



# Supply chain channel coordination with triple bottom line approach

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## ABSTRACT

In this paper, we explore coordination of a sustainable risk-neutral supply chain that faces greening effort dependent demand. We propose a framework for exclusive distribution of sustainability responsibilities in a decentralised setting. We classify decentralised supply chain according to distribution of responsibilities for greening and social efforts. Our study demonstrates that greening and social responsiveness indices simultaneously influence all optimal parameters of a supply chain. We analyse generalised wholesale price and linear two-part tariff contracts for dyadic supply chains with triple bottom line objective. We demonstrate that a decentralised supply chain can be coordinated when the supplier is socially responsible.

## 1. Introduction

Mounting regulatory pressure, rise in demand for eco-friendly products, and similar requirements of different stakeholder groups have led to the adoption of greening and socially responsible practices by supply chains across the world. Firms spread over diverse sectors such as, retail (Wal-Mart<sup>1</sup>, Tesco, Sainsbury's, Marks and Spencer), technology (Apple<sup>2</sup>, Dell), jewellery (Tiffany and Company<sup>3</sup>), outdoor clothing & gear (Adidas<sup>4</sup>, Nike<sup>5</sup>, Patagonia), garden centres (Wyevale), luxury watches (Chopard<sup>6</sup>), automobiles (Maruti Suzuki India Limited, Hero Honda), and food (McDonalds), are working simultaneously towards becoming *green and socially responsible* organisations. Wal-Mart has planned to rope in up to 70% of its Chinese suppliers to participate in an energy efficiency program before the end of 2017<sup>7</sup>. In the luxury industry sector, Kering luxury group is focusing on sustainability to develop it as a

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<sup>1</sup> Journal report (2014, April 8). "Wal-Mart's Green Initiative: Status Report". *Wall Street Journal*. Retrieved from <http://www.wsj.com/articles/SB10001424052702304432604579473453226974252>, accessed on 16/09/2016.

<sup>2</sup> Journal report (2015, March 30). "Lisa Jackson on Apple's Green Initiatives". *Wall Street Journal*. Retrieved from: <http://www.wsj.com/articles/lisa-jackson-on-apples-green-initiatives-1427770864>, accessed on 17/09/2016.

<sup>3</sup> Thomas, D. (2015, December 1). "The Luxury Sector Now Focusing on a Sustainable Future". *The New York Times*. Retrieved from <http://www.nytimes.com/2015/12/02/fashion/luxury-brands-focusing-on-a-sustainable-future.html>, accessed on 14/09/2016.

<sup>4</sup> Jervell, E.E. (2015, September 24). "Adidas Moves to Address Environmental Worries". *Wall Street Journal*. Retrieved from: <http://www.wsj.com/articles/adidas-moves-to-address-environmental-worries-1443075134>, accessed on: 16/09/2016.

<sup>5</sup> Ibid.

<sup>6</sup> Thomas, D. (2015, December 1). "The Luxury Sector Now Focusing on a Sustainable Future". *The New York Times*. Retrieved from <http://www.nytimes.com/2015/12/02/fashion/luxury-brands-focusing-on-a-sustainable-future.html>, accessed on 14/09/2016.

<sup>7</sup> Clancy, H. (2014, August 29). "Walmart Extends Energy Efficiency Focus To Chinese Suppliers". *Forbes*. Retrieved from: <http://www.forbes.com/sites/heatherclancy/2014/08/29/walmart-extends-energy-efficiency-focus-to-chinese-suppliers/>, accessed on 07/09/2016.

core competence<sup>8</sup>. Apple Inc. is sharing the initial cost with its supplier Foxconn Technology Group to improve labour conditions at Chinese factories that assemble iPhones and iPads<sup>9</sup>. A recent survey conducted by *MIT Sloan Management Review* and *Boston Consulting Group* reveals that majority of business executives recognise that both social and environmental aspects are “significant” or “very significant”, but only a minority is convinced that they are contributing enough to promote the cause<sup>10</sup>. Lack of a coherent coordination strategy has proved to be a major hindrance towards implementation of triple bottom line (TBL) objectives<sup>11</sup>.

Elkington (1998) proposed the concept of TBL that consists of three separate bottom lines namely, profit, people, and planet accounts. In spite of TBL being an accounting framework, managers face the problem of measuring TBL index by a common unit (Hall, 2011) and subsequently incorporating these concepts into their business practices (Hsueh, 2014). Varying business focuses as well as regulatory norms of various firms across the same supply chain worsen the problem of objective alignment (Brandenburg et al., 2014; Wilhelm et al., 2016). Apart from focusing on corporate social responsibility (CSR) related activities, Apple Inc. has invested in wind energy projects in China to implement green manufacturing processes of the immediate suppliers such as, Foxconn, Lens, Catcher and Solvay<sup>12</sup>. Wal-Mart has partnered with Patagonia for developing eco-friendly products<sup>13</sup> to turn its business ‘Green’ and it is driving most of the CSR related activities on its own<sup>14</sup>. Mattel has recalled over 20 million Chinese-made children’s toys after detection of the use of excessive lead paint beyond permissible levels and has paid US\$2.3 million as fine for violating lead paint ban in the US<sup>15</sup>. Implementation of TBL practices across a supply chain often faces the hurdle of misalignment of business objectives across different firms. As a result, supply chain faces the problem of discoordination and subsequently, loss of profit (Seuring, 2013).

