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Review on Social Responsibility of Chinese Companies in the Context of Carbon Neutrality and Performance

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Abstract: China will increase its autonomous national contribution, adopt more vigorous policies and measures, strive to peak CO_2 emissions by 2030, and achieve carbon neutrality by 2060. To achieve the goal of carbon peaking and carbon neutrality, there is still enormous pressure to reduce emissions. Still, it is also an inevitable requirement to cope with global warming. As microeconomic subjects with the ultimate goal of profit, enterprises promote economic growth while their economic activities have a significant impact on the natural environment. This study uses VOSviewer software to visualize and analyze domestic and international research hotspots. Further, it discusses the development, corporate behavior, social perceptions, and national policies in related fields to provide positive guidance for enterprises to consciously assume social responsibility.

1. Background of the Study

With the dramatic increase in population, carbon dioxide produced by increased human activities has exacerbated global warming. The burning of chemical fuels, and over-exploitation of industrial, agricultural and forestry land and natural resources have seriously damaged the diversity and sustainability of the ecosystem, limiting the living space of human beings as well as posing a serious challenge to future development. Since 2020, the world's total population has exceeded 7 billion and is expected to reach 10 billion by 2050. The growing population has increased the demand for and consumption of resources such as energy, food, and living environment, which has brought great pressure to all walks of life. Some meteorologists have warned that the global carbon dioxide emission level needs to be reduced by 85% by 2050 compared to 2000. Otherwise, the rise in global temperature will have a beneficial impact on the ecological environment. To combat global warming, countries have joined together to sign the Paris Agreement, making it a legally binding document to combat climate change on a global scale. The agreement clearly plans that the ultimate goal is to achieve peak carbon emissions as soon as possible and to achieve carbon neutrality on this basis; Countries are required to customize their own programs or strategies to achieve peak carbon and carbon neutrality according to their own national conditions.

Controlling reasonable carbon emissions, achieving carbon peaking and carbon neutrality, and mitigating global warming is of great significance to sustainable economic development and the future development of human beings, and require the joint efforts of all countries and industries.

Reducing carbon emissions, saving resources and protecting the environment have become the social responsibility of enterprises, but there is still a certain contradiction between CSR and performance, and the fulfillment of CSR will inevitably harm the performance of enterprises, but in the long-term development, the fulfillment of CSR can help improve and enhance the corporate image and increase the customer's loyalty to the brand. Under the supervision of national policies and driven by social trends, most enterprises have responded to the national call to fulfill social responsibility actively, but there are still some enterprises that are greedy for short-term benefits and violate government laws and regulations by emitting substandard exhaust gases, waste liquids and wastes in their operations. From a worldwide perspective, it seems that protecting the ecological environment, developing a low-carbon economy, and achieving sustainable development is the general trend.

Based on the above analysis, this paper takes "carbon peaking and carbon neutral" as the social background, and uses the literature collected by the Web of Science database and China Knowledge Network to conduct visual analysis with VOSviewer software to explore the relationship between corporate social responsibility and corporate performance in this context.

2. Research Methodology

2.1. General Research Methodology

This study takes the current policy environment of carbon neutrality as the background and explores the relationship between corporate responsibility and corporate performance. This will provide a theoretical basis of practical significance for the healthy and sustainable development of China's listed companies and the early realization of the "carbon neutral" and "carbon peak" goals of the country.

VOSviewer is a visualization tool developed by van Eck et al. from the Science and Technology Research Center of Leiden University, The Netherlands, specifically for analyzing knowledge units of the literature based on VOS visualization technology. Its outstanding features are its strong graphic presentation capability and its suitability for large-scale sample data analysis. Now updated to version 1.6.6, it is mainly oriented to literature data and is suitable for the study of undirected networks, focusing on the visualization of scientific knowledge.

The data used in this study were obtained from the Web of Science (WOS) core collection database and China Knowledge Network, with the WOS search criteria of "subject," English language, journal article type, and keywords "business, management." Management", the search yielded 2240 articles. The search criteria of CNKI were "topic=CSR, performance" and the type of literature was journaled articles. The source was selected as core journals, and the advanced search yielded 632 articles.

