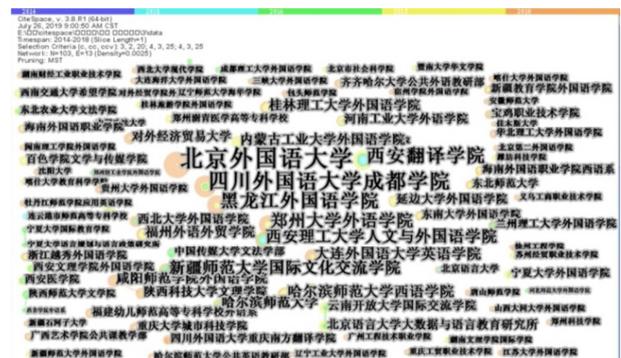


Figure 3. Visualization of the co-institutes network.

The CiteSpace analysis shows that there are 103 research institutes and 13 collaboration links in the co-institute network. Figure 3 shows that most of the nodes are isolated points, indicating that almost all the research results have been completed by a single author. Only a few organizations have had collaborative experiences, and the intensity of collaboration is very weak. However, there is also small-scale cooperation, such as School of Foreign languages, Xianyang Normal University and Liberal Arts College, Shaanxi University of Science and Technology. Therefore, it is suggested that the future research can strengthen regional linkages and university cooperation.

Table 1. Top 10 institutes on language studies in China in the context of the Belt and Road Initiative.

Institutes	Frequency	Institutes	Frequency
Beijing Foreign Studies University	16	School of International cultural Exchange, Xinjiang Normal University	10
Chengdu College of Sichuan International Studies University	13	School of foreign languages, Zhengzhou University	10
Heilongjiang International university	12	School of English Studies, Dalian University of Foreign Language	10
Xi'an Fanyi University	11	School of Foreign languages, Xianyang Normal University	9
School of Humanities and Foreign Languages, Xi'an University of Technology	10	School of Foreign languages, Harbin Normal University	9

From Table 1, it can be seen that from 2014 to 2018, the highest volume of language studies in the context of the Belt and Road in China was Beijing Foreign Studies University, followed by Chengdu College of Sichuan International Studies University and Heilongjiang International University. As can be seen from the table above, the main scientific research institutes in the field of language studies in the context of the Belt and Road are from foreign language colleges or foreign language departments. Firstly, Beijing Foreign Studies University has the highest volume of publications, because it is the most comprehensive language university in China. Especially some minority languages are only offered professionally at Beijing Foreign Studies University. The Belt and Road is promoted in multiple countries and involved with multiple languages, so as a leader of foreign language universities nationwide, Beijing Foreign Studies University naturally has a lot researches on it. Secondly, Chengdu College of Sichuan International Studies University ranks high because its researches mainly focus on the translation practice of some the Belt and Road policies, documents, and speeches. Finally, the research advantage of Heilongjiang International University is to combine the background of the Belt and Road with the cultivation of

language talents in Russian.

4.2.3. Keyword Co-occurrence Analysis

Keywords are words and terms chosen from within or outside of academic papers to indicate items of information in the content of papers used for literature indexing [21]. Therefore, keywords reflect the subject and content of the literature. Keyword co-occurrence analysis is an effective way to elucidate the structure of scientific knowledge, explore research hotspots, and discover research trends.

In the software interface, the node categories were respectively set to keyword cooperation analysis, the node threshold value was 2\2\10; 4\3\20; 4\3\20 in terms of annual frequency of appearance—and the other parameters were set to be unchanged. The CiteSpace V software was run to create statistics on the keywords and create a knowledge map, overlapping keywords were manually eliminated. As shown in Figure 4, the CiteSpace analysis results show a total of 105 nodes, and 153 interaction lines. When retrieving data, the search formula contains “the Belt and Road” and “Silk Road Economic Belt”, so these two nodes cannot be used as high frequency keywords.

