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GREEN TRANSFORMATION AND UPGRADING PATHWAY OF HEAVY- POLLUTION INDUSTRIES IN BEIJING-TIANJIN-HEBEI: A BP-DEMATEL-NK APPROACH

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Abstract

This research introduces an innovative approach combining the Backpropagation (BP) neural network, Decision-Making Trial and Evaluation Laboratory (DEMATEL) method, and NK model (BP-DEMATEL-NK) to identify critical factors, examine their intricate relationships, and simulate the optimal pathway for the green transformation and upgrading (GTU) of heavily polluting industries in the Beijing-Tianjin-Hebei region of China. Following an exhaustive literature review and a questionnaire survey, six key factors were identified: resource utilization, environmental pollution, innovation resources, innovation output, cost input, and performance output. The BP neural network determines the significance of these factors, and the DEMATEL method investigates their interrelationships. The NK model is subsequently employed to simulate the most effective GTU sequence: "cost input → environmental pollution → innovation resources → innovation output → resource utilization → performance output". This study enriches the literature by proposing a comprehensive framework for understanding the synergistic evolution of environment, innovation, and benefit within the scope of industrial GTU. Furthermore, the findings offer valuable insights for policy-making and industrial transformation in China and other regions facing similar challenges.

Key words: economic benefits, green transformation and upgrading, NK model, resource environment, technology innovation,

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