2.2. Brief Description of Research Methods

The main research methods in the sample literature are qualitative studies, quantitative studies, qualitative + scenario analysis, quantitative + scenario analysis, and hybrid + scenario analysis. Quantitative studies, qualitative + scenario analysis, quantitative + scenario analysis, and mixed + scenario analysis were commonly used for the carbon synthesis of Carbon peaking.

The Japanese scholar Yoichi Kaya established the link between human social activities and carbon emissions and created the Kaya constant equation to decompose the factors influencing carbon emissions through the Kaya decomposition method. These methods have been widely used in carbon peak-related studies. Wang, et al. combined the Zenga index with Kaya characteristics and used the index to explore the imbalance patterns of regional carbon emissions and carbon

intensity in China [1], and identified the factors contributing to carbon imbalance and polarization. Daiva Makuteniene, et al. used the log-averaged partition index (LMDI) method [2], analyzed the factors affecting GHG emissions, assessed the dynamics of GHG emissions in agriculture, and identified the elements with the most significant impact on emissions. Wang, et al. developed a comprehensive projection model based on the Kaya constant equation [3], the log-averaged partition index (LMDI) model, and scenario analysis methods to forecast the trend of CO_2 emissions in China under different scenarios in 2030, and calculate the emission reduction potential and influencing factors for each sector separately.

Researchers use quantitative analysis methods to decompose the factors influencing carbon emissions in a region or industry to identify the main drivers of carbon emissions, and then use scenario design to simulate the pathway to peak carbon, which can effectively study the problems related to peak carbon. Zhu, et al. first selected six main factors influencing CO_2 emissions in China's transportation sector (gross domestic product, population, urbanization rate, energy consumption structure, energy intensity, and industrial structure) to develop a prediction model of CO_2 emissions based on a support vector regression (SVR) [4].

Cui et al. developed a framework for assessing carbon emission uncertainty based on peak carbon simulation by first introducing a stirring model to explore the effects of demographic [5], economic, and technological factors on carbon emissions, followed by peak emission simulation. Ma et al. To identify a low-carbon roadmap for future residential buildings [6], this study, for the first time, assessed historical carbon emission mitigation and simulated using dynamic emission scenarios energy and emission peaks for the residential building sector in China were simulated using dynamic emission scenarios.

There are also researchers who will study the best-integrated approach of a multi-criteria carbon allowance allocation scheme under the cost minimization objective through planning modeling. Chai et al. used time-series data from Xinjiang from 2000-2019 and studied the influence of several factors on CO_2 emissions using the stirring model [7]. Based on this, a GA-BP neural network was introduced to predict the carbon emission trend in Xinjiang from 2020-2050. Shi et al. studied the decomposition of carbon emission factors and prediction of carbon peaks from the perspective of multi-objective decision making and information fusion processing [8], using sample collection methods and statistical analysis methods for sample collection, and the results of this multi-objective decision making and information fusion processing based decomposition of carbon emission factors and prediction of carbon peaks can be used for the decomposition of industrial carbon emission factors and prediction of carbon peaks in other cities in China. Xu et al. developed a simple decomposition model to study the dynamic impact of energy consumption structure on the peak CO_2 emissions in China through scenario studies [9]. It is noteworthy that optimal planning models are increasingly used in the transition of energy systems because they can quantify the cost of future transition paths while giving lower-cost transition paths. Wu et al. propose an optimal model to analyze China's CO_2 emission paths for 2010-2050 [10], i.e., the baseline and 1.5 ℃ to 2 ℃ target scenarios. Emission paths for the baseline and target scenarios from 1.5 ℃ to 2 ℃. A quadratic directional distance function model was used to calculate the marginal cost of carbon emission reduction for 30 Chinese provinces and to allocate CO_2 emission allowances among the provinces.

3. Domestic and International Research Analysis

3.1 Emerging Research Analysis

Using VOSviewer, the view of the time of occurrence of the terms in the keywords of the literature from 2018 to 2020 is plotted as shown in Figure 1. The earlier the time the term tends to

be blue, and the later the time, the term tends to be yellow. From the figure, we can see that the terms csr performance, csr disclosure, and csr report are densely distributed around 2020, which shows that in recent years, the relationship between CSR and financial performance has received much attention from academics, and a large number of scholars have conducted research and analysis on it, and finally concluded that the two are not simply directly related to each other. Scholars have conducted in-depth studies, such as exploring the relationship between the two. There are still many limiting factors, such as the institutional environment, political connections, and the nature of property rights.

