Institut für Logistik- & Dienstleistungsmanagement
der FOM University of Applied Sciences

Green logistics and supply chain volatility: Is there a ´green bullwhip effect´ to be feared in supply chains?

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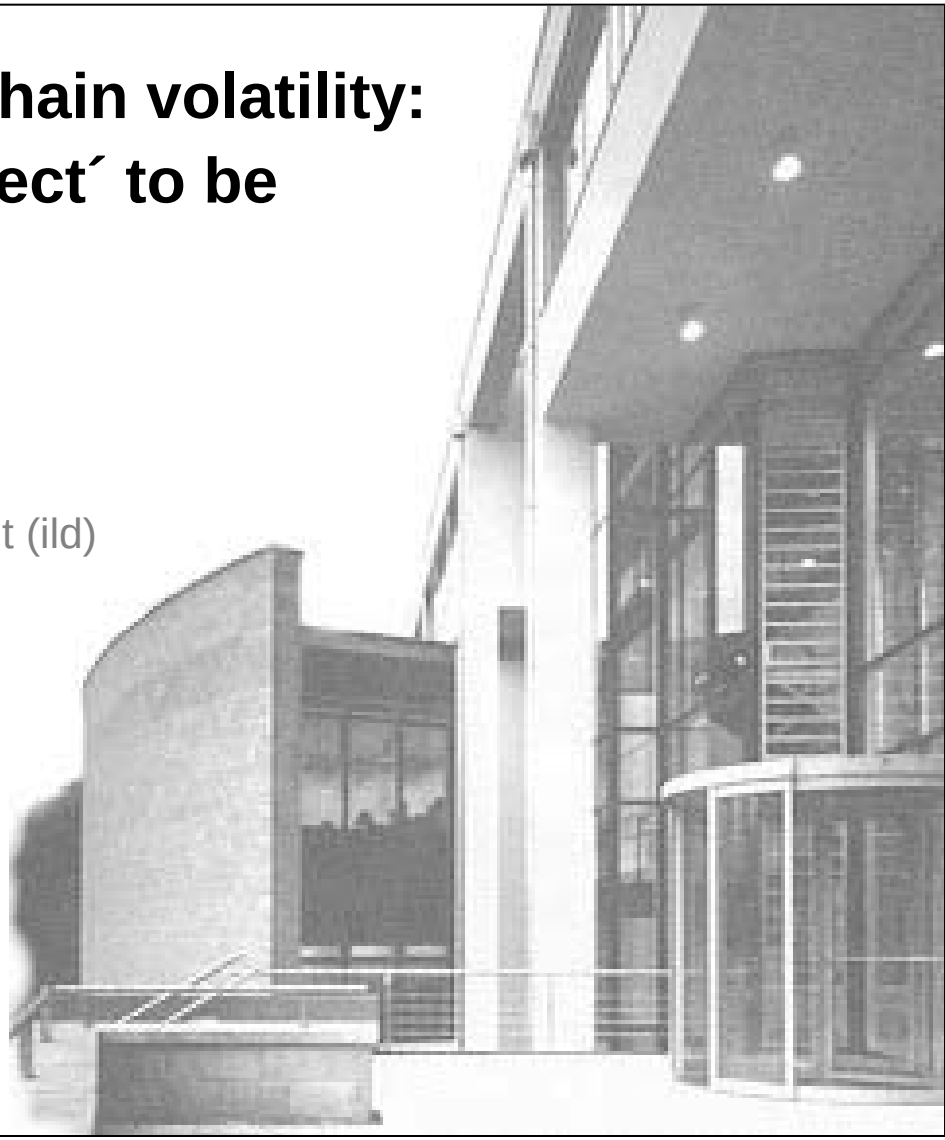

