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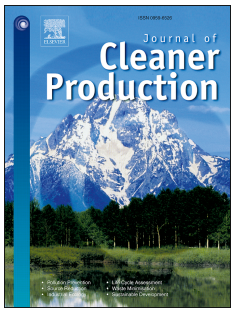

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An Optimization Model for Green Supply Chain Management by Using a Big Data Analytic Approach

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Abstract: This paper presents a multi-objective optimization model for a green supply chain management scheme that minimizes the inherent risk occurred by handling hazardous materials, associated carbon emission and economic cost. The model related parameters are capitalized on big data analysis. Three scenarios are proposed to improve green supply chain management. The first scenario divides optimization into three options: the first involves minimizing risk and then dealing with carbon emissions (and thus economic cost); the second minimizes both risk and carbon emissions first, with the ultimate goal of minimizing overall cost; and the third option attempts to minimize risk, carbon emissions, and economic cost simultaneously. This paper provides a case study to verify the optimization model. Finally, the limitations of this research and approach are discussed to lay a foundation for further improvement.

Keywords: hazardous materials, inherent risk, carbon emissions, multi-objective optimization, green supply chain management, big data

1. Introduction

As environmental resources are increasingly depleted, the conflict between economic growth and environmental protection has received greater attention from scholars of supply chain management (SCM) (Zhu et al., 2008; Zhu et al., 2010; Ala-Harja and Helo, 2014). Creative management of a supply chain in the context of sustainable development, with the particular goal of minimizing the environmental impact that suppliers have on end users, is referred to as Green Supply Chain Management (GSCM)

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