



Investigating indirect flood impacts on businesses - a Cumbria case study

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Relevance of the topic

- Growing levels of complexity in economic networks, markets and business supply chains
- Interdependencies between different actors in a business supply chain (suppliers, customers, transport infrastructure, utilities)
→ indirect impacts
- Indirect impacts invoked e.g. by interruption of production processes, surrounding infrastructure (transport, electricity)
- Gather improved understanding of factors and processes that influence indirect flood impacts on businesses



Case study in Cumbria (UK)

- Investigation of flood impacts on businesses in 3 major flood events in 2005, 2009, 2015
- Estimated overall impacts:
 - 2009 flood: £275 million, £124 million to commercial property and businesses
 - 2015 flood (Storm Desmond): £520-662 million, average loss per flooded business: £84,455
- Significant impacts on infrastructure in both floods, mainly transport network -> bridge and road closures for several months
- Business landscape in Cumbria:
 - High percentage of small to medium sized businesses
 - Flood affected sectors: retail, tourism/ hospitality
- About 41% of businesses directly affected (2015 event)
- 65% experienced some type of negative impact

Interviews with businesses

- Interviews with 15 businesses affected by the floods
- What types of (indirect) flood impacts did occur to businesses?
- Were there noticeable impacts on the business supply chain?
- What were factors, actors, processes influencing these impacts?
 - A business (e.g. size, sector, production mode)
 - A flood event (e.g. type of flooding, duration)
 - External factors (e.g. infrastructure network)
- What were mitigation or resilience measures and how did these measures influence the impacts?



Indirect impacts – business interruption

- Indirect losses from business interruption and loss of trade same or up to 4 times higher than direct losses

“Let's call it the total business loss, was probably around, I guess 4 times the material loss. So when we were making decisions around "Shall we get a piece of equipment up and running quicker, do we ship a part in, which would take a week, we would”

- Duration of business interruption a crucial factor leading to loss of trade and loss of customers
- Damage to transport network causing major disruptions for several months
- Many businesses not directly affected, but experiencing loss of trade due to infrastructure disruptions and customers not coming to area

