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RESEARCH ARTICLE

A Bibliometric Analysis of Balanced Scorecard Research with Higher Education by Vosviewer

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ABSTRACT

This paper reviews the research advancements related to the Balanced Scorecard through a bibliometric analysis using VOSviewer in the context of higher education. It introduces the background and evolution of the Balanced Scorecard, elaborating on its applications and key factors within higher education. This study examines country collaboration and keyword co-occurrence across 259 articles on the Balanced Scorecard in higher education by VOSviewer, sourced from the SCOPUS database spanning from 1997 to 2024. The findings indicate that research in this domain has been continuous since the inception of the theory. The United States and the United Kingdom emerged as early leaders in the field, while China and Iran entered the research landscape later, with an average starting year of 2018. The keyword co-occurrence analysis reveals that, alongside the evolution of the Balanced Scorecard theory, there has been increasing research interest in performance management and strategic management within higher education. Despite Kaplan & McMillan introducing the concept of the triple bottom line of the Balanced Scorecard—comprising social, economic, and environmental value—in 2020, there remains a lack of relevant research in higher education.

INTRODUCTION

An organization's performance measurement system greatly influences employee behaviour (Kaplan & Norton, 2001). The Balanced Scorecard (BSC) is an innovative performance management system that translates an organization's strategy into actionable measurement indicators and target values across four perspectives: finance, customers, internal operations, and learning and growth. Analog Devices (referred to as "ADI") first implemented the Balanced Scorecard in 1987, and Kaplan and Norton formally proposed the concept in 1992. Since then, the authors of the society-based development theory have further refined the Balanced Scorecard by mapping strategies to indicators, translating operational indicators of intangible assets, and exploring synergies within a group context (Kaplan & Norton, 1996a, 2001, 2006).

With a stronger emphasis on social responsibility, later studies integrated these ideas into the Balanced Scorecard framework. They replaced "customers" with "stakeholders" and incorporated financial, environmental, and social indicators as key outcomes. This latest structural change makes the Balanced Scorecard more relevant and adaptable for today's organizations (Kaplan & McMillan, 2020).

Higher education is the foundation for the sustainable development of the national economy. It is divided into public and private universities according to the funding source(Nazarko & Šaparauskas, 2014). However, colleges and universities are facing challenges brought by insufficient funds, increasing competitive pressure, internationalization, and technological change(Ota, 2018; Stromquist, 2007). At the same time, the improvement of social expectations and environmental and social responsibilities also put forward higher requirements for Higher education institutions (HEIs) (Kappo-Abidemi &

Kanayo, 2020).

With the application of BSC in different organizations, more and more scholars have a strong interest in the application of BSC in HEIs. An important measure of a university's success is performance (Uslu, 2020). BSC has been widely used in different dimensions of performance evaluation in HEIs, and has achieved remarkable results in many colleges and universities.

As a strategic control tool, BSC plays a positive role in improving the scientific research and innovation performance of universities and shows similar indicator patterns in different colleges and universities(Peris-Ortiz, 2019). This shows that the application of BSC in the higher education area is consistent and replicable, providing experiences and a model for other higher education institutions to learn from. The combination of the balanced Scorecard and the multi-criteria decision-making method makes the balanced Scorecard realize the quantification and concretization of strategic objectives and improves management efficiency and transparency of the universities(Özdemir & Tüysüz, 2017; Ramasamy, 2016).

The performance of HEI refers to the efficiency and effectiveness of higher education institutions in realizing their functions in areas such as education, scientific research, and social service. It covers not only the performance of students in academic achievement, but also the teaching quality of teachers, the output of scientific research results, the impact of social services, and the operational efficiency of institutions(Cullen, Joyce, Hassall, & Broadbent, 2003; Fuchs et al., 2020; Kettunen, 2008).

Related research mainly involves stakeholders, social responsibility, indicator research, and case studies of different industries. It has made continuous research progress and published a large number of research papers. However, there is a lack of systematic trend analysis and combing in higher education. The aim of this study consists of the following research objectives:

(1) An overview of the scientific literature on the field of university-balanced Scorecard.

(2) Analyze influential authors and countries

(3) Identify the research trend of the balanced Scorecard in higher education and evaluate its development.

