

Hot Topic and Evolution Trend of Chinese International Contracting Project Risk Research Knowledge Graph Analysis Based on Citespace

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Abstract: With the high-quality development of the "One Belt and One Road" initiative, Chinese enterprises actively "go out", the international contracting project business is growing steadily, and its risk research results are constantly emerging. In order to summarize the research achievements of this field in nearly 20 years, this paper uses CiteSpace software to organize and analyze 2009 documents in this field in the period from 2000 to 2021 in China Knowledge Network (CNKI) journal database, and clearly shows the development course, hot themes and evolution trend of the field. First, this field will become the focus of scholars' attention with the growth of turnover; second, the core scholar group has been formed, but the cooperation between universities, enterprises and scholars is not close enough; third, the three hot topics are risk involved object, risk theory research and risk practice application; and fourth, the development process and evolution trend are divided into three stages: starting period, rising period and breakthrough period.

Keywords: Belt and Road , international contracting project, risk researches

I. INTRODUCTION

In 2021, the total number of 11,932 newly signed contracts for international contracting project business in China is 11,932, the amount of newly signed contracts is 260.25 billion US dollars, the completed turnover is 172.9 billion US dollars, the total turnover has been 2.00 trillion US dollars, and the amount of newly signed contracts is 3.01 trillion US dollars. To drive China's products, technologies and services to "go global", promote the transformation and upgrading of the domestic economy, and achieve win-win cooperation and development with relevant countries (regions), international contracting projects have become the main way for Chinese enterprises to jointly build "Belt and Road" and promote the construction of international infrastructure connectivity and production capacity cooperation. However, international contracting projects are more complex than domestic projects, and in addition to traditional risks, the political, legal, fiscal, exchange rate and other risks of the host country. In 1996, Lei Shengqiang published International Engineering Risk Management and Insurance, which marked the beginning of the systematic research of international contracting project risk in China. After decades of development, the research of

Chinese scholars in this field has become more and more mature and meticulous.

II. 1. DATA SOURCE AND RESEARCH METHOD

A. Data source

Using the China National Knowledge Network (CNKI) database as the retrieval platform, the retrieval method is set as: "theme =" ('+' overseas project '+' international project '+' overseas contracting project ') risk, retrieval condition = "accurate", literature category = "academic journal". The time range is set from 2000-2021, and the retrieval time is November 27,2022. A total of 2041 documents are obtained. Non-research documents such as "news report" and "meeting notice" were artificially removed during the data cleaning process, and 2,009 documents were finally obtained as data sources for bibliometric statistics and visual analysis of the literature.¹

B. Study Methods

CiteSpace is a visual analysis software focusing on the analysis of the potential knowledge contained in scientific literature². In this paper, on the basis of documentation, through CiteSpace software generated keywords clustering knowledge map, keywords time line clustering analysis map, keywords emergent analysis map, and the author post analysis map, in 2000-2021 China international contracting engineering literature hot topics and evolution trend of statistical analysis and visual presentation, to show the knowledge of domestic and international contracted engineering risk research panorama.

III. OVERVIEW OF INTERNATIONAL CONTRACTING PROJECT RISK RESEARCH

A. Annual publication volume trend

The publication time and the annual publication volume distribution of the literature can directly reflect the research heat and development speed in the research field (see Table 1). Table 1 shows the published scale of the completed turnover and international engineering contracting risk research literature of Chinese enterprises from 2001 to 2021. As can be seen from Figure 1, from 2000 to 2021, the number of

published articles on international project contracting risk research has been increasing year by year, especially after 2006. This shows that the risk research of international contracting projects has attracted more and more attention from more and more scholars, and the research heat is increasing. According to the annual post volume trend chart, The risk study of international contracting projects can be roughly divided into three stages: the first stage is 2000-2006, At this stage, the number of articles is small and the growth is slow, The average annual number of publications is 25, Among them, 22 articles were published in 2001; The second phase was from 2006- -2016, In this stage, the growth rate of

documents was significantly accelerated compared with the previous stage, The average annual number of articles was 115.8, In 2016, There were 162 articles posted, It is nearly 5 times of the average annual amount of documents issued in the previous stage; The third phase is for 2017-2021, At this stage, the number of articles appeared in twists and turns, The average post volume was 143.8, 109 articles in 2019, 162 articles in 2020. In particular, in the third phase of 2019, the global COVID-19 epidemic affected the development of international contracting project business, and the number of documents plummeted.

