

Research Situation and Theme Analysis of Chinese Science and Technology Reports Based on CiteSpace

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Abstract:

At present, the main situation of international competition is no longer the direct war and Cold War mode in the past, and science and technology competition has become an important situation of international competition. Science and technology reports carry the key documents and achievements of science and technology, and it is of great significance to understand the research status of science and technology reports. In this study, CNKI was used as the main literature source, "Science and technology report" was used as the main title for search, bibliometric analysis was carried out with CiteSpace software, and hot topics of science and technology report were analyzed and summarized.

Keywords:

Scientific and Technical Reports, CiteSpace, Thematic Analysis

1. Introduction

According to the definition of China's national standard GB-7713-87, a science and technology report is a document that describes the results of a scientific and technological research, or the results of a technology development test and evaluation, or discusses the status quo and development of a certain academic and technical issue. In general, we believe that a scientific report is a record of a researcher conducting scientific research and producing scientific results for a certain scientific and technological project or a description of the research process [1]. Nowadays, the influence of science and technology on international competition cannot be underestimated, and relevant departments must deeply realize that the rapid development ability of science and technology and the ability to transform scientific and technological achievements from potential productivity to actual productivity have become the supporting force to enhance the comprehensive national strength. In international competition, countries with scientific and technological advantages and strong ability to transform scientific and technological achievements will be at the forefront of competition. Therefore, scientific and technological reports play a vital

role in this scientific and technological competition, and it is of great significance to have an in-depth understanding of the research status of scientific and technological reports. This study adopts bibliometric analysis and literature content analysis to conduct literature research and summary of the current research progress of scientific and technological reports.

2. Research Basis

2.1. Research Basis

This study mainly uses CiteSpace for the metrological analysis of scientific and technological reports. The software, developed and researched by Professor Chen Chaomei, has a variety of built-in bibliometric functions and is a commonly used metrological tool for current bibliometric methods. Based on source data, CiteSpace can draw co-citation map, keyword map and time zone view, etc. It can identify relevant clusters, key nodes and research hotspots in real time, so it is often applied to the forefront of research in a certain subject field. In addition, the software can also perform quantitative analysis of prescribed literature to form a knowledge graph that is easy to understand.

2.2. Research data and screening

In this paper, CNKI database is used, and the journal sources of “CSSCI” and “PKU” are selected, which have high credibility, wide influence and high authority, so as to ensure the reliability and depth of the research as much as possible. The specific steps of the search used advanced search, the topic = “Scientific report”, the end year set to 2022, and a total of 677 relevant articles were obtained. The title, abstract and other contents of the retrieved articles were identified, and through manual screening, announcements, news, reference formats, literatures without authors and other documents were removed, and 192 sample literatures were obtained.

3. Bibliometric Analysis

3.1. Analysis of the volume of communications

The number of journal publications reflects the academic interest and trend of the research topic, therefore, doing a trend analysis of the number of publications reflects the heat of the development of the research over time. This study searched for published literature up to 2022. As shown in Figure 1, the number of articles published in domestic science and technology reports between 1992 and 2022 is relatively small, and although the overall trend is upward, the research heat still needs to be improved.

According to the trend change of the number of published papers, it is divided into three stages:

(1) From 1992 to 2011, the number of published papers was small and fluctuated, with peaks in 1997, 2001 and 2007.

(2) From 2012 to 2015, the number of published papers obviously showed a rapid rise, reaching a peak of 23 in 2015.

(3) From 2016 to 2022, the number of published papers showed a downward trend, and then rebounded from 2021 to 2022. In this stage, the research literature has

decreased, but there are a large number of scientific and technological reports related announcements that have been excluded. After the development of the first two stages, the use of scientific and technological reports has increased.

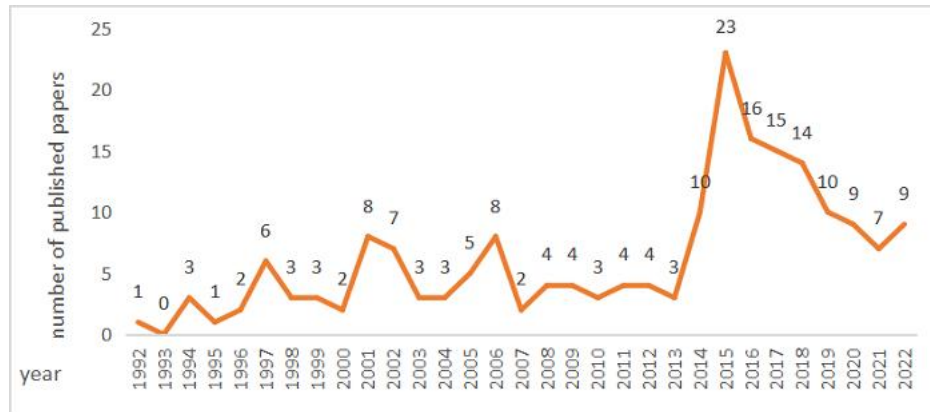


Figure 1. Number of scientific and technological reports published in China from 1992 to 2022.