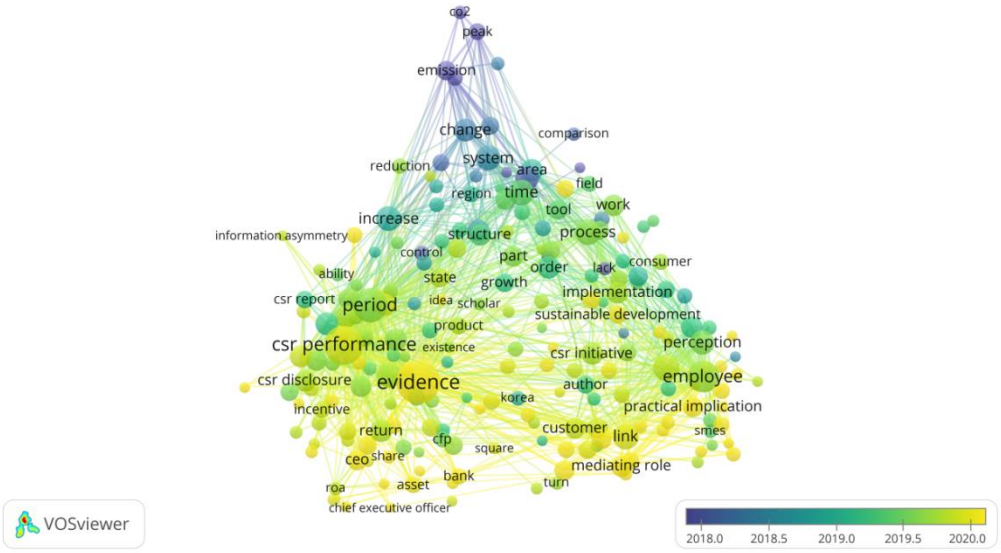

Figure 1: The terms in the keywords of the literature from 2018 to 2020.

3.2 Analysis of Research Hotspots

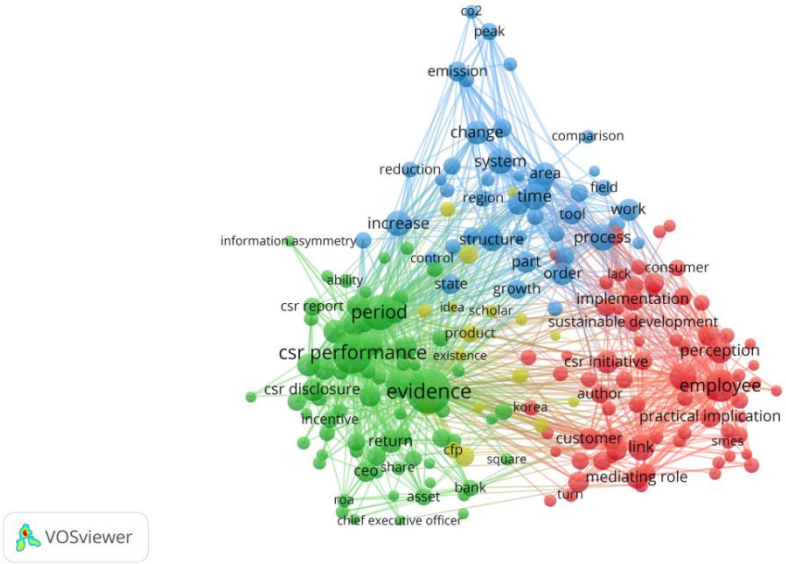

Figure 2: The research hotspots of CRS from 2018 to 2020.

We use the VOSviewer software to find out the research hotspots of CRS from 2018 to 2020.,

which are shown in Figure 2.

There are three color clusters. Green cluster: The content of this cluster mainly reflects the attention of scholars on CSR and financial performance. The main keywords included in this cluster are csr performance, csr disclosure, and csr report. Blue Cluster: This cluster reflects scholars' views on how and how soon China can achieve a carbon peak. This cluster contains keywords such as CO_2, peak, emission, system, and reduction. Red cluster: The content of this cluster mainly reflects the attention of scholars to other factors that influence CSR. This cluster contains the main keywords employee, practical implication, and consumer.

