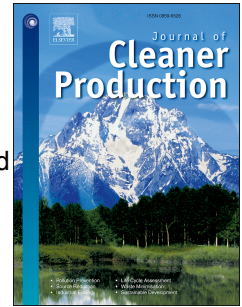


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Carbon Emission Reduction and Promotion Policies Considering Social Preferences and Consumers' Low-carbon Awareness in the Cap-and-trade System

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Abstract: We incorporate social preferences, which are divided into relationship preferences and status preferences, and consumer low-carbon awareness into a supply chain with one manufacturer and one retailer under the cap-and-trade system. First, we suppress the price policies and investigate the manufacturer's carbon-emission reduction strategy and the leading retailer's low-carbon-related promotion strategy with and without the agents' social preferences. Then, we analyze the game dominated by the manufacturer with and without considering pricing policies. We prove that consumer low-carbon awareness improvement incentives channel members to invest in emission reduction and promotion and that this investment is beneficial to member profits and utilities. The channel members' utilities increase with their social preference value. However, their profits, emission-reduction level and promotion level might not necessarily do so. In the manufacturer-led supply chain, wholesale price increases with the retailer's social preference value and decreases with that of the manufacturer. The retail price decreases with the manufacturer's social preference value and increases with that of the retailer. The manners that the leader's decision affects the follower's decision-making and the channel members' social preferences affect their decision-making depend on who the dominator is in the supply chain. In addition, we design a new contract and coordinate the supply chain in the presence of the agents' social preferences. With the contract, the company's utility increment increases with its own social preference value and decreases with that of its cooperator.

Keywords: Social preference, Carbon emission reduction, low-carbon awareness, Promotion, Cap-and-trade, Channel coordination

1. Introduction

To control carbon emissions generated by human activities, cap-and-trade has become the most popular regulation adopted by many countries or economies, such as the EU, the US, and China. It offers firms the flexibility to choose among different operational levers for compliance (Kroes *et al.* 2012). In a cap-and-trade system, the regulator sets a

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