3.2. Analysis of main authors

When studying the relationship between the development of scientific reports and the authors of literature, it is essential to analyze the contributions of the authors. By setting a time range of 1982-2022 in citespace, we get a total of 345 authors with 423 lines connected, indicating that the intensity of cooperation between authors is not high, with a density of 0.007. Use Price Law, $M = 0.749N^{\frac{1}{2}}$, where M represents the number of publications by core research authors and N represents the number of journals in which authors published the most in the field. In this study, N is 6, and according to the calculation, M is about 2, that is, the minimum number of published papers by the core author is 2. According to the statistics, 42 authors published two or more articles, and the core authors accounted for 12.2% of all authors. There were 12 authors who published 3 or more articles, accounting for 28.6% of the total number of core authors.

Table 1 shows the top 5 authors with the highest number of published papers.

Table 1. Top 5 authors in terms of number of publications.

Starting year	Author	Number of publications
2015	Xu Yan	6
2018	Zheng Yanning	6
2014	Zeng Jianxun	5
2014	Sun Jianjun	5
2001	Huo Zhenli	5

3.3. Issuing agency studies

Table 2 shows the institutions with three or more publications. The results show that the Institute of Scientific and Technological Information of China accounted for 18% of the total number of published papers, reaching 34, far ahead of the second place with 9 published papers. As the backbone of the research on science and technology reports, the Institute of Scientific and Technological Information of China has great reference value for the research of science and technology reports.

Table 2. *Top 5 Issuing Organisations in terms of number of articles issued.*

Starting year	Research organisation	Number of publications
2001	China Institute of Science and Technology Information	34
2014	School of Information Management, Nanjing University	9
1997	China Defense Science and Technology Information Center	5
2001	Northwest Institute of Nuclear Technology	5
2015	School of Information Management, Central China Normal University	4

3.4. Keyword analysis

In addition to the topic of “science and technology report”, other keywords with high frequency include information resources, technical record, scientific research management, America, etc. Among them, there are 9 keywords with a frequency of more than 3 times, as shown in Table 3, which have important reference significance for the theme and direction of science and technology reports.

Table 3. *Centrality of research keywords for scientific and technical reports.*

Frequency	Centrality	Starting Year	Keyword
73	1.11	1992	Scientific and technical report
7	0.21	2002	Information resource
7	0.03	1994	Technical record
6	0.02	2002	Scientific research management
5	0.12	2003	America
5	0.14	2002	Grey literature
4	0.05	1992	Library
4	0.07	1994	Informatics
4	0.03	2001	China

4. Thematic Analysis

After understanding the basic situation of the literature through the software, combined with the literature content analysis, reading the literature content, we can summarize the key research themes and research content of the science and technology report.

4.1. Management of scientific and technical reports

4.1.1. Management of research results

Science and technology report is a kind of science and technology achievement, so it is very important to manage the achievement information scattered in the network environment and scientific research institutions. Liang Jiwen et al. used science and technology reports to evaluate the achievements of science and technology projects, and to evaluate the relevance of science and technology projects and achievement documents [2]. Li Lin et al. put forward the basic work of the management of scientific and technological achievements, namely registration management, analyzed the registration of China's national defense scientific and technological achievements,

and proposed ways to promote China's scientific and technological progress and economic growth [3].

4.1.2. Research Data Management

Scientific research data is an important part of scientific research reports, detailed management of scientific research reports needs to pay attention to the processing of scientific research data, and scientific research reports also provide conditions for the development of scientific research data work. Yin Liying et al. analyzed the research situation of scientific and technological data management service mode, and analyzed the status quo of scientific and technological data management service subject, service content, service strategy and service object from the service perspective [4]. Zhao Xian et al. investigated the work status and problems of Shandong Province, which carried out scientific data work earlier, and proposed work path guidance for Shandong Province by referring to the scientific data work of the national science and technology plan [5].

4.1.3. Quality Management

The quality of science and technology report is an important feature of science and technology report, and the management and control of the quality of science and technology report is helpful to improve the level of science and technology report. Du Weiwei, Zhong Kai and Qiao Zhen [6,7,8] all investigated the quality of China's science and technology reports. Du Weiwei used fuzzy comprehensive evaluation method and analytic hierarchy process to analyze the quality of China's science and technology reports, and believed that the quality of China's reports was between good and medium. Zhong Kai designed a questionnaire to investigate service users and analyze the resource quality of the national science and technology report service system. Finding that the quality resources are insufficient, although the needs of users are basically met, the satisfaction of users needs to be improved. Qiao Zhen used the literature survey method to summarize the research situation on the quality control of Chinese science and technology reports from three aspects, and believes that the quality evaluation and control system of China's science and technology reports is not perfect. Xu Yan et al. proposed to integrate report quality control into the scientific research management process, evaluate the quality of science and technology reports through review and evaluation, and integrate to build a more efficient scientific research management process [9].

