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Editorial

# Sustainability in Supply Chains with Behavioral Concerns

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**Abstract:** Environmental sustainability has received considerable attention in industry and academia. Many firms have begun to adopt sustainability practices, such as investing in cleaner technology and using organic or recyclable materials, to enhance sustainability in supply chains. Such sustainability practices affect corporate social responsibility and business performance. On the other hand, when consumers and supply chain managers make decisions, they may be constrained by behavioral concerns. Behavioral concerns can significantly influence optimization in supply chains. Thus, it is critical to consider the impacts of behavioral concerns on sustainability in supply chains. In this paper, we concisely examine studies in sustainability issues in supply chains with behavioral concerns and introduce the papers featured in this Special Issue.

**Keywords:** sustainability; supply chain management; behavioral concerns; environmental performance; carbon emission

## 1. Introduction

With the emergence of environmental problems, such as global warming caused by carbon emissions, sustainability issues have received considerable attention [1,2]. Various policies related to the environment have been legislated to protect our environment and enhance environmental sustainability for our society [3–5]. Meanwhile, the triple bottom line indicates that in order to achieve sustainable development, firms should take into account social and environmental performance in addition to economic performance [6–8]. Increasingly, consumers are aware of environmental sustainability and are willing to pay a higher price for eco-friendly products [9,10]. To fulfill social and environmental responsibility and meet consumers' expectations, firms in various industries have begun to invest in sustainability projects, such as reducing carbon/pollution emissions during the manufacturing process and improving the greenness of products by adopting recyclable materials [11,12]. For example, Apple has allocated a \$1.5 billion green bond dedicated to financing sustainability projects since 2011, which has resulted in an 8.9-million-ton reduction of their carbon footprint in 2016 alone [13,14]. H&M, the Sweden fast fashion company, has introduced organic cotton into product development and clean technology to reduce pollution and carbon emissions in its manufacturing process [15]. Marks & Spencer, the largest retailing group in the UK, launched Plan A in 2007 to achieve its sustainability goal by sourcing responsibly, reducing waste, and helping communities [16]. All in all, environmental sustainability concerns and sustainability practices significantly affect the performance of all firms in supply chains [17,18].

On the other hand, there is no doubt that nowadays the role of human behavior in supply chain management is an important and timely topic. Individuals may have different behavioral concerns

when they make decisions. In the context of the supply chain, a behavioral concern can exist at the individual (e.g., consumer) level or the organizational (e.g., firm) level. For example, consumers may have fairness concerns when they make purchasing decisions [19,20]. Firms may be imposed on different risk influences when they make operational decisions [21]. The aforementioned behavioral concerns are likely to affect the economic and environmental performance of the supply chain.

Motivated by the importance of sustainability and the role of human/organizational behavior in supply chains, we thereby organize this Special Issue on “Sustainability in supply chains with behavioral concerns”. In this paper, we briefly discuss the literature related to sustainability issues in supply chains with the consideration of behavior, and summarize the key findings in the published articles in the Special Issue.

## 2. Sustainability in Supply Chains with Behavioral Concerns

There is a growing literature focusing on sustainability in supply chains with behavioral concerns. Typical behavioral concerns in the context of sustainability in supply chains include consumer environmental awareness [5,12,22], risk attitude [23,24], loss aversion [25,26], fairness concern [27,28], and strategic behavior [29,30], etc. Many reports show that an increasing number of consumers are aware of environmental sustainability and social responsibility and are more willing to purchase sustainable products. For example, Bemporad and Baranowski [9] and the European Commission [10] show that more than half of consumers they surveyed were willing to pay a higher price for sustainable products. Nielsen [31] conducted a survey study across 60 countries and found that 66% of 30,000 consumers were willing to pay a premium price for sustainable products, which had increased from 55% when compared with the figure for the previous year. The extant literature has investigated sustainability in supply chains with environmentally concerned consumers. Nourira et al. [32] studied the selection of production processes and the choice of input products with environmental constraints and greenness-dependent demand. Du et al. [33] have examined emission reduction strategies for supply chains with consumer preference for low carbon. Dong et al. [5] investigated sustainability investment in a supply chain with environmental awareness consumers under cap-and-trade regulation. Yang and Chen [34]’s findings shed light on the effects of consumer environmental awareness on retailer-driven carbon emission abatement. Chen et al. [35] studied the impact of power structure on sustainable supply chains with environmental awareness consumers. Shi et al. [12] investigated the valuation of the bargaining contract for a sustainable supply chain with environmental awareness consumers. Shi et al. [1] examined the cleaner technologies investment in a supply chain with competing retailers facing environmental awareness consumers.

