Library Using Bibliometrics to Drive the Development of Subjects

Ji FANG, Jin HUANG*, Feng-ping WEI, Rong ZHANG and Yi-Hua HE
Library of Huazhong University of Science and Technology, 1037 Luoyu Road, Wuhan, China
*Corresponding author

Keywords: Bibliometrics, Discipline development, Academic analysis.

Abstract. It is becoming a new trend for the library to provide the decision-making basis for the development of the university discipline by using bibliometrics, this paper clarifies the significance and importance of promoting bibliometric services by the bibliometrics best practice of the Huazhong University of Science & Technology Library in the subject situation analysis of the ESI, the ESI contribution analysis report of the department and the academic influence analysis of the department (laboratory), etc. And it is pointed that it is a way to improve the bibliometric services by strengthening construction of the library collection resources, cultivating the librarian cooperation consciousness and enhances the librarian’s service ability.

Introduction

Universities pay more and more attention to the acquisition of factual arguments in the subject development planning, decision-making and personnel evaluation. For example, in the future development and planning of subject, which is the dominant subject that is needed to increase the intensity of construction? Which subjects are on the rise in the world, but very weak? What subjects need to be compressed or cross direction? What are the potential scientists in a discipline? What are the promising disciplines, academic teams and academic leaders in this university? These forward-looking or predictive information is the most needs and concerns of scientific research managers, and directly affect the resource allocation and talent development and other disciplines development decisions.

Relying on library resources and professional advantages, it is an opportunity and challenge for the development of the university library to improve the service quality by developing and utilizing the resources and arraying out the bibliometric analysis from the perspective of library information and literature information, and providing in-depth analysis report for the development of university disciplines and talent assessment[1].

Many large databases are able to analyze the discipline or theme of the retrieved papers, but the classification of database on the basis of "subject" or "theme" and the settings of the category of the Ministry of education, first-level disciplines, second-level disciplines, and the "subject and specialty" in universities that are widely adopted by domestic universities, are so different that is hard to correspond. The planning and management of the universities is mainly according to the colleges, in order to provide scientific analysis report for the scientific research managers with the real reference value according to their needs, it is necessary to organize, analyze and statize the data of the thesis according to the department[2]. How to quickly, accurately and reasonably classify all kinds of papers to meet the needs according to the disciplines and departments, which truly reflect the various disciplines, faculties and laboratory paper indicators, is a major difficulty to carry out disciplinary analysis and is need to adopting appropriate technical means to complete.

Some libraries have been a lot of exploration and practice, has accumulated a wealth of experience, some of the library is still in its infancy. This paper will take the Huazhong University of Science and Technology Library as an example to introduce several typical models of bibliometric analysis service model and describe in detail the personnel organization, thinking of work, implementation process, technical points and achievements of each service, hoping to provide reference for brother college library to carry out the bibliometric analysis service.
Practices at Huazhong University of Science & Technology Library

Huazhong University of Science and Technology Library in 2013, relying on the Information consulting department to set up Institute of science and technology information, has formed the way of work that led by the Institute of Science and Technology Information and assisted by subject librarian. After years of efforts, the subject analysis and academic evaluation of our library has been gradually standardized and normalized. By the end of 2016, the library has completed more than 80 research and analysis reports. Among them ,the “ESI Ranking Analysis Report of Huazhong University of Science and Technology” and the "ESI Contribution Degree Report of Department of Huazhong University of Science and Technology", which is completed on the basis of Essential Science Indicators (ESI) and Web of Science database every year, in which the data is detailed, the analysis is objective and the conclusion is accurate, provides important reference for the decision-making of the discipline development and the optimal allocation of resources.

The bibliometric analysis of our bibliography is based on the scientific research of the university, paying close attention to the trend of discipline development, dedicating to mining and studying the information of discipline development, carrying out bibliometrics analysis and academic evaluation, the bibliometric analysis is deeply integrated into the development strategy of the university, and is highly praised by the university leaders.

ESI Discipline Situation Analysis

Academic situation analysis based on ESI is a routine bibliometric analysis service in our library. Each year, one to three reports are written according to the needs of the library that are mainly finished by the librarians who have followed the ESI database for a long time ,which data collection and sorting by the librarian or other student assistants.

The ESI database is updated annually in early or middle 1, 3, 5, 7, 9, and 11 months . The March data cover the longest time, for the past 11 years. In the practical work, we use the data of March as the benchmark data to define the subject area by the range of journals in each subject area of ESI, retrieve the field data of ESI directly using Web of Science (SCIE / SSCI) or InCites database. For the non-dominant subject areas, which do not enter the top 1% ranking, the "threshold comparison method" is used to compare the total cited frequency (the "threshold value") with the lowest ranked institution in the ESI discipline. The "proximity", the ratio of the total cited frequency of non-dominant subjects to the threshold of the subject, is used to estimate the size of the gap and to find the most promising disciplines from which to predict the next subject likely to enter the top 1% of the rankings[3]. Those dominant subjects that have already entered the top 1% of the ranking, compare with institutions or other universities which rank more forward, such as the former 1 ‰ institutions or other universities.

