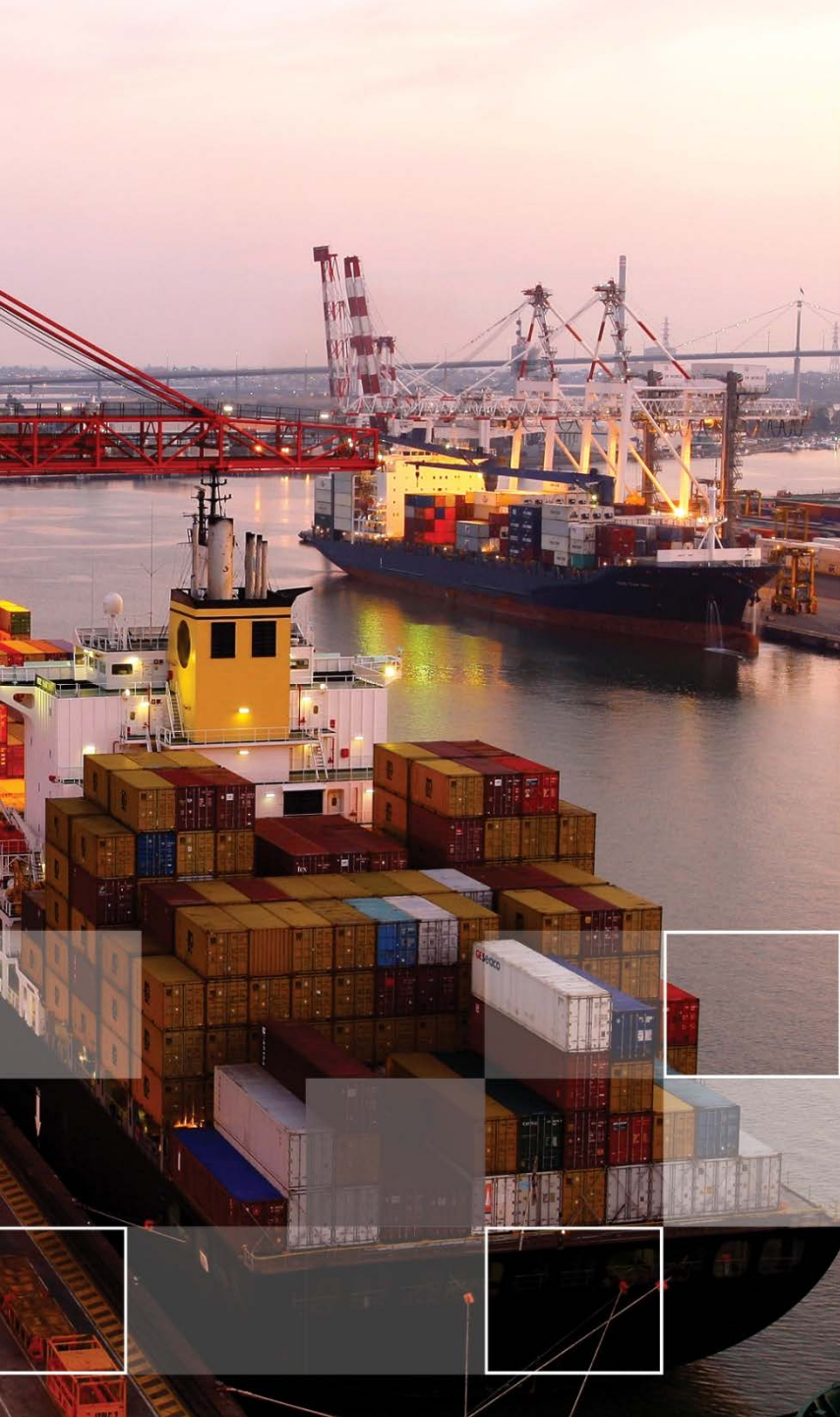




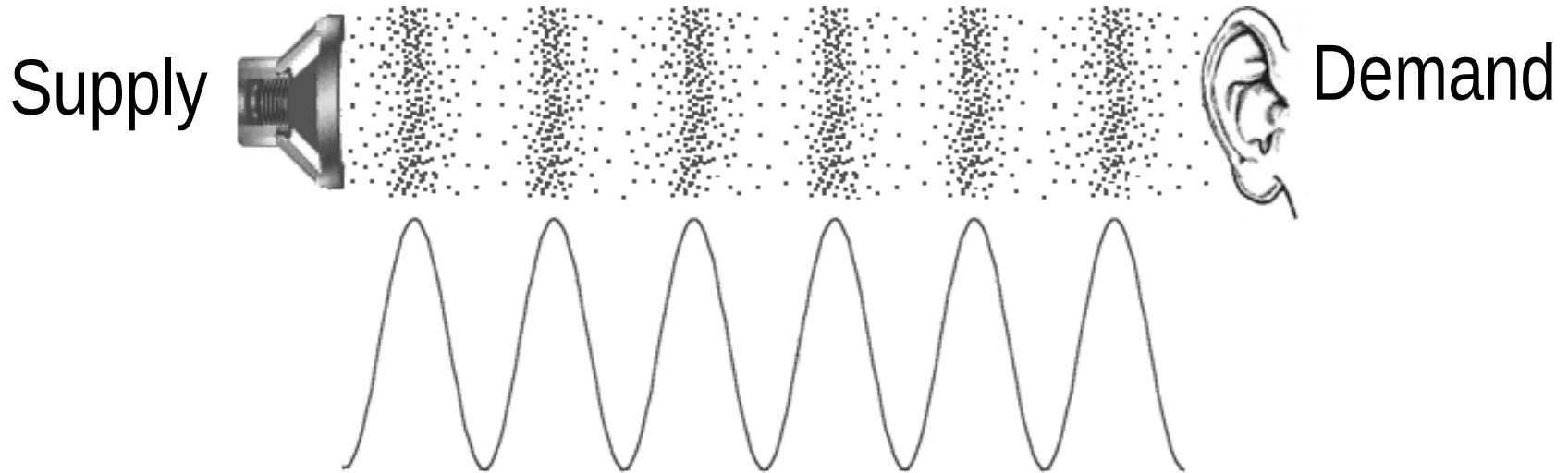
Developing Strategies for Green Supply Chain Management

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What is a supply chain?



The interdependent organisation of supply and demand from raw product forecasting to strategic asset investment.

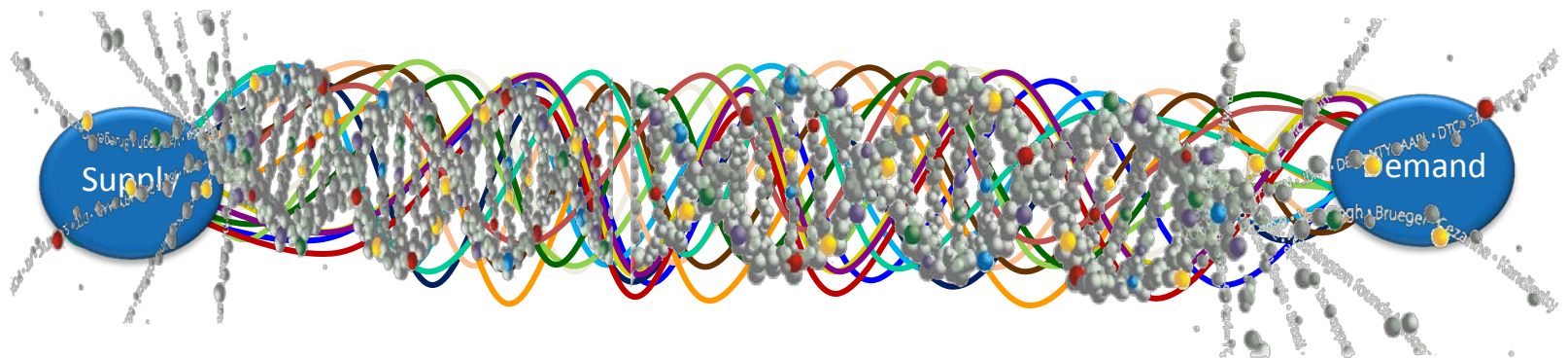
What is a supply chain ?

A supply chain:

- links producers, businesses and consumers, agencies and governments in complex decision-making.
- involves precise time and cost management in logistics and multimodal transportation.
- operates in environments heavily influenced by external variables (e.g. economic, legislative and social).
- faces constant change in response to the global business environment and innovations.

What determines supply chain strategy?

