

# Supply Chain Sustainability and the Triple Bottom Line

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## Abstract

The objectives of sustainability are to satisfy the triple bottom line – social, economic and environmental goals must be met. The literature has an abundance of papers that deal with the environmental aspect. This paper explores the literature to surface examples of the other dimensions of the triple bottom line. Recommendations for addressing the triple bottom line in a more comprehensive manner are proposed.

**Keywords:** supply chain, sustainability, triple bottom line

## Introduction

The interest in sustainability has grown over recent years and is shared among a variety of national and international organizations, special interest groups and corporations around the world. Sustainable business practices and as described in this paper - sustainable supply chain practices – are becoming a worldwide business requirement. Some of the main sustainability requirements have been stated explicitly by a number of different organizations. A widely cited definition of sustainability is attributed to the United Nations Brundtland Commission and reads as follows:

“meeting the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987)(Christopher, 2011).

Another set of requirements describes the broader and more specific application of sustainability and can be seen in the ten principles of the UN Global Compact which was enacted in 1999. The ten principles establish a set of core values for organizations to follow and encourage those organizations adopting the principles to influence their partner organizations to subscribe to the principles as well. The ten principles address a set of universal issues in human rights, labor, environment and anti-corruption (see The Ten Principles <http://www.unglobalcompact.org/aboutthegc/thetenprinciples/index.html>>).

Another example that is widely acknowledged is a set of guidelines for corporate social responsibility (CSR) published by the International Institute for Sustainable Development (IISD, 2007). The CSR Principles focus on the social dimension and do not align with the full scope of sustainability. The primary area of agreement between the two sets (CSR and The Ten Principles) of principles is the intersection on the environment.

## **Literature**

A growing number of publications focus almost exclusively on the environmental aspects. Green supply chain management focuses on environmental aspects across every element of the supply chain. The book by Emmett and Sood (2010) is a very good example of this literature with chapters and cases that discuss green product design, responsible resource use and reverse logistics. Carter and Easton (2011) have conducted a more extensive literature review on 20 years of sustainable supply chain management research.

Environmental concerns within the supply chain are at the forefront in other articles such as environmentally responsible manufacturing (Ellram, Tate and Carter, 2008) and environmental purchasing (Tate, Ellram and Dooley, 2012). The environment and sustainability can also be found in assessment approaches as seen in the work by Pope, Annandale and Morrison-Saunders (2004). While the work by Morelli (2011) does not address supply chain explicitly, it is a prime example of defining sustainability exclusively from the environmental perspective. The other two elements of the triple bottom line are not addressed.

One possible explanation may lie in the word usage in question. The phrase 'environmental sustainability' works well and everyone has a reasonable understanding of that terminology. The phrases 'economic sustainability' and 'social sustainability' are not as readily understood. The acceptance of the terminology and the ability to operationalize the terms may contribute to the popularity of one topic while the others receive less attention.

## **Environmental Aspects**

Two international standards, ISO 14040:2006(E) and ISO 14044:2006, provide guidelines for conducting LCA. Section 4.1.2 of ISO 14040:2006(E) describes the life cycle perspective as follows: "LCA considers the entire life cycle of a product, from raw material extraction and acquisition, through energy and material production and manufacturing, to use and end of life treatment and final disposal. Through such a systematic overview and perspective, the shifting of a potential environmental burden between life cycle stages or individual processes can be identified and possibly avoided." (ISO, 2006). Section 4.1.3 of the standard indicates the "Environmental Focus" of the standard and that "...Economic and social aspects and impacts are, typically, outside the scope of the LCA" (ISO, 2006).

Environmental Impact Assessment (EIA) is often performed in conjunction with the LCA approach. EIA may also be used as a separate evaluation technique in some instances. EIA as the name suggests is also focused exclusively on environmental impacts and does not evaluate economic and social aspects.

NOVO Group is an excellent example of a corporation that has made extensive use of both LCA and EIA. The company is also a very good example where the sustainability philosophy is a core attribute of the organization. Everyone in the organization knows the company's beliefs and the emphasis that is placed on sustainability. NOVO Group is also a unique example in the fact that the company embraces sustainability practices within their own operations and the commitment to sustainability extends to their product line as well (Monroe, 2013).

LCA is primarily concerned with the actual product, how it will be used, how it will be serviced and how it will be disposed of throughout the different stages of the product's life. The EIA approach when used with LCA, is primarily concerned with the impact of producing the product and any by-products that may result from the various processes (Monroe, 2013).

