

Visual Analysis of Research Content and Development Context of Comprehensive Budget in China

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Abstract: With the development of market economy, comprehensive budget management plays a more and more important role in enterprise management. In this paper, CiteSpace visual analysis method is used to study 757 papers of CNKI from 2000 to 2019, which are highly related to comprehensive budget research. Knowledge maps are generated from two aspects: the relationship between core authors, and the correlation of high-frequency keywords. This paper summarizes the main contents of knowledge structure in the field of comprehensive budget research, divides the development of comprehensive budget research into three periods, and systematically presents the development context and stage hot spots of comprehensive budget research. China's comprehensive budget research has made great progress, but there is still a huge space for development. Future research needs the joint efforts of scholars to contribute Chinese wisdom to comprehensive budget research.

Keywords: comprehensive budget; CiteSpace; knowledge map; visual analysis

1. Introduction

Comprehensive budget management is a specific and detailed plan for the future development prospects of enterprises. It can help enterprises plan, control, adjust and evaluate performance. Its emergence has played an earth shaking improvement role in the development of modern enterprise management mode [1].

In enterprise management organization, budget is the basis of management control process. Although the budget is widely used in enterprises, it is far from perfect. Since 1900's, strategic budgeting and activity-based budgeting have appeared in the western world in order to improve the original budget system. What's more, Fraser and hope propose to go beyond the budget and constantly subvert the shackles of the traditional budget in order to pursue a more suitable model for enterprises. The severe challenges faced by enterprises' comprehensive budget have attracted more attention of scholars to the traditional budget debate. The gap between theory and practice has prompted the Institute of Management

Accountants (IMA) to study a series of work on strengthening the relationship between theory and practice since 2003. In this paper, CiteSpace software is used to systematically summarize and summarize the domestic research results on comprehensive budget management, and find the same system rules from seemingly different research results, so as to provide reference for subsequent researchers in this field, so as to promote the deepening and systematization of China's comprehensive budget research.

2. Data Sources and Research Methods

2.1. Data Sources

This paper obtains the literature data from 2000 to 2019 from CNKI database, and chooses 2000 as the starting point. The reason is that in 2000, the former State Economic and Trade Commission issued the basic norms for large and medium-sized state-owned enterprises to establish modern enterprise system and strengthen management, which clearly requires domestic large and medium-sized enterprises to implement comprehensive budget management. From this, comprehensive budget management is really concerned Business management began to develop.

In CNKI journal database, we searched the articles with "comprehensive budget management" in the title or key words, and the retrieval period was from 2000 to 2019. Chinese core journals and CSSCI source journals were selected as the literature source categories. A total of 840 valid results were retrieved. In order to ensure the research accuracy, it is necessary to further screen out high-quality and representative literature, and refer to the following literature exclusion criteria: (1) articles that only mention "comprehensive budget" in the title or text, but not related to the research topic of comprehensive budget; (2) irrelevant literature such as reviews, reports, news, etc.; (3) repetitive materials. After screening according to the above principles, 757 effective literatures were finally obtained as the research object of this paper.

2.2. Research Method

In this paper, CiteSpace bibliometric analysis method is used, which uses the relevant knowledge of

mathematics and statistics to quantitatively analyze the characteristics of literature, which is also the mainstream method of literature research. CiteSpace software links the knowledge domain, and can analyze the historical documents collected in CNKI database systematically. CiteSpace is efficient and convenient. In recent years, CiteSpace has been widely used in the research of knowledge mapping of various disciplines by domestic and foreign scholars. With the help of this tool, this paper draws the knowledge map of the relationship between core authors, high-yield research institutions, clustering relationship of high-frequency keywords and characteristics of keyword emergence, so as to comprehensively display the information panorama of comprehensive budget knowledge field, and provide scientific reference basis for predicting the forward trend of comprehensive budget field.

3. Analysis on the Literature Characteristics of Comprehensive Budget Research in China

3.1. The Relationship between Core Authors

The effective cooperation among core authors in the research field can improve the output of scientific research results. Through the presentation of knowledge map, we can clearly show the relevant cooperation network, and analyze the relationship between core authors of literature.

