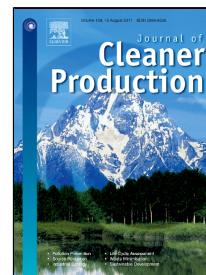


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# Examining industrial structure changes and corresponding carbon emission reduction effect by combining input-output analysis and social network analysis: A comparison study of China and Japan

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## Abstract

Industrial structure adjustment is one solution for responding economic slowdown and environmental problems occurred during China's rapid industrialization. Such an adjustment may also lead to carbon emission reduction since it encourages industrial innovation and resource efficiency. However, few studies have been conducted on examining the effect of industrial structure adjustment on carbon emission reduction. Under such a circumstance, this study develops an integrated evaluation model based on Input-Output Analysis and Social Network Analysis to quantify the evolutionary trends of industrial structure, demonstrate the inner-relationship between different sectors and investigate the industrial structure-related carbon emissions. China and Japan were selected as case study countries. Results show that industrial structure was gradually improved in China and various connections were established between different sectors. For Japan, the industrial network densities were lower than for China and exhibited a downward trend that reflected the weakened relationship between different industries. Service sectors dominated the Japanese economy, as shown by the relatively higher degree centrality and betweenness centrality of service sectors. The electricity and heat production sector was further investigated to illustrate the industrial structure-related carbon emissions. Finally, this study concluded that compared to the industrial structure features in a developed country, such as Japan, China's industrialization is still in its infancy. Thus, it is crucial to prepare industrial structure adjust policies so that the overall social-economic performance can be improved.

**Keywords:** input-output analysis; social network analysis; industrial structure; carbon emissions; China

## 1. Introduction

Industrial structure reflects the complex relationship or connectedness between different industrial sectors and the impact of each industry on the whole industrial network. After decades of

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