Bibliometric analysis is a method to objectively evaluate research hotspots and research evolution trends in this field by using mathematical statistics according to the publication rules of papers(Yu, Xu, & Fujita, 2019). This paper systematically analyzes the research results of the Balanced Scorecard in the field of higher education at home and abroad from 1996 to 2024 with the help of science-based visualization software VOSviewer. This paper discusses the research situation and hot frontier of the Balanced Scorecard in the field of higher education. It puts forward the prospect of this research in order to provide references for future research.

1. LITERATURE REVIEW

2.1 The Implementation of Balanced Scorecard in HEIs

The Balanced Scorecard was introduced into the field of higher education to improve the strategic management and quality control of universities(Ruben, 1999). Quantitative indicators and strategic objectives help HEIs to clarify strategic direction and evaluate and manage development performance (Petrudi et al., 2022). Different case studies show that many colleges and universities set specific goals such as improving research quality, improving teaching quality, enhancing student satisfaction through a balanced Scorecard, and formulating corresponding indicators and measures(Alani, 2018; Hladchenko, 2015). A balanced scorecard is considered a strategic management tool suitable for HEIs. Its advantage is that it can be adapted to different situations. HEIs need to customize the application of a balanced Scorecard according to their own characteristics and strategic objectives(Al-Filali et al., 2024;

Siratananont et al., 2022).

The application of a balanced Scorecard in higher education institutions is flexible and comprehensive. BSC as a performance measurement system (PMS) has been introduced for higher education institutions. It is suitable for assessing the performance of academic staff while noting the impact of leadership, communication, and academic qualifications on the adoption of BSC(Philbin, 2011). The study (Primasari & Setyohadi, 2018) explores the use of the IT Balanced Scorecard to improve information technology infrastructure in higher education, identifying key issues in IT infrastructure governance. (Margarita et al., 2019) used the improved balanced Scorecard to evaluate the comprehensive indicators of university service quality, including academic performance, research activities, market evaluation, financial indicators and human resource characteristics. Using the Balanced Scorecard as a strategic tool, some research shows how the Balanced Scorecard, fuzzy AHP, and TOPSIS methods can be used to identify priorities in higher education strategic planning, providing strategic recommendations for university policy-making(Petrudi et al., 2022; Yudatama et al., 2016).

2.2 The Key Factors of BSC Implementation

Some key factors must be considered to construct and implement an efficient balanced scorecard, such as clarifying strategy, constructing four dimensions of the balanced Scorecard, and formulating key performance indicators(Kaplan & Norton, 1996b; Malina et al., 2001).

A strategy is a comprehensive plan developed by an organization to achieve its long-term goals and vision(Kaplan & Norton, 1996a). The strategy of HEI refers to a series of action plans and decisions made by universities to achieve their long-term development goals(Heleta et al., 2021). Strategies are designed to guide the university's work in teaching, research, social services, etc., in response to the challenges and opportunities of the internal and external environment(Fijałkowska et al., 2018). Within the framework of the BSC, strategy is concretized and measured in four dimensions: Learning and growth, internal processes, customers, and finance(Kaplan & Norton, 1996a). These four dimensions not only focus on the short-term financial indicators of colleges and universities but also cover the long-term organizational development and ability improvement of colleges and universities, which reflects the multi-dimensional and long-term strategy in colleges and universities(Cao & Li, 2014; Fia et al., 2023; Umashankar & Dutta, 2007).

The social responsibility of the HEIs is usually part of the strategy, and the commitment to social responsibility can not only promote the reputation of the colleges and universities but also enhance the sense of belonging and responsibility of internal teachers and students(Santos et al., 2020). Researchers found it has significantly improved student academic achievement and the overall performance of the university by implementing social responsibility related to the environment and sustainability (del Carmen Vásquez-Torresn et al., 2021).

As key stakeholders, the government and management directly participate in the university's governance and decision-making process, and have a substantial impact on the university's strategic direction(Kettunen, 2008). Through the evaluation and supervision of the university's performance, the education quality and management level of the university are continuously improved (Camilleri, 2021).

The BSC was initially widely and successfully applied to enterprises. One of the main reasons is that the financial dimension of the BSC reflects the economic performance and profitability of the organization, which is considered as one of the ultimate goals(Quesado et al., 2018) . It is consistent with the profit statement of the enterprise. Although the other three dimensions are non-financial indicators, their improvement and optimization will ultimately improve financial performance(Kaplan & Norton, 1996b).