Table 1 The Volume of Chinese Enterprises and the published literature from 2001 to 2021

year	Turnover (US \$100 million) A	post volume (article) B	year	Turnover (US \$100 million) A	post volume (article) B
2001	89	22	2012	1166	112
2002	112	15	2013	1371	130
2003	138	31	2014	1424	147
2004	175	20	2015	1541	136
2005	218	42	2016	1594	162
2006	300	37	2017	1686	152
2007	406	45	2018	1690	151
2008	566	68	2019	1729	109
2009	777	85	2020	1559	162
2010	922	85	2021	1549	127
2011	1034	115			

At the same time, the study found that the period associated with Chinese enterprise international contracting project turnover, using SPASS software in table 1 A (turnover) and B (post) for variable correlation analysis, calculate the

correlation coefficient of 0.991 (table 2), shows that the strong correlation, namely the more the turnover, the more the number of post.

Table 2 Analysis results of the correlation between publication volume and turnover

	turnover	Number of posts
turnover	1(0.000***)	0.991(0.000***)
Number of posts	0.991(0.000***)	1(0.000***)

Note: ***, ** and * represent the significance levels of 1%, 5% and 10%, respectively

B. Study power distribution

a) Document quantity and partnership analysis

The core author is a mainstay of research in various professional fields, and research in leading fields. According to the lower limit of the core authors of Price (Price) theory³, the minimum number of core authors in this field is 3. Statistics show that 45 authors published 3 or more papers during this period and published a total of 205 papers, accounting for 10.2% of the total number of papers. This indicates that the core authors in this research field has been formed, but the overall number of core authors is low. Specifically, in terms of the number of articles published, the number of articles published by the core authors is not

high. The visual analysis of the author cooperative relationship map was generated by the author through CiteSpace software. There were 635 nodes and 152 connections, and the network density was 0.0008, indicating that although there are a lot of researchers in this field, there is a loose cooperative relationship.

b) Analysis of the number of articles issued by research institutions and the cooperative relations

Visual analysis of the partnership is conducted through CiteSpace software. There are 534 nodes and 67 lines in the map. The analysis results show that the network density is 0.0005, indicating that the partnership between the research institutions is not close enough.

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IV. KEYWORD CO-OCCURRENCE MAP ANALYSIS
 IN INTERNATIONAL CONTRACTING PROJECT
 RISK RESEARCH

A. Keyword word frequency analysis

Visual analysis of the keywords through CiteSpace software, the selection standard is "TopN (50)", "Pathfinder", "Pruningslicednetworks", "and" Pruningthemergerednetwork " to generate the keyword word frequency map and keyword clustering map of international contracting project risk research, and analyze the hot topics in this field. The node type selects "Keywords" to plot the co-occurrence map of the keywords.

The atlas contains 225 nodes and 604 connecting lines. After the centrality calculation, the hot spot keywords of the first 30 times of occurrence frequency are listed. As can be seen in Table Table 3, International Engineering (653, 0.33), Risk management (245, 0.47), risk (194, 0.21) Contractors (172, 0.34), At more than 100 times, And has a relatively high centrality degree, In the first echelon of hot research keywords in this field; The occurrence frequency of the second tier hot spot keywords is 40-100 times, Including project management (71, 0.07), exchange rate risk (60, 0.29) Risk identification (60, 0.19), Risk analysis (54, 0.10), Risk control (48, 0.07), financial risk (47, 0.02), Risk prevention

(46, 0.09) Subcontractor (41, 0.56); The third echelon appears between 10-40 times, Such as tender offer, Belt and Road, overseas projects, risk evaluation, claims, financial management engineering projects, foreign exchange risk, bidding and strategy, etc. The above main hot spot keywords first appeared in the time, in 2001 and 2009 more. In addition, some keywords do not appear more frequently but are more central, which are hot words in this field, such as risk factors (13,0.51), project bidding (7,0.28), Chinese enterprises (10,0.19), cost control (8,0.17), hydropower station (2,0.15) and letter of credit (4,0.11). Therefore, it can be shown that the risk subject of international contracting projects not only involves contractors but also subcontractors, and the risk categories are mainly exchange rate risk and financial risk, including risk identification, risk analysis, risk prevention and control, risk control, risk evaluation, claim and so on. In addition, scholars through project management, financial management, contract management and other keywords research, comprehensively respond to the risk changes of international contract projects.

