Research Status and Trends of Postgraduate Thesis Quality - A CiteSpace Visualization Analysis Based on CNKI and WoS Databases

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Abstract – Degree thesis quality comprehensively reflects postgraduates' innovation ability, scientific research ability and scientific research level. The aim of this paper is to review and analysis the current status and trends of research on the quality of postgraduate thesis in China National Knowledge Infrastructure (CNKI) and Web of Science (WoS) from 2004 to 2024 using visual analysis methods. The results of research found that both literatures of CNKI and WoS pay more and more attention to the research on the quality of postgraduate thesis. The number of relevant papers in CNKI has increased in the past five years, and the research focuses on the factors influencing the quality, the evaluation standards and the strategies for improving the quality. Researchers have published 105 articles in WoS from 2004 to 2024, with three stages of development, focusing on quality assurance of postgraduate education and thesis, the thesis itself, and the attitudes. The analysis of keyword clustering and timeline spectrum at CNKI and WoS shows that although the research hotspots and directions have their own focuses, they are all centered on the core of thesis quality.

Keywords – Postgraduate Degree Thesis, Thesis Quality, Visual Analysis, CiteSpace.

I. INTRODUCTION

The quality of talent cultivation is the lifeline of degree and postgraduate education, and the quality of thesis is an important reflection of the quality of postgraduate cultivation. Quality of thesis is a reflection of the knowledge, skills and qualities acquired by postgraduates during their study period, and it is an important outcome indicator for evaluating the quality of postgraduate training (Luo et al., 2023). However, due to various reasons in recent years, the quality of postgraduate thesis has shown a downward trend, and the phenomena of falsification, plagiarism, and low level are common, which has aroused widespread concern and heated discussion in the society. Based on this background, the Ministry of Education of the People's Republic of China (2014) issued the Measures for Sampling Inspection of Doctoral and Master's Degree Thesis in 2014, and formally carried out the sampling inspection of dissertations in 2015. Taking master's degree thesis as an example, in 2015,16,275 theses that had been awarded degrees in 2014 were sampled nationwide, of which 286 theses had problems, accounting for 1.76%. This is only the problematic dissertations found in the case of 5 per cent sampling. If all of them are audited and checked, the number of problematic dissertations will be concerning. To sum up, ensuring the quality and level of postgraduate thesis and the quality of postgraduate training is an important proposition for the connotation development of degree and postgraduate education at present. Therefore, this study comprehensively combs through the research hotspots and evolution vein of graduate thesis quality in the past 20 years, with a view to providing references for subsequent studies.

II. RESEARCH METHODS AND DATA SOURCES

2.1. *Research Methods*

CiteSpace software is developed based on Java language and citation analysis theory for literature data minin-

-g and information visualization and analysis. The software draws a graph of the trend of issuance that can clearly show the development of postgraduate dissertation research; it can also analyze the relevance of the data from different perspectives such as authors, countries, journals, and provide readers with valuable insights to improve the effectiveness and efficiency of their research. Keyword co-occurrence and clustering map can help to identify the core themes and related research directions of postgraduate dissertation research in CNKI and WoS, visualize the research dynamics and changing law of the field, and comprehensively reveal the research hotspots and trends in the field.

2.2. *Data Sources*

Literature data were searched using CNKI as sources, with "master" + "degree thesis quality", "postgraduate" + "master's degree thesis" as the main subject terms, further manual reading was used to screen and manually remove news reports, conference notices, calls for papers, reviews and other documents, and finally 324 valid documents were obtained, with the search time spanning from 2004 to 2024.

Similarly, this research searches literature data by using WoS as sources and "postgraduate" + "quality of thesis", "graduate student" + "quality of thesis" as topics for the search. And irrelevant literature such as interviews, book reviews, conference speeches, etc. were manually eliminated, and a total of 105 valid literature was finally obtained.

