

# Sustainable Supply Chain Management: An Overview

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Sustainable Supply Chain Management  
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## Agenda

- Sustainability and Sustainable Supply Chain Management
- Supply Chain Strategic Fit
- Triple A Supply Chain

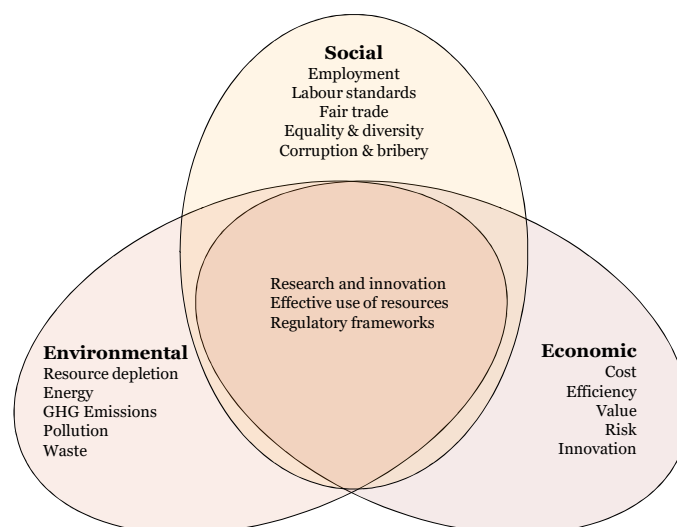
## What is Sustainable Development?

*“To meet the needs of the present without compromising the ability of future generations to meet their own needs”*

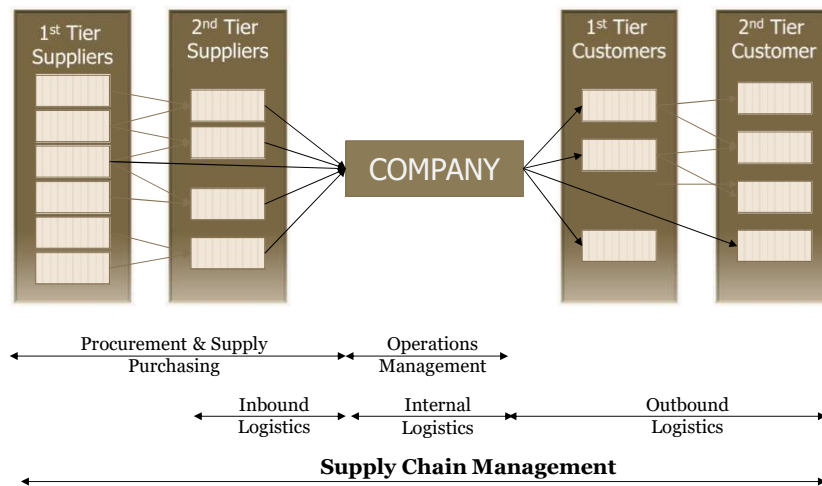
The World Commission on Environment and Development, United Nations, 1987

**Corporate social responsibility (CSR)** is a business approach that contributes to sustainable development by delivering economic, **social** and environmental benefits for all stakeholders.