Table 3 Key topics of domestic and international contracting projects from 2000 to 2021

order number	keyword	word frequency	centrad	The first year	order number	keyword	word frequency	centrad	The first year
1	International engineering	653	0.33	2001	16	contract management	40	0.15	2009
2	risk management	245	0.47	2001	17	contracting of project	33	0.26	2003
3	risk	194	0.21	2001	18	tender offer	32	0.11	2009
4	contractor	172	0.34	2000	19	Belt and Road	32	0.02	2015
5	project management	71	0.07	2004	20	risk management and control	31	0.16	2013
6	exchange rate risk	60	0.29	2005	21	Overseas projects	29	0.07	2009
7	risk identification	60	0.19	2006	22	countermeasures	29	0.00	2009
8	risk analysis	54	0.10	2003	23	risk evaluation	26	0.04	2007
9	manage	50	0.18	2001	24	claim indemnity	24	0.11	2001
10	Risk Management	48	0.07	2010	25	financial management	22	0.11	2013
11	financial risk	47	0.02	2013	26	project item	22	0.03	2008
12	Risk prevention	46	0.09	2008	27	exchange risk	20	0.06	2007
13	be on guard	44	0.10	2001	28	tender	20	0.02	2005
14	the way to deal with a situation	44	0.08	2008	29	risk prevention and control	18	0.08	2009
15	sub-contractor	41	0.56	2001	30	policy	17	0.36	2007

B. Keyword cluster analysis

Through CiteSpace software, 11 main clusters were obtained, and the Q value was 0.8076, indicating the network community structure and the clustering effect is good; the S value was 0.9399, greater than 0.9, indicating that the clustering results are convincing. The clustering results with remarkable structure and good results can help us to analyze and grasp the overall characteristics and development trend of international contracting project risk research.(Q value interval is [0,1), Q> 0.3 means

that the community structure is significant; the average profile value of $S > 0.7$ indicates that the clustering is highly efficient and convincing.)⁴

V. HOT TOPIC OF INTERNATIONAL CONTRACTING PROJECT RISK RESEARCH

The keywords in the literature were clustered to form a keyword cluster map and analyze the chart (Table 4). It can be seen that there are 11 key keywords in the field of international contracting project risk. In terms of cluster scale, the scale of cluster # 0 international project is the largest (22), followed by cluster # 1 exchange rate risk (20) and # 2 risk factor (19); From the perspective of average profile value, each cluster size is greater than 0.945, among which the cluster # 4 contractor and # 8 risk is the largest (1.00), and the cluster profile managed by # 5 is the smallest (0.846).

Table 4 2000-2021

clustering	Cluster size	Cluster profile	The main keywords
# 0 International engineering	22	0.932	International engineering; risk control; risk evaluation; overseas engineering; coping strategy
# 1 Exchange rate risk	20	0.973	Exchange rate risk; risk response; contract risk; construction enterprise; exchange rate changes
# 2 Risk factors	19	0.912	Risk factors; risk identification; project contracting; risk assessment; risk avoidance
# 3 Subcontractor	18	0.951	Subcontractor; risk prevention; political risk; project subcontracting; general contractor
# 4 The contractor	18	1	Contractor; international works; contract terms; fidic; risk management
# 5 Management	17	0.846	Management; claims; project management; tax risk; engineering
# 6 Countermeasures	16	0.894	Countermeasures; problems; contract management; international projects; general contracting
# 7 Compliance management	15	0.918	Compliance management; risk control; Angola; enterprise "going out"; host country
#8 risk	14	1	Risk; prevention; analysis; construction project; risk management
# 9 Risk analysis	13	0.873	Risk analysis; foreign exchange risk; performance guarantee; countermeasures; buyer's credit
#10Belt and Road	11	0.981	Belt and Road; Chinese enterprises; letter of credit; railway; epidemic risk