III. RESULTS AND DISCUSSIONS

3.1. *Publication Statistics*

3.1.1. *Analysis of Publications in CNKI*

As shown in Figure 1, from 2004 to 2024, the number of publications in CNKI shows an overall fluctuating upward trend. The number of publications increased slowly from 2005 to 2012, and then reached 17 papers in 2012. Subsequently, the number of publications fluctuated sharply from 2015 to 2021, and reached a peak of 27 in 2021, after which the number of publications tended to decrease, but still remained at a high level of 21-24 papers. In particular, the cumulative number of papers in the last 5 years was 118, which proves that the research on the quality of postgraduate thesis has received more and more attention, and there are an related academic papers.
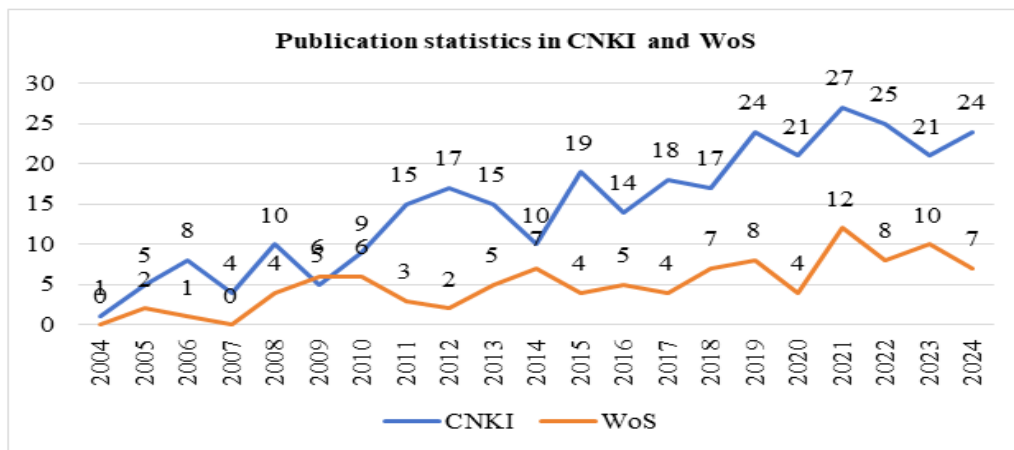

Fig. 1. Publication statistics in CNKI and WoS.

Since 2010, there has been a gradual increase in the number of publications. This is mainly attributed to the fact that the Outline of the National Medium- and Long-Term Educational Reform and Development Plan (2010-2020) explicitly puts high quality as the core task of educational reform and development, as well as the implementation of the Innovative Plan for Postgraduate Education, which has enabled postgraduates to give full play to their roles in scientific research. As an important part of higher education, postgraduate education, the writing of its thesis is the final part of the postgraduate training process, and it is a comprehensive reflection of the quality of postgraduate education. Driven by the policies and instructions, the number of relevant research publications in China will continue to grow and reach its peak in 2021.

3.1.2. *Analysis of Publications in WoS*

As can be seen from Figure 1, the total number of WoS literature releases in 2004-2024 is 105. The number of publications in WoS also shows a slow growth trend, with a low and unstable number of publications between 2004 and 2007. In 2010-2014, the number of publications decreased, and then fluctuated upwards between 2015-2021, reaching 12 in 2021 and then declining again. The trend of WoS research releases on the quality of postgraduate theses in 2005-2024 can be roughly divided into three stages. From 2005 to 2013 is in the initial development stage. The reason for the small number of publications in this period may be that before 2013, the attention of WoS research on the quality of graduate thesis was relatively low, and the research on related topics was in the initial state. 2014-2020 is in the fluctuating stage of development. This period may be due to the fact that the attention of WoS academics to the quality of postgraduate thesis has increased, but has not yet formed a sustained research hotspot, resulting in the fluctuation of the number of relevant research articles. From 2021 to 2024, the WoS research in this period is in the stage of rapid development, and the number of articles issued in 2021 reaches a peak of 12. The reason for this is that the significant increase in the number of articles in 2021 may be attributed to the increasing international emphasis on quality assurance in higher education, and the quality of postgraduate students, as an important part of higher education, has received the attention of more scholars.

