Sustainable Development, Big Data, and the Economy: Scientometrics Analysis

Chunglien Pan[1], Wenshan Yang[2*], Xuanyu Liang[3], Zonghua Tang[4]

peter5612@gmail.com[1],wenshan.yang@qq.com[2*],3108951421@qq.com[3],2802986000@qq.com[4]

School of Accounting, Nanfang College-Guangzhou, Conghua, Guangzhou, 510970, China

Abstract: Affected by the current international economic development situation, the potential of data-driven methods in solving economic challenges has become increasingly obvious, and the relationship between sustainable development and big data has gradually begun to develop on a global scale. Using scientometric analysis methods, we selected research literature from the Web of Science (WoS) database from 1900 to 2023 and conducted a systematic review. Based on the data from 237 retrieved, this paper uses VOSviewer and Bibliometrix to analyze and visualize the results. The results show that the research on sustainable development, big data, and the economy is gradually deepening, the research scope is diversified and gradually expanding, and the whole is in a positive upward trend. By showing the cross-network between keywords and the development trend of each related keyword, we provide a reliable basis for researchers to grasp the development of the field.

Key word: Sustainable development, Big data, Economy

1. Introduction

The intensification of globalization has made the connection between sustainable development, big data, and the economy more and more close. Countries around the world can better understand the impact of global economic trends and trade patterns on sustainable development, and the relationship between sustainable development and big data has also changed. Countries have begun to use data-driven methods to deal with global challenges[1].

The development of the relationship between sustainable development and big data is affected by the interaction of technology, socio-economic, environmental, and other factors. Technological developments, including factors such as the Internet, sensors, and cloud computing[2], have made it more feasible to collect, store, and analyze large amounts of data, and have also facilitated the integration of big data into sustainable development efforts. Global agreements such as the 2030 United Nations Sustainable Development Goals (UN SDGs) provide a common framework to encourage countries to adopt a data-driven approach to monitoring and achieving development goals. Effective use of data can contribute to economic growth by supporting industries that rely on data analysis[3]. A data-driven strategy can improve market competitiveness and attract investment.

There are already journals that analyze and study big data and sustainable consumption, including the use of BDPA, decoupling analysis panel big data, game theory and sustainable consumption, institutional theory and big data analysis, the establishment of big data-based

rating indicators, and the application of traditional economic models in big data[4]. Taking the supply chain as an example, in the current global environment, supply chain organizations operate in increasingly complex and dynamic markets, and sustainable supply chains become inevitable to meet the dramatic changes in customer needs[5]. Academia seeks to follow new and emerging trends, with academics developing frameworks that bridge the current gap in digital supply chain research by examining existing levels of adoption of digital technologies and their potential to drive positive sustainable development outcomes[6].

Based on 237 articles collected in the Web of Science (WoS) database, this paper conducts scientometric analysis and uses VOSviewer and Bibliometrix to draw charts of research results related to this topic, providing clear research directions for researchers.

2. Data and methods

To obtain literature on sustainability, big data, and the economy, we use the following Web of Science (WoS) advanced search query:

TS=("Sustainable development") AND TS=("Big data") AND TS=("Economy")

A total of 237 articles (including the SCI extension, SSI.) were collected on May 27, 2023. Analysis and visualization of the results were performed using VOSviewer and Bibliometrix.

3. Study mapping results

To explore the research on sustainability, big data, and economics to date, this paper presents the following findings for data and visual analysis. It covers annual trends on the topic; Country, author, and keywords; the main theme of the subject study; Correlation factor analysis.

3.1 Annual trends

In general, the annual publication volume of articles and references shows a trend of slow and then rapid fluctuations. Articles and references published from 2014 to 2016 were very rare, and the number of articles and references published in 2016 as a node until 2018 has been on a steady upward trend. From 2018 to 2022, the annual number of posts showed a rapid and steep growth trend and reached a peak in 2022. This shows that scholars from all walks of life are increasingly interested in the research topics of sustainable development, big data, and economy, and indirectly shows that with the development of the economic era, the state pays more and more attention to and supports the research on this topic. And this upward trend is likely to continue.