Using the co-occurrence analysis function of CiteSpace for literature authors, the cooperative relationship map of all authors is generated. The nodes in the graph are the core authors of the selected literature, and the number of articles published by the authors is positively correlated with the size of the nodes; the

connection between nodes indicates that there is a cooperative relationship between the core authors of the literature, and the higher the degree of cooperation, the thicker the corresponding lines. According to the knowledge map among authors and the statistical data, the author with the largest number of papers published in the field of comprehensive budget research is Wade Hong (3 articles), while the latter author only published one or two articles, which indicates that there is no expert or scholar who takes the number of papers as the advantage in comprehensive budget research. From the perspective of cooperation among authors of comprehensive budget research, there are six groups of authors who have cooperative relationship, and most of them cooperate with each other. In addition, a considerable number of literature authors have not participated in the composition of cooperation network, which indicates that the degree of cooperation of authors in comprehensive budget research in China is not very close. At the same time, it can also be found that the number of papers published by core authors is not significantly different, and the size of nodes is not obvious, which indicates that there is no absolute authority in the research of comprehensive budget, and the results may be similar.

Further ranking according to the number of papers published, the top ten core authors with a large number of articles are shown in Table 1. It can be found that among the core authors of comprehensive budget research, their research directions are relatively scattered, and the core authors' fields are obviously different. Generally speaking, comprehensive budget research covers a wide range of subjects and has a high degree of interdisciplinary intersection.

Table 1. Core authors of comprehensive budget research

Number of papers issued	Author	Unit	Research direction
3	Wei Dehong	Guangxi University	Enterprise Economy; Accounting; Macroeconomic Management and Sustainable Development
2	Li Fushen	China Network Communications Group	Information economy and postal economy
2	Zhang Xiaotie	China Network Communications Group	Information economy and postal economy
2	Wang Xiaoling	China Network Communications Group	Information economy and postal economy
2	Yi Xianfeng	China Network Communications Group	Information economy and postal economy
2	Wu Ziyu	Chang'an University	Accounting
2	Li Li	Yan'an University	Enterprise economy; Accounting
2	Xu Weijun	Guangdong Institute of mechanical and electrical technology	Accounting; Enterprise Economy; Educational Theory and Educational Management
2	You Baojian	Xi'an Jiaotong University	Automation technology; Computer software and computer applications
2	Wang Shunjuan	Peking University Third Hospital	Research on medical and health policy and laws and regulations

3.2. High Frequency Keyword Analysis

Using CiteSpace to draw the keyword clustering view, this paper makes co-occurrence analysis on the subject keywords of comprehensive budget research literature. On the one hand, we can see the general direction of the research topic in the discipline field, on the other hand, it can also reflect the evolution trend and research process of the discipline. Taking one year per unit as the time partition, the year 2000-2019 is divided into 20 time zones. The CiteSpace built-in path finding algorithm is used to extract the top 50 keywords with the highest frequency in each time zone, and the less frequent and unimportant keywords are hidden to generate the keyword Association co-occurrence knowledge map.

According to the running results of CiteSpace, we can find that the nodes represent the location of keywords. The larger the nodes are, the higher the frequency of keywords appears, which usually represents the research hotspot. The connection between nodes indicates that there is related content between keywords. Among them, the theme keyword "comprehensive budget management" appeared 319 times. According to the frequency of the remaining keywords, the top 10 keywords with higher frequency were further sorted out (see Table 2). It can be found that the most frequent keywords in the field of comprehensive budget research are enterprise (80 times), enterprise management (78 times), enterprise comprehensive budget management (72 times) and budget (34 times). The frequency of subject keywords is much higher than that of the following keywords, which shows that in the field of comprehensive budget research, the system of

comprehensive budget management is a research hotspot, and the other keywords are mainly generated in the practical application of enterprises.

Table 2. Keywords frequency node information of comprehensive budget Research

Keyword	Frequency of occurrence
Enterprise	80
Business management	78
Enterprise comprehensive budget management	72
Budget	34
Budget management	33
Budget program	29
Fiscal administration	27
Balanced Scorecard	21
Budget adjustment	19
Enterprise groups	18

4. Research Content and Development Context

4.1. Research Content

Through the built-in log likelihood ratio algorithm of CiteSpace system, seven main clusters in the keyword knowledge map are generated (see Table 3). By consulting the relevant literature research results and combining with the clustering characteristics of high-frequency keywords of comprehensive budget research, this paper classifies the knowledge structure of comprehensive budget research and sorts out the main research contents in the field of comprehensive budget, which are "strategic budget", "operational budget" and "beyond budget" [2-12].