## The Triple Bottom Line (TBL)

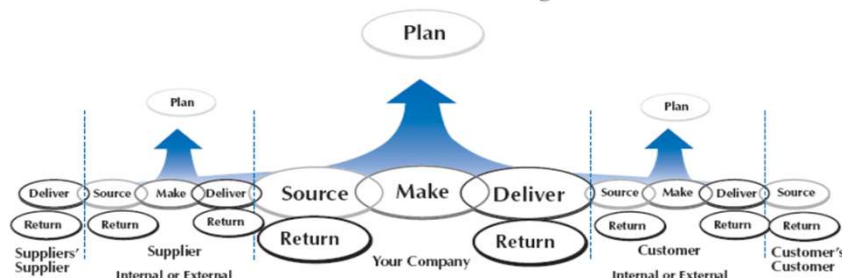


## Supply Chains

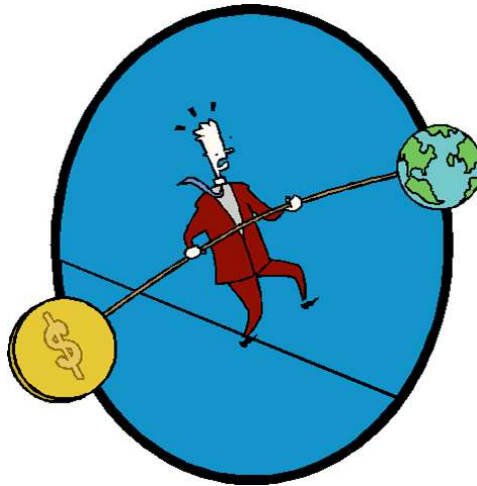


## The Supply Chain Operations Reference (SCOR) Model

SCOR is Based on Five Distinct Management Processes



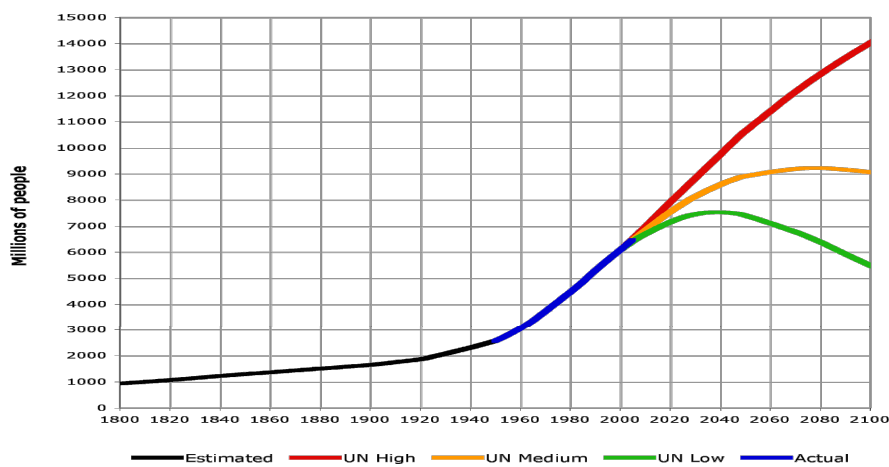
## Why is sustainability a challenge?



- Profits
- Market share
- Costs
- NPV
- ROI
- Shareholder returns

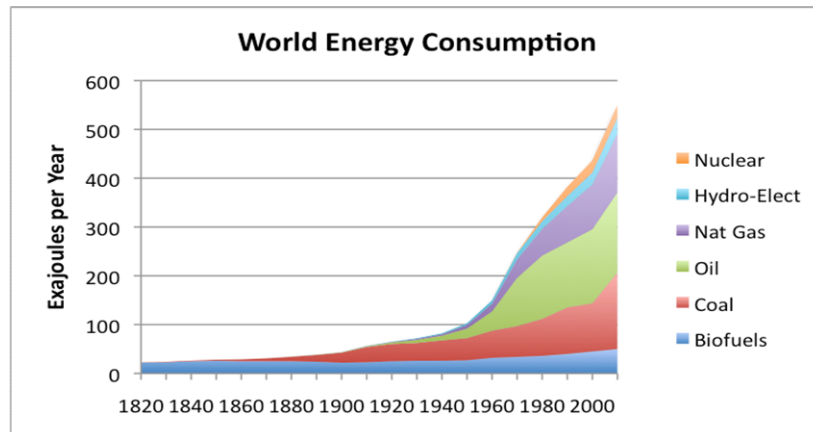
- Greenhouse gas emissions
- Pollution
- Waste
- Natural resource depletion
- Corporate social responsibility