3.3 Analysis of Cited Literature

The top 5 highly cited literature on CSR research within corporate environmental governance performance in the web of science database for the period 2009-2022 originated from 4 different journals. Two of them are from JOURNAL OF CORPORATE FINANCE. Gillan et al. review mainly financial economics-based ESG and CSR studies demonstrating that ESG/CSR-related activities and corporate markets are strongly correlated. Nirino et al. use a database of 356 European listed companies and use linear regression models to confirm the negative and significant relationship between corporate controversy and financial performance, arguing that ESG practices should not be used as a means to mitigate the negative effects of controversy, but rather as a way to avoid it. While Drempetic et al. propose that ESG scoring measures corporate sustainability in a way that offers advantages to large companies with more resources, and that the concept of sustainable and responsible (S.R.) investment expresses the idea that each investment should be based on the ethics of S.R. investors.

4. Discussion

4.1 Challenges That Are Faced

First of all, compared with developed countries, China needs to make more efforts to achieve the goal of carbon peaking and carbon neutrality. From the perspective of total emissions, China's total carbon emissions are about two times that of the United States and three times that of the European Union, and the carbon emission reduction required to achieve carbon neutrality is much higher than that of other economies. From the perspective of the carbon emission development trend, carbon emission in developed countries peaked around the 1980s to 2007, and these countries have at least 40 years or even 70 years window to achieve carbon neutrality by 2050, while the time to achieve carbon neutrality in China from 2030 to 2060 is only about 30 years, which is significantly shorter than that of European and American countries. The efforts and extent of China's efforts to achieve the goal of carbon neutrality are far greater than those of European and American countries.

In November 2019, more than 11,000 scientists worldwide declared that the planet is facing a "climate emergency." In December 2020, U.N. Secretary-General Guterres called on all global leaders to "declare a climate emergency until their countries become carbon neutral. In February 2021, the U.N. Security Council held a high-level debate on climate change and peace and security, in which the U.N. Secretary-General made clear that climate disruption is a crisis amplifier and multiplier Climate change exacerbates the risk of instability and conflict.

While long-term, real solutions to climate change depend on mitigation, adaptation is still essential and an immediate solution to the problem. First, many of the impacts of climate change are already occurring, and there is no way to minimize the negative effects of these impacts without adapting to change them through means of adaptation. For example, now due to light, heat and water are some changes, that is, some elements of the climate have changed, which on the layout of

agricultural planting, to better resist disaster varieties of options, have put forward some new needs. Although China's grain production has increased year after year, it is actually a function of technological advances such as planting adjustments and variety selection, which means more costly inputs are needed. These are all adaptation measures. So adaptation measures are still very useful for the impacts that are already happening. Secondly, it takes - time for mitigation measures to really have an effect. Because all greenhouse gases have a lifetime, they will be around for decades, centuries, or even longer. Even if we take mitigation measures today, even if we reach near-zero emissions, the climate effects of the greenhouse gases that were emitted in the past or are emitted now will still be felt for decades, centuries, or even longer, especially since sea levels will still be Rising. So for the impacts and risks that have occurred and will occur, it is important to rely on adaptation measures to reduce their adverse effects.

Third, the challenge of carbon emissions faced by industrial enterprises. At present, while the foreign economic situation is not optimistic, China has already won the battle against poverty, domestic demand is growing strongly, and the goal of economic growth has been adjusted to be led by boosting domestic demand in order to realize both internal and external cycles. At the same time, the goal of achieving the carbon peak by 2030 forces China to carry out supply-side reform, optimize the industrial structure, and improve energy efficiency to ensure that economic growth and carbon emissions are decoupled after the carbon peak is achieved. Enterprises at the bottom of the industrial chain, with unreasonable energy structure, high energy consumption, and low energy efficiency are under pressure to be eliminated; strategic new industries are also under pressure to plan for rapid development within ten years and complete the construction and production as soon as possible how to obtain space for their own development after the carbon peak is an essential part of the comprehensive planning for industrial enterprises in the past ten years. 2030 is the deadline for China to reach the carbon peak, which is less than ten years away. China is still a developing country, and the rapid growth of domestic demand will be accompanied by the rapid growth of energy consumption and carbon emissions after the completion of the national poverty eradication task at the end of 2020. The rapid growth of domestic demand is bound to be accompanied by the rapid growth of energy consumption and carbon emissions. To achieve the carbon peak within ten years, China's industrial enterprises will face great development pressure, forcing China to start supply-side reform, adjust industrial structure and optimize energy supply.