The financial status of HEI is related to its operation, teaching quality, scientific research strength and long-term development(Geuna Aldo et al., 2003). Effective financial management ensures colleges and universities have a stable source of funds to support their teaching, research and social service activities to achieve their educational objectives and promote academic progress(Chatterton & Goddard, 2000).

Public universities are funded by a variety of sources, including government grants, tuition income, research funding, social service income and alumni donations. Private universities generally rely on tuition as their main source of income(Sanyal & Johnstone, 2011).

In the Balanced Scorecard framework, the financial dimension focuses on the university's financial position and financial performance, including revenue, expenditure, budget management and resource efficiency(Heaton, Teece, & Agronin, 2023). This dimension helps the HEIs understand their financial health and ensure that sufficient funds are available to support the achievement of their strategic goals(Alani, 2018; Umashankar & Dutta, 2007). But unlike corporations, public and nonprofit colleges and universities do not have profit as their primary goal. While financial performance is also pursued, revenue is primarily for the school's mission and development and is not distributed to shareholders(Chandrasiri, 2003).

Some studies define customers as all stakeholders; they point out that students, employers, and local government are the main customers in previous studies (Marzo, Pedraja, & Rivera, 2007). In most of the current studies, students are considered customers of higher education, and student evaluations of education are viewed as consumer-oriented (Stukalina, 2014). In a case study of a private university in Pakistan, students' satisfaction and willingness to learn were improved by treating them as customers(Raza, Qazi et al. 2021). Student satisfaction and graduate employment rate are considered to be measurable indicators(Margarita, Liliyana, Aliya, Svetlana, & Zulfira, 2019; Taylor & Baines, 2012).

The Learning and growth (or innovation) dimension focuses on the HEI's capacity development in terms of people, systems, and organizations, as well as its ability to continuously improve and create value. This includes employee training, knowledge sharing, technological innovation, and other aspects(del Carmen Vásquez-Torresn et al., 2021; Fuchs et al., 2020). In the current social background, educational institutions need to learn and grow more, with innovative teaching and operation processes, learning culture, and knowledge management systems to improve their competitiveness (Akhtar, Khan, Atlas, & Irfan, 2021).

Performance measurement from the internal process perspective can explain the efforts made by internal activities to achieve organizational performance, such as the standardization, efficiency and quality dominated by internal activities (Berdnikova, Afonichkina et al. 2022). In the service process of higher education, teaching quality, life service, and schooling conditions will affect students' satisfaction and overall performance (Padlee, Reimers et al., 2020). In addition, different governance systems affect university performance (Ismail, Abdullah et al., 2022). In the teaching process, providing teachers with teaching feedback can promote professional growth and enhance the implementation of progressive practice to benefit students' learning (Burleigh, Kroposki et al., 2023).

The internal process dimension focuses on the university's excellence in key business processes to ensure efficient, high-quality delivery of education and services(Alani, 2018; Balzer, 2020). Relevant research suggests that a university's internal processes can improve performance and effectively help achieve university strategy. Its observation indicators include teaching quality, learning process, internal facilities, management information system and so on(Weerasooriya, 2016).

2. DATA SOURCES AND ANALYSIS METHODS

3.1 Data Sources

This study collected data from the Scopus database, which was Launched by Elsevier in 2004; it is the world's largest abstracts and citations Database. The search time is from 1995 to 2024. It was Retrieved on July 12, 2024.

In order to ensure the centrality and accuracy of the literature, the search strategy is set as the theme in Scopus: (" Higher education Balanced Scorecard "; "University Balanced Scorecard"; Language: (English), document type: (Article), and the search time span was set as 1997-2024. After the two search results were combined and irrelevant references were manually removed, the sample size was finally determined to be 259 articles. The retrieved literature records were downloaded and saved as CSV files and exported in the format of "Full Record and Cited References" as data samples for analysis in this paper.

As can be seen from Figure 1, the number of research publications on BSC in Higher education shows a wavy pattern from 1997 to 2024(June). There were relatively more studies in 2009 and 2013 and in 2018-2020. It has also been on an upward trend for the past three years. This indicates that with the development of the theory of balanced scorecards and the change in social conditions, more and more researchers pay attention to its application in the field of higher education.