## World Population

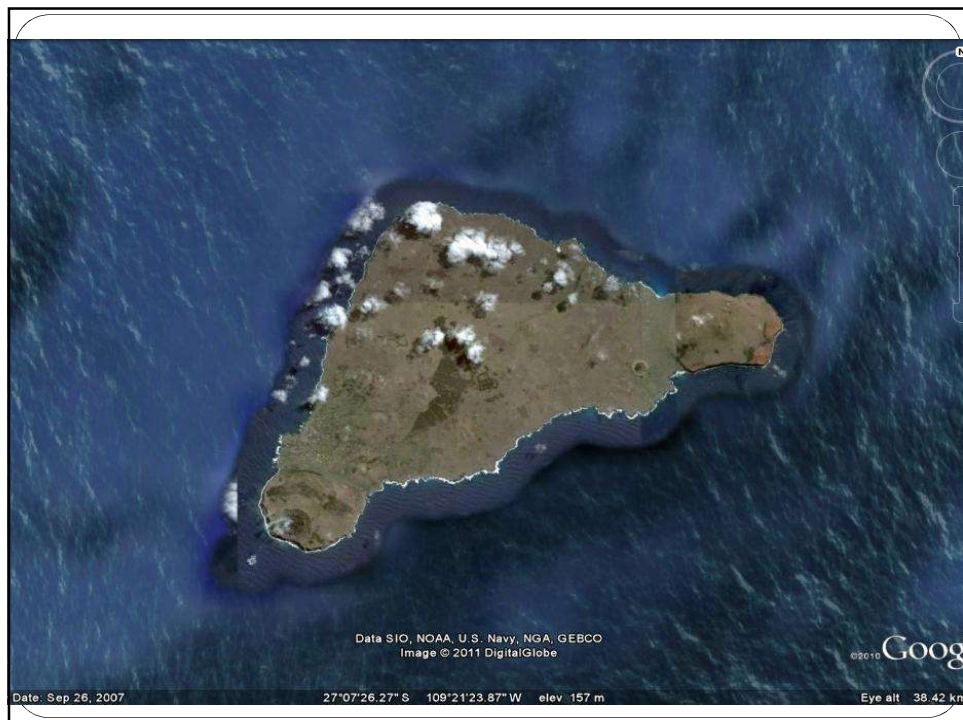


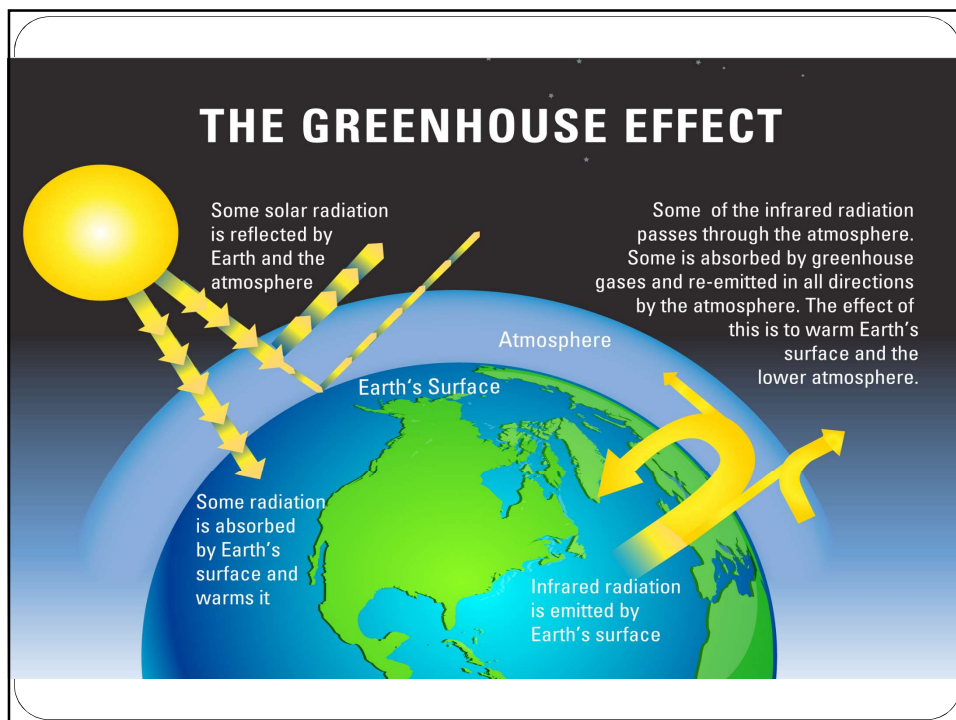
Based on UN projections

