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# SELECTING CLEANER PRODUCTION MODES FOR GREEN SUPPLY CHAINS UNDER CARBON CAP-AND-TRADE POLICY

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## Abstract

The national carbon market has expanded rapidly, playing a crucial role in advancing the circular economy. This growth has fostered the green and low-carbon transformation of society, while also encouraging consumers to adopt low-carbon consumption behaviors. In light of the carbon cap-and-trade policy and evolving consumer environmental preferences, this paper constructs a green supply chain (SCM) consisting of a manufacturer and a retailer. The manufacturer is the decision leader, choosing between investing in product greenness level (Scenario G) or carbon emission reduction (Scenario T). We explore the conditions under which the manufacturer selects one cleaner production mode option or both (Scenario GT). We find that: (1) The manufacturer achieves simultaneous maximization of both the optimal greenness level and carbon emission reduction under Scenario GT required two specific conditions: moderate carbon traded volume per unit and absence of capital constraints; while under capital constraints, the manufacturer's profit declines contingent upon both the initial capital level and the prevailing capital cost rate. (2) Investment in Scenario G proves more advantageous when consumers demonstrate higher sensitivity to product greenness, whereas Scenario T is preferable under opposite conditions. (3) The retailer's investment preferences for cleaner production modes consistently align with the manufacturer's, creating a mutually beneficial "win-win" outcome for supply chain participants.

*Key words:* carbon cap-and-trade policy, carbon green supply chain, consumer environmental preference, emission reduction, greenness level

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