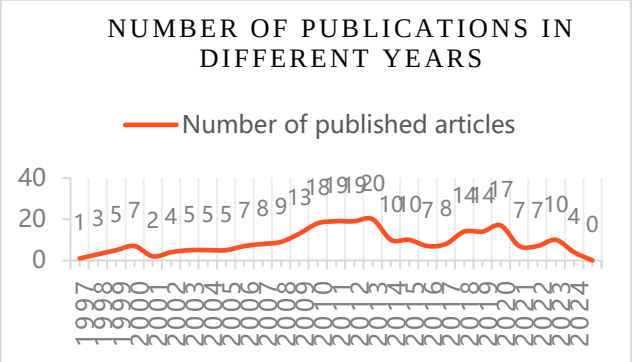

Figure1:Number of publications in different years
Source: Authors' elaboration based on Scopus.

3.2 Analysis Method

This paper uses scientometrics visualization software VOSviewer as a tool to process and analyze the higher education Balanced Scorecard research literature according to the number of published documents in different years, the author of the document, the network of cooperating countries, and the frequency of keyword co-words. The purpose is to observe the research characteristics and evolution of higher education balanced Scorecard.

3. RESULT AND ANALYSIS

4.1 Co-authorship Analysis

Co-authorship analysis can describe how authors in the field carry out knowledge exchange and resource sharing. In this paper, author cooperation analysis was carried out based on research results classified as "article" in the SCOPUS database and the minimum number of author documents was set to 2. It was found that 251 authors were involved, and five authors or their teams published two or more papers. The link strength between authors is 0, indicating that there is almost no author/team interaction in this research area.

Table 1: Co-authorship analysis

	Documents	Citations	Total link strength	
Kettunen j.	7	128	0	
Self j.	2	68	0	
Zolfani s.h & ghadikolaei a.s.	2	51	0	
Cugini et al.	2	12	0	

Nedospasova et al.	2	1	0	

Source: Authors' elaboration based on Scopus and VOSviewer.

Through the cooperation analysis of organizations, the minimum number of documents for organizations is set to 2, and it is found that out of 490 organizations were selected. But they have a link strength of 0 to each other.

The analysis of national cooperation networks in this research area can show the research cooperation networks between different countries, as well as the influence of different national houses. In the VOSviewer analysis, by setting the minimum number of documents per country to 5, 18 countries were found to meet the requirements, and six countries with node strength 0 were removed to obtain a visualization map of the national cooperative network. It can be clearly seen from the graph that it is divided into 4 clusters, all of which mainly include Britain, Belgium, Italy and Taiwan. The second cluster mainly includes the United States, Canada, and China; the third cluster consists of Australia, Germany, and Spain. The fourth cluster is mainly India and Iran. From the cooperative network diagram (Fig2).

Base the co-authors' country analysis, it involved 67 countries, and the parameter of the number of papers was set to 5. 19 countries were selected and grouped into 5 clusters. Cluster 1 includes the United Kingdom, Italy, Taiwan(China), and Belgium. The cluster 2 includes Australia, Germany, and Spain. Cluster 3 includes China and Thailand; The cluster 4 contains Iran and India. Cluster 5 contains the United States and Canada .

From the Network Visualization, It is found that the United States and the United Kingdom have the largest nodes, which means that the United States and the United Kingdom have greater scientific influence in this field. In addition, the line connection between different clusters also shows that there is a direct and indirect relationship between them. For example, the United States has a relatively close relationship with Iran's research in this field, and the United Kingdom has the same relationship with China.

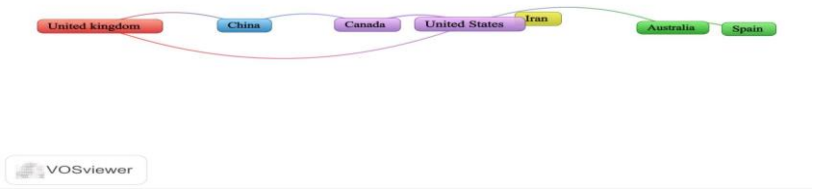

Figure2:Network Visualization of co-authorship with national
Source: Authors' elaboration based on Scopus and VOSviewer.

Overlay Visualization (Figure3) shows that in the field of research, the United States and the United Kingdom were the first countries to start the study, while China is the last to begin research.The average publication year in China was 2018,The first article was published in 2009, and in the first six months of 2024, three of the four Scopus articles were from Chinese authors.