4.2 Policy Environment

As a result of the growing population, rapid economic development, and rapid consumption of resources, the environment is getting worse and worse, and countries around the world are paying more attention to protecting environmental resources. In addition, due to the influence of economic globalization, the world economy is characterized by low-carbon globalization, and "energy saving, carbon reduction, carbon peaking, carbon-neutral" has become a hot topic of international attention, and more and more countries are working together to solve the greenhouse effect, resource depletion, ecological damage and other problems to cope with global climate change. According to the statistics of the Organization for Economic Co-operation and Development (OECD), 54 countries in the world have achieved a carbon peak so far, most of them are developed countries such as Germany, Norway, the U.K., the Netherlands, the U.S., etc. By 2030, there will be 58 countries, including China, that will achieve a carbon peak. By 2030, 58 countries, including China, will have reached peak carbon. The first country to achieve peak carbon was the European Union, with nine member countries getting peak carbon in 1990, with total carbon emissions of about 4,854 million tons and per capita carbon emissions of about 11.3 tons, mainly from energy consumption and agricultural production [11]. The year the U.S. reached its carbon peak was 2007, with total

carbon emissions of about 7.416 billion tons and per capita carbon emissions of about 24.5 tons. Carbon emissions in 2020 are lower than in 2019 due to the impact of the new crown epidemic. In January 2021, then U.S. President Joe Biden signed an executive order to return to the Paris Agreement to achieve the goal of carbon neutrality by 2050 through measures such as optimizing the energy mix, promoting energy e-IT, and market incentives [12]. Carbon peak is the basis and prerequisite for carbon neutrality, and developed countries such as Europe and the United States advocate achieving carbon neutrality by 2050, and have taken positive actions and implemented a series of policy measures.

The Paris Association, adopted in December 2015 at the 21st United Nations Climate Change Conference, establishes the principles of equity, commonality, capacity and responsibility, and requires countries to develop their emission reduction programs and strategies according to their national circumstances, in order to achieve a global balance between carbon emissions and removal of construction in the second half of the 21st century [13]. China is an active follower, layer and contributor of the agreement, as well as an internationally responsible power, responding positively to global climate governance. However, in order to complete the process of industrialization and urbanization, China needs human intervention to achieve carbon peaking, unlike European and American countries. According to the International Energy Agency, China's carbon emissions from electricity and heat and industry are higher than the global average [14]. To achieve the goal of carbon peaking and carbon neutrality, there is still huge pressure to reduce emissions, but it is also an inevitable requirement to cope with global warming. In 2017, several cities in China established national carbon emission trading markets, using the regulatory role of the market to promote the relevant responsible parties to control carbon emissions spontaneously [15]. In September 2020, the Chinese government proposed at the 17th U.N. General Assembly: "China will increase its national autonomous contribution, adopt more vigorous policies and measures, and strive to peak CO_2 emissions by 2030 and achieve carbon neutrality by 2060." This is a solemn commitment made by China to the international community, and a broad and profound economic and social change. 2021 October, the State Council issued the "Carbon Peak Action Plan by 2030" clearly pointed out to guide enterprises to adapt to the requirements of green low-carbon development distinction, and proposed to focus on the implementation of "ten actions to reach the carbon peak" In this regard, it is important to build carbon neutral development of enterprises. In this regard, it is important to build a carbon neutral development strategy for enterprises to achieve the goal of "double carbon" in China.