According to the classification of cluster labels (Table 5), the research hotspots of engineering project risk management are analyzed from three aspects: risk involved object, risk theory research and risk practice response. In terms of risk objects, scholars mainly pay attention to the risks of contractors in international projects. Ma Jianjun believes that in the process of business transformation and upgrading, in order to effectively prevent major business risks, it is necessary to establish their own unique business risk management system, so as to guide the sound and rapid development of international project contracting business.⁵ Liu Lin believes that in the process of the country's continuous promotion of "Belt and Road" construction, the initiative to "go global" have provided a good internal and external environment for China's outbound investment. However, the complex geopolitical risks, imperfect economic and legal systems, cultural differences and unstable public relations have led to many challenges in China's outbound investment. In light of domestic and international situations, encouraging Chinese enterprises to "go global" through the establishment of international governance system, developing diversified investment models, and establishing people-to-people and cultural exchange mechanisms, which is a good condition for achieving win-win outbound investment and cooperation against the context of "Belt and Road".⁶ From the point of risk basic theory research, different from the domestic project common traditional risk, scholars in the field is more focused on the international contracting project exchange rate risk, liu junying liu think international engineering exchange rate influence factors, it is difficult to predict, the contractor should take international project life cycle as the main line of the project exchange rate risk take appropriate measures to manage.⁷ Zhu Yi systematically identified and classified the risk factors of international contracting projects through literature research and expert interview, and applied AHP method to analyze the risk factors, and finally found the classification system of risk factors according to the weight value and changes.⁸ In terms of risk practice response, Liu Qiang established the basic framework of risk management of overseas engineering projects through practical engineering cases, analyzed the main process and management control points of enterprise-level and project-level risk management, and summarized the methods and experience of Chinese enterprises in the risk management of overseas international engineering projects. The implementation methods of the risk management system and framework in the international engineering project are discussed and analyzed.⁹ in recent years, When China's international engineering contracting enterprises conduct their international business, Often subject to sanctions by the World Bank, the Asian Development Bank and other international multilateral banks due to compliance

management and other factors, According to Juna, Given that international engineering contractors are often sanctioned by international multilateral banks such as the World Bank and the Asian Development Bank due to compliance management and other factors, The Contractor shall be aware of the rules and standards established by the US Department of Justice, ICC, International Bank, and International Organization for Standardization, International rules and standards should be integrated into the enterprise management system, Combined with the daily compliance management work of the enterprise, Establish a practical compliance management system, So as to explore and form the best compliance management practices in line with their own situation.¹⁰ In response to the risk of sudden outbreak in recent years, Liu Xinwei believes that COVID-19 continues to spread around the world, and overseas Chinese projects have suffered a great impact. While suffering from economic losses, enterprises are faced with the systemic risks of force majeure and a large number of potential legal disputes. International contracting project enterprises should be problem-oriented and designed to cope with the risk of the epidemic.¹¹

Table 5 Keyword cluster classification table

classify	Cluster name
Risk research object	# 0 International Works;
	# 3 Subcontractor;
	# 4 Contractor;
Risk methodology	# 10 Belt and Road
	# 1 Exchange rate Risk
	# 2 Risk Factor # 8 risk
Risk practice theory	# 5 Management
	# 6 Countermeasures
	# 7 Compliance management

VI. THE EVOLUTION TREND OF DOMESTIC DIGITAL GOVERNANCE RESEARCH

The keyword timeline clustering of CiteSpace software can visualize the evolution trend of a research field in a certain time range, which is conducive to scholars to investigate the relevant research progress and frontier dynamics in a relatively long-term scope based on a historical perspective. This study is presented by the keyword timeline clustering and keyword emergence analysis.

A. Keyword timeline clustering map analysis

CiteSpace The time variables are introduced into the graph network, and the time line cluster graph is generated through the clustered keywords, sketching the historical trajectory and time span of the development of specific keywords in each cluster. According to the timeline map information of keywords, the risk study of international contracting projects from 2000 to 2021 can be generally divided into the following three stages (Table 6).

The first stage is the initial period of 2000-2005. At this stage, the CPC Central Committee established and implemented the "going global" strategy, and the number of domestic enterprises going global and the amount of contracts increased significantly. Scholars mainly study from a macro perspective, focusing on international engineering, contractors, engineering contractors, subcontractors, risks and other basic content.

The second stage is the rising period from 2006 to 2010. With the continuous extension and expansion of the research content, a clear research context is gradually formed. This stage mainly focuses on the theoretical and practical response of risk identification, risk early warning, risk control, risk prevention, bidding risk, contract risk, contract management, insurance company, insurance claim and other specific risks.

The third stage is the breakthrough period 2011-2021. This stage begins to focus more on and refine, and starts in the direction of refinement and internationalization. Contract management, tax risk, contract text, overseas operation, host country, integration ability, compliance management, the whole chain, epidemic prevention and control risk control stage research hotspot, related research to the micro level, contract management, contract text, tax risk, epidemic prevention and control shows that research context keywords more detailed, overseas management, host country, territorial management, integration ability, the whole chain of keywords show that enterprises in this stage has attention in the host country to carry out the whole chain of localized management risk.

