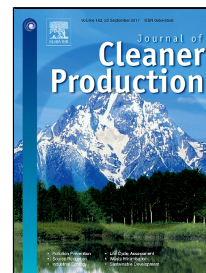


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Considering Environmental Implications of Distribution Channel Choices: A Comparative Study Based on Game Theory

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## **Considering Environmental Implications of Distribution Channel Choices:**

### **A Comparative Study Based on Game Theory**

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*Abstract:* Recently, with the rapid development of e-commerce in the world, the total scale of online-shopping has reached a notably high level. The environmental benefits of online retailing have been highlighted in many studies, but many factors could have contributed to opposing results. Motivated by the new sharp expansion of online shopping in China, we employ a game-theoretic based model to make a comparative study of the environment impacts of single-channel (traditional retail channel) and dual-channel (online direct channel and traditional retail channel) supply chains, by taking product characteristics, customers' distribution range and propensities into account. To the best of our knowledge, no previous researchers have considered these factors simultaneously. Numerical analyses are applied to illustrate the model and demonstrate the influences of these factors on channel selection decisions and their resulting effects on the environment. Our results provide a reference for companies to decide whether to add an online direct channel for a specific product. The conclusions can also benefit the government in guiding companies to distribute products in more eco-friendly ways.

*Keywords:* channel selection; environment costs; game theory; customer distribution range; policy proposal

## **1. Introduction**

In recent years, online shopping, especially in China, has experienced an enormous upswing (Lo et al., 2016). By the end of 2013, China had overtaken the US to be the largest online retail market in the world. In 2015, the amount of online retail sales in China had reached to \$584.3 billion, including \$150 billion of new consumption (Zhang et al., 2016). In these circumstances, many bricks-and-mortar companies have chosen to add an online channel to sell their products to customers directly via their websites.

The Chinese government has set many policies to promote the development of e-commerce, especially in rural areas. At the same time, many Chinese e-commerce giants, such as Alibaba and Jingdong are also committed to expanding sales in the rural market (<http://www.gov.cn/xinwen/2015-11/17/content5013507.htm>). However, because of the wide distribution range of customers, as well as inadequate logistics facilities, product distribution in rural areas remains difficult, and would also have more diverse impacts on environment compared with that in urban areas.

For cheaper delivery fees, people -- especially young people -- choose to buy almost everything online, though many of these products can be easily obtained from physical stores nearby ([http://www.economist.com/business-finance/displaystory.cfm?story\\_id=15955376](http://www.economist.com/business-finance/displaystory.cfm?story_id=15955376)). What are the

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