3.2. *Keywords Co-occurrence Analysis*

3.2.1. *Keywords Analysis in CNKI*

This study integrates and analyses the keywords in CNKI document titles, and obtains a keyword co-occurrence knowledge graph containing 245 keyword nodes and 499 lines, with a network density of 0.0167 (see Figure 2a). As shown in Table 1, the keywords with the highest co-occurrence frequency are "thesis", up to 153 times, and other keywords with high co-occurrence frequency include "quality of thesis", "postgraduate" and "quality assurance". It shows that different disciplines in China attach great importance to the quality of postgraduate dissertations, especially in the fields of engineering and education. Meanwhile, scholars have conducted in-depth research on the strategy of improving the quality of dissertation, the factors influencing the quality of dissertation, and the evaluation standard of dissertation quality. Betweenness centrality is a measure of the importance of a network of nodes, reflecting a node's ability to mediate throughout the network, and nodes with a centrality greater than 0.1 are called key nodes. The mediational centrality of "thesis", "quality of thesis" and "quality assurance" are all greater than 0.1 (see Table 1). This indicates that these keywords have a strong connecting role and important influence in the whole research network of postgraduate thesis quality, co-

-nstituting the key nodes and core themes of postgraduate thesis quality research.
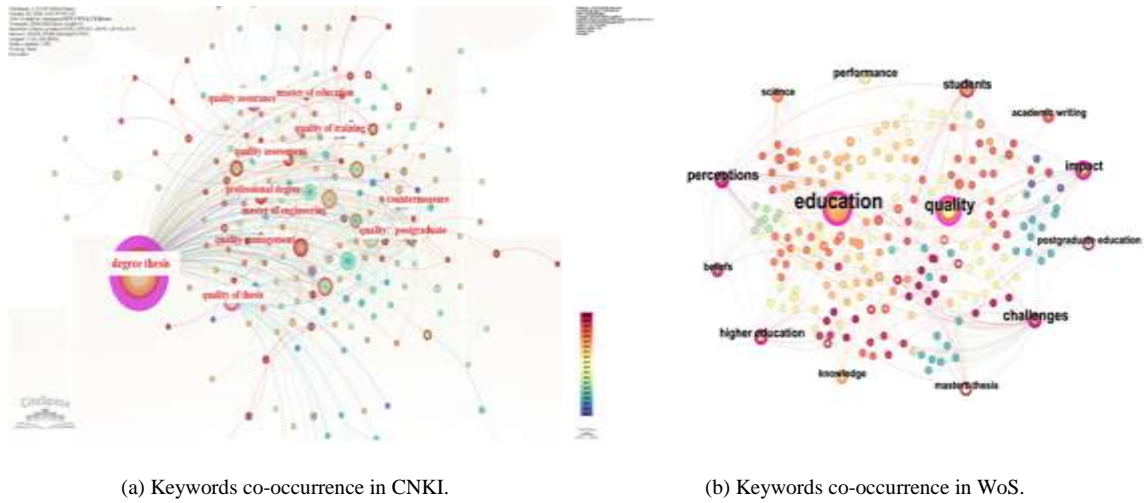

| (a) Keywords co-occurrence in CNKI. | (b) Keywords co-occurrence in WoS. |

Fig. 2. Keywords Co-occurrence map in CNKI and WoS.

Table 1. Keyword Frequency and Centrality in CNKI and WoS (TOP 5).

CNKI					WoS				
No.	Keywords	Frequency	Betweenness Centrality	Year	No.	Keywords	Frequency	Betweenness Centrality	Year
1	Degree Thesis	153	1.07	2004	1	Education	20	0.51	2013
2	Quality	29	0.07	2004	2	Quality	11	0.34	2009
3	Quality of Thesis	23	0.17	2006	3	Perceptions	8	0.19	2008
4	Postgraduate	19	0.08	2005	4	Impact	4	0.16	2008
5	Quality Assurance	19	0.11	2008	5	Dissertation	5	0.15	2010

3.2.2. *Keywords Analysis in WoS*

As shown in Figure 2b, this study integrates and analyses the keywords in the WoS literature transcripts to obtain a keyword co-occurrence knowledge graph containing 345 keyword nodes and 930 connecting lines, with a network density of 0.0157. As shown in Table 1, the keywords with the highest co-occurrence frequency are "education", up to 20 times. This keyword as the key node has the highest betweenness centrality (0.51), because the higher the frequency of the keyword, the higher the likelihood of co-occurrence with other keywords. Other keywords with "quality", "perceptions", "impact" and "dissertation". It can be found that higher education as a key stage of training high-quality personnel, has been the focus of attention of WoS academics, in which the quality of the problem is as is as the focus of higher education research. Meanwhile, the research perspective of scholars in WoS is developing towards diversification, focusing on the cognition of different subjects and the influence of related factors (Pinar et al., 2023; Cardwell et al., 2024). It is worth noting that the high frequency of "challenges" implies that postgraduate theses face problems such as insufficient application of technology and difficulties in communication between teachers and students in the process of quality assurance (Choo et al., 2024).

