Bibliometric Analysis of the Research Status of Tangka Images at Home and Abroad

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Abstract. Carrying out research on Thangka images is of great significance for accelerating the construction of China's cultural industry, especially the protection of Thangka's cultural heritage. This paper will analyse the current research situation of Thangka images at home and abroad to provide reference for relevant personnel. This paper uses Chinese academic journals, doctoral and master's degree thesis, international conferences, and English journals as information sources to perform quantitative analysis on the research results of the Thangka images published in them. The search process does not set a time limit, and uses CNKI and Excel analysis tools to relevant topics of the 55 Chinese documents and 21 foreign literatures are subject to annual trend analysis, document source analysis, author analysis, and distribution agency research. By this paper, the development trends, important information sources, important authors, and important research institutions of Thangka image research are obtained.

1. Introduction

Tangka (Tangga), also known as Thang-ka, Thang-ga, is a Tibetan transliteration. It refers to a religious scroll painting that is mounted on a colored satin and then hung for worship. Its picture content is mainly based on religious themes, with distinctive ethnic characteristics, rich religious colors and unique artistic style. Thangka is a unique form of painting art in Tibetan culture. The subject matter involves history, politics, economy, culture, folklore, secular life, architecture, medicine, astronomy, calendar and other fields. It is called "Encyclopedia of the Qinghai-Tibet Plateau" by domestic people[1]. In 2006, Thangka was included in the first batch of national intangible cultural heritage lists approved by the State Council of the People's Republic of China and determined and published by the Ministry of Culture[2].

Thangka is highly ornamental and is an extremely precious image and real historical material in various fields of Tibetan studies. It has high academic value at home and abroad [3]. It is precisely based on the rich connotation of Thangka that the research on Thangka images is of great significance for accelerating the construction of China's cultural industry, especially the protection of Thangka's cultural heritage. It is precisely based on the rich connotation of Thangka that the research on Thangka images is of great significance for accelerating the construction of China's cultural industry, especially the protection of Thangka's cultural heritage. Based on this, the author adopts a literature measurement research method, taking China Knowledge Network (CNKI), Wanfang database, and Web of science papers as samples, and statistically analysing the "Tangka image" papers from the
perspective of image processing to reveal the field’s research status and development trends, with a view to providing reference for subsequent research.

2. Research methods and data sources

This article uses literature measurement research methods to analyse the publication year, source journals, authors, and publishing organizations of Thangka image literature. The author at CNKI on April 28, 2020, used academic journals, doctoral and master's degree thesis, conferences and newspapers as the object, and used "topic = Thangka image" as the retrieval type to perform topic retrieval. The search results were 249 articles [4]. On the Wanfang Data Knowledge Service Platform, academic papers are used as the object, and "topic = Thangka image" is used as the retrieval type to perform topic retrieval. The retrieval results are 2 articles. In Web of Science, all databases are used as the object, and "topic = Tangka image" is used as the search type to perform topic search, and the search results are 4 articles. The authors performed data cleansing and deduplication on the obtained literatures, and checked them one by one, eliminating 179 articles that were repeatedly published and irrelevant to the topic of this article, and finally obtained 76 articles that met the requirements.

3. Bibliometric analysis

3.1. Annual trend analysis of the number of published papers

The quantity of literature reflects the research hotspot and research level of a certain field to a certain extent, and it is an important indicator to measure the development of this subject field. Through the statistics of the number of specific subject documents in specific information sources, it is helpful to understand the development status and trend of this field from the external characteristics of the amount of documents [5]. Based on this, the author uses EXCEL software to statistically analyse the number of papers of Thangka images and the resulting chart is shown in Figure 1.

![Figure 1. Annual trend analysis of the number of published papers.](image)

It can be seen from Figure 1 that China's research on Thangka images has been growing steadily since the first paper appeared in 2006. The number of papers reached its peak in 2014 (12 articles), after which the number of papers declined year by year and reached the second highest point in 2019 (11 articles). So far, 76 papers have been published, and an average of 5.4 papers have been published annually. Overall, the research time of Thangka images is not long, the number of papers is not large, and the academic accumulation is obviously insufficient.

