

Game theoretic analysis of supply chain based on mean-variance approach under cap-and-trade policy

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ABSTRACT

In recent years, carbon emission problem occurred by carbon dioxide as one of the main greenhouse gases, has become the focus due to its great influence on human life. With the increase of consumers' low-carbon consciousness, this paper studies the supply chain which consists of a single supplier and a single manufacturer in presence of market low-carbon preference. First, we establish the mean-variance analysis model. Second, we study the optimal decisions of channel members considering the risk factor in three situations: traditional supply chain without emission reduction, individual emission reduction by manufacturer and supply chain collaborative emission reduction. Finally, the equilibrium results are demonstrated by numerical studies. The results show that chain members' profits are not only affected by their own risk-aversion level, but also by other chain member's risk aversion level. More important is that there exist the optimal carbon emission reduction level and profits in system collaborative emission reduction. The research makes operation mechanism of low-carbon supply chain clearer and provides a theoretical reference for supply chain members on pricing and investment strategy of emission reduction.

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