THE LEAN AND GREEN SUPPLY CHAIN CONCEPT

Introduction

Climate change and the environment are the some of the biggest issues facing the world today. Greenhouse gas emissions, particularly CO2, are the major contributing factor global warming[1]. The majority (56%) of Australia's energy-related greenhouse gases were emitted in the production and consumption of goods and services for the purpose of household final consumption[2], including the storage and transportation of these. The non-household transportation sector alone contributed 10% of Australia's total greenhouse emission in 2004[3], making it a critical element for its sustainability targets.[4]

Although it is consumption of the individual that fuels these emissions, as awareness increases and the consumer looks to become accountable for their own carbon footprint, the environmental impact of a product will move up in importance on their list of decision making criteria. This will move the pressure back to the businesses providing their goods and services, making a lean, green supply chain a competitive advantage.

Companies that have made a proactive move to a green supply chain now, rather than waiting for regulations to force change, have discovered that the benefits go beyond a competitive advantage, in fact, they reach the P&L directly by discovering new cost efficiencies.

Corporate and political situation:

The environment has been a constant presence in the global media and now we are seeing the governmental and corporate response in the emergence of green strategies.

Political leaders in Europe are pushing environment to be a top real priority in the EU agenda for the next decades. And a new political scenario in the US and the increasing rumours of Al Gore running for the presidential elections in 2008 may radically change the North American approach to environmental issues.

In 2005, Australia, China, India, Japan and the USA founded a new partnership to address climate change, energy security and air pollution issues in ways that

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[1] ABS Yearbook 2004
[2] Energy and Greenhouse Gas Emissions Accounts, Australia, 1992-3 to 1997-98 (4604.0)
[3] ABS Yearbook 2004
[4] Eddington Transport Study (http://www.hm-treasury.gov.uk/independent_reviews/eddington_transport_study/eddington_index.cfm)

encourage economic development and reduce poverty.[5] And although not ratified here, the Kyoto Protocol influences the way we approach the future. The Australian Government has committed to Australia's internationally agreed target of limiting emissions to 108% of 1990 levels between 2008 and 2012 and has financed a $1.8 billion domestic climate change programme.[6]

With all this global attention, the reality of a world-wide carbon trading scheme is looming on the horizon. So, it is not surprising to see that 'Corporate Responsibility' reporting (green accounts) is on the rise (from 45% of Global fortune 250 companies in 2002 to 67% in 2005)[7].

A number of organizations have already made the move and are saving the environment and $$$

Target initiated a cardboard recycling program. Cardboard comprises 65 percent of its total waste management efforts. In 2004, Target's 1,313 stores and 22 distribution centres collected nearly 362 million kilograms of corrugated boxes for recycling and **saved 4.8 million trees.** Target has since launched two new initiatives, a Six Sigma study and a Reverse Logistics program, to maximize its cardboard-recycling efforts.

Texas Instruments saved USD 8 million each year by reducing its transit packaging budget for its semiconductor business through source reduction, recycling, and use of reusable packaging systems (20% annual savings).

Pepsi-Cola saved USD 44 million by switching from corrugated to reusable plastic shipping containers for one litre and 20-ounce bottles, conserving million pounds of corrugated material.

McDonald's reduced the weight, volume, and environmental impact of its packaging materials and explores new packaging alternatives. The company conserved 3,200 tons of boxboard containers and **saved $3.6 million**.

The push from the customer to the corporation and back to the service providers…

One of the most illustrative current examples of consumer pressure that is affecting Australia producers is the 'Food Miles' phenomenon in the UK. Being one of the

[5] ABS Yearbook 2006
[6] http://www.greenhouse.gov.au/international/kyoto/index.html
[7] Source: KPMG "International Survey of Corporate Responsibility reporting in 2005"

countries that import our fresh produce, British public opinion weighs heavily on the success of our exports.

The release of the UK Government 2003 Energy White Paper, which proposed a 60% reduction of carbon emissions in the UK from 1990 levels by 2050, sparked a new methodology in environmental responsibility. UK retailer Tesco decided to list food miles on imported products, with the ideology of giving the consumer the chance of an informed choice about their carbon footprint – this has since become the 'Food Miles' phenomenon.