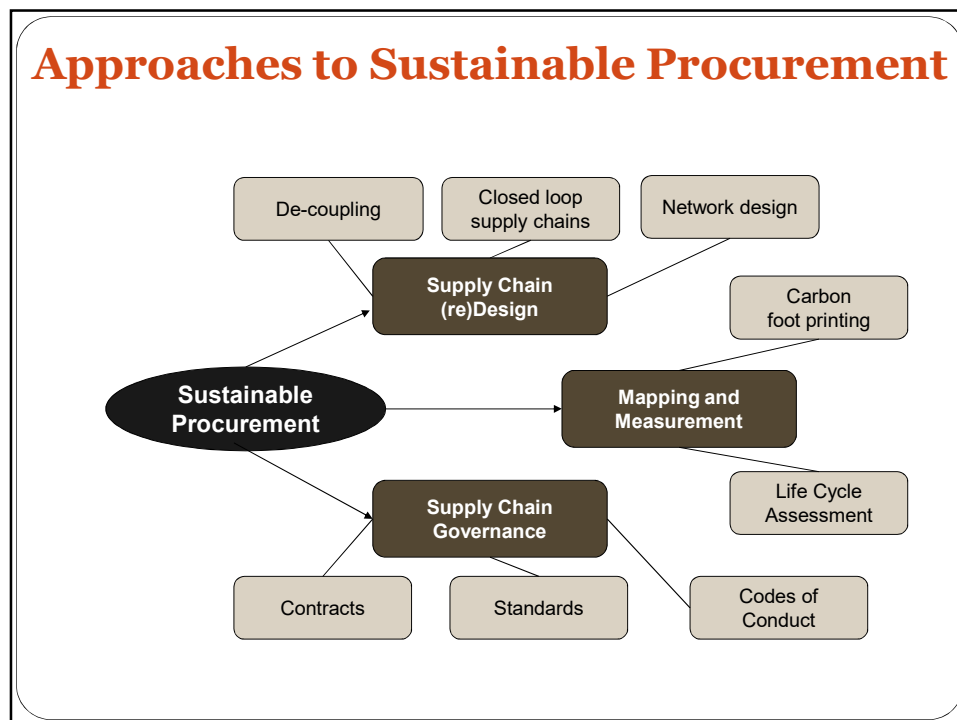
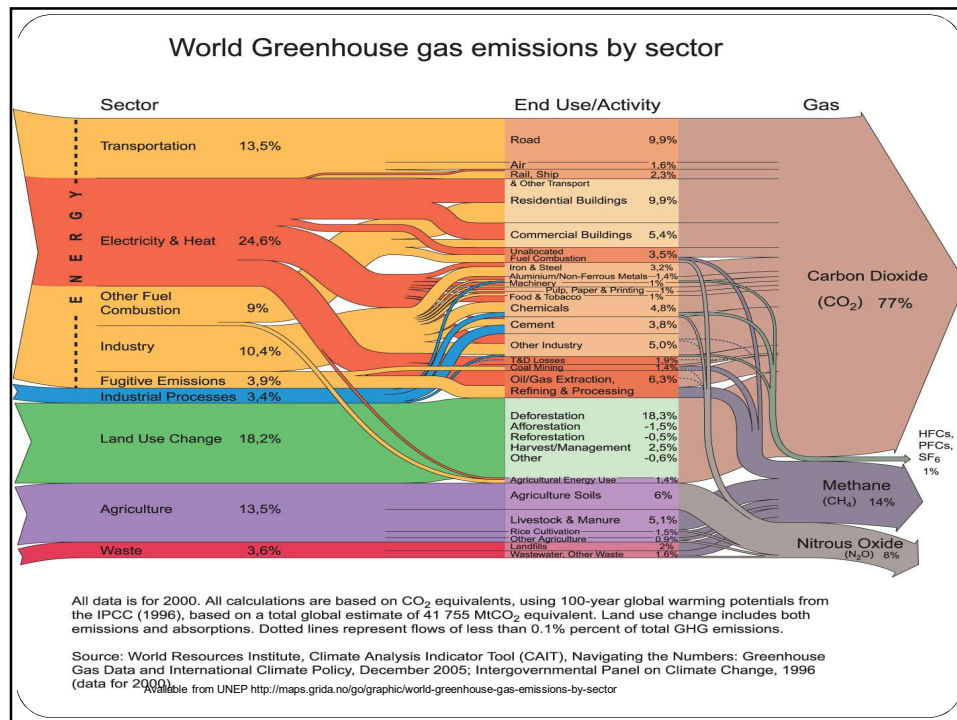
## Global Consumption



