



Combining Data Mining to Analyze the Book Design Research

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Abstract. Book design is not only the main branch of plane design, but also an important research object in the field of publishing. In order to further understand the current research status of book design in China and summarize the research hotspots and directions, based on the bibliometric analysis software COOC 10.07, this paper uses data mining technology to statistically analyze the CSSCI literature of book design research in recent 15 years. The result shows that the research on book design has phased characteristics, including three stages: start, rise, and fall. Literature sources are mostly related to the field of art. The study hotspots of book design include “cover design”, “innovation” and “design”, etc. Designers should focus on readers' reading experience, deeply analyze the reading behavior and needs of various readers, strengthen cross-border integration research, and provide book design works with humanistic care and contemporary aesthetic characteristics for various readers.

Keywords: Book Design · Cluster · Co-Occurrence Analysis · Data Mining · COOC 10.07

1 Introduction

Design grows with the civilization of human beings [1]. From the agricultural age to the industrial age, and then to today's information age, the design presents different forms in different social stages [2]. Among them, book design is a systematic thinking behavior and the overall construction of text information by designers [3]. Literature metrology, as a quantitative analysis method based on mathematical statistics, obeys the rules of scientific papers, takes the external characteristics of scientific papers as the research object, and objectively evaluates the development process of a certain field through its quantitative relationship, distribution structure, and other characteristics. At present, its application in various fields has been relatively mature. This paper takes book design as the research object, based on Bibliometrics and COOC 10.07 [4] and other softwares, using the CNKI database as the data source, this paper analyzes the research progress of book design, and tries to sort out the research hotspots, current situation and development prospects of book design.

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2 Materials and Methods

2.1 Data Source and Search Strategy

This paper takes CNKI database as the main database source for retrieval. Entering the advanced search interface, “CSSCI” is selected as the source category, “book design” is taken as the subject word. The search conditions are “accurate”, and the search time domain is from January 1, 2007 to December 31, 2021, a total of 15 years, and the search operation time is February 9, 2022. After comparison and screening, screen out irrelevant contents such as drafts, meetings and notices. Then read and screen their abstracts, excluding non-academic literature such as communication reports and introductions, as a result, a total of 617 papers meeting the requirements were obtained as the data of this study.

2.2 Data Mining Softwares

This study was processed by literature quantitative analysis software COOC 10.07 and Excel, 1) Use literature quantitative analysis software COOC 10.07 merge the TXT documents of sample documents; 2) Use literature quantitative analysis software COOC 10.07 removes the duplicate of TXT documents of sample papers after merging to obtain the Excel documents; 3) Check each field one by one and then use the COOC 10.07 extract the word groups such as time, author, affiliation and keywords from the de-duplicated papers and make Excel tables; 4) Use COOC 10.07 analyze the above words after frequency statistics.

3 Results

3.1 Characteristics of Papers’ Quantity

The number of 617 papers with the topic of “book design” retrieved in CNKI database is shown in Fig. 1. As can be seen from Fig. 1, the number of papers issued shows an overall upward trend over time, reaching its peak in 2019. The research on book design can be divided into three stages: The first stage is from 2007 to 2017, which is characterized by a relatively small number of papers, showing a slow upward trend as a whole. This stage is the initial stage of book design research, and there is relatively little research on book design in China; The second stage is 2018–2019, which is characterized by a large number of papers, with an obvious increasing trend, and the annual number of papers reached its peak in 2019. This stage is the rising stage of book design research; The third stage is 2020–2021, which is characterized by a downward trend in the number of papers issued, which is the falling stage of book design and research.

3.2 Affiliations’ Contribution

The number of papers issued by book design and research affiliations based on the CNKI database ranks among the top 20, as shown in Fig. 2. After analyzing Fig. 2, it can be found that the top three research institutions are the “Academy of Arts &

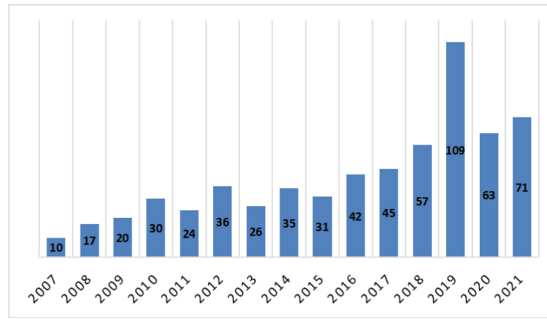


Fig. 1. Trends in Literature Volume From 2007–2021.

