New Energy and Sustainable Development: A Scientometric Analysis

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Abstract. New energy has become a focus of public and scientific scrutiny for the sustainable development. This paper reviews related literature of new energy involving sustainable development, and studies the evolution of emerging trends by a scientometric analysis to evaluate all relevant academic publications. The literature summary is conducted and the publication trend of the related literature is revealed. Research fields of new energy and sustainable development related articles are discussed, and then literature distributions involving journals and countries are analysed. A scientometric analysis for new energy and sustainable development involves a precise observation of new energy development trends, providing new research ideas that could be extended to other fields about sustainable development.

1. Introduction
Energy issues have threatened the sustainable development of society, economy and environment [1,2]. For more than half a century, the global economy has repeatedly suffered from rising prices caused by oil supply shortages as a result of the excessive consumption of fossil fuels [3,4]. The development and utilization of traditional energy sources have also seriously affected the global environment, causing serious damage to the environmental situation in some regions and areas [5-7]. There is an urgent need to study new technologies of alternative energy sources and fuels in order to meet the growing energy demand and apply them in specific fields [8]. The sustainable development of energy is the coordinated development of resources, economy, society and environment [9]. New energy industry is not only a key part of the national economy, but also an important link to achieve green, low-carbon and sustainable development [10,11]. How to realize the mutual benefit of new energy utilization and economic growth is very important for sustainable development.

The sustainable development and utilization of energy resources is the basic condition for the sustainable development of society and economy, and an important way for the sustainable development of ecology and environment [12,13]. The natural nature of new energy has laid the foundation for sustainable development [14]. Electrification is an important prerequisite for human development, and the fact is that hundreds of millions of people around the world are still living in energy poverty [15]. However, the distribution of fossil fuels is uneven [16]. If the global economy relies too much on fossil fuels, it will cause an energy crisis on a regional or even global scale [17]. Despite the inefficiency, many places still rely on traditional energy sources whose use has proven to cause serious harm to environmental health [18,19]. Therefore, it is necessary to study new energy to meet the increasing energy demand and promote sustainable development.
In this study, the trends of new energy and sustainable development are explored based on a scientometric analysis. The structure of this paper is as follows. Scientometric analysis for new energy and sustainable development related literature is conducted in Section 2, including literature summary and literature distribution analysis. Section 3 presents the conclusions.

2. Scientometric Analysis

New energy is one of the important sustainable development problems faced by mankind in the 21st century [20]. Many scholars have done a lot of research on new energy in many aspects [21-23]. Before analyzing and summarizing the previous studies, the literature metrological analysis tools were used to investigate the relevant studies to better understand the progress, change rules and development direction of the previous studies. Through the analysis of the existing research results, the research status and shortcomings are summarized. Summing up the research trend provides the knowledge foundation for the research of this paper.

2.1. Literature summary

Firstly, the literatures related to new energy and sustainable development were collected from the core databases of Web of Science. The time interval for all literature retrieval results ranged from 1990 to 2020.

For the literature retrieved from the Web of Science core collection database, "new energy" and "sustainable development" are used as the key words. As shown in Fig. 1, there were 7417 papers on the same research topic in the end.

![Web of Science search](image)

Figure 1. Literature search of Web of Science core collection database

The 7417 literatures were first published in the 1990s, and began to increase after 2007, and have continued to increase in recent years, as shown in Fig. 2. According to the year of publication of the literature, we can see how much attention scholars paid to the problem. It is obvious that there are relatively few researches on new energy and sustainable development before this century, which indicates that new energy towards sustainable development in the 21st century has become one of the problems that scholars need to solve urgently.
Fig. 3 shows related results based on new energy and sustainable development research fields. From this figure, energy fuels, environmental sciences, and green sustainable science technology are the fields with the most related publications. Moreover, environmental studies have a relatively high number of relevant papers.

Fig. 3. Research fields of new energy and sustainable development related articles.
2.2. Literature distribution

From the research area in which the journal is located, it can be concluded that the subject range involved in new energy and sustainable development issues. According to the percentage of the number of published literatures in each journal in Fig. 4, the results of new energy and sustainable development are most published in the Journal of Cleaner Production, Sustainability and Renewable & Sustainable Energy Reviews. Cleaner production and sustainability are the main fields involved in new energy and sustainable development. In addition, leading journals in the field of energy policy, and the mainstream journals in the field of energy application (such as Applied Energy and Energy Conversion and Management) have a lot of studies on the new energy and sustainable development, which indicates that the issues of new energy and sustainable development have been attached importance to by scholars.

As can be seen from Fig. 5, China is the country with the most research on new energy and sustainable development, accounting for 22.394% of the total number of literatures. In second place was the United States, with 13.280% of the total. It was followed by England, with 7.105%. China, the United States, and England collectively account for 42.779% of the global total of related articles on new energy and sustainable development. In addition, countries with relatively more research on new energy and sustainable development include: Italy, Germany, Australia, Spain, France and India.
3. Conclusions
This paper adopts a scientometric analysis to evaluate the new energy and sustainable development related literature in the Web of Science core collection database. The literature summary is conducted first. 7417 papers about new energy and sustainable development are found, and the publication trend of the related literature is revealed. Moreover, research fields of new energy and sustainable development related articles are discussed. Then literature distributions involving journals and countries are analysed. Journals about cleaner production, sustainability, energy policies and applications are the mainstreams of new energy and sustainable development. In addition, China, the United States, and England collectively account for over 40% of the global total of new energy and sustainable development related articles.

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