On the other hand, risk attitude has also received increasing attention in the context of sustainability in supply chains. Choi and Chiu [23] explored the mean-downside-risk and mean-variance newsvendor models for sustainable fashion retailing with the consideration of risk attitude. Lai et al. [24] studied sustainability investment in the supply chain with risk attitude and information sharing. Based on the type of the firm’s risk attitude, i.e., risk-neutral or risk-averse, and the information sharing decisions, i.e., without information sharing or with information sharing, they developed four game-theoretical models to study the effects of risk attitude and information sharing on sustainability investment. Bai and Meng [36] investigated the impact of the firm’s risk aversion for a supply chain with carbon emission reduction constraints by the mean-variance approach. They considered a supply chain with two competing manufacturers and one retailer in which one of the manufacturers invests sustainability efforts to reduce carbon emissions when either the manufacturers or the retailer is risk-averse.

In addition, firms and/or consumers may incur potential losses due to various uncertainties, e.g., supply uncertainty and demand uncertainty, in the supply chain. Firms/consumers have different attitudes towards the loss. Loss aversion is one of the typical types of loss attitudes existing in real practice. There are several papers which study sustainability in a supply chain with loss aversion. Niu et al. [26] studied the effects of power structures on a sustainable supply chain with a loss-averse supplier. Chen and Sheu [25] investigated the green product positioning problem with the consideration

of loss-averse consumers. By developing two loss-averse newsvendor models, Choi [37] studied a loss-averse newsvendor with carbon emissions under cap-and-trade regulation. Feng and Tan [38] considered a sustainable supply chain with a loss-averse manufacturer and investigated the impact of risk aversion on the performance and the coordination of the supply chain.

Moreover, research works have shown that firms and/or consumers may exhibit fairness preference, under which firms/consumers not only care about their monetary payoffs but also the fairness outcome of profit allocation in the supply chain [19,28]. There are a few papers in the literature examining the effects of fairness concern on sustainability in supply chains. Li et al. [28] studied the effects of fairness concern on pricing and carbon emission reduction in a supply chain where the retailer has a fairness concern. Du et al. [27] and Liu et al. [39] investigated the effects of fairness concern on green technology investment in a supply chain. Both considered that either the upstream supply chain member or the downstream supply chain member had fairness concern. Zhang et al. [40] studied the joint effect of fairness concern and consumer environmental awareness on sustainability investment in a supply chain.

Furthermore, when making purchasing decisions, consumers may strategically decide when/how/where to buy products based on their behavior. Such strategic behavior should not be ignored by firms because it may significantly affect the firms' operational decisions in the presence of consumer strategic behavior. There are a few papers which study sustainability in a supply chain with the consideration of strategic consumers. Jiang and Chen [29] studied green technology investment with the consideration of strategic consumer behavior and carbon-emissions-sensitive random demand. Huang and Wang [41]'s work shows the effects of strategic consumer behavior on the performance of a closed-loop supply chain by comparing three remanufacturing scenarios, i.e., no-remanufacturer, partial-remanufacturing, and full-remanufacturing. Chen et al. [30] investigated the joint optimization problem of production and pricing for green crowdfunding products in the presence of strategic consumers.

In this Special Issue, supply chain sustainability with behavioral concerns has been examined and we introduce the accepted articles as follows. Goswami et al. [42] studied the measurement of perceived corporate hypocrisy (PCH) in the context of U.S. retail employees. The role of corporate hypocrisy in sustainability achievements has been addressed in previous research with a focus on consumers' and/or investors' perceptions. Departing from the previous literature, the authors investigated PCH from the employees' perspective. By using a three-stage Item Response Theory modeling approach, they developed a scale to measure employees' perceived corporate hypocrisy where they could explore four salient components of the employees' PCH, i.e., perceived lack of morality, perceived control breach, double standards, and a value-behavior gap. They also developed a nine-item PCH scale which was confirmed to be reliable, valid, and unbiased for different demographic groups.

Shao et al. [43] studied the optimal battery recycling strategy for electric vehicles under government subsidies. The authors developed a utility function to capture the feature of behavioral concerns. That is, they considered consumer environmental awareness associated with battery recycling for an electric vehicle. By exploring the interaction between the government and the electric vehicle manufacturer, they examined the effects of government subsidy on the optimal battery recycling strategy. The results demonstrate that in the case of an exogenous government subsidy, the manufacturer either recycles all the batteries or does not recycle batteries when the effect of the recycling scale on costs is unremarkable; otherwise, it recycles used batteries when the benefit from recycling is moderate. When the government subsidy is sufficiently large, the battery recycling rate will be decreased when the subsidy increases. The authors also analyzed a case with endogenous government subsidies and found that optimal recycling strategies are similar to those in the exogenous case, in which the optimal recycling rate depends on the related parameters.