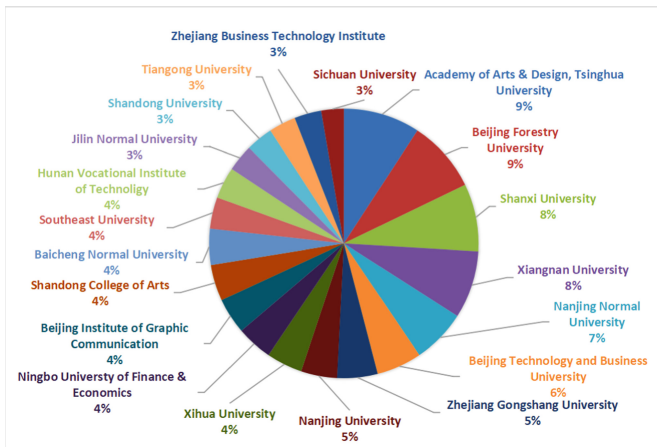


Fig. 2. Quantitative Characteristics of Literatures in Affiliations From 2007–2021(Top 20).

Design, Tsinghua University”, “Beijing Forestry University”, “Shanxi University” and “Xiangnan University”. On the whole, book design and research affiliations are mainly universities, indicating that universities and scientific research institutes are the main force of book design research; The characteristics of the main research affiliations of book design are also very obvious, as shown in Table 1. From 2007 to 2021, the number of research affiliations ranked among the top 20, of which 18 were mainly comprehensive universities. The professional and comprehensive degree of the main research affiliations of book design in China has become the main driving force to promote the development of book design research.

3.3 Research Hotspots

3.3.1 Keywords Co-occurrence Analysis

Keywords are the high generalization and refinement of the article’s core idea. Keyword co-occurrence analysis can be used to find the research subject and analyze the research

Table 1. Number of Literatures by Affiliations From 2007 to 2021(Top 20).

NO.	Affiliation	Literature Quantity	NO.	Affiliation	Literature Quantity
1	Academy of Arts & Design, Tsinghua University	17	11	Beijing Institute of Graphic Communication	8
2	Beijing Forestry University	16	12	Shandong College of Arts	8
3	Shanxi University	15	13	Baicheng Normal University	8
4	Xiangnan University	15	14	Southeast University	7
5	Nanjing Normal University	12	15	Hunan Vocational Institute of Technology	7
6	Beijing Technology and Business University	10	16	Jilin Normal University	6
7	Zhejiang Gongshang University	9	17	Shandong University	6
8	Nanjing University	8	18	Tiangong University	6
9	Xihua University	8	19	Zhejiang Business Technology Institute	6
10	Ningbo University of Finance & Economics	8	20	Sichuan University	5

frontier evolution of a certain knowledge field. High-frequency keywords reflect the hot spots in the research field to a certain extent; Node network is one of the manifestations of knowledge map. The circles in the network represent the network node, and the size of the circles represents the occurrence frequency of keywords. The larger the circles are, the higher the frequency of keyword co-occurrence. On the contrary, the lower it is. The number and thickness of wires between each node are also related to the degree of relationship between the nodes.

The network nodes of keywords are selected by COOC 10 07 software. After adjusting the corresponding threshold as required, VOS viewer is used to draw the keyword network structure diagram and generate the co-occurrence map of book design and research keywords. The visual analysis results are shown in Fig. 3. Through the analysis

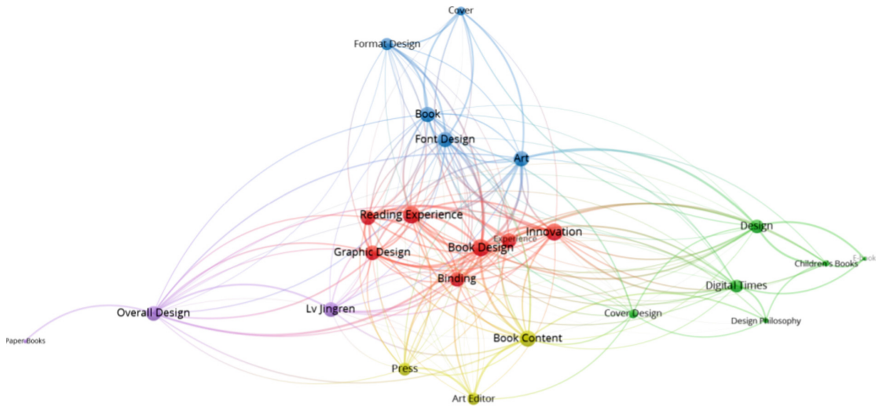


Fig. 3. Keywords Co-occurrence Graph of Book Design.

of Fig. 3, it can be seen that the high-frequency keywords on book design research, except “book design”, appear more frequently than “cover design” and “book”, indicating that these three are important research contents in the field of book design; Secondly, the research of book design is inseparable from design, and the keywords “design”, “innovation” appear more frequently; As a leading figure in the field of book design, “Lv Jingren” appears frequently in key words; The emergence of high-frequency keywords such as “children’s books” and “format design” shows that China has paid more and more attention to the research in these aspects, which has played an irreplaceable role in promoting the development of book design.