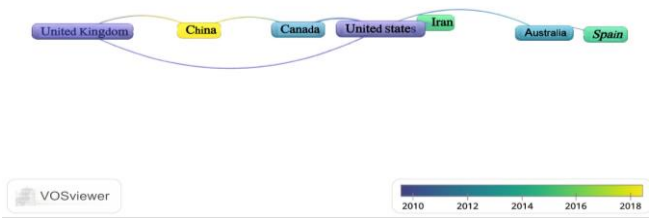

Figure3: Overlay Visualization of co-authorship with national

Source: Authors' elaboration based on Scopus and VOSviewer.

Density Visualization (Fig 4) shows that the United Kingdom, the United States, and Iran are the countries with the highest number of publication in this field.Cluster countries led by China and cluster countries led by Australia and Spain have less research in this field.

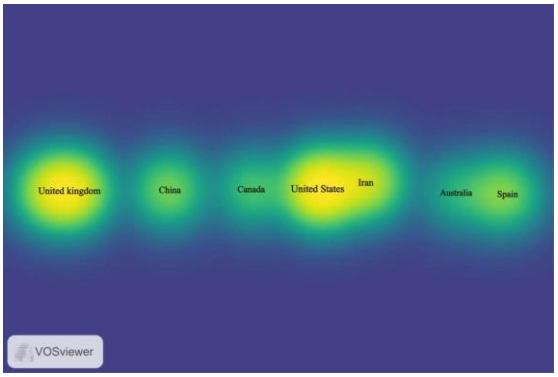

Figure 4: Density Visualization of co-authorship with national
Source: Authors' elaboration based on Scopus and VOSviewer.

4.2 Keywords Co-occurrence Analysis

Co-occurrence analysis is a powerful text mining technique that can identify the frequency of co-occurrence of keywords in text data and analyze related trends, themes and potential connections. This paper applied the analysis in VOSvievwer, set the minimum co-occurrence frequency to 6 times, and identified 45 keywords after keyword cleaning. The results of the Co-occurrence analysis are divided into 3 clusters, and its Network Visualization showed that in the field of higher education, taking the "balanced scorecard" as the core had different co-occurrence frequency and relationship strength with strategy, performance measurement, organization, innovation, academic etc. It is clear that the Balanced Scorecard is deeply integrated with many aspects of higher education, which work together to improve organizational performance, optimize management strategies, promote academic innovation and promote sustainable development.

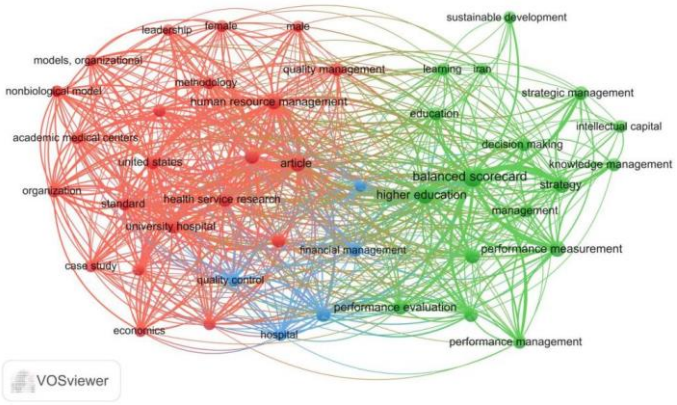

Figure 5: Network Visualization of Co-Occurrence with all keywords
Source: Authors' elaboration based on Scopus and VOSviewer.

The Overlay visualization results of Co-Occurrence with all keywords show that the research focus on university balanced Scorecard has gradually expanded from the initial aspects of organizational efficiency, quality indicators, university hospitals, health services, etc., to the relationship between employees, management, quality control, information management, human resource management, strategic management, performance measurement, etc. The use of the United States as a keyword also appeared in the earlier period, which indicates that the relevant research was dominated by the United

States during this period. In the later period, Iran also appeared as a keyword, indicating that with the continuous development of research, Iran became the main research country in this field during this period (average year 2014). The hot keywords are sustainable development, strategy, decision-making, performance management, performance evaluation, higher education, men, and women. Hot keywords in different periods represent the changes in research hotspots of balanced scorecards. Hot keywords with an average year of 2014 show the BSC related to sustainable development and performance system of balanced Scorecard in this period. The emergence of the keywords Iran and women and men not only shows the main contribution of Iran to the research during this period but also shows that the relevant research has fully considered the religious background.