Figure 1 shows the trend of literature changes in the literature related to the topics of sustainable development, big data, and economy, with sustainability being the fastest growth rate. This clearly shows that the research interests and research priorities of scholars from all walks of life from 2014 to 2022 also indirectly reveal that the external environment is also changing. In the future, this trend is still likely to continue to rise.
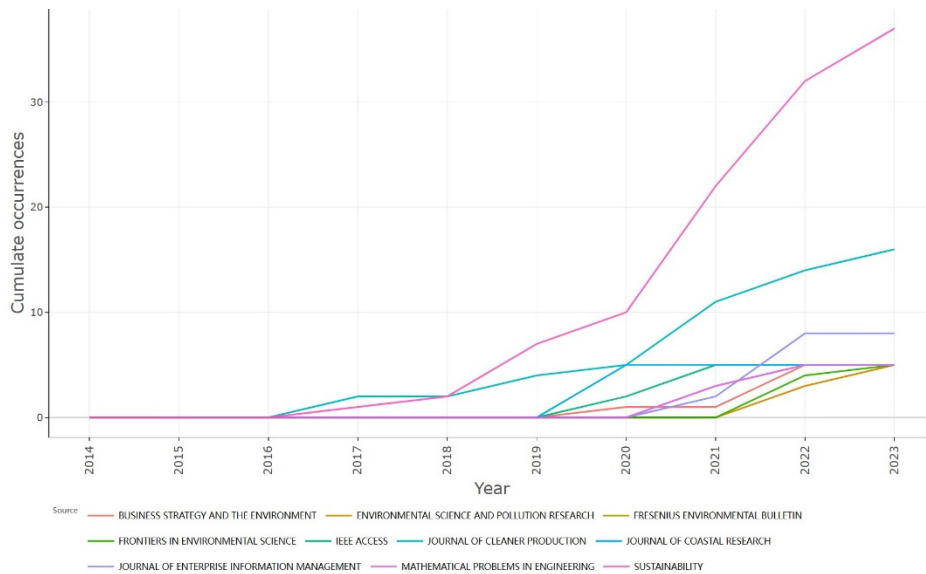
Figure1. Trends in literature publication over time

3.2 Country, author and keywords

Figure 2 clearly shows the relationship between countries and author keywords. Among them, "AU" represents the author, "AU_CO" represents the author's country, "DE" represents the keyword, and the thickness of the line indicates the quantity.

Most of the authors are Chinese authors, and in addition to authors from China, most of them are from India, Italy, Australia, the United Kingdom, and other countries. This undoubtedly shows that countries around the world are gradually realizing the importance of using data to promote sustainable development for the economy, and among them, China is undoubtedly among the best, and in addition to its own research, it is also constantly gathering research from other countries. Although developed countries with strong scientific research technology and infrastructure have been at the forefront of research, other countries are also actively participating in steady progress. Authors from various countries cooperate in research exchanges, and sustainability[7] is the most important among all research keywords. At the same time, the countries in the chart almost cover research related to the digital economy, sharing economy, big data analysis, Internet of Things, digitalization, and other aspects, which fully reflect the characteristics of multidisciplinarity.
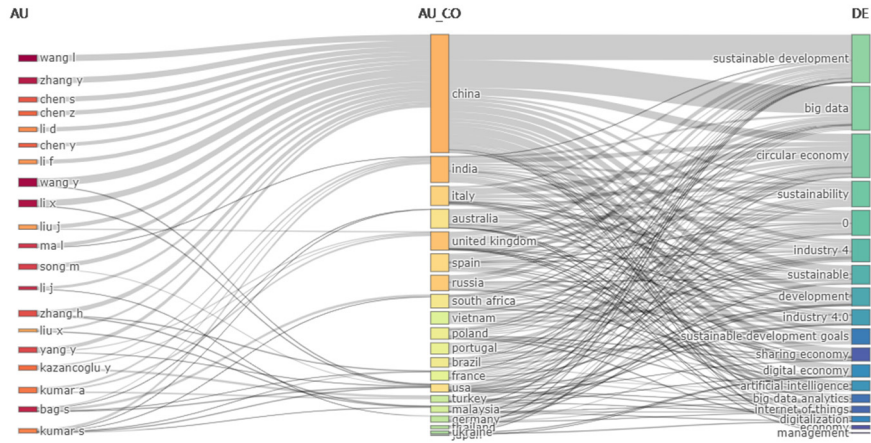
Figure 2. Three-domain view

