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Research on the influence of digital economy on carbon emission intensity

— Based on the perspective of e-commerce.

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1. INTRODUCTION AND RESEARCH QUESTIONS

According to the China E-Commerce Report (2021) released by the Ministry of Commerce of the People's Republic of China, e-commerce adheres to innovative development, greatly promotes the process of digital industrialization and industrial digitization, and the national e-commerce transaction volume maintains positive growth.

With the rapid development of e-commerce, the digital economy has exhibited a remarkable growth trend. In recent years, China has prioritized the "dual carbon" goals in its efforts to promote economic transformation and achieve harmonious development between humans and the land. This study delves into the impact of the digital economy on China's carbon emission intensity, utilizing panel data from 30 provincial administrative regions from 2011 to 2020. By employing the entropy weight Topsis method and incorporating transactional income and volume of the e-commerce industry into the digital economy development index, the study provides a comprehensive analysis of this relationship.

Therefore, this study will provide a more micro-analysis of the relationship between the digital economy and carbon intensity from an e-commerce perspective. Our research questions are as follows: (1) Can the development of digital economy attenuate carbon emission intensity? (2) What kind of relationship does the digital economy show on carbon emission intensity? (3) Does the digital economy affect carbon emission intensity by influencing technological efficiency?

2. THEORY AND RESEARCH MODEL

3. empirical analysis and other methods, and the main technical routes are shown.(Figure 1).

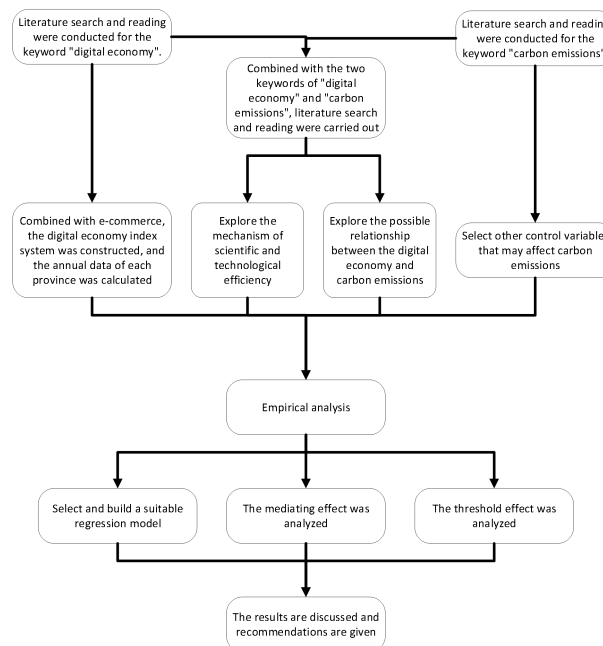


Figure 1. Research model**4. MATERIALS, RESULTS AND MAJOR FINDINGS**

An empirical study was conducted on a sample of 30 provincial-level administrative regions from 2011 to 2020. The data mainly comes from the National Bureau of Statistics, the China Carbon Accounting Database (CEADs), provincial statistical yearbooks, etc. In order to reduce the impact of excessive dimensional differences, the variable population density is logarithmic.

The empirical research reveals that the development of the digital economy not only contributes to reducing carbon emission intensity but also exhibits an inverted U-shaped relationship, characterized by an initial increase followed by a decrease. This finding suggests that during the initial stages of digital economy development, carbon emission intensity may temporarily rise. However, as digital technologies mature and their application scope expands, their inhibitory effect on carbon emissions gradually becomes evident.

Furthermore, the study explores the potential pathways through which the digital economy influences carbon emission intensity. Through mediation effect testing, it is found that technological efficiency plays a significant mediating role. This implies that the development of the digital economy indirectly affects carbon emission intensity by enhancing technological efficiency.

Based on these findings, the study proposes countermeasures to promote digitization from three aspects: e-commerce logistics, information flow, and infrastructure construction. These recommendations aim to achieve carbon emission reduction and high-quality economic development as soon as possible. They hold significant value for China in achieving its "dual carbon" goals and promoting the coordinated development of the digital economy and the ecological environment.

5. MAIN CONTRIBUTIONS

The primary contribution of this study lies in its comprehensive analysis of the intricate relationship between the digital economy and carbon emission intensity, particularly from an e-commerce perspective. By incorporating transactional income and volume of the e-commerce industry into the digital economy development index, the research offers a more nuanced understanding of how digitalization impacts environmental sustainability. The study's empirical findings reveal that the digital economy not only has the potential to reduce carbon emission intensity but also exhibits a dynamic relationship with it, initially increasing and then decreasing over time. This inverted U-shaped relationship provides crucial insights for policymakers and industry stakeholders in anticipating and managing the environmental implications of digitalization. Furthermore, the identification of technological efficiency as a significant mediating factor in this relationship underscores the importance of enhancing technological capabilities in mitigating the environmental impact of digital economy growth. This finding opens up new avenues for future research and intervention strategies aimed at promoting a green and sustainable digital economy.

In summary, this study contributes significantly to the field of sustainable development by bridging the gap between digital economy research and environmental science. Its findings not only enhance our understanding of the environmental implications of digitalization but also provide valuable guidance for policymaking and industry practices aimed at achieving a low-carbon and sustainable future.

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