LCA and EIA are very useful and effective for what they are intended to evaluate – the product and by-products and the environmental impacts. There are many other elements in the supply chain which LCA and EIA do not explicitly evaluate. Additional prompting is needed to fully consider many of the elements that are not directly involved in the production of products or the production and handling of by-products (Monroe, 2013).

Other companies like Subaru and Toyota have instituted 'zero-landfill' programs at their

North American facilities in an effort to operate in an environmentally friendly manner. These programs are also intended to address the ‘environmental’ objective from the triple bottom line. There may be some spillover benefit in economic or social but the primary benefit is in environmental.

### Social Aspects

The International Institute for Sustainable Development proposes a “six-stage ‘plan, do, check and improve’ implementation framework for a CSR approach” (IISD, 2007). This framework is commonly associated with the quality field and is traditionally used for process improvement. In this situation, the improvement cycle is applied to social issues that confront a company. It affords an opportunity to evaluate current policy, plan for modifications to policies, check those new policies for improvement and compliance with social guidelines.

### Comprehensive Approach

The SCOR® Model (Supply Chain Council, 2013; Bolstorff and Rosenbaum, 2007) from the Supply Chain Council provides a comprehensive view of the major elements of a supply chain (see Figure 1). By depicting the different elements of the supply chain in this fashion, the identification and evaluation of all possible sustainability issues becomes somewhat easier. The model states the elements which then prompts the necessary thought and questioning to identify sustainability issues that might otherwise be overlooked (if using LCA or EIA).

This paper proposes the use of the SCOR® Model from the Supply Chain Council as a framework for sustainability evaluations. The five terms used in the SCOR® Model are Plan, Source, Make, Deliver and Return. The sequence follows the logical order of events that occur in the supply chain. The following discussion and outline demonstrates how the SCOR® Model can be deployed for sustainability initiative evaluations.

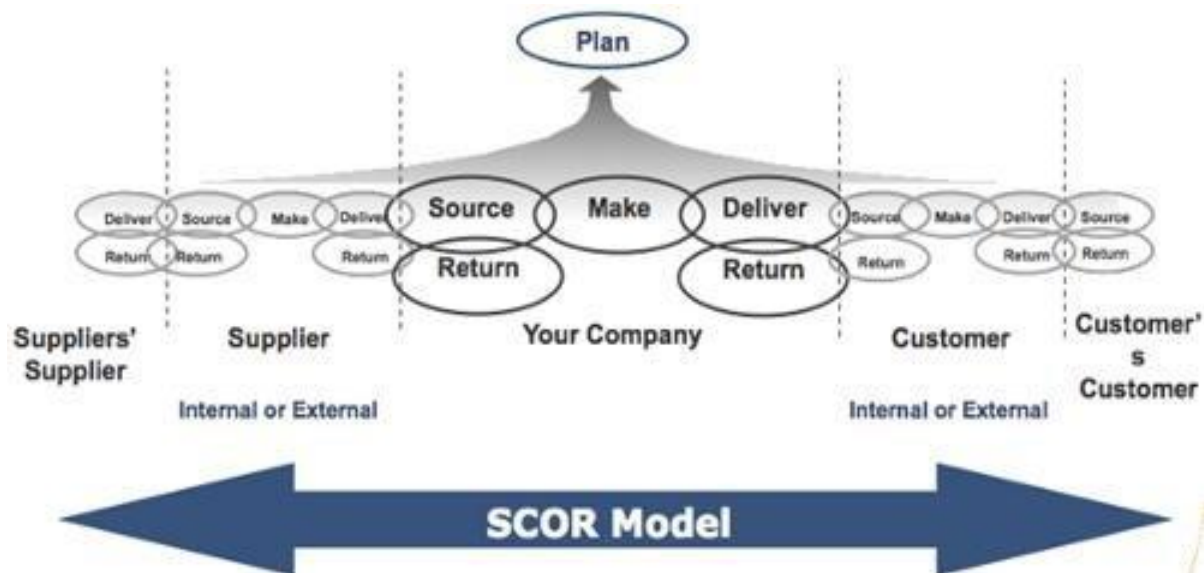


Figure 1 The SCOR® Model

SOURCE: Supply Chain Council; accessed on May 20, 2013 at [www.supply-chain.org](http://www.supply-chain.org)

### Plan

Are the principles of sustainability used as a set of guiding principles in the Planning stage for the company’s supply chain? The full range of environment, economic and social issues are included in the Planning issues to be considered.