3.3 Main Theme

Using Bibliometrix for thematic analysis leads to Figure 3. As can be seen from the figure, digital economy, China corporate social responsibility, smart city services, big data, green environmental protection cooperation, circular economy, sustainability and other fields are very important to this topic, and have achieved good development. However, although the sharing economy, green innovation, economy circular sustainable development goals are very important, they have not yet achieved good development.
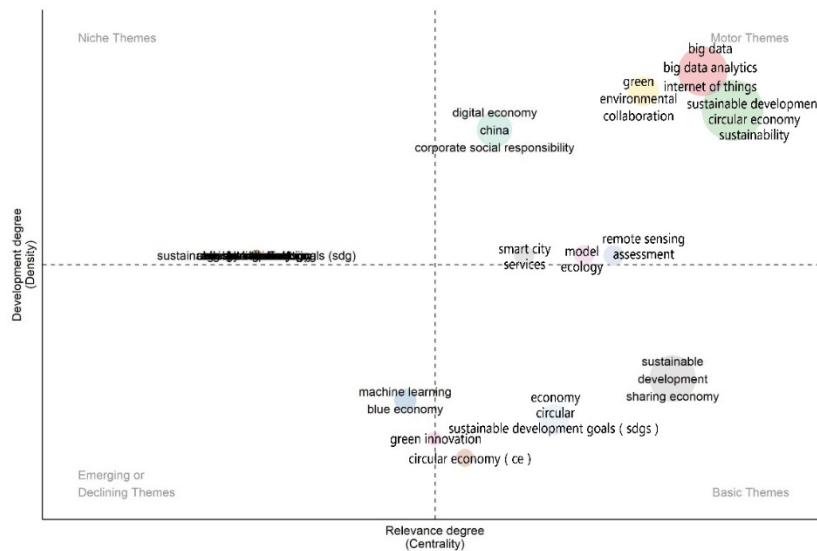

Figure 3. Strategic coordinates

3.4 factor analysis

Using the MCA method for multiple factor analysis to form a conceptual structure map (Figure 4), we identified three clusters and used the size of the cluster pattern to determine their importance.

The largest cluster is the red cluster, which includes the environment, energy, co2 emissions, consumption, system, information, china, economy, innovation, data analysis, model, industry, impact. Among them, the system[8] is the closest to the central point, which shows that the system is a very important solution for sustainable development, big data and economic topics. The second is blue clustering, which includes sustainable development , supply chain management, barriers, framework, design. The third cluster is the green cluster, which includes industry 4.0 technologies, predictive analysis, artificial intelligence, circular economy, future, opportunities, things, and internet. Finally, the purple cluster includes business models, big data 1, capabilities,indicators. Judging by the graph, circular economy[9], opportunity factor[10] in green cluster and supply chain management[11], framework factor[12] in blue cluster and big data factor[13] in purple cluster are more popular in their respective fields and get more attention.
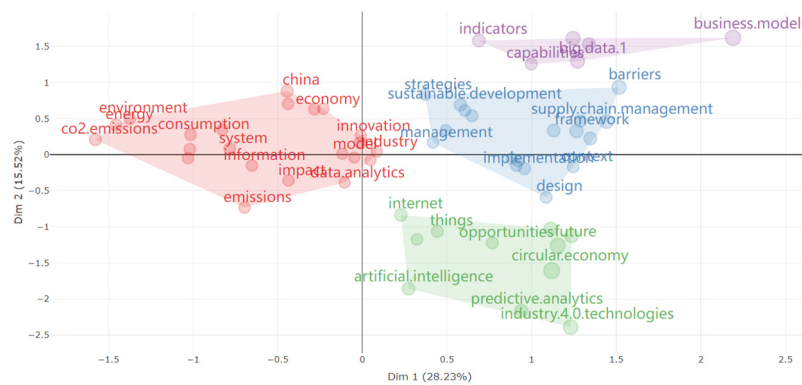

Figure 4. Conceptual diagram of structure

4. Conclusion

This paper studies and analyzes the relevant literature on sustainable development, big data, and the economy. The results of the quantitative analysis and systematic review of the literature in this study show that. Among the countries in the world, China has a higher degree of attention, and research results are more prominent. Systems, opportunity factors, supply chain management, framework factors, big data factors, and other topics are relatively important and have received higher attention and relatively good development. Sharing economy, green innovation, circular economy, and other topics, although also important. But seriously underdeveloped in some conceptual frameworks and need to be further developed and supplemented.

All in all, under the current world development situation and environment, experts and scholars around the world are paying more and more attention to the research of sustainable development, big data, and the economy.

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