Practice has proved that the analysis based on ESI has a high accuracy in the prediction of potential dominant subject. In 2014, based on the data from the ESI database in March, we used InCites to obtain the total citation frequency of the non-dominant subject areas. Using the “threshold comparison method”, it is concluded that the "proximity" of immunology, molecular biology, genetics, social science, environmental science and ecology is very high. In 2015, these subjects in the ESI in January, May, July update data get into the global top 1% ranking, and have become our university's new dominant subject.

Each update of ESI will overwrite the previous data, and the database provides only the most up-to-date data. Historical data are often required in the report, revealing the evolution of the indicator by comparison. It is also an important basic work to save ESI index data. Our library designates a dedicated staff to follow up the ESI database to keep us informed of updates and to save ESI index data, in addition to writing information briefings, who also determines whether the need for the preparation of the depth of the academic situation analysis report according to the changes of indicators. Our ESI data accumulated over the years is considered to be the most complete and accurate ESI database in our university, making it the most reliable ESI historical data source in the whole university.
The Analysis Report on the Departments Contribution of ESI

The analysis report based on the departments contribution of ESI is a conventional bibliometric report service of our library, which is completed in the year before the summer. The report is written by the science and technology information research librarian and the related data is completed by the subject librarian.

The analysis report on the departments contribution of ESI is based on the March ESI data. Different from the analysis of the ESI discipline situation only to the level of indicators data, the contribution of the report will go deep into the analysis of the composition of the index data. Similarly, we define the subject scope with ESI of each subject field journals, retrieve our university paper ESI data in various fields (Article and Review two types) in a period of time (the same time range as March data) with Web of Science (SCIE/SSCI), then each document involved with tagging the Department, and as far as possible to the individual scholars.

We use the completely consistent rules as ESI to determine the contribution of institutions and authors so that each author and institution enjoy the influence of literature equally. For each paper, the number of papers in each institution is increased by 1, and the citation frequency of each institution adds the cited number of this paper.

We analyze the contribution of the Department from two aspects: the number of papers and the cited frequency. On the one hand, according to the number of papers and the cited frequency of different subject field, we measure the contribution of different departments in the same field based on the number of papers and the total cited frequency. On the other hand, according to the percentage of ESI subject field from the number of papers and the total cited frequency, we discuss the contribution of the same department to different ESI subjects. The marking workload of papers belong to the colleges and departments is very large and tedious. To improve efficiency, we develop the the summarize platform of academic papers of Huazhong University of Science and Technology. We introduce our university's newest papers bibliographical reference of Web of Science (SCIE/SSCI) into the platform at fixed time annually, and the papers are allocated to the subject librarian for marking. In addition, the personal information of teachers, masters and doctors is included in the summarize platform. When the subject librarian summarizes the information through the platform, the possible authors are pointed out intelligently based on the author's Chinese phonetic, in this way, the subject librarian find out the right information of the author base on this hint and their experience. The unique identifier, such as Research ID ,ORCID and so on, of the researcher isn't widely spread. What's more, the address of the author is not standard, not complete, with spelling error and in abuse of abbreviation. For these reasons it still costs a lot of time of the subject librarian to identify the author of the paper even that the platform makes papers marking be more convenient. After the identification of the papers whose author come from different departments, the background of the platform will carry out the statistics to the data, and produce the number of papers and the frequency of the subjects in the 22 ESI subjects and the number of the papers citation frequency and its proportion. These data constitute the main body of the contribution of all departments in the report, we are in accordance with the discipline and the department respectively according to the department, with a clear, eye-catching table or chart lists the data.

The contribution reports of ESI department show the number of the paper and the quality of the paper in various disciplines objectively. The university leaders attach great importance to the report and it becomes an important reference data for the summer work conference that the university leaders takes part in, and provide reference in the decision-making of discipline development, optimizing the allocation of resources and brain gain. In addition, departments can find their own advantages and disadvantages out, and then develop a reasonable development plan.

Analysis of Academic Influence of Department (Laboratory)

The analysis that focuses on the academic influence of the department (laboratory) is the custom literature metrology analysis service for our university provided by our library, which is dominated by the sci-tech information institution and with the assistant of the department librarians. Taking <the
analysis of the academic influence of Wuhan National Laboratory for optoelectronics as an example, the report was completed by the subject librarian of the sci-tech information institution, the subject librarian of the information consulting department and the subject librarian of the optoelectronics group. Coordination of the research, design of the structure and framework, collection of data and report writing are in the charge of the sci-tech information institution. Subject librarian is responsible for communication with the department and data retrieval. And part of the librarian of the information consulting department assist in processing data.