3.2. Analysis of the source database of the paper

Analysis of the source database of Thangka image papers can determine the main source of this research field, which is convenient for readers to read and provide an effective reference source for scientific research. According to statistics, for the 76 papers selected in this paper, the source database is shown in Table 1.
Table 1. Analysis of the source database of the paper.

| Source database                  | Number of papers | Proportion of papers |
|----------------------------------|------------------|----------------------|
| English Academic Journal         | 8                | 10.53%               |
| International Conference         | 13               | 17.11%               |
| Chinese Academic Journal         | 44               | 57.89%               |
| Chinese Master Degree Thesis     | 11               | 14.47%               |

In Table 1, there are 21 foreign papers and 55 Chinese papers. Chinese papers include 44 journal papers and 11 master degree thesis papers. The author further analyses the source of Chinese periodicals.

1. Analyze the number of papers published in journals. The 44 papers selected in this paper are distributed in 32 different journals. According to Bradford's law [6], according to Bradford journal area division rules, draw Bradford journal partition table (see Table 2):

Table 2. Bradford Journal Partition Table

| Partition category   | Number of papers in journals (n) | Number of journals | Number of papers | Percentage of total papers |
|----------------------|----------------------------------|--------------------|------------------|---------------------------|
| Core area            | n>=3                              | 2                  | 7                | 15.91%                    |
| Related area         | 3>n>=2                            | 7                  | 14               | 31.82%                    |
| Discrete area        | n<2                              | 23                 | 23               | 52.27%                    |

The analysis shows that the papers in the core area come from two journals with the fewest numbers and the highest efficiency. The relevant area includes seven journals with a large number but the average efficiency. The discrete area includes the 23 journals with the largest number and the low efficiency. The three kinds of journals have a ratio of 2: 7: 23=1: 3.5: 12.25, Bradford coefficient: \( a = 3.5 \). \( a > 1 \), its distribution law conforms to Bradford's law.

2. Analyze the distribution of journals. According to the list of source journals of the Chinese Science Citation Database (2019-2020), the Journal of Computer-Aided Design & Computer Graphics, Journal of Jilin University (Engineering and Technology Edition), Laser & Optoelectronics Progress, and Journal of Central South University (Science and Technology) are the core of the CSCD. Computer Engineering, Computer Engineering and Applications, Computer Science, Journal of Computer Applications, and Journal of Data Acquisition & Processing arc CSCD extensions. Among the 44 journal papers, there are 13 CSCD core + CSCD extensions, accounting for 29.5% of the total number of papers. It can be seen that the quality of Thangka image papers is relatively high.

3. Analyze the average citations and average downloads of papers. The number of papers published in Computer Applications, Computer Engineering and Design and Journal of Computer-Aided Design & Computer Graphic is higher than other journals. To a certain extent, these three journals have a great influence on the research of Thangka images, and the quality of the four articles published by them is relatively high.

3.3. Statistical analysis of the author

By analyzing the authors of Thangka's image papers, you can understand the basic situation of researchers in this field and determine the core authors, so that you can further understand the research
status and trends in this field [7]. In the 76 papers researched by Thangka Image, the second author was removed. There were 40 first authors. There were only 25 authors who published only one paper, accounting for 62.5% of the total number of first authors. According to Lotka’s law [8], only when the author of a paper published is about 60%, the core author group will be generated, obviously the core author group of Thangka image has been formed.

According to Price’s law [9], calculate the core author formula $M = 0.749$, where $M$ is the number of papers and $N_{\text{max}}$ is the number of papers of the most prolific authors in the statistical period. Only those authors who published more than $M$ papers are the core authors [10]. Statistics show that the authors with the highest volume of articles are Huaming Liu of Fuyang Normal University and Wenjin Hu of Northwest Minzu University. Both of them have published 7 papers. According to the formula and $N_{\text{max}} = 7$, $M$ is 1.98. In practical applications, according to the principle of rounding, $M$ takes the value 2, that is, the author who publishes more than 2 articles is the core author. According to statistics, there are 15 authors who have published more than 2 papers, and a total of 51 papers have been published. The number of core authors accounted for 37.5% of the total number of first authors, and the number of published articles accounted for 67.11% of the total number of papers. This exceeds the standard of 50% of Price’s law, indicating that the core author group has been formed, which is consistent with the conclusion drawn by Lotka’s law. The following Table 3 shows the core authors of Thangka image research.