3.3.2 Cluster Analysis of Keywords

Cluster analysis is one of the commonly used methods in bibliometric analysis. It is a multivariate statistical method to study classification problems. The basic principle of cluster analysis is to cluster the nearest or most similar keywords into one category. This study is based on a high-frequency keyword matrix and COOC 10 07 as the platform. After analysis by community clustering, 13 clusters, 37 keywords.

As can be seen from Table 2, “cover design”, “book content” in cluster1 and “book”, “design”, “binding” and other keywords contained in cluster2 are three keywords closely related to the keyword “book design” in cluster0; Cluster3 reflects the interactive and entertaining of children’s books design [5]; Cluster4 contains the important aspects of book design research, that is, format design and artistry; Cluster5 reflects that the field of concept books design pays more attention to the application of technology and materials, the innovation of form and the embodiment of cultural connotation; Cluster6 contains keywords such as “color”, “graphics”, “application” and “emotion”, which are interrelated and inseparable, they usually use different colors and graphics to express different emotions [6]; Cluster7 contains two key words: “overall design” and “Lv Jingren”. Lv Jingren’s book design works well explain what is overall design; In the cluster8, it reflects the importance of “innovation” in design teaching; Cluster9 contains three keywords:

Table 2. Clusters of Keywords

Cluster	Keyword
C0	Book Design
C1	Cover Design, Book Content
C2	Design, Book, Binding
C3	Children's Books Design, Interactive, Entertaining
C4	Format Design, Artistry
C5	Material, Form, Concept Books, Cultural Connotation
C6	Color, Graphics, Utilize, Wordage, Emotion
C7	Overall Design, Lv Jingren,
C8	Innovation, Teaching
C9	Graphic Design, Application, Font Design
C10	Printing Technology, E-books, Paper Books, Traditional Books
C11	Traditional Culture, Inheritance
C12	Art, Aesthetics, Reading

“graphic design”, “application” and “font design”; The emergence of “e-books” in cluster10 shows that book design is developing with the time, and does not stop at the design and research of paper books, but pays attention to printing technology on the basis of traditional books, keeps up with the trend of the times and will further develops in the future; Cluster 11 well reflects the need for the inheritance of traditional culture; Cluster12 reflects the reading needs of readers with the progress of the times and economic development, on this basis, it also pays more attention to art and aesthetics.

4 Discussion

From the research content of book design, there are still limitations in China's book design research at present. There are many high-level papers, but in recent years, there are few relevant research literature, relatively weak concentration of journals, weak research strength and little intersection of research content. Specifically, the number of relevant papers has an obvious downward trend. As a barometer of the development of art design discipline, the number of research papers indicates the prosperity and importance of the discipline in the process of social development. The decline of book design research papers indicates that the development momentum of book design in China has not been fully revealed. The reason may be that the literature research has a certain lag, which affects the growth of relevant studies; The weak concentration of periodicals indicates that book design, as a design discipline, has less influence, which makes the development of characteristic periodicals insufficient; It is not enough to rely solely on institutes and universities for relevant research. As a design discipline, book design needs to study together with market changes. Therefore, it is often inseparable from the support of

enterprises and governments. The joint efforts of enterprises, governments and institutes and universities may be the best way for the development of book design in the future.

From the perspective of the future development needs of book design, the diversification of information communication forms has given birth to the diversification of reading forms and reading methods, which makes book design pay more attention to reading experience and continue to move towards a new development trend. It is no longer a single design method, but a combination of new design ideas, printing methods, materials, which promotes the diversification of book design Integration and aestheticization, especially the research of the digital age and e-books. Book design has gradually become a hot spot, which shows to some extent that art comes from life and tries to better serve the concept of a better life.

Generally speaking, the research and development of book design has a good prospect and has achieved some results, but there are also deficiencies, such as less relevant research literature, relatively weak periodical concentration, weak research intensity, little cross-cutting of research content, weak sustainable development momentum, etc. The future research direction can be carried out from the following aspects: ① Pay attention to closely combining book design research with other cultures to enhance the academic influence of book design; ② Further expand the vision of book design literature research and deeply excavate the spiritual connotation of book design; ③ Actively expand the space for the combination of book design theory and practice.

5 Conclusion

Books are not only an important tool for human beings to spread ideas, but also shoulder the important task of improving the overall civilization of society. Their existing form and design concept always need to adapt to the environment of modern technology and culture on the basis of cultural inheritance. Thus, book design research is not simply copying, but creative transformation and innovative development. Scholars need to learn to use experiential thinking and business logic to systematically create the innovative form of books under the new technologies [7]. In addition, designers should focus on readers' reading experience, deeply analyze the reading behavior and needs of various readers, strengthen cross-border integration research, and provide book design works with humanistic care and contemporary aesthetic characteristics for various readers [8].

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