Zhu and Yu [44] investigated the effects of warranty efficiency of remanufactured products on the performance of closed-loop supply chains. As consumers may not be confident in the quality of remanufactured products, closed-loop supply chains would provide warranty services for the remanufactured products to enhance consumers' perceived value of the products. The authors

suggested that the warranty service can be provided by the manufacturer, the retailer, or the remanufacturing system. They showed that which party should provide the warranty service depends on the cost of providing the warranty by a corresponding party. Specifically, when the cost of providing the warranty by the manufacturer is low, then the warranty service should be provided by a manufacturing system; otherwise, it should be provided by the retailer.

Finally, Zou et al. [45] examined the impacts of technology licensing on the performance of a closed-loop supply chain, which consists of one supplier, one manufacturer, and one third-party remanufacturer, with environmental awareness consumers. The authors developed a game-theoretical model to explicitly characterize the interplay between the supplier and the manufacturer upon the adoption of technology licensing. They found that remanufacturing by technology licensing will increase the manufacturer's profit but decrease the supplier's profit, and may not always improve environmental performance. In addition, they showed that the existence of remanufactured products does not reduce the quality of the new products.

### 3. Concluding Remarks

In this paper, we discuss the importance of sustainability issues in supply chains with the consideration of behavior effects. We review the papers in this Special Issue. To summarize, Table 1 presents the core topics and some important findings in the featured papers of this Special Issue.

**Table 1.** Features of the papers in this special issue.

Paper	Topics	Core Insights/Contributions
Goswami et al. [42]	Measuring employees' perceived corporate hypocrisy	<ul style="list-style-type: none"> <li>Discovering four salient components of the employees' perceived corporate hypocrisy (PCH), i.e., the perceived lack of morality, perceived control breach, double standards, and a value-behavior gap.</li> <li>Developing a nine-item PCH scale that was confirmed to be reliable, valid, and unbiased for different demographics groups.</li> </ul>
Shao et al. [43]	Optimal battery recycling strategy for an electric vehicle under government subsidy	<ul style="list-style-type: none"> <li>In both cases, i.e., with the exogenous government subsidy and with the endogenous government subsidy, the manufacturer's optimal battery recycling strategy depends on related parameters.</li> <li>When the government subsidy is sufficiently large, the battery recycling rate will be decreased if the subsidy increases.</li> </ul>
Zhu and Yu [44]	The effects of warranty efficiency of remanufactured products on the performance of a closed-loop supply chain	<ul style="list-style-type: none"> <li>Whether the manufacturer or retailer should provide the warranty service depends on the cost of providing the warranty by each party. Specifically, if the cost of providing the warranty by the manufacturer is low, then the warranty service should be provided by the manufacturing system; otherwise, it should be provided by the retailer.</li> </ul>
Zou et al. [45]	The impacts of technology licensing on the performance of a closed-loop supply chain with environmental awareness consumers	<ul style="list-style-type: none"> <li>The remanufacturing by technology licensing will increase the manufacturer's profit while decreasing the supplier's profit.</li> <li>The existence of remanufactured products does not reduce the quality of new products.</li> <li>The remanufacturing by technology licensing may not always improve the environment.</li> </ul>

To conclude, we believe that this paper has highlighted several crucial areas of supply chain sustainability with behavioral concerns. This Special Issue sets out a promising starting point to promote future research in the following aspects. First, behavioral concerns also include social influence among consumers [46]. It would be worthwhile to investigate the impact of social influence on sustainability decisions in supply chains. Second, to improve performance and to better make decisions, information updating and supply chain contracting have been widely used in supply chains [47–49]. It would be interesting to examine how information updating and supply chain contracting improve sustainable operational decisions (e.g., adopting clean technologies, reducing carbon emissions, and eliminating water pollution). Third, it may be tricky to implement sustainable practices because they may harm the performance of supply chain members in the short term in outsourcing supply chains [50]. It is urgent and timely to design a sound mechanism to motivate all supply chain members in participating in a joint sustainability effort. Forth, our literature review suggests that previous research mainly focuses on one type of behavioral concerns. Consequently, it would be intriguing to incorporate several types of behavioral concerns in supply chains in future research.

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