3.3. *Keywords Cluster Analysis*

3.3.1. *Keywords Cluster Analysis in CNKI*

Based on the keywords co-occurrence atlas, the keyword clustering atlas is obtained by LLR calculation, as shown in Figure 3a. The clustering module value (referred to as Q value) and the average contour value (referred to as S value) are the main parameters for evaluating the clustering atlas, and the clustering module value Q = 0.5372 (>0.5) and the average contour value S = 0.868 (>0.7) indicate that the clustering results are reasonable and have high credibility.

(a) Keywords cluster in CNKI.   (b) Keywords cluster in WoS.
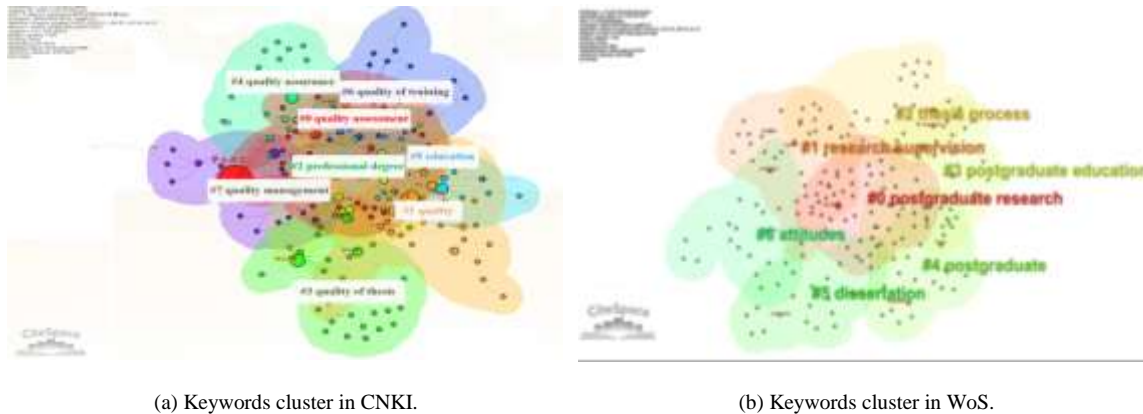
Fig. 3. Keywords cluster map in CNKI and WoS.

Further summarizing and integrating, it is found that research on the quality of postgraduate thesis in CNKI mainly focuses on the following 3 aspects:

(1) Research in the area of factors influencing the quality of postgraduate thesis (#3, #6). Researchers classify the factors affecting dissertations into subjective and objective factors, only that the focuses of different studies are different. For example, Yao (2008) analyzed the factors influencing the quality of graduate dissertations from the perspectives of internal and external factors.

(2) Research in the area of quality evaluation standards for graduate thesis (#0, #2). Through the literature combining, it is found that although the researchers have different views on the formulation of dissertation quality evaluation standards, they agree that the formulation of dissertation quality evaluation standards should follow the professional cultivation objectives as the primary principle. For example, Qiu (2018) designed a dissertation evaluation standard based on the fuzzy comprehensive evaluation method consisting of five indicators: topic selection, innovation value, academic achievements, writing level and specification, evaluation and defense.

(3) Research in the area of quality improvement strategies for postgraduate thesis (#1, #4, #5, #7). Different scholars in China have put forward different suggestions on the path of improving the quality of postgraduate dissertations through empirical studies. For example, Yang and Liu (2008) proposed that optimizing the training plans, clarifying the supervisor's responsibilities and establishing a monitoring system are effective strategies to guarantee the quality of the thesis.