Table 3. Cluster identification of comprehensive budget research field

Research contents	Cluster number	Primary coverage
Strategic budget	#0 Strategy	Value chain analysis; Strategic oriented comprehensive budget; Special decision-making budget; Enterprise financial objectives; Strategic map;
	#3 Comprehensive budget	Balanced scorecard; Target management; Internal control; Budget executive unit;
Operation budget	#4 Performance appraisal	Enterprise resource planning; Fine management; Activity based budget; Cost assessment;
	#6 Operating budget	Job quota; Budget assessment; Business objectives; Benchmarking analysis;
Beyond budget	#2 Management model	Resource based theory; Core competitiveness; Key issues; Competitiveness maintenance;
	#5 Organization structure	Self organization; Governance structure; Economic Decision-making; Operation management; Enterprise management;
	#7 Budget monitoring	Budget implementation process; Beyond budget performance model; Financial indicators; Enterprise value;

4.1.1. Strategic budget

Strategic budget includes two clusters, namely #0 "Strategy" and #3 "Comprehensive budget". The main research contents of #0 "Strategy" include: value chain analysis, strategic oriented comprehensive budget, special decision-making budget, enterprise financial objectives, strategic map. The main research contents of #3 "Comprehensive budget" include: Balanced Scorecard, target management, internal control, budget implementation unit.

The initial purpose of strategic budget is to serve decision-making management, which is beneficial for the senior managers with professional knowledge and information to get expectations and realize communication in the face of various unknown situations. The balanced scorecard is the product of continuous improvement in strategic management. The establishment of balanced scorecard can help the enterprise's short-term behavior and the future long-term goal to be linked and unified, thus constituting an important part of the enterprise's strategic organization management system.

Under the strategic budget, the implementation of the whole strategy has a systematic framework, which not only involves the optimization of the value chain, but also enables the enterprise's strategy to adapt to the external changes in the face of uncertain factors such as changes in external market environment and technological level [13-18].

4.1.2. Operation budget

Activity budget includes two clusters: #4 "Performance appraisal" and #6 "Operating budget". The main research contents of #4 "Performance evaluation" include: enterprise resource planning, refined management, activity-based budget, cost assessment. The main research contents of #6 "Operating budget" are: Operation quota, budget assessment, business objectives, benchmarking analysis.

The concept of "Activity-Based Budgeting" was first proposed by Cooper and Kaplan (1988). They thought that the reverse tracing process of activity-based costing system is exactly the process of activity-based budgeting. Activity based budgeting is to track the cost of the product, and then collect the cost of the product to the cost of the resource used. The process of operation budget is not difficult to understand, but the actual operation process is far from simple, because it requires a lot of detailed control, which is different from the traditional budget management.

The premise of operation budget is operation management. By identifying and distinguishing value-added and non value-added operations, compressing non value-added operations and improving value-added operations, the process can be continuously improved. The priority of resource allocation is not determined by the manager's subjective idea, but by the value-added ability of the activity itself. The process of dynamic evaluation of production resources input and output is established [19,20].

4.1.3. Exceeding budget

Beyond budget includes three clusters, namely #2 "Management model", #5 "Organization structure" and #7 "Budget monitoring". The main research contents of #2 "Management model" include resource-based theory, core competitiveness, key issues and competitiveness maintenance. The main research contents of #5 "Organization structure" include: self-organization, governance structure, economic decision-making, operation management and enterprise management. The main research contents of #7 "Budget monitoring" include: budget implementation process, beyond budget performance model, financial indicators, enterprise value.

In the BBRT, Jeremy hope and Robin Fraser (2001) first proposed the concept of "beyond budget". Beyond budget is a management mode that adapts to the rapid change of the current new economy. It integrates a variety of advanced budget methods and performance management means, technologies and tools to separate the goal setting of employees from the evaluation and incentive, so as to meet the actual needs of enterprise budget management. Enterprises adopting the model of beyond budget management need sufficient technical support to cope with market changes in a timely manner. Under the circumstances of exceeding budget, there is usually no misplacement of department functions. It emphasizes customer needs, fully empowers functions, and jumps out of the limitations of traditional budget management, which makes each stage of enterprise management process more adaptive [21].

4.2. Development Context

Using the built-in word frequency detection technology in CiteSpace, the path finding algorithm can show the sudden change of keywords in research samples, and further analyze the development context and evolution trend of comprehensive budget research. The keyword emergence reports generated by CiteSpace are summarized as shown in Table 4 [22-24].

Table 4. Summary of emerging keywords in 2000-2019

Sort	Keyword	Emergence rate	Start year	End year
1	Management by objectives	4.2167	2000	2009
2	Budget-making	3.1866	2000	2008
3	Budget program	3.9548	2002	2009
4	Performance appraisal	5.7405	2010	2015
5	Strategic budget	4.2901	2010	2014
6	Operation budget	3.9722	2010	2014
7	Beyond budget	6.0237	2015	2018
8	Budget Management Information System	3.4976	2016	2019

By comparing the emergence years of each group of keywords, we can find that the comprehensive budget research presents a more obvious development stage.