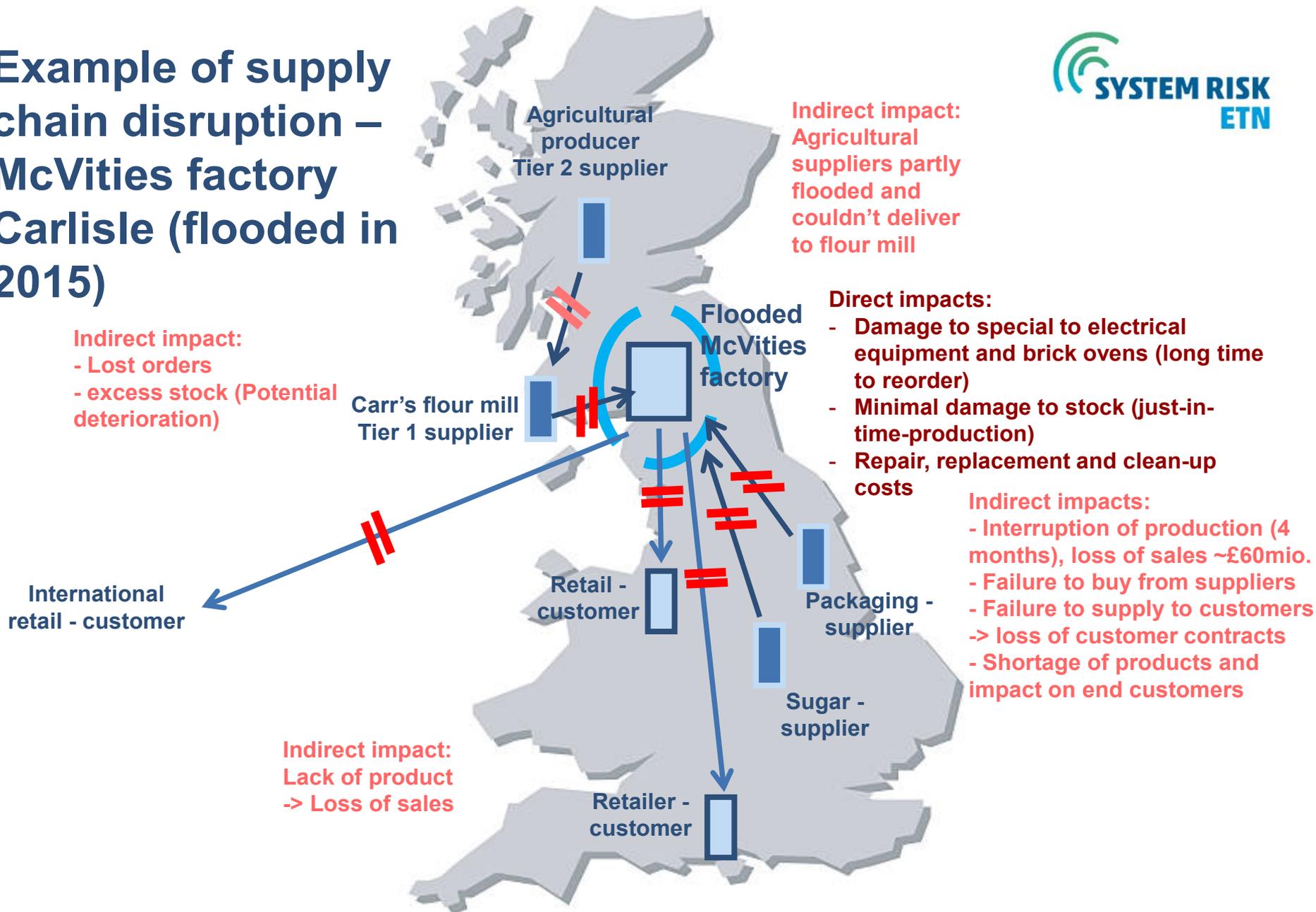
Supply chain effects

- Supply chain impacts on customer side relevant for all businesses
-> customer side generates value for business, keeping customer base is crucial

“[...] keeping in touch with our customer base, which is the most important thing. If you don't provide them with something, they are going to start finding somewhere else to shop. And then when you reopen, they might not come back. So you keep your customer base, that's your most valuable asset, is your customer, so you look after them more than anything.”

- Many of the businesses in Cumbria are smaller businesses that sell to end customers (retail, tourism)
- Effects on supplier side more relevant for bigger businesses and where strong interdependency on few suppliers
- Example: Hotel has one major supplier for perishable goods (~700,000£ per year), who suffered from hotel being closed for several months

Example of supply chain disruption – McVities factory Carlisle (flooded in 2015)



Further indirect impacts

- Positive impacts for constructing and building sector
- Image/ reputational impact: miscommunication in media led to decrease in visitors to region for several months
- Business closure due to flooding:
 - No official estimates or statistics
 - Business closure mostly occurring for non-viable businesses
- Indirect impacts on employees
 - Only few redundancies
 - Important to keep qualified employees

Factors influencing indirect impacts

- Flood depth most important factor driving the direct damages (premises, equipment, stock), which in turn influence business interruption times
- Insurance procedures contributed to long business interruption times
- Renting vs. owning
- Businesses with previous flood experience and resilience measures implemented were able to better cope with the flood impacts
- Obstacles in implementing resilience measures like insurance or property level resilience: lack of financial resources, lack of risk awareness

Conclusions and outlook

Conclusions

- Most significant indirect impact: business interruption and subsequent loss of trade and loss of customers
- Damages to regional transport network one of the main causes for business interruption in Cumbria
- Availability and cost of insurance a major concern for smaller businesses
- Findings emphasize the benefits of a strong community and local network in providing support to affected businesses

- **Better integration of indirect impacts in flood risk assessments and management**
- **Need for improved strategies for business recovery and resilience**
- **-> Integrated effort amongst (local) actors, e.g. FRM, infrastructure, insurance, businesses**

An aerial photograph showing a residential area completely inundated with brown floodwater. A multi-lane highway runs along the left edge of the flooded zone. The houses and buildings are mostly obscured by the water, with only their roofs and some trees visible above the surface.

Thank you

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Key references

Title photos (from left to right): <https://www.reuters.com/news/picture/cumbria-floods-idUKRTXQYMO>; https://ichef-1.bbci.co.uk/news/624/cpsprodpb/162A7/production/88519709_88519708.jpg; <https://www.dailymail.co.uk/news/article-3351883/Imagine-room-Mail-launches-Christmas-Appeal-ROBERT-HARDMAN-witnesses-impact-Storm-Desmond-devastated-families.html>

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