5th European Forum on System Dynamics and Innovation in Food Networks

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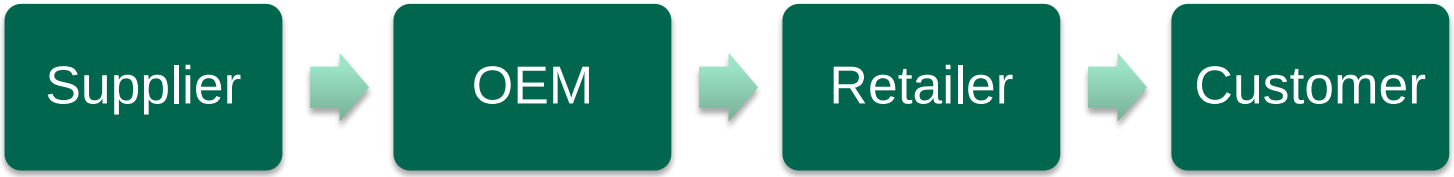
Agenda

1. Introduction
2. Bullwhip Effect
3. Green Logistics Instruments
4. Volatility Assessment
5. Conclusion

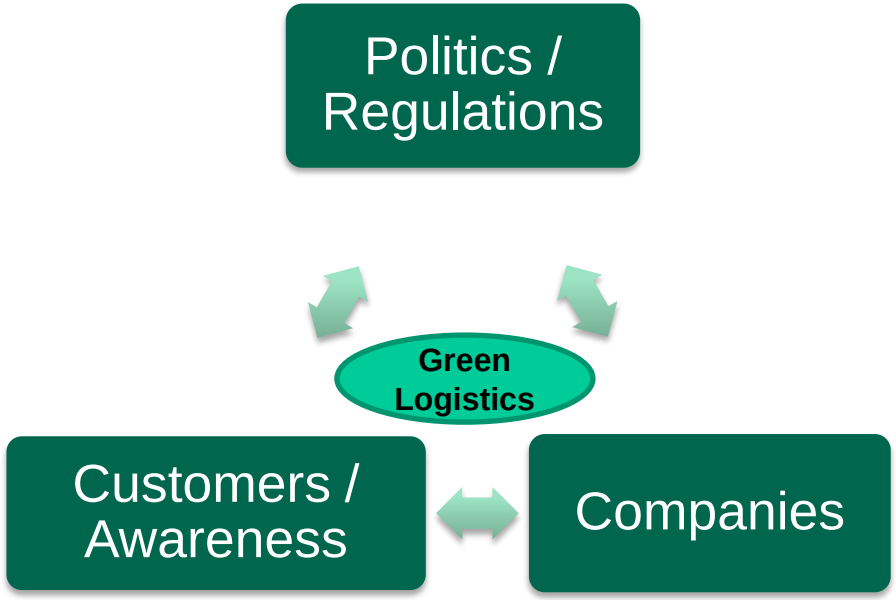
(1.) Introduction: SCM Trends and Methods

- Logistics has evolved into the complex co-ordination of whole supply chains (supply chain management) searching for an optimum of operations of a multitude of companies working in the same line of a product or service flow towards an end customer.



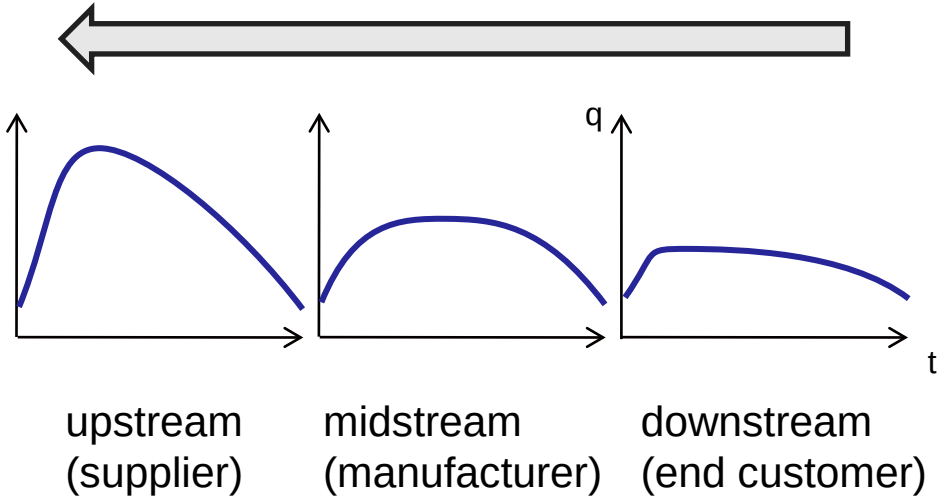
(1.) Introduction: SCM Trends and Methods