Connecting coordination mechanisms with environmental and sustainability issues has remained an unexplored area of sustainable supply chain (Seuring, 2013). Specifically, analysis of general supply contracts with the balanced incorporation of all the elements of TBL has remained a challenge (Brandenburg et al., 2014). Designing generalised contracts for supply chains with TBL approach can eliminate the problem of discoordination among different agents of a supply chain. Apart from this gap in extant literature, previous business examples raise the following additional questions: Since objectives vary across firms of a supply chain, how can a supplier firm ensure channel coordination? In a supply chain, if one agent is responsible for both greening and CSR efforts, and the other agent is a profit maximiser, how can the system be designed to achieve channel coordination? Similar question can arise also when the responsibility of greening and CSR efforts are distributed among supply chain agents exclusively. The specific research questions we aim to explore are as follows:

1. How can all the dimensions of TBL: (i) economic, (ii) environmental, and (iii) social, be integrated into one unified framework of a supply chain?
2. How do environmental and social effort impact supply chain performance?
3. In a sustainable supply chain, how should responsibilities of sustainability (environmental and social responsibilities) be distributed so that it also yields the best overall performance for the supply chain?
4. Under what circumstances does a supply chain with triple bottom line objective coordinate?

In this paper, we seek to answer the aforementioned questions by investigating a dyadic supply chain that puts efforts toward greening as well as CSR activities, along with profit motive while facing deterministic demand. Specifically, we examine such supply chains under two scenarios of decentralisation: (i) one supply chain agent acts as only profit maximizer, and the other agent acts as a TBL maximiser and thus incurs the cost for both greening and CSR activities; and, (ii) one agent focuses only on greening and the other agent is involved only in CSR efforts. Through this model, we try to understand how different indices of TBL influence the optimal parameters of various stakeholders in a supply chain, with a change in the objective of constituent members. In the context of channel coordination, we discuss two contract types namely, wholesale price (WP) and linear two-part tariff (LTT), from the supplier’s perspective. Using Stackelberg game, we develop generalised optimal expressions for retail prices, order quantities and contract parameters for the aforementioned scenarios of decentralisation. We propose channel coordinating LTT contract for all the scenarios. We further show that the optimal retail prices, order quantities and profit distributions for pure profit, green and socially responsible supply chains can be derived as special cases of our proposed model. Through our proposed analytical model, we integrate all the dimensions of the TBL construct with extant literature on supply chain coordination. We also illustrate by a numerical example the distribution of objective functions and retail prices for a dyadic supply chain with TBL approach.

<sup>8</sup> Thomas, D. (2015, December 1). “The Luxury Sector Now Focusing on a Sustainable Future”. *The New York Times*. Retrieved from <http://www.nytimes.com/2015/12/02/fashion/luxury-brands-focusing-on-a-sustainable-future.html>, accessed on 14/09/2016.

<sup>9</sup> Ruwitch, J. (2012, May 10). Apple, supplier Foxconn to share costs on improving factories. *Reuters*. Retrieved from <http://www.reuters.com/article/us-foxconn-idUSBRE84907J20120510>, accessed on 15/09/2016.

<sup>10</sup> The Economist. (2014, August 30). A new green wave. *The Economist*. Retrieved from <http://www.economist.com/news/business/21614152-few-pioneering-businesses-are-developing-sustainability-policies-worthy-name-new>, accessed on 09/09/2016.

<sup>11</sup> Ibid.

<sup>12</sup> Pham, S. (2016, December 09). Why Apple is investing in wind turbines in China. *CNN News Report*. Retrieved from: <http://money.cnn.com/2016/12/09/technology/apple-wind-turbine-china-investment/>, accessed on 11/01/2017.

<sup>13</sup> Burke, M. (2010, June 05). Wal-Mart, Patagonia Team To Green Business. *Forbes*. Retrieved from: <http://www.forbes.com/forbes/2010/0524/rebuilding-sustainability-eco-friendly-mr-green-jeans.html>, accessed on 11/01/2017.

<sup>14</sup> Makower, J. (2015, November 17). Walmart sustainability at 10: An assessment. Retrieved from: <https://www.greenbiz.com/article/walmart-sustainability-10-assessment>, accessed on 11/01/2017.

<sup>15</sup> Liberty International Underwriters (2016, September 16). Product recall costs mount for businesses. *Australian Financial Review*. Retrieved from: <http://paidcontent.afr.com/liberty-international-underwriters/insurance/article/product-recall-costs-mount-businesses/>, accessed on 11/01/2017.

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