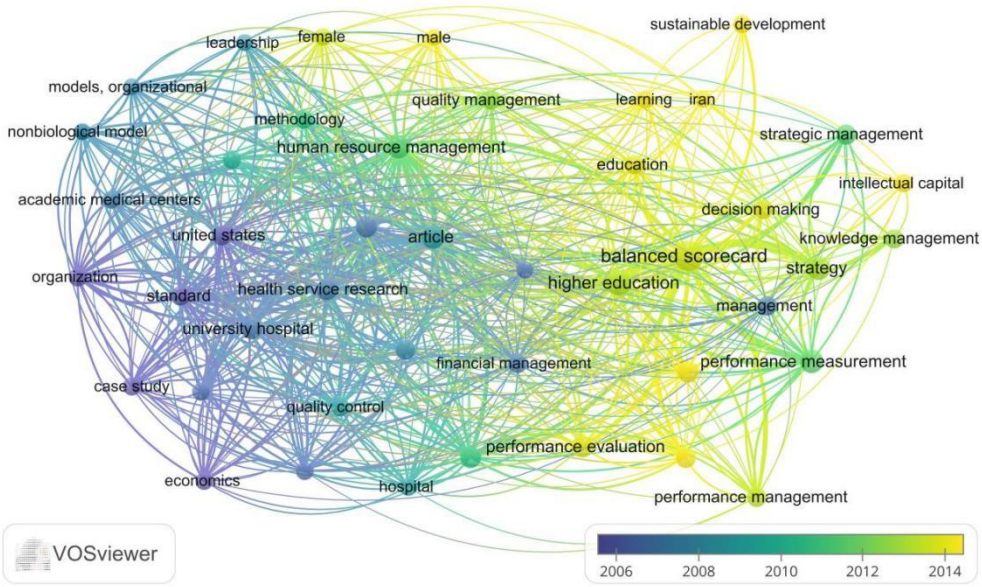

Figure 6: Overlay Visualization of Co-Occurrence with all keywords
Source: Authors' elaboration based on Scopus and VOSviewer.

The results of the density visualization (keyword collaborative visualization) analysis show the heat distribution in the study area. The analysis results show that under the university balanced scorecard theme, decision making, knowledge management, strategic management, performance measurement, performance evaluation, performance management and human resource management are presented as keywords with high density, which indicates that the research focuses on two aspects: performance and strategy. This fits perfectly with the theoretical development of the balanced Scorecard.

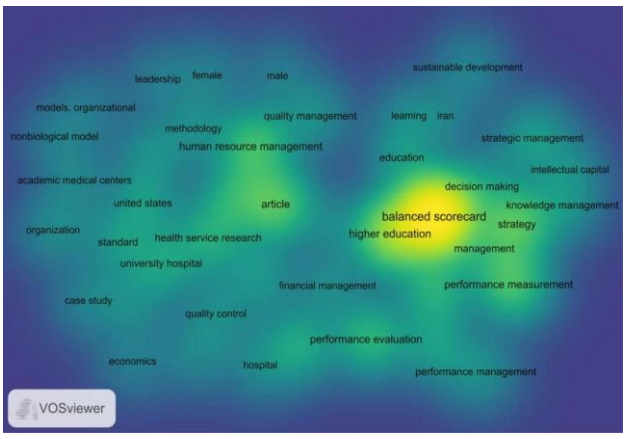

Figure 7: Density Visualization of Co-Occurrence with keywords
Source: Authors' elaboration based on Scopus and VOSviewer.

1. CONCLUSIONS

This study uses VOSviewer to review bibliometrics and analyze the progress of research on balanced scorecards in the field of higher education. Our visual analysis provides insights into key research areas, trends, and the dynamic interconnections between the various fields involved in the field. The study shows that there has been no interruption in research in this field since 1997, but the popularity of research has fluctuated. The relevant countries represented by the United States and the United Kingdom are the dominant players in this field and also influence the scholars and researchers of other countries, while the relevant countries represented by China are relatively late in this field of research. From the perspective of keyword analysis, with the continuous improvement of BSC by the authors of this theory, scholars have also conducted in-depth research. However, Kaplan & McMillan proposed a balanced scorecard that updates the triple bottom line strategy in 2020. This triple bottom line is social value, economic value and environmental value, and this theory has not been further studied and discussed in the field of higher education. Therefore, in the context that the Balanced Scorecard has been fully proven to be applicable to higher education institutions, the Balanced Scorecard has taken social value, economic value and environmental value as the triple bottom line, but there are no scholars in the field of higher education to study this.

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