- Furthermore recent trends in logistics favour and even demand sustainable solutions for transport flows termed green logistics



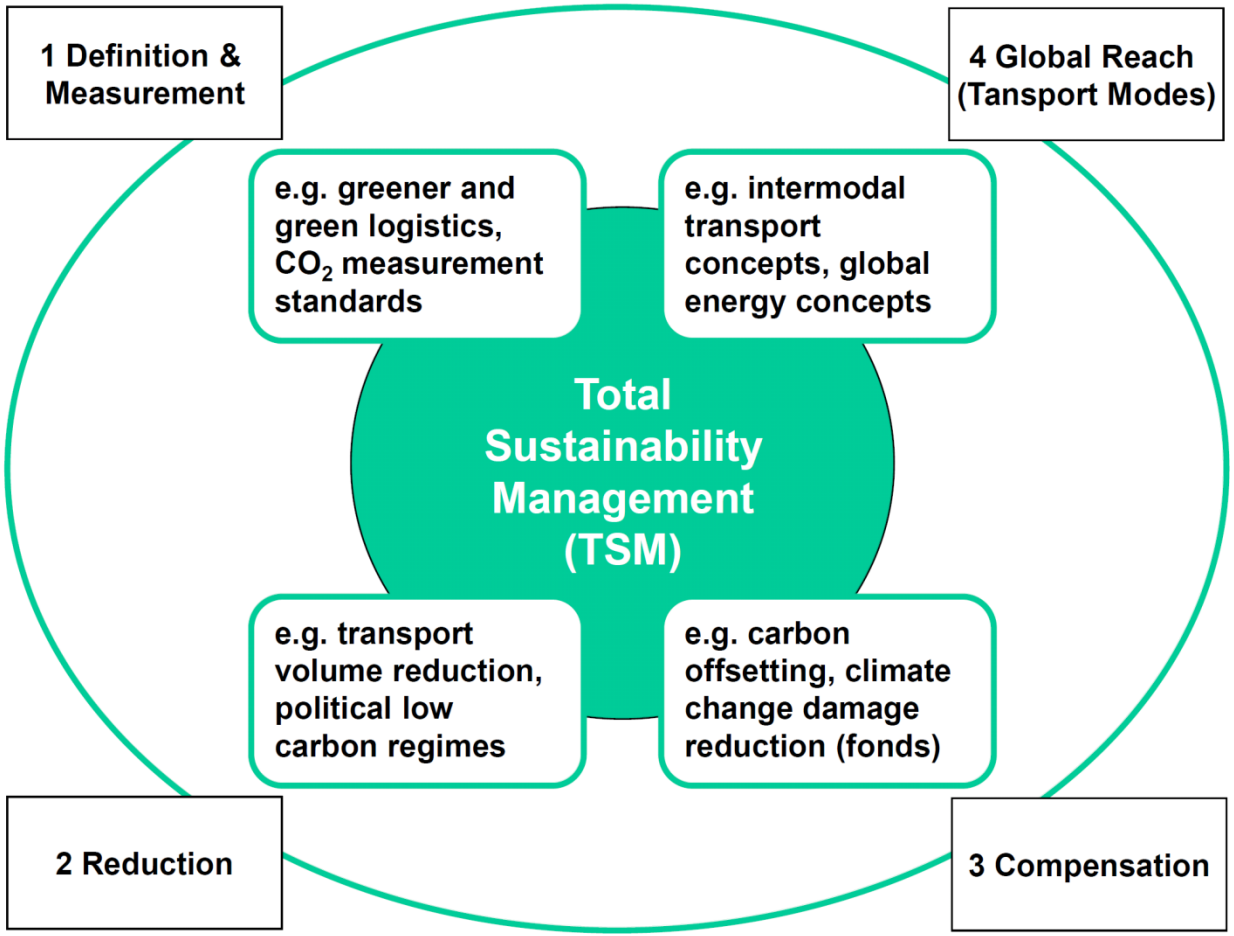
(2.) Existing Bullwhip Effect Literature and Data