Based on Vaclav Smil estimates from Energy Transitions: History, Requirements and Prospects together with BP Statistical Data for 1965 and subsequent



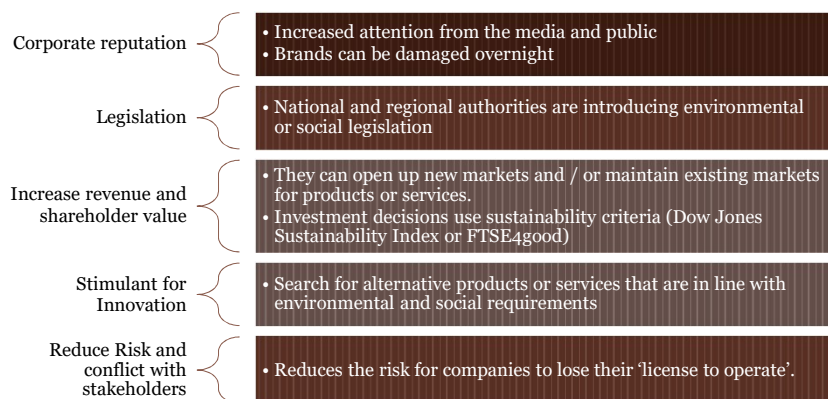




## Social and Ethical Issues in the Supply Chain

- Employment & labour standards
  - Freedom of association
  - Forced labour
  - Child labour
  - Human rights
- Equality & diversity
- Fair trade
- Corruption & bribery

## Why are sustainable supply chains important?



Source: KPMG (2009) Buying into Sustainability: Practical framework on how to implement sustainable procurement



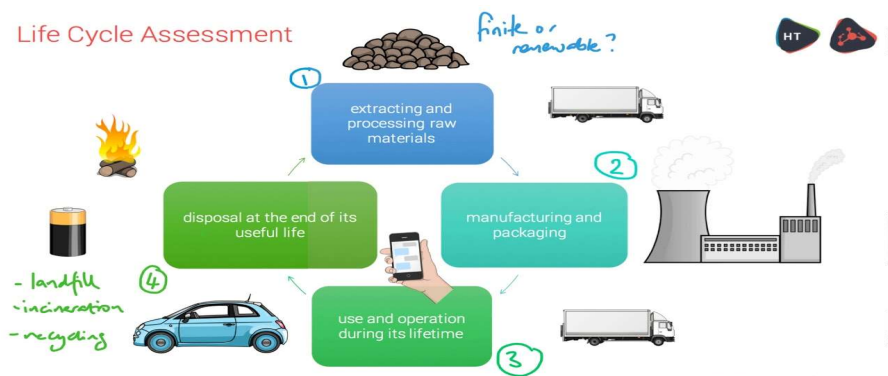
## Life-Cycle Assessment (LCA)

Life cycle analysis (LCA) is a systemic process used to evaluate the environmental burdens associated with a product or process. It identifies energy and materials used and the wastes or emissions released to the environment. LCA is also meant to evaluate and implement opportunities to effect environmental improvements.

A life cycle of a product, service, or utility may include evaluation and analysis from the inception or the design of a product until its end-of-life disposal or disassembly and beyond, such as its reassembly. LCA involves calculating and analyzing the burdens associated with the production, use, and reuse of utilities, goods, and services over their life cycle. This includes processes such as cultivation, extraction, manufacture, delivery, use, recycling, and maintenance.