The "double carbon" goal has promoted cooperation and communication among countries and further increased the requirements for enterprises, but there is still a conflict between the social responsibility of enterprises and their performance. According to Wei Yanying and others [16], administrative and market-oriented policies have a significant negative impact on short-term corporate performance and a significant positive impact on long-term corporate performance and social responsibility, respectively. To achieve this goal, the government should plan development policies to make enterprises fulfill their social responsibility and achieve the effect of reducing resource waste and environmental pollution; consumers tend to have higher loyalty to corporate brands that can actively complete their social responsibility and participate in charity or public welfare activities, and these corporate brands can be rated higher, so enterprises should also actively fulfill their social responsibility to improve consumers' brand, Therefore, enterprises should also actively fulfill their social responsibility to enhance consumers' brand loyalty and thus promote the competitiveness of enterprises [17]. In other words, they should contribute to the realization of "double carbon" and promote their own long-term development.

4.3 Corporate Behavior

As micro-economic agents, profit-oriented enterprises drive economic growth and have a significant impact on the natural environment, especially energy-related enterprises. However, different companies have different behavioral choices regarding environmental ethical responsibilities. Some companies take the initiative, while others choose between social responsibility and short-term profit.

The structure, nature, and state of resources already owned or controlled by the firm are important binding forces when market competition drives the firm to implement eco-innovation strategies; however, the insignificant interaction between resource redundancy and other factors suggests that the realization of governmental environmental regulatory forces is not bound by the firm's resource status; when the firm's executive group forms a strong will to implement eco-innovation, the binding force of the firm's resource status will be reduced. Both show that the resource status of a company does not constitute an excuse or a dominant force to reject eco-innovation [18]. The Ministry of Environmental Protection and the Securities and Futures Commission has issued a series of rules and regulations that clearly state that environmental information must be disclosed by listed companies in heavily polluting industries, while voluntary disclosure is practiced in other sectors. However, the overall quality of environmental information disclosure in China is poor, so how to promote the active implementation of energy conservation and emission reduction obligations of enterprises, and thus to improve the awareness of corporate environmental responsibility has become a key part of the construction of ecological civilization. According to Hoda et al. [19], the management of an enterprise is the core of the control of the enterprise and plays a decisive role in the strategic decision-making and behavior selection of the enterprise. The firm is not only influenced by the formal system, but also plays an important role in the informal system.

Therefore, it is necessary for us to conduct an in-depth study on the social and environmental responsibility behavior of enterprises, and present clear quantitative indicators to enterprises on the relationship between social responsibility and performance, focusing on carbon emissions, to encourage enterprises to consciously assume social responsibility while ensuring their performance, and combine the role of national policy regulation with the optimization of social responsibility and enterprise performance intentionally taken by enterprises.

5. Summary

In the current social environment, with the increase in population, industrial activities, automobile emissions, etc., the carbon environment is not very optimistic and has reached a point that cannot be ignored. If we cannot save energy and reduce emissions, then our ecological environment will be greatly affected by the global temperature rise, which will be a disaster for us and other living creatures. That's why carbon neutrality is already on the agenda. Now both individuals and large enterprises need to make their contributions, especially large enterprises. The greater the capacity, the greater the responsibility, reflecting that carbon neutrality and corporate performance are closely related.

This time the social responsibility of the enterprise is very big, the performance of the enterprise may have some impact because of social responsibility, but it can be exchanged for greater benefits. A company does this well, reflects its ability, reflects its role. It will impress more clients, and clients can be more confident in giving their projects to this type of company. For the company, it not only contributes to the environment, but also makes a name for itself. This is a good thing. Companies should do this well.

The situation in China is not as good as in the West, and it has a much longer time to become

carbon neutral. China has introduced many policies to accelerate this situation. We are striving to achieve the goal of carbon neutrality as soon as possible. We in China, as a world power, contribute accordingly, and we as Chinese citizens should also be honored to do what we can. This is not only about our current life, but also about our own children and grandchildren, and the future of the earth. All Chinese companies should pay attention to this.

After the domestic and foreign comparison, China is not suitable to copy the foreign treatment. China should come out of its own road, combined with China's own situation, with the Belt and Road, power, energy and chemical industry, etc., out of a fast and stable road. This is the time when every enterprise should take its social responsibility and put it into practice. The robustness of China's policy can be analyzed by using the double-difference method, and we can make changes according to the policy, which is often critical.

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