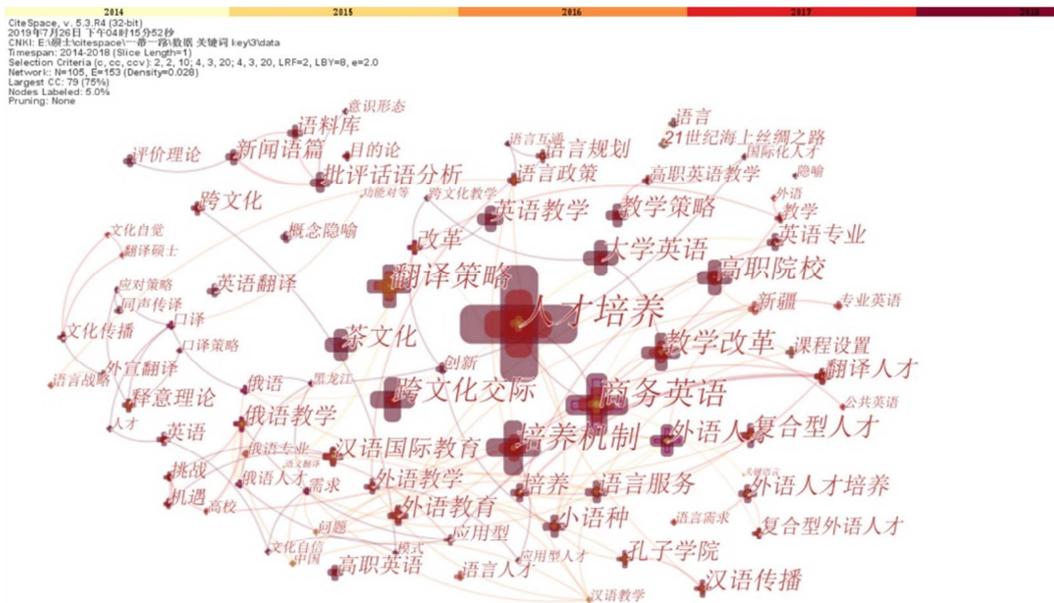


Figure 4. Visualization of keywords.

The top ten keywords were filtered from the keyword co-occurrence diagram based on frequency, shown in Table 2 below.

Table 2. Top 10 keywords on language studies in China in the context of the Belt and Road Initiative.

Keywords	Frequency	Keywords	Frequency
Personnel training	106	Education reform	37
Business English	58	Higher Vocational Colleges	35
Training mechanism	49	English teaching at college	33
Translation strategy	45	Foreign language talents	29
Cross-cultural communication	44	Tea culture	27

The research shows that, based on the top 10 keywords, the research topics on the field of language studies in the context of the Belt and Road are mainly divided into three parts: the cultivation of language talents, the countermeasures of major universities and colleges, and the way of cultural communication and transmission. Tracing back to the origin, this is mainly in response to the call of national policy. The research development basically follows the Belt and Road policy actions. In July 2016, the Ministry of Education issued Education Action Plan for the Belt and Road Initiative, which requires China and countries along the route to conduct education cooperation, carry out talent training and co-construct the cooperation mechanism. Therefore, keywords such as “personnel training”, “training mechanism”, “education reform”, “foreign language talents” and “compound talents” have become research hotspots. At the same time, the Belt and Road has a greater demand for the language itself, so it has promoted “Russian teaching”, “Translation Strategy”, “Chinese Communication”, “Business English” and other aspects.

4.3. Strategic Diagram Analysis

4.3.1. Strategic Diagram Analysis Method

In order to clarify research hotspots and frontiers of language studies in China in the context of The Belt and Road, based on the co-word clustering analysis and strategic diagram analysis method, this part draws out the strategic diagram, as seen in Figure 5.

Strategic diagram analysis is based on the establishment of the co-word matrix and clustering of the subject words, and uses a visual form to represent the results. This strategic diagram has been used in many co-word analysis studies. For example, Law (1989), Coulter (1998) [22, 23].