Table 6 Timeline clustering stage of international contracting projects

stage	time	keyword
stage I	2000-2005	International engineering, engineering contracting, subcontractors, contractors, risk, exchange rate risk, project financing, project management, claim management
stage II	2006-2010	Risk identification, risk early warning, bidding risk, risk early warning, risk control, risk prevention, contract risk, bid quotation, contract management insurance company, insurance claim Contract management, risk management and control, tax risk, contract text, overseas operation,
phase III	2011-2021	localization, host country, integration ability, compliance management, the whole chain, epidemic prevention and control

B. Present analysis of key words

Through CiteSpace software, 2009 documents were sorted by present years, and the visual view spectrum of key keywords in international contracting project risk research from 2000 to 2021 was detected. According to the analysis results, it can be divided into three stages: the first stage is 2000-2010. claim, project bidding, foreign exchange risk and contractor are the research focus of this stage. These two keywords not only last for a long time, but also have large strength, which

are the only keywords with more than 10 strength. The second stage is from 2010 to 2015. Related research mainly focuses on keywords such as going out, project contracting, Libya, contract amount, financial risk, and political risk. The third stage is from 2015 to 2021. Belt and Road, tax risk, risk prevention and control, and epidemic prevention and control have become new hot spots in the risk research of international contracting projects, which deserve further attention.

VII. STUDY CONCLUSIONS AND FUTURE PROSPECTS

A. Study Conclusion

In this study, 2009 international contracting project risk research papers from China Knowledge Network (CNKI) from 2000 to 2021 were taken as the research object, and the development process and hot topics of international contracting project risk research were analyzed and discussed. The research conclusions can be summarized as the following points.

First, from the overall trend of the research, the international contracting project risk research rapid development, research heat continues to rise, the relevant research published with the international contracting project business completed steady growth, under the "area" initiative, with the development of the international engineering contracting industry in the field is still a research hotspot.

Second, from the author and research institutions present map, international contracting project risk research core author group has been formed, but between scholars, research network density is low, research between scholars and institutions cooperation is not close enough, between

colleges, scholars, cooperation between enterprise width and depth is still have development space. Secondly, the main research institutions in this field are mainly state-owned enterprises that carry out international contracting project business, supplemented by universities and law firms. In the next step, private enterprises should pay attention to the experience accumulation and research in this field when going out to carry out international project contracting business.

Third, from the perspective of keyword co-occurrence map, keywords with high word frequency include international engineering, risk management, risk, contractor, project management, exchange rate risk, risk identification, risk analysis, etc. Based on the keyword cluster analysis map, this study summarizes the three hot topics of domestic and international contracting project risk research, including three aspects of risk related objects: risk object, risk theory research and risk practice response of engineering project risk management.

Fourth, based on the keyword timeline map and keywords appear results, combing the domestic and international contracting project risk research development process and

evolution trend, put forward can the field research is divided into starting stage (2000-2005), rising period (2006-2010) and breakthrough (2011-2021), and through the analysis of time line map and keywords present information summarizes the forefront of the research direction, for future research has certain significance.

B. Research outlook

First, on the cooperation network, it is suggested to strengthen the horizontal and vertical cooperation between enterprises, schools and scholars. International contracting projects involve multiple disciplines, involving not only traditional business risks such as engineering quotation in multiple fields, engineering construction, engineering management, financial management, contract management and tax planning, but also political risk, exchange rate risk, legal risk, social risk and other risks that are different from domestic contracted projects. As the risk practice of international contracting projects gradually advances to localization, this field requires researchers who understand language, national conditions, technology and management to make in-depth analysis and interpretation. Therefore, scholars from different institutions and disciplines should strengthen cooperation to jointly promote the deepening research in this field.

Second, in terms of research topics, we should continue to pay attention to the successful risk response cases of international contracting projects in various countries, summarize the experience of preventing risks, defusing risks and reducing risk losses in practice and enrich the practical theories in this field.

Thirdly, in terms of research content, the risk research in various relevant fields of the host country should be carried out under the localized diversified management strategy, and the risks should be continuously refined and improved, so as to lay a foundation for the high-quality development of enterprises' localized international contracting projects in the host country.

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