Determine the uncertainties hindering sustainability in the UK freight transport sector

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Research Problem Proposition

- Many researchers have developed supply chain uncertainty models focusing mainly on manufacturing.

- Transport has always been considered as a marginal activity within supply chains (Stank & Goldsby, 2000).

- Inefficiencies in logistics operations within UK supply chains are negatively impact on transport sustainable performance.
Research Aim

Our aim is to verify a transport uncertainty pyramid model taking a supply-chain perspective, and determine which different forms of uncertainty impact on transport sustainability.
Literature Review

Number of Researchers have developed Uncertainty models with a manufacturing focus, e.g. Uncertainty Circles (Mason-Jones and Towill 1999)
Conceptual model

Logistics Pyramid Model (Sanchez-Rodrigues et al., 2007)
Focus groups methodology

- The focus group methodology has received little attention in logistics research (New 1995, Frankel 2005).

- Their application leads to innovation in business-problem solving (Bryman 2001).

- The researcher a high degree of flexibility regarding the research plan and process (Krueger 1998).

- Small group being representing of a big population (Krueger 1998).

- Main design factors: similarities and differences between participant, group size, participants’ geographical location and conflictive interests between some participants.
Research process and analysis

• Sample: 150 potential participants from carriers, shippers, customers, trade associations, consultancy companies and policy makers.

• Participants were allocated in 7 focus groups (3 in Midlands, 2 in London, 1 in Cardiff and 1 in Edinburgh) depending on the location of their workplaces.

• Process: Uncertainty causes in Post-It notes, clustering and cause-and-effect exercise.

• Analysis: Application of a number of two-way tables, but triangulating them with the group interview scripts.

• Final response rate: 35 per cent.
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Actual theory saturation

a) New Issues by Focus Group

- Birmingham
- London 1
- London 2
- Nottingham 1
- Nottingham 2
- Cardiff
- Edinburgh

New issues per participant:
- Birmingham: 4
- London 1: 2
- London 2: 1
- Nottingham 1: 1
- Nottingham 2: 1
- Cardiff: 1
- Edinburgh: 1

b) New Clusters by Focus Group

- Birmingham
- London 1
- London 2
- Nottingham 1
- Nottingham 2
- Cardiff
- Edinburgh

New clusters:
- Birmingham: 8
- London 1: 6
- London 2: 2
- Nottingham 1: 2
- Nottingham 2: 2
- Cardiff: 2
- Edinburgh: 2
## Overall findings

<table>
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<tr>
<th>Source of uncertainty</th>
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Overall findings

- Delays
- Demand/Delivery
- Infrastructure
- Coordination
- Rigid
- Supply Chain Integration
- Cost
- Technology
- Legislation
- Complexity
- Inventory Management
- Communication
- Vision
- Returns
- Global Sourcing
- Inter-modal

Number of Post-It notes
## Comparison of clusters based on supply chain role

<table>
<thead>
<tr>
<th>Themes SC Role</th>
<th>Delays</th>
<th>Demand/Information</th>
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<th>Coordination</th>
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Level of importance of different themes founded

- There are four themes that represent 63 per cent of the data, delays, demand and information issues, delivery constraints and lack of coordination.

- There are other group of themes that together represent 20 per cent of the data, road and rail infrastructure, logistics costs, supply chain integration and technology, they all have more than 10 occurrences.

- Other themes have less than 10 occurrences, e.g. legislation, complexity, inventory management and communication.
The evolution of the Logistics Pyramid Model

- **External Uncertainty**
  - Carrier
  - Shipper
  - Customer

- **Control**
  - Coordination
  - Delays

- **Demand/Inventory Issues**
- **Source of uncertainty**
- **Cluster**
  - Under 5
  - 5 to 10
  - 10 to 15
  - 15 to 20
  - 20 to 25

- **Cause of uncertainty**

**Number of Post-It notes**
- Under 5
- 5 to 10
- 10 to 15
- 15 to 20
- 20 to 25

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The evolution of the Logistics Pyramid Model

- **External Uncertainty**
  - Road Congestion
  - Supply disruptions
  - Demand/Inventory Issues

- **Control**
  - Coordination
  - Unloading delays
  - Delivery Constraints

- **Carrier**
  - Delays

- **Shipper**
  - Loading delays

- **Customer**
  - Unloading delays

Number of Post-It notes:
- Under 5
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The evolution of the Logistics Pyramid Model

- **External Uncertainty**
  - Road Congestion
  - Supply disruptions
  - Loading delays
  - Delays

- **Carrier**
  - Control
  - Coordination
  - Unloading delays
  - Tight delivery windows
  - Delivery Curfews
  - Delivery Constraints

- **Customer**
  - Limited storage capacity

- **Shipper**
  - Demand/information
  - Coordination

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**Cause of uncertainty**

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The evolution of the Logistics Pyramid Model

- **External Uncertainty**
  - Road Congestion
- **Carrier**
  - Unloading delays
- **Customer**
  - Limited storage capacity
  - Delivery Curfews
- **Shipper**
  - Supply disruptions
- **Control**
  - Sub-optimal inventory policy
  - Demand forecast accuracy
- **Coordination**
  - Demand/information

- **Cause of uncertainty**
  - Delivery Constraints
- **Cluster**
  - Number of Post-It notes:
    - Under 5
    - 5 to 10
    - 10 to 15
    - 15 to 20
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**Sources of uncertainty**
- Product demand volatility
- Limited information visibility
- Delivery curfews
- Product demand volatility
- Tight delivery windows
- Delays

**Clusters**
- External Uncertainty
- Control
- Carrier
- Customer
- Shipper
- Coordination
The evolution of the Logistics Pyramid Model

- **External Uncertainty**
  - Road Congestion
  - Sales not connected to logistics
  - Supply disruptions
  - Demand forecast accuracy
  - Sales not connected to logistics

- **Control**
  - Integration
  - Demand flexibility
  - Sub-optimal inventory policy
  - Demand forecast accuracy
  - Integration

- **Carrier**
  - Integration
  - Sales not connected to logistics
  - Unloading delays
  - Loading delays
  - Coordination

- **Shipper**
  - Integration
  - Sales not connected to logistics
  - Delays
  - Coordination

- **Customer**
  - Integration
  - Lack of information visibility
  - Limited storage capacity
  - Delivery Curfews
  - Product demand volatility
  - Delivery Constraints

**Number of Post-It notes**
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Concluding Remarks

- The findings indicate that the sources of uncertainty impacting on sustainable logistics are delays, delivery constraints, insufficient demand and inventory information, and insufficient coordination.

- The four themes found in the focus groups are an important indicator of further research needed.

- The model can be used as a template to guide transport operations within supply chains to identify the main barriers and enablers of sustainability.

- The model has been refined based only on participants’ perceptions. Further, empirical-based research is needed to quantitatively validate and test it in real-world situations.
Thank you for your attention

Any questions?