## Life-Cycle Assessment (LCA)

Life Cycle Assessment



## Life-Cycle Assessment components

*Life cycle inventory analysis* quantifies energy and raw materials requirements, air emissions, waterborne effluents, solid waste, and other environmental releases incurred throughout the life cycle of a product, process, or activity. The goal is to examine all the inputs and outputs in a product's life cycle, beginning with a product's composition, where those materials came from, where they go, and the inputs and outputs related to those component materials during their lifetime.

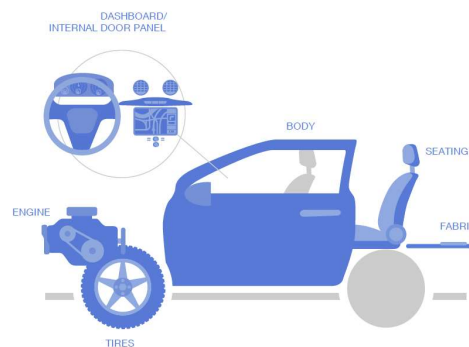
*Life cycle impact assessment* is an evaluative process of assessing the effects of the environmental findings identified in the inventory component for all inputs and outputs throughout the activities of an organization or supply chain. The impacts of a process/product can be compared to help manufacturers or consumers choose among options.

*Life cycle improvement analysis* is a continuous improvement process. It conducts an improvement analysis to determine how the product, service, or utility influences the environment. The change is then made in the inventory analysis to recalculate its total environmental impact.

## FCA - Design for Vehicle Life

FCA aims to reduce the environmental impact of its products through the use of environmentally friendly materials and design choices that encourage recovery and recycling at the end of life.

Since 2015, vehicles sold in Europe have 95% of their weight recyclable, with 10 new materials with recycled or lower density elements .



## Eco-design definition

Eco-design refers to the environmental design of a product and/or process. It focuses on reducing and preventing the environmental effects of a product before it is produced, distributed, and used. Eco-design may examine the disassembly of products at the end of life and reveals the associated cost benefits and environmental impact of revision, reuse, and recycling.

Eco-design is very relevant as, in the design phase of any product or process, up to 80 percent of the environmental impacts are determined.

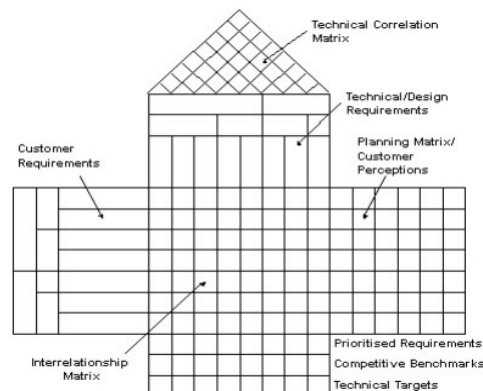
The eco-design process entails five major steps:

- (1) Assess environmental impacts;
- (2) Research the market;
- (3) Run an ideas workshop through brainstorming or ideas generation;
- (4) Select design strategies;
- (5) Design the product.

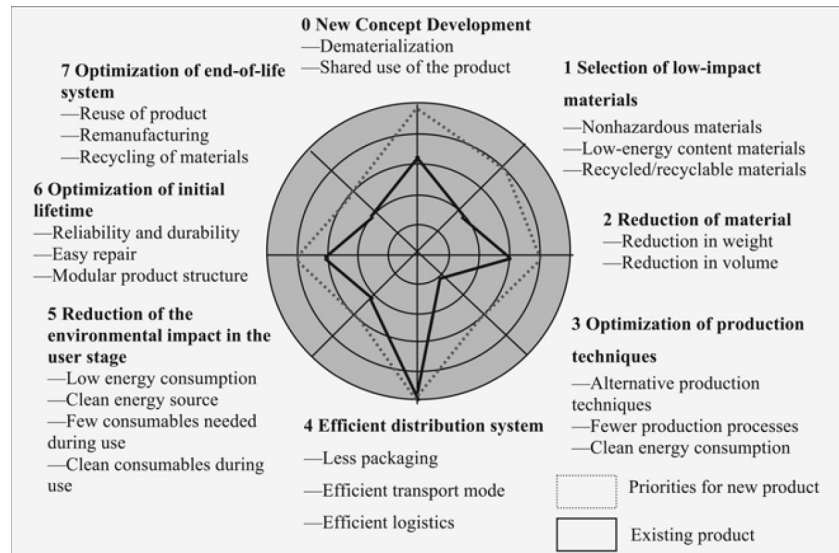
## Quality Function Deployment (QFD)

Quality function deployment (QFD) is a process method developed in Japan to allow the requirements of customers to be incorporated into engineering characteristics for a product.