3.3.2. *Keywords Cluster Analysis in CNKI and WoS*

Similarly, the cluster analysis of high frequency words in WoS studies resulted in six clusters, as shown in Figure 3b. The above six categories represent the specific research hotspots of postgraduate thesis quality resea-

-rch in WoS respectively. Among them, Q = 0.7941 (>0.5) and S = 0.8588 (>0.7), indicating that the clustering results are reasonable and highly credible.

Further summarizing and integrating, it is found that WoS research on the quality of postgraduate thesis mainly focuses on the following three aspects:

(1) Research in graduate education and thesis quality assurance processes (#0, #1, #2). "postgraduate research" emphasizes the research work of postgraduate students itself, which involves the direction, methodology and results of the research. "research supervision" highlights the supervisory and monitoring aspect of the research process, where supervisors' supervision and guidance play a key role in the quality and direction of postgraduate research. McCallin and Nayar (2012) state that the current challenges in supervising doctoral research require the adoption of a hybrid model. The 'thesis process' focuses on the entire process of the thesis from topic selection to completion, including the tasks and requirements at each stage. And Pu and Xu (2024) discussed the formation of self-assessment criteria for graduate students in thesis writing.

(2) Research related to the thesis (#3, #5). This category is directly centered on the dissertation, and the research mainly covers the structure of the dissertation, the quality of the content, and the writing specification. For example, Li et al. (2020) found that the Random Forest model performs best in identifying high-grade dissertations and that the number of published papers is the most important predictor of dissertation quality.

(3) Studies related to attitudinal dimensions (#4, #6). This category focuses on studies of postgraduate students' attitudes towards thesis writing, supervisors' attitudes towards supervision, and reviewers' attitudes towards thesis evaluation. For example, master's students and those with relevant coursework and research opportunities had more positive attitudes towards research, students' expectations of extended study time for a research-based thesis may have influenced their choices, and supervisor encouragement and students' sense of research competence had a significant effect on attitudes towards research and choice of thesis type (Marendić et al., 2023).

3.4. *Keywords Timeline Analysis*

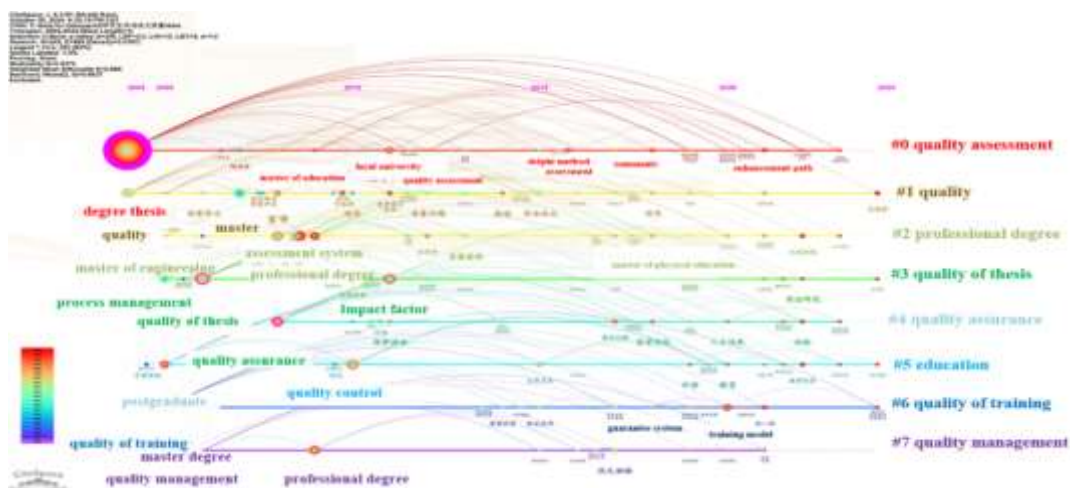3.4.1. *Keywords Timeline Analysis in CNKI*

Fig. 4. Keywords timeline map in CNKI.