4.2. Construction of a scientific and technical reporting system

4.2.1. International experience

Shi Lei compared the construction of science and technology reporting system between China and the United States, and believed that China's science and technology reporting system is not perfect compared with that of developed countries [10]. Hu Hongliang et al. studied the evolution of the science and technology reporting system in the United States, and summarized the effective measures taken by the management department of science and technology reporting in the context of the network [11].

4.2.2. China Construction

Scholars have a wide range of research objects on the construction of China's science and technology reporting system, including national institutions in the macro, provincial institutions and universities in the micro. Xiong Sanlu put forward suggestions on establishing centralized, decentralized and integrated management institutions, improving laws and regulations, establishing standards and norms, and establishing constraint and incentive mechanisms to build a national-level science and technology reporting system [12]. Shi Chunli proposed the establishment of a three-level collection and service system for the construction of China's national defense science and technology report system [13].

4.3. Universal access to scientific and technical reports

4.3.1. Dissemination of shared issues

The storage and dissemination of scientific and technological reports can rely on the power of libraries, and the policy environment for promoting the dissemination and storage of scientific and technological reports needs to safeguard the rights and interests of all participants [14]. The goal of the establishment of China's science and technology report system is to promote open sharing. Yuan Shifen reviewed the historical development and current situation of the national science and technology report system, and integrated the open access and science and technology report system from the aspects of policy, resource utilization and organizational management [15]. In the context of the network, the use of the Internet to publish science and technology reports has become a necessary means. In order to promote the openness of science and technology administration, it is necessary to establish a relevant system for the disclosure of science and technology reports on the network and strengthen public supervision. Yan Xiang designed and improved the network disclosure system from four aspects: evaluation system, Internet content, external supervision and disclosure scope [16].

4.3.2. Intellectual Property Issues

The open and shared science and technology reporting system can play an important role, but there are many problems in the opening of science and technology reporting today. Improper opening has led to the destruction of the intellectual property rights of the owners of scientific research results, and the current safeguard measures have many inadequacies. Li Ping advocated improving the science and technology report system, enhancing the protection of intellectual property rights, and proposed increasing the confidentiality obligation for science and technology reports, improving the disclosure of abstracts, and setting up delayed disclosure [17]. Hu Hongliang and others discussed the concept of intellectual property rights in science and technology reports from a legal perspective, and put forward suggestions to solve the problem of intellectual property rights in science and technology reports [18]. Liu Jingyu et al. discussed the rights and interests of different information resources. The copyright of scientific and technological reports is complicated and subject to strict restrictions. They established a framework property rights mechanism for the description of rights and interests of digital resources to help library resources analyze the rights and interests status and analyze the copyright risks in the whole cycle of scientific and technological reports, which is conducive to promoting the construction of science and technology report system [19]. Ren Liang et al. divided the service of science and technology reports into four cycles, put forward copyright risks in different cycles, and put forward four-dimensional countermeasures for establishing

review system, authorization system, multi-channel authorization and legislative protection [20].

5. Summary and Suggestion

At present, the status of science and technology competition is becoming more and more prominent in international competition. As a key document in science and technology activities, the effective use of science and technology reports can promote the sound development of science and technology. However, there are few literatures on science and technology reports in China, and the research enthusiasm needs to be improved. At present, the authors with more research achievements in science and technology reports are Xu Yan and Zheng Yanning, both of whom are scholars of the Institute of Scientific and Technological Information of China. The Institute of Scientific and Technological Information of China has also made outstanding contributions to the research of science and technology reports among institutions and colleges, and is the backbone of the research of science and technology reports. At present, the main research hotspots in the research of science and technology report are summarized as the management, system construction and popularization and utilization of science and technology report. In order to give full play to the role of science and technology reports and promote the development of China's scientific cause, the following suggestions are put forward: Further clarify the importance and role of science and technology reports, raise the awareness of scientific research workers, improve the format of science and technology reports, and lay down the basic conditions for the application of science and technology reports; Deepen and refine the management of science and technology reports, properly collect scientific research results, integrate the information and data of science and technology reports, strictly check the quality of science and technology reports, and improve the quality of science and technology reports; Establish and improve the system of science and technology reports, learn from the successful experience of foreign countries in the construction of science and technology reports, build a comprehensive and three-dimensional framework of science and technology reports with both scientific research management and legal protection, pay attention to the open sharing of science and technology reports, promote exchanges, but also pay attention to the protection of the property rights of science and technology reports.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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