- Systems Thinking
- Transaction Costs
- Fuel
- Transport
- Logistics
- Labour
- Business Processes
- Finance
- Information Technology
- Procurement
- Supply Chain Management
- Commercial Power
- Legal and Regulatory Systems
- People and Relationships
- Strategic Asset Investment
- Political Economy



Modifiable factors for a more sustainable supply chain

- Fuel type
- Mode of transport
- Commercial Power
- Information Technology
- Legal and Regulatory Systems
- Strategic Asset Investment
- Government Policy

Fuel Type

- Petrol, diesel, LPG (liquefied petrol gas) most commonly used for cars and trucks.
- Electric vehicles or a hybrid combination are becoming more common especially for short trips.
- 2nd generation biofuel is starting to get a wider use even for aeroplanes.
- LNG (liquefied natural gas) is now being promoted for use in vessels and locomotives; GTL (gas to liquid) is another option.
- Cleaner fuel will be compulsory for vessels in a number of countries in 2015 with less Sox (sulphur particles) emissions, however expensive technology (scrubbers).
- Hydrogen still in early development stage.

Fuel Type



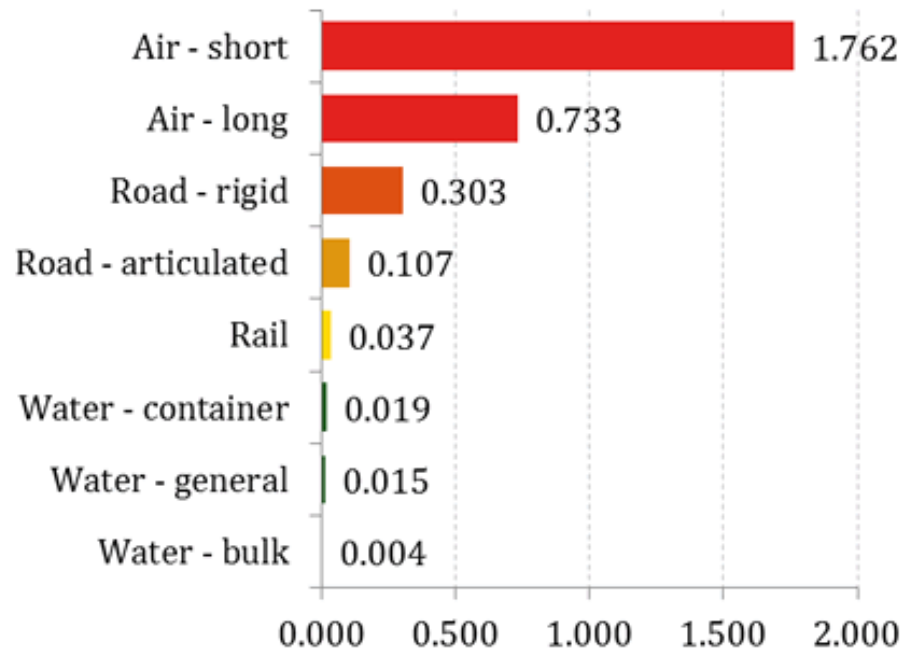
This is what we are trying to avoid !



Ferry bunkering LNG in Stockholm

What type of transport?

Freight Transport Emissions: kg CO₂e/t.km



Note: All figures are kilograms carbon dioxide equivalents per tonne kilometre (kg CO₂e/t.km). Figures based on a well-to-wheels analysis of fuel used and average loading per vehicle. For air freight long is greater than 3,700 km while short is less than it, no RFI multiplier is used. Road vehicles are based on UK diesel truck averages. Rail based on UK diesel and electric trains. All water vessels are ships, not ferries.