| First author  | Number of papers published |
|---------------|----------------------------|
| Huaming Liu   | 7                          |
| Wenjin Hu     | 7                          |
| Tiejun Wang   | 5                          |
| Ru Xue        | 4                          |
| Weilan Wang   | 4                          |
| Xiaojing Liu  | 4                          |
| Xiang Fei     | 3                          |
| Wanpin Gao    | 3                          |
| Qian Liu      | 2                          |
| Xiaobao Lu    | 2                          |
| Shouliang Tang| 2                          |
| Xiaoran Guo   | 2                          |
| Yan Xu        | 2                          |
| Hui Xie       | 2                          |
| Lu Yin        | 2                          |

3.4. Statistical analysis of published paper institutions

The names of the institutions assigned by the thesis are generally named after the specific unit where the author is located. Most of them are secondary institutions. Through preliminary statistical analysis, it is found that the number of the papers distributed to each unit is small, which does not have the meaning of analysis and comparison. Therefore, the author imports 76 institutional data of published papers into Excel for processing, and uniformly revises the names of all organizations. The main operations are as follows: (1) The name of the second-level unit is removed, and the name of the first-level unit shall prevail; (2) Correct the different names of the same unit, whichever is the latest name; (3) For co-authored papers, only the name of the institution where the first author is located [11]. The number of papers published by institutions after standardization is shown in Table 4.
Table 4. Statistics on the number of papers published by institutions.

| Ranking | Institution name                      | Number of papers | Percentage of total papers(%) |
|---------|---------------------------------------|------------------|------------------------------|
| 1       | Northwest Minzu University             | 38               | 50.00%                       |
| 2       | Qinghai University                     | 9                | 11.84%                       |
| 3       | Xizang Minzu University                | 7                | 9.21%                        |
| 4       | Fuyang Normal University               | 6                | 7.89%                        |
| 5       | Lanzhou University of Technology       | 4                | 5.26%                        |
| 6       | Chengdu University of Technology       | 3                | 3.95%                        |
| 7       | Southwest Jiaotong University          | 2                | 2.63%                        |
| 8       | Ningxia University                    | 2                | 2.63%                        |
| 9       | Dalian Polytechnic University          | 1                | 1.32%                        |
| 9       | Gansu Normal University for Nationalities | 1                | 1.32%                       |
| 9       | Qinghai Nationalities University       | 1                | 1.32%                        |
| 9       | Qinghai Normal University              | 1                | 1.32%                        |
| 9       | Minzu University Of China              | 1                | 1.32%                        |

It can be seen from Table 4 that Northwest Minzu University has the highest number of published papers, reaching 38, accounting for 50% of the total papers published. Qinghai University ranks second and Xizang Minzu University ranks third. It shows that these three institutions are in a leading position in the field of Thangka image research in China, and there are a group of high-level author groups. At the same time, it also reflects the comprehensive strength of the three universities in the research of Thangka image to a certain extent.

4. Conclusion

Based on the previous analysis, the following conclusions can be drawn:

From the annual trend analysis of the number of published papers, since the first paper was published in 2006, the research on Thangka images in China has been steadily increasing. The number of papers reached its peak in 2014 (12 articles), and the number of papers thereafter declined year by year, and reached the second highest point in 2019 (11 articles). So far, 76 papers have been published, with an average of 5.4 papers published each year. In general, the research time of Thangka images is not long, the number of papers is not large, and the academic accumulation is obviously insufficient.

By analyzing the source of the paper database, 21 of the 76 papers selected in this paper are foreign-language literature and 55 Chinese literature. There are 44 journal articles and 11 master thesis in Chinese literature. Among them, 44 journal articles are distributed in 32 different journals. Among the 44 journal articles, there are 13 CSCD core + CSCD extensions, accounting for 29.5% of the total papers. It can be seen that the quality of Thangka image papers is relatively high.

It can be seen from the statistical analysis of the distribution of authors that 15 authors have published more than 2 papers and 51 papers have been published. The number of core authors accounts for 37.5% of the total number of first authors, and the number of published papers accounts for 67.11% of the total number of papers. This far exceeds the 50% standard of Price law, indicating that the core author group has been formed.

By analyzing the institutions that published the papers, Northwest Minzu University has the highest number of published papers, reaching 38, accounting for 50% of the total papers published. Qinghai University ranks second and Xizang Minzu University ranks third. It shows that these three institutions are in a leading position in the field of Thangka image research in China, and there are a group of high-level author groups. At the same time, it also reflects the comprehensive strength of the three universities in the research of Thangka image to a certain extent.
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