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RESOURCE ALLOCATION OPTIMIZATION AND GREEN LOW-CARBON DEVELOPMENT PATHWAYS IN MANUFACTURING ENTERPRISES UNDER DIGITAL EMPOWERMENT

Jianmin Wang, Chenchen Wang, Lixiang Wang*

School of Economics and Management, Anhui University of Science and Technology, Huainan, 232001, China

Abstract

As the global digital economy gains momentum, digital empowerment is playing a pivotal role in fostering both optimized resource allocation and a transition toward green, low-carbon practices among Chinese manufacturing enterprises. Using 2011-2020 data from Chinese A-share manufacturing listed companies, this study employs fixed-effects models and mediation analysis to assess how digital transformation reduces carbon intensity and the mediating role of resource allocation optimization. The core findings underscore that: (1) Digital transformation significantly lowers carbon intensity, a conclusion that remains robust across a series of tests. (2) Mediation effect analysis indicates that digital transformation benefits resource allocation optimization within firms, which in turn effectively reduces carbon emissions, with the marginal contribution of innovation resource optimization being particularly notable. (3) Heterogeneity analysis reveals that the carbon reduction effects are more prominent in small firms, mature firms, and companies in the eastern regions. Based on the empirical results, this study underscores the necessity of a multi-pronged approach to support manufacturing decarbonization. Policymakers and firm managers should prioritize enhancing digital infrastructure, implementing differentiated strategies, encouraging innovation and resource efficiency, and building an orchestrated digital management system. Such initiatives are critical to drive the development of green technology and ultimately fulfill carbon reduction objectives.

Key words: digital transformation, green low-carbon development, manufacturing enterprises, resource allocation

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* Author to whom all correspondence should be addressed: e-mail: lxwang6783@163.com