Global Food Security: Cambridge Symposium 2015

UK-India Food Supply Chains- Sustainability and Food Security

Mukesh Kumar,

Centre for International Manufacturing

Institute for Manufacturing, Department of Engineering

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Outline

- Research Context
- UK-India food supply chains: structural differences
- Food product safety in cross-border supply chains
- Climate Change impact on food supply chains
- Designing sustainable food supply chains
- What next

Research Context

- Started food supply chain research theme in 2005
- Exploring geographical dispersion in Thailand based Food supply chains (Kittipanya-ngam, Shi and Gregory et al 2011)
  - Perishability, value density, uncertainty and risks, market opportunities, and technological advances