### *Source*

Are the principles of sustainability guiding the company's choices when making sourcing decisions? These decisions include selection of suppliers, insourcing vs. outsourcing, developing a supplier as a strategic partner, choosing local vs. distance suppliers, and many other supplier related decisions. In any given sourcing decision is there a supplier that meets the company's sustainability requirements better than the original option. The entire triple bottom line is considered explicitly in making these decisions.

### *Make*

All of the sustainability statements regarding manufacturing apply here. Reduce, reuse and recycle the materials used in the manufacturing process are the primary approaches for using these resources in a responsible manner consistent with sustainability. Company positions must be developed which include environment, economic and social considerations and explicit policies to address the triple bottom line.

### *Deliver*

Throughout the entire global supply chain there are multiple transportation elements and multiple handoffs (Russell and Saldanha, 2003). Transportation is a major concern with regard to emissions and the related environmental impact. The multiple listings of Plan, Source, Make, Deliver, Return across the SCOR® diagram reinforce the idea that the material/product will be transported a number of times.

An example in this segment is intermodal transportation which translates to benefits in each of the areas for the triple bottom line. Tyssen et al. (2011) describe two case studies where decisions involving intermodal terminals resulted in benefits that are seen in each category – economic, environmental and social.

Transportation choices have a major effect on the carbon footprint for companies. The decision to utilize intermodal rail for a significant portion of the transportation of products will have a very favorable impact on the company's environmental compliance, carbon footprint or other environmental metric. Intermodal also provides an economic benefit when compared to greater utilization of truck deliveries (Monroe, 2013).

### *Return*

This stage of the supply chain applies to many of the materials used in the product itself or in the packaging and shipping materials used at different stages in the supply chain. Return may refer to the product, used component parts, packaging, or even reusable or recyclable shipping materials. The economic benefits here will manifest as cost savings and in some cases new revenue streams. While the environmental and economic benefits are at the forefront, additional probing should be used to identify social benefits as well. Most will agree that responsible use of resources is also beneficial to society in the long run.

### **Summary**

A brief summary of analysis techniques discussed in this paper appears in Table 1. The main lesson to be learned is that there is no single technique currently in use that provides a comprehensive evaluation of supply chain sustainability. In this paper, the SCOR® Model has been proposed as a framework to move towards a more comprehensive analysis technique for supply chain sustainability.

LCA and EIA are concerned only with the environment. The IISD framework focuses on CSR which may or may not cover supply chain sustainability adequately. The SCOR® Model affords the opportunity to look at the triple bottom line in a much more comprehensive manner and provides a very systematic approach to sustainability analyses.

*Table 1 Supply Chain Sustainability Assessment Techniques*

<b>Technique</b>	<b>Used for this Purpose</b>
Life Cycle Assessment	Product through all stages of product's life
Environmental Impact Assessment	Specific environmental concerns for producing the product and any by-products that occur
IISD Framework	Plan, do, check and Improve cycle for CSR; covers all aspects of CSR and incorporates the perspective from major stakeholders
SCOR® Model	Comprehensive evaluation of all supply chain elements including Plan, Source, Make, Deliver and Return as guiding terms. Covers strategic decisions, supplier selections, manufacturing, transportation, recycling, reuse and disposal.

The model of 'plan, source, make, deliver, and return' can be superimposed over each stage of the supply chain and can be used to guide the evaluation. This includes multiple tiers of suppliers, multiple transportation linkages from suppliers to the manufacturing operations, and then the multiple levels of the distribution system. By doing this, every possible element in a global supply chain is included in the model and will be evaluated when supply chain sustainability initiatives are proposed.

The SCOR® Model was developed more than two decades ago and was intended to provide a common language to discuss supply chain management elements. Recently, the SCOR® model has been proposed as a framework to guide and sustain supply chain improvement (SCC, 2013). In this paper, the model is proposed as a framework for evaluating supply chain sustainability initiatives as companies make changes to address the triple bottom line. By explicitly addressing all three of the triple bottom line components - environment, economic and social - the SCOR® Model can lead to a much more thorough evaluation of sustainability.

One future research idea that came from developing this paper is to take a new look at defining sustainability. As discussed here in the paper, 'sustainability' does not work well when used in a phrase combined with 'economic' or 'social'. On the other hand, 'environmental sustainability' is meaningful and readily understood. The proposed research will unbundle and rephrase the three different objectives of the triple bottom line in an effort to expand the investigation in the social and economic dimensions of the triple bottom line.

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