In 1988, Law proposed the use of “strategic diagram” to describe the internal connection in a field and mutual interaction of different fields. In strategic diagram, the x-axis represents the centrality, which indicates the strength of the interaction among fields; the Y-axis represents the density, which indicates the strength of internal connections in a certain field.

Centrality is used to measure the degree of interaction between one subject field and other subject fields. The more or the stronger the interaction between a subject field and other subject fields, the more central the subject field becomes in the entire research system. For a particular category, the calculation of the centrality can be performed by the strength of the links between all keywords of the category and the subject words of other categories. The sum, square or square root of these external links can be used as

the centrality of the category.

Density is used to measure the strength of the internal connection between the words that make up the cluster, that is, the strength inside the cluster. It can well illustrate the ability to maintain a cluster and the development of this cluster in the field. There are many ways to calculate the density of a certain category. First, count the number of times that each pair of subject words or keywords in this category appears in the same document; then calculate the average, median, or sum of squares of these internal links to get the density of this category.

The two-dimensional coordinate drawn with centrality and density as parameters is strategic diagram, which can summarize the structure of a field or sub-field. Its typical structure is that the horizontal axis represents concentricity, the vertical axis represents density, and the origin of the coordinates is the median or average of the two axes. This diagram divides each research field into 4 quadrants, which can be used to describe the research and development status of each subject.

4.3.2. Discussion

By using CiteSpace software, two key indicators “novelty” and “popularity” are introduced in the strategic diagram instead of the traditional Centrality and Density, which can more visually disclose the structure of research hotspots in a certain field and its development trend.

If there are N co-occurrence technical terms to form K clusters, and M technical terms in each cluster, Y represents the year of emergence, the calculation formula of “novelty” is:

$$NDi = \frac{1}{M} \sum_{j=1}^m Y_{ij} - \frac{1}{N} \sum_{g=1}^n Y_g, (i = 1,2,3 \dots K)$$

If there are N co-occurrence technical terms, forming K clusters, and M technical terms in each cluster, F represents co-occurrence frequency, the calculation formula of “popularity” is:

$$Ci = \frac{1}{M} \sum_{j=1}^m F_{ij} - \frac{1}{N} \sum_{g=1}^n F_g, (i = 1,2,3 \dots K)$$

After using the CiteSpace V software to perform keyword co-occurrence analysis, the keyword matrix can be found in the project file which is automatically generated by the software. Then the pair of keywords with the highest cosine function by the maximum function value can be found, which can be used as the central subject word of the first cluster. Then, the cosine index of the keywords in the subject word is sorted in descending order (the keywords after the 10th place

are excluded because the cluster reaches a saturation value). Then return to the original matrix and delete the members in the cluster one by one (rows and columns must be deleted). Repeat the above steps until all keywords with co-occurrence are added to clusters. Although there are keywords remaining in the matrix, there is no co-occurrence relationship between these keywords, that is, the co-occurrence strength between

these keywords is 0. The cluster generation ends here, and the remaining keywords are no longer added to any cluster.

According to the above method, 23 key words clusters in the field of language studies in the context of Belt and Road were obtained in the matrix. And according to the keywords contained in each cluster, the name of each cluster is summarized and numbered, as seen in Table 3.

Table 3. 23 key words clusters.

Cluster	Cluster Name	Cluster	Cluster Name
1	Political speech translation	13	Language Planning
2	Chinese International Education	14	Teaching and communication of Chinese
3	Opportunities and challenges in curriculum reform	15	Foreign language education and personnel training in Xinjiang province
4	Language and culture & foreign publicity	16	Interpretation Strategy
5	Russian majors & talent training	17	Teaching Reform
6	Positive discourse analysis	18	Yunnan province Language Services
7	Non-General Language & Talent Training	19	Critical Discourse Analysis
8	Foreign Language Education Policy	20	Cross-cultural communication
9	English talents training in Henan Province	21	Arabic
10	Confucius Institute and Language Policy	22	language needs and talent training
11	Higher vocational English Teaching	23	Foreign language teaching
12	Translation Theory		

According to the above calculation formula, the novelty and popularity can be calculated. Then the strategic diagram is plotted with the clustering popularity as the horizontal axis and novelty as the vertical axis, as shown in Figure 5.