Eco-design initiatives explicitly include environmental dimensions in QFD analysis.



## Life Cycle Design Strategy framework



## Suppliers' involvement in product eco-design

Supplier involvement in eco-design initiatives is critical when supplier processes, products, and policies are impacted by new product designs.

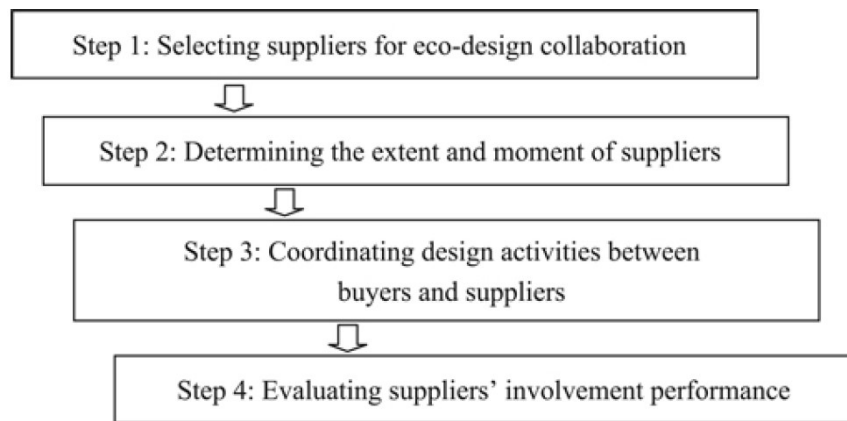
The main drivers to suppliers' involvement are:

- Solving potential technical and environmental problems
- Further developing the buyer-supplier relationship
- Time and cost resources savings

The main success factors for suppliers' involvement are:

- Share Win-Win Benefits for Buyers and Suppliers
- Build Mutual Trust Between Buyers and Suppliers
- Identify and develop appropriate and significant Supplier Capabilities

## Suppliers' involvement in product eco-design – main steps



## Suppliers' involvement in product eco-design – main steps

### Step 1: Selecting Suppliers for Eco-Design Collaboration

The selection of suitable suppliers should consider:

(1) the degree of consensus among buyers for the selected suppliers; (2) the degree to which suppliers' capabilities match buyers' capabilities; (3) the degree to which suppliers' business culture matches buyers' business culture.

### Step 2: Determining the Extent and Timing of Supplier Eco-Design Involvement

Suppliers might be involved in at least five different phases of product development: idea generation, business assessment, product concept development, product engineering and design, prototype building. The development risk of an eco-design program impacts on the specific supplier involvement stage for product eco-design.

The extent of supplier involvement—the level of the responsibility of suppliers—can be composed of White Box (informal supplier integration; suppliers may act as consultants), Gray Box (formalized supplier integration; joint development is available), and Black Box (design is primarily supplier driven).

## Suppliers' involvement in product eco-design – main steps

### **Step 3: Coordinating Design Activities Between Buyers and Suppliers**

A  $2 \times 2$  matrix can be established to act with respect to different levels of supplier responsibility and of product development risk. In particular in a situation involving a high level of supplier responsibility and high development risk, suppliers should be engaged earlier in the product concept design stage. At this stage, information for eco-design is normally vague, and collaboration between buyers and suppliers should be close and interactive. Numerous details for technical and environmental issues can be discussed and evaluated. Regular verbal communication is generally necessary. Face-to-face contacts are also significant for information exchange.

### **Step 4: Evaluating Suppliers' Involvement Performance**

The suppliers' involvement performance can be evaluated by considering how much easier it is for the buyer to execute the eco-design program with the supplier's involvement as well the better environmental performance achieved due to the involvement of the supplier