However the simplistic concept of 'Food Miles' tells only part of the story, only measuring transport distance, not actual energy consumption. Increasingly environmental campaigners are looking at the 'carbon footprint' of products, taking a more holistic view of their energy use – including the type of transport, the time stored and method refrigeration, just to name a few. Although more complicated in its calculation, the many factors which are taken into account should provide a more equitable view of the global freight industry's role in carbon emissions. Effective supply chain analyses need to recognise that sea transport is, according to many surveys, one of the least environmentally damaging modes of transport.[8]

In many cases, products grown in developed markets also have a substantial amount of domestic 'Food Miles', due to the centralisation of retailers' distribution systems. This may be more efficient in logistics terms, but not when measured by the carbon emissions produced.

The 'Food Miles' situation is a clear example of why companies need to prepare themselves for this type of pressure and need to understand what their carbon footprint is now and how to get it to where they want it to be.

So what can we, as logisticians and supply chain analysts, offer these companies? The expertise and advice on how to measure, map and implement a lean and green supply chain - a green formula.

The Green Formula

The green supply chain concept can be achieved by;
- **conserving** the energy/resources used in the supply chain
- **reducing** the pollution waste it produces.

[8] Source: Containerisation International (http://www.ci-online.co.uk/?TId=22052875092)

Green supply chain analysis often leads to innovative processes, continuous improvements, and improved alignment among supply chain partners.

Many companies have increased their competitiveness by engaging in environmental performance-enhancing activities (such as converting waste to by-products, reducing obsolescence through VMI, etc.).

Companies that pro-actively increase investment in technologies and operations for lean and green supply chain will be positioning themselves well for the future as;

- The costs of materials and energy continue to grow as the world economy expands.
- Public pressure for environmental, health, and safety performance remain strong.
- Awareness of the 3BL grows (Triple Bottom-Line reporting: concerning the relationship of profit, people, and the planet).
- People's growing antipathy to globalization is leading to strong non-governmental organisation activity regarding businesses' sustainable performance.

The Methodology

Mapping the current environmental effect of a company gives them a reference point to work with, not only to measure themselves against their competitors but also to measure their own improvement as recommended Green Supply Chain Initiatives are implemented.

Where does is usually go wrong?

1. **Production**
   - Poor factory layout causes inefficient processes.
   - Complicated material, product, and package design creates waste.
   - Inefficient production planning creates waste and pollution in the supply chain.

2. **Warehousing**
   - Inefficient use of cartons, cardboard boxes and pallets creates waste.
   - Poor warehouse planning creates waste.
   - Lack of equipment maintenance creates waste and pollution.

3. **Transportation**
   - The transfer of raw material and goods from one point to the next in supply chain creates pollution (carbon dioxide (CO2), carbon monoxide (CO), nitrogen oxides (NOx), and particulate matters.

Green Supply Chain Initiatives

A collaborative effort of analysis with the customer identifies key problem areas and leads to the recommendation of an appropriate Green Supply Chain Initiative, such as the one below;

- **Productivity Improvement in the supply chain**

- **Environmental Accounting Technique**
  Ensure that major waste disposal costs are made explicit and attributed directly to the responsible product or business unit.

- **Waste Reduction Programs**
  - Choose appropriate materials.
  - Reevaluate the lot sizes of purchase orders and production runs – smaller orders (reduce obsolete/waste, inventory level, and electricity usage at DCs/plants.
  - Consider using slip sheets instead of wooden pallets.
  - Reduce number of SKUs in supply chain (improve forecasting, reduce obsolescence/waste).
  - Eliminate excess packaging at the distribution center;
    - Work with vendor to minimize packaging (put more garment on hangers, ask vendors not to stuff paper in footwear, etc.).
    - Recycle cardboard boxes/cartons at the DC.
    - Encourage suppliers to provide recyclable packages/cartons and initiate return-to-vendor program.
    - Perform yearly self-assessments of its environmental operations and publish the results in an annual report.
  - Transport Pollution Reduction Programs
    - Optimize distribution network (minimize distance between each node in supply chain)
    - Choose the best possible transportation mode for your supply chain.
    - Reduce carton weight (lighter truck will consume less energy)
    - Consolidation at origins to optimize container size to reduce number of containers and trips.
    - Deconsolidation at destination to reduce trips to DC's (convert from 20'/40'/45' to 53' containers).
    - Reduce supplier base and forming partnership with key suppliers.
    - Port of Entry Analysis (choose the best route from origin to destination to minimize gas emission).

Conclusion

Today's environmental situation has created a unique opportunity for business, to be responsible corporate citizens and create cost and process efficiencies at the same time.

However not all corporations will be able to tackle the great green frontier on their own. And so it seems that with new era of the lean, green supply chain has created a new need in the market place; a need for the green supply chain analyst.

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