- Supply chain research includes ample knowledge about increasing stock and order levels upstream in supply chains induced by small changes in customer demand (bullwhip effect).
- This is mainly caused by information gaps and missing co-ordination among supply chain companies and deciders.



3. Green Logistics Instruments

(3.) Green Logistics Integrated Concept



3. Green Logistics Instruments

(3.) Green Logistics Instrument Levels

1. Traffic Reduction
2. Traffic Optimization
3. Modal Shift
4. Alternative Engine Systems

4. Volatility Assessment

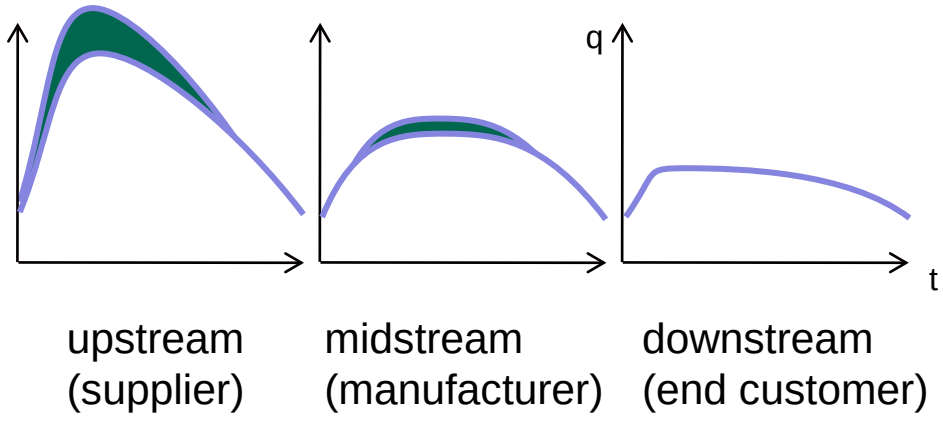
(4.) Volatility Assessment of Specific and Selected Instruments

Green Logistics Instrument	Transmission Character	Influence on Flexibility	Influence on Volatility *V*
(a) Electric-driven trucks	Restriction of transport range	*Negative* influence due to shorter range	*Increasing V* due to feared shortages
(b) Reduction of empty tours (trucks)	Reduction of shipment intervals	*Negative* influence due to longer spacing	*Increasing V* due to feared shortages
(c) Slow steaming (ships)	Longer travel period & more ships needed	Negative influence - increased travel time	*Increasing* V due to feared shortages
(d) Use of biofuel (planes)	Change of speed and range	Positive influence due to higher range	*Decreasing V* due to less shortage fear
(e) Carbon dioxide emissions trading (airlines)	Reduction of flight intervals	Negative influence due to decrease in capacity	*Increasing V* due to restricted capacity and rising prices

4. Volatility Assessment

(4.) Overall Volatility Assessment and Green Bullwhip Effect

- An increasing volatility in existing supply chains amplifying bullwhip effects due to green logistics measures can be expected and termed a „green bullwhip effect“.
- Most analyzed green logistics instruments have a high probability in leading to increased volatility and therefore amplifying the general bullwhip effect.



5. Conclusion

(5.) In general a **green bullwhip effect** or added volatility **by green logistics instruments** has to be expected though other areas of green measures will have a mitigating effect.

→ Specific industries as e.g. fashion and electronics should be prepared to **expect longer travel and lead times** and strategically increase stock levels.

→ A **meta-management concept** could be useful in green logistics to check for unintended consequences of green measures.

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Thank you for your attention!

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