Sources: DEFRA

Commercial power

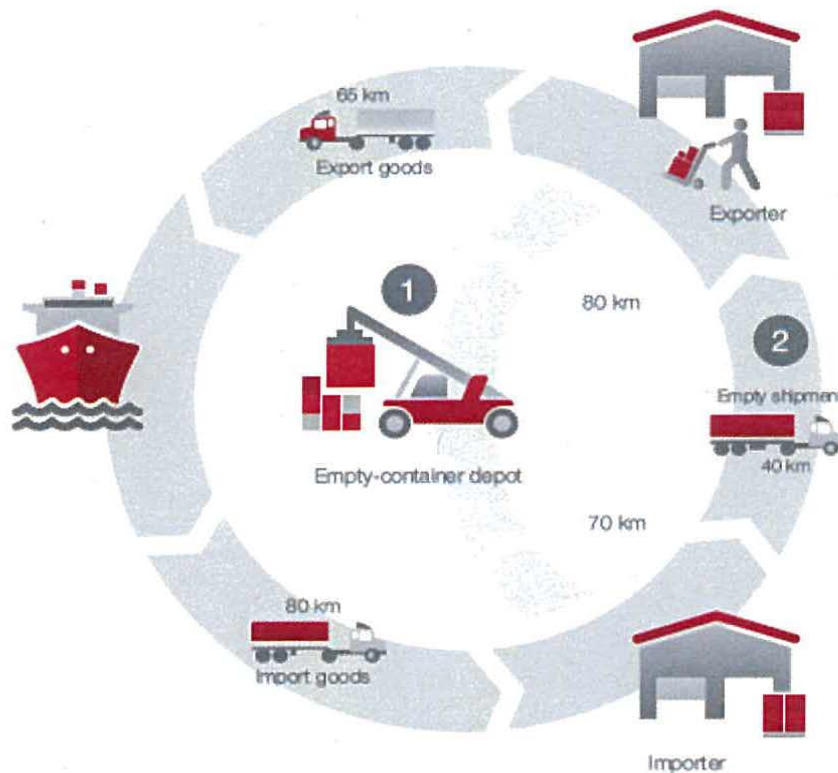
- Reducing unit cost: 18,000 TEU vessel cheaper per TEU (\$1.50) to run than 12,500 TEU vessel.
- Potentially one (leased?) container pool worldwide with no shipping company logos avoids duplication and encourages better utilisation of available containers. In the USA terminals are now thinking about a “grey” chassis pool .
- Vessel slow steaming now widely accepted. Hamburg Sud vessels use a ‘trimming assistant’ at sea to reduce fuel usage.
- Ability to calculate your CO₂ emissions output when you book your freight.
- Port of Rotterdam is offering 5% reduction in port costs if vessels reduce their CO₂ emissions.

The use of information technology

- Advanced and increased knowledge enables smart decision making in all forms of transport.
- Electronic data interchange (EDI) widely used in developed countries but less so in developing countries.
- Use of smart vehicle technology results in optimal driving and reduced fuel consumption (no stop/start).
- Increased use of vehicle monitoring and trip planning (telematics) avoids congestion.
- Intelligent Transport Systems (vehicle platooning).

Smart use of information

SMART TECHNOLOGY MINIMISES EMPTY CONTAINER SHIPMENTS



- 1 The normal route: 295 km
Empty run: 150 km
- 2 Optimised route: 185 km
Empty run: 40 km

The container is delivered to the importer and, if it proves to be suitable for cargo, is driven to the exporter by truck without intermediate storage in the container depot.

Legal and regulatory systems

- Prioritising funding of road over rail : in Australia and in most other countries.
- De-regulate coastal shipping.
- Inland rail on the East coast and a Very Fast Train project (which could potentially reduce air travel).
- The Heavy Vehicle Charging and Investment Reform project (which is now shelved) would have resulted in a more equitable distribution of the costs of carrying freight by road.

Strategic asset investment

- Cold ironing (use of shore power instead of ship's diesel engines whilst ships are in port) is increasing; large investment is needed by port authorities.
- Availability of LNG bunkering in more ports.
- Maersk Line made a strategic decision to retrofit vessels with more fuel efficient propulsion and implemented slow steaming. Most shipping lines now practise slow steaming for container vessels.
- Consider the location of intermodal hubs and distribution centres.

Cold ironing



Fixed cold ironing



Flexible cold ironing



Hybrid power barge



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Government policy

Governments can influence the debate and encourage the implementation of increased use of more environmentally friendly forms of transport e.g.

- Australia: encourage coastal shipping, subsidise port shuttles in Victoria, decision on Moorebank intermodal terminal in NSW, changes in the RET (renewable energy target) legislation.
- EU subsidises and encourages the 'Highway of the Seas' project and the use of barges (freight shifts road/water).
- North America: the 'TIGER' grants concentrate on sustainable transport solutions.
- Norway: the government made it compulsory to connect oil platforms in the North Sea to the electric grid instead of using diesel.
- Increased use of the Arctic route and North West passage will reduce transit times and transport costs.

Summary

- Many options to reduce environmental footprint and ensure sustainable supply chains.
- Most options cost more, however increasingly people are prepared to pay extra for greener supply chains.
- Modal shift or adopting more environmentally friendly methods of transport usually requires intervention by government and has long lead times.
- Logistics industry is making progress and as pollution in general increases, quicker remedial action will occur.
- Developed world should lead the charge. The developing world is less able to afford more expensive supply chains to reduce their environmental footprint.

Ships of the future?





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Thank you