4.2.1. Exploration of theoretical basis of comprehensive budget management (2000-2009)

In 1992, after the establishment of market economy system in China, the reform continued to deepen, the economy developed rapidly, and the comprehensive

budget management gradually began to receive attention. Until 2000, in order to adapt to the market economy system, the former State Economic and Trade Commission issued the basic norms for large and medium-sized state-owned enterprises to establish modern enterprise system and strengthen management. This document pointed out that domestic large and medium-sized enterprises should speed up the implementation of comprehensive budget management.

At this point, comprehensive budget management began to be valued by enterprises and developed continuously. At this stage, almost all the theories on comprehensive budget are introduced from abroad, which is difficult to match the actual situation of China's economic market. Therefore, it is urgent to establish a comprehensive budget management system suitable for the domestic market environment. At the initial stage of exploration, it is difficult to get rid of the traditional theoretical concepts. It pays too much attention to the budget preparation, budget implementation and the achievement of budget objectives, focusing on profits, management expenses and sales costs, ignoring the long-term strategic objectives of enterprises.

In order to adapt to the development of market economy, the state has also issued relevant policy documents to guide enterprises to establish a comprehensive budget system. In April 2002, the Ministry of Finance issued the guiding opinions on the implementation of financial budget management in enterprises, which encourages all enterprises with technical conditions or a certain scale to establish and improve comprehensive budget management. The new general principles of enterprise finance was implemented in 2007. The document pointed out that enterprises should take cash flow as the core, improve the budget system and strengthen budget assessment in order to establish comprehensive budget management. In July 2009, the basic norms of enterprise internal control began to be implemented. The document further standardized the establishment of enterprise comprehensive budget management, clarified the functions and powers of each department in the budget system, and formulated the enterprise budget management system. With the introduction of a series of rules and regulations, under the guidance of the national government, comprehensive budget management has been scientific development in enterprise practice.

4.2.2. Discussion on the practice of comprehensive budget management (2010-2014)

In 2010, in order to ensure the establishment of enterprise internal control system, the Ministry of finance, China Securities Regulatory Commission, National Audit Commission, China Banking Regulatory Commission and China Insurance Regulatory Commission jointly issued 18 internal control supporting guidelines. It includes the guidelines for the application of enterprise internal control No. 15 - comprehensive budget, which requires enterprises to make budget arrangements for various activities of production and operation, and to formulate target plans for financial activities, investment activities and business activities in the forecast period. In addition, guideline No. 15 explains the implementation of the budget in detail, from the beginning of budget preparation to the implementation of the budget in the process, and the final budget evaluation. This also shows that although the theory of comprehensive budget management is

becoming more and more mature, there are still many problems in practice [25,26].

With the drastic changes of market economy environment and the continuous acceleration of product innovation cycle, the traditional budget management has increasingly exposed shortcomings, even constraining the original function. Many modern management concepts and practical experience show that comprehensive budget improvement has become more and more important for the development of enterprises. The improvement of comprehensive budget integrates the traditional budget framework system and advanced management concepts. It is based on information technology and aims at matching budget management and organizational environment. The specific tools and methods include strategic budget, operation budget, continuous improvement budget, etc.

4.2.3. Application of comprehensive budget management information technology (2015-2019)

In 2015, the State Council issued the 13th five year plan for the development of big data industry to support the innovation and development of big data technology and industry, and encourage the cultivation of new business models. At the same time, the new budget law, which was implemented in 2015, also clarifies the new direction of the development of comprehensive budget management, meets the requirements of reform and development, and carries the content of system innovation. The rise and development of big data has a profound impact on all aspects of society. The arrival of big data era undoubtedly brings new opportunities and challenges to the comprehensive budget management of enterprises.

Traditional comprehensive budget management has been unable to adapt to the pace of the development of the times, new budget management model needs to be explored. Beyond the budget in comprehensive budget management is not a budget management mode in some aspects, but more reflected in an information system. This information system relies on big data technology to create a decision support system for managers to quickly respond to market changes, so as to help enterprises take every step of business development.

5. Conclusion and Prospect

5.1. Conclusion

By using CiteSpace knowledge map analysis tool, this paper takes the comprehensive budget research in CNKI database from 2000 to 2019 as the research object, carries out visual analysis, and obtains the visual knowledge map of the relationship between core authors and keyword Association and co-occurrence. This paper analyzes the knowledge map, identifies the core author cooperation network of comprehensive budget research literature and keyword related co-occurrence network, so as to understand the current situation of comprehensive budget research in China.