The data retrieval methods of several national laboratories and research institutions of thesis mainly adopt the institutions expansion. Paper of the same type optical research center data retrieval also need to construct retrieval type, On the one hand, to view the historical evolution, collecting different name spelling in different periods. On the other hand retrieving the organization's documents by institutions expansion retrieval functions first, and then get more spelling through the study of literature classification of its optical class documents address information.

It is reported, the data that we provide has been used in the laboratory results show, work summary, and project report for many times, which provide important reference for subject construction and development of photoelectric laboratory.

Conclusion

Intelligence analysis using the methods of literature metrology, which combines with a variety of information analysis tools and evaluation methods. From the angle of library information and literature information, we develop the trend of disciplines and departments for evaluation and analysis, which provide consulting and services for evaluation and analysis, the university personnel training, scientific research and development of decision-making. University scientific research management and discipline development decision pay more and more attention to the fact data, literature metrology services which improve the service level of library is facing the challenges and opportunities. The library of Huazhong University of Science and Technology based on the database of a Web of Science, InCites and ESI, carrying out academic analysis and evaluation work, has make the literature measurement analysis service become a new luminescent spot. The measures that we ensure the quality of academic analysis in literature measurement analysis services are: making sure that the data is accurate; clearly indicating the sources of the data, searching strategies and research methods, to obtain repeatable data; using the appropriate concept report notes, for the convenience of his professional readers; that the analysis and conclusion to data must be on the basis of neutral and objective. After years of practice, in our point of view, the library literature measurement analysis service also need to do the following several aspects for improvements:

According to Conditions, Combine with Collection and Subject Characteristics

Huazhong University of Science and Technology is a comprehensive university whose subjects of science, engineering and medicine are excellent, so we choose a series database of Web of Science to carry out academic analysis and discipline based on the evaluation of resources. For the humanities and social sciences, the evaluation function of the Web of Science is very limited, on the contrast, monographs and dissertations may better reflect their real influence. Therefore, the primary task of serving university subject development is to design and planning the project according to the subject characteristics and the collection of the university, to understand the working focus of the university, pay attention to trends in research and development around the university subject, to develop and promote the bibliometric analysis services on the basis of library resources.

Strengthen Teamwork

Bibliometric analysis involves a wide range of services, and each kind of analysis requires a large amount of data to support the retrieval, what's more, the cleaning and organization of various data is time-consuming. So complex and meticulous work force with one person is difficult to complete, in
this way, team partners is the best policy. Therefore, we should set up a team to carry out the bibliometric analysis, and to accomplish a complex task. In the structure of knowledge, the team should have a sturdy theoretical knowledge of library and information science, but also has the ability of skilled information retrieval and data processing, as well as good skills of communication and coordination. In order to facilitate the work, different types of work should be led by different people, and to play the enthusiasm and advantages of each talent. On the basis of a professional team, there can also be an auxiliary force. For example, the majority of the subject librarian of our library and other departments of the information consulting department, can provide help when it's necessary. With their help, the work efficiency can be guaranteed even that the situation of heavy tasks happens.

**Seek Cooperation, Spread Service Field**

In the early time of the establishment of the library, bibliometric analysis of normal service work is ESI data storage and consulting, compilation of ESI information, the ESI analysis report of subject situation and the analysis report of ESI subject, all the work is gradually standardized based on years of exploration. In 2013, we visited the some scientific research management departments, such as scientific research management, office of development and reform and subject construction office, actively carried out academic analysis and displayed library subject evaluation enthusiasm and strength. At the end of 2014, association for science and technology organized the award to a higher level paper of the whole university, entrusted the library to finish the detailed paper data. Because of the continuity of work reward, the work of high level paper data sorting also become a norm of library work gradually. So bibliometrics analysis service must be point with surface, and through several features work, communicating with other departments and universities, to seek cooperation, to expand service areas and broadening the service content.

**Strengthen Learning and Research**

Bibliometric analysis service is a work that keeps pace with the times, and its methods, techniques, tools and contents may change with the development of society. We should continue to learn new knowledge, new technology and new ideas, and apply it to the work of bibliometric analysis for maintaining the energy of subject evaluation and academic analysis. At present, the measurement tools used in the subject evaluation are based on the bibliometric analysis of citation analysis. We should learn how to introduce the network measurement and peer evaluation into the academic evaluation. In order to improve the efficiency of data analysis, we need to study and learn more powerful software for data analysis and processing. The subject of bibliometric analysis is mostly related to science, engineering and medicine. With the development of the university, it is necessary to evaluate the humanities and social sciences. In this case, studying and researching new techniques, tools and methods is imperative.

**References**