Based on the CiteSpace software, the Timeline View function was selected to draw a keyword timeline map (see Figure 4). By observing the changes of keywords in different years or time periods, we can find out the evolution process of the quality research of postgraduate thesis in CNKI.
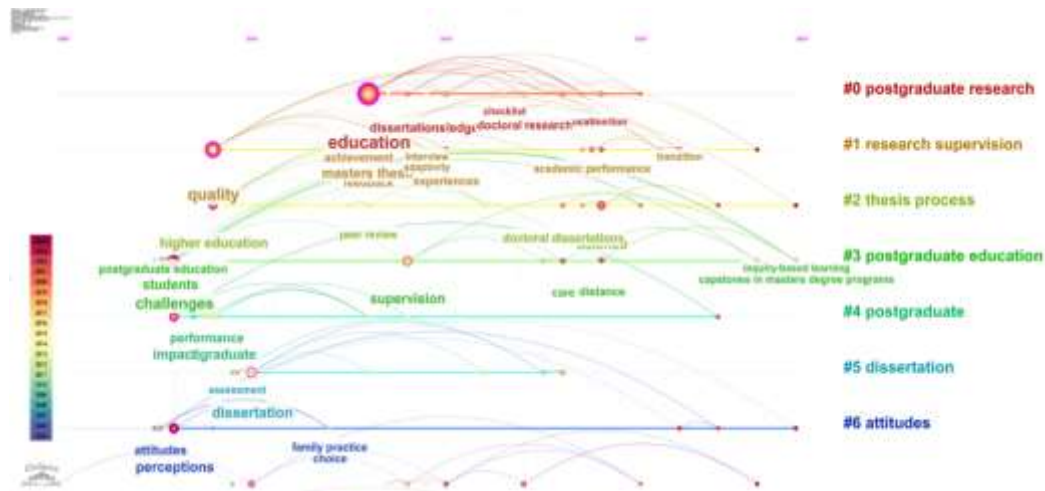

Fig. 5. Keywords timeline map in WoS.

The cluster with the longest appearance in the timeline graph is #1, which mainly focuses on the research on the path to improve the quality of postgraduate dissertations. As improving the quality of postgraduate dissertations is both complex and comprehensive, such a cluster is exploring to discover more improvement paths by encompassing the full use of double-blind evaluation system, postgraduate training system and dissertation management system. Cluster #5 reached the peak of the cluster in 2005, after which the research hotspot declined, and the research gradually became hot in 2019.

3.4.2. *Keywords Timeline Analysis in WoS*

In figure 5, the cluster with the longest appearance in the timeline graph is #3, which mainly focuses on the thesis review, specific teaching methods and curriculum of graduate education. It reflects the current relevant research not only focuses on academic results, but also pays attention to the innovation of teaching methods and the cultivation of practical ability. #6 Relative to other clusters, this cluster focuses on various types of attitudes and perceptions related to the quality of graduate theses, such as students' motivation to learn, teachers' commitment to teaching, and society's recognition of graduate students, which in turn affects the overall direction of graduate thesis quality.

IV. CONCLUSIONS

Based on CiteSpace software, this paper explores the research hotspots and evolutionary trends of the quality of postgraduate thesis at CNKI and WoS in an attempt to reveal the trajectory and future trends of the development of the field. It is found that (1) The overall number of publications in CNKI has been increasing, the number of related academic papers has increased in the past five years, and the number of articles issued has been gradually rising since 2010. The total number of publications in WoS from 2004 to 2024 is 105, and the trend of publications can be divided into three stages: preliminary development, fluctuating development, and rapid development. (2) CNKI keyword co-occurrence analysis shows that the words thesis has a high frequency, and CNKI research mainly focuses on the factors influencing the quality of thesis, evaluation standards, and

enhancement strategies. The co-occurrence analysis of WoS keywords shows that there are many high-frequency words related to higher education, and the research mainly focuses on the quality assurance process of postgraduate education and dissertation, the dissertation itself, and the attitudinal level. (3) CNKI clustering results research focused on quality influencing factors, evaluation criteria, and enhancement strategies. WoS clustering results of the same study focused on the process of quality assurance of graduate education and dissertation, dissertation, attitude level. (4) The quality cluster in the CNKI timeline spectrum appears for a long time and focuses on quality improvement paths, etc., while the postgraduate education cluster appears for a long time in WoS, and WoS also focuses on postgraduate student attitudes influence on the quality of thesis.

ACKNOWLEDGMENT

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