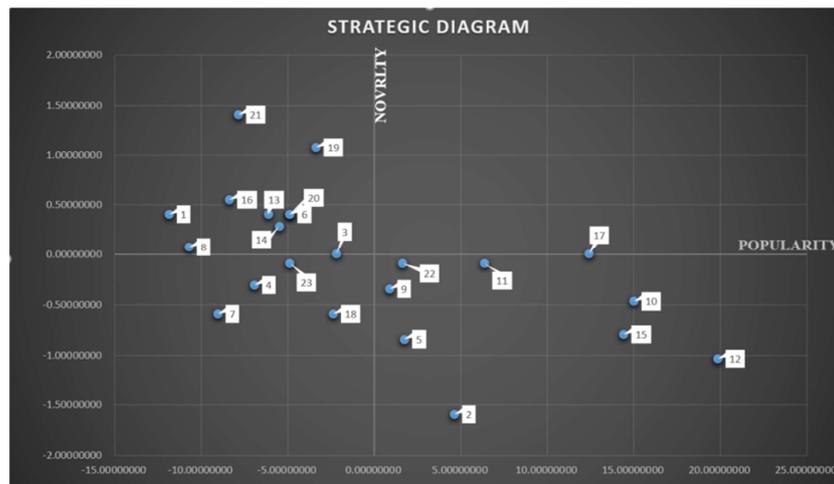


Figure 5. Strategic diagram.

Only cluster 17 is located in the first quadrant, and the novelty and popularity values of the cluster are both greater than zero. This shows that “Teaching Reform” has attracted a lot of attention and is a research hotspot in recent years. However, the small number in the first quadrant indicates that such research field still lack systematic development.

Clusters located in the second quadrant are cluster 1, cluster 3, cluster 6, cluster 8, cluster 13, cluster 14, cluster 16, cluster 19, cluster 20 and cluster 21. The novelty of these clusters is greater than zero, and the popularity is less than zero. This indicates that the research contents represented by these clusters are new topics in recent years, but the researches have received less attention. As long as the popularity is improved, the clusters in the second quadrant will move to the first quadrant, becoming more mature research hotspots.

Cluster 4, cluster 7, cluster 18, and cluster 23 are located in

the third quadrant. The novelty and popularity of these clusters are both less than zero. It shows that the research contents represented by these clusters are not highly concerned, and there is less research in recent years, which means they are marginalized.

Cluster 2, cluster 5, cluster 9, cluster 10, cluster 11, cluster 12, cluster 15 and Cluster 22 are located in the fourth quadrant, whose popularity are greater than zero and novelty are less than zero. This shows that the research contents represented by these clusters have attracted much attention, but they are not research hotspots in recent years and belong to basic research contents.

5. Conclusion

This paper adopts research methods of co-word analysis and co-word cluster analysis, and more specially, uses

research yield analysis, cooperation diagrams analysis and strategic diagram analysis methods. The object of this study is the existing researches of language studies in China in the context of The Belt and Road. By conceptualizing a macro view of the overall development characteristics and trends of the academic community, this study hopes to bring some useful references to scholars.

Based on the topics collected from the CNKI database, this study uses CiteSpace software for analysis and visualization. The results possess a certain reference value. At present, the research on the language studies in the context of The Belt and Road is increasing and has begun to take shape, but most of them focus on traditional fields, and the collaborations between institutes and authors are not close enough. Future research can be combined with policy documents, focusing on language planning, foreign language teaching, language translation, and training of minor language talents, to better serve the implementation of the Belt and Road.

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