Through the analysis of the literature characteristics of comprehensive budget research, the results show that: first, from the perspective of the relationship between core authors, the core authors in the field of

comprehensive budget research are not outstanding, there are no authors with advantages in the number of papers, the research directions of each author are quite different, the interdisciplinary degree in the field of comprehensive budget is high, and the cooperation among authors needs to be strengthened; Second, from the perspective of key words From the perspective of co-occurrence map, "comprehensive budget" is the most frequent, and the research on its own system accounts for a large part. Secondly, the focus of research is on "enterprise", "enterprise management" and "enterprise comprehensive budget management". Comprehensive budget research should always be applied to enterprise practice, and the research content has strong connection.

There are three main aspects of budget research, namely, comprehensive budget, comprehensive budget theory, comprehensive research content, and research content. In the context of development, the paper analyzes the year when the key words appear, and combs out the overall research trend of comprehensive budget management in 2000-2019, which are: the exploration of the theoretical basis of comprehensive budget management, the discussion of comprehensive budget management practice, and the application of comprehensive budget management information technology.

5.2. Prospect

In the 21st century, from the external macro environment, the basic feature of the world economy is to transform towards internationalization, financialization and knowledge; from the micro perspective, human society will stride from the traditional industrial and agricultural society into the science and technology information society, and the unfamiliar environment makes more and more enterprises fall into uneasiness. The competitive environment of enterprises is changing dramatically. The emerging industries that may defeat the enterprises are likely to rise suddenly. The uncertainty of the environment increases the risk of enterprise decision-making, and the rigid organizational structure changes to flexibility. It is inevitable that the enterprise's management blindly pursues the benefit way, and the enterprise must pay attention to the construction of the core competitiveness.

To put the comprehensive budget management in the core position of enterprises, we need to do: first, we should guide and control the production and operation activities of enterprises more effectively to meet the needs of strategic and comprehensive budget; second, in the face of all kinds of unknown opportunities and challenges, the comprehensive budget management of enterprises should develop flexibly so as to adapt to various changes. From the point of view of concept and method, there are two main directions [27].

5.2.1. Guided by the concept of systematic thinking

In the complex market changes, there has never been a lack of management tools of management masters, such

as value chain analysis, benchmarking, balanced scorecard, process reengineering and so on. But these tools are often difficult to work, essentially because there is no unified holistic view or lack of innovation.

The lack of holistic concept often ignores the interaction between parts and pursues only local optimization, which is harmful to the whole. For example, in the early stage of process reengineering, too much emphasis is placed on the "things" that can be designed, while ignoring the interests of the internal personnel of the organization, which leads to staff resistance and makes the overall performance fail.

These management tools themselves are not wrong, but need managers to turn to systematic thinking. The so-called systematic thinking should focus on the whole, and "critical system thinking" based on holism should encourage innovation. Holism emphasizes the normal operation and good cooperation between parts. Starting from the organizational level, local optimization should obey the overall goal [28]. The concept of holistic system also shows that it gives priority to system language to solve problems, regards organization, part and environment as the relationship among system, subsystem and super system, and systematically combines relevant methods to examine problems and solve these problems according to different viewpoints [29].

5.2.2. Pay equal attention to "field research" and "historical research" as research methods

Research budget management requires the promotion of both field research and historical research, which complement and promote each other [30].

The first method is field research. This method is mainly in the face of all kinds of confusing accounting practice form, from the explanatory and explanatory theory to elaborate, focusing on exploring the internal logic of limiting practice. This kind of exposition is a theory at the enterprise level, which reveals the hidden law in practice. Based on the theory of explanation and explanation, it is very helpful to standardize the practice. At the same time, the method of field research is consistent with practice, which has strong pertinence to practice.

The second research method is historical research method. This method is based on historical research and comparative history research to practice the social origin behind, which needs to be clearly established on the basis of social rules and social significance. This theoretical method explains the objective behavior of enterprises from various angles, and puts management accounting under the background of a series of human social organizations, so as to explain the deep reasons for the deviation between practice and theory. It also includes historical research on the background and social origin. On the one hand, it can analyze the law of management accounting's reaction on society, on the other hand, it can explore the deep-seated reasons of historical and social changes promoting the reform of management accounting [31].

Based on the integration of the two methods, combined with the social background for the future, it is more likely to make the comprehensive budget management theory in practice to achieve a unified internal consistency. The field research is based on the enterprise application research, and establishes a more adaptive comprehensive budget management mode under the specific economic environment. Under the guidance of the established long-term goal, historical research should further explore and enhance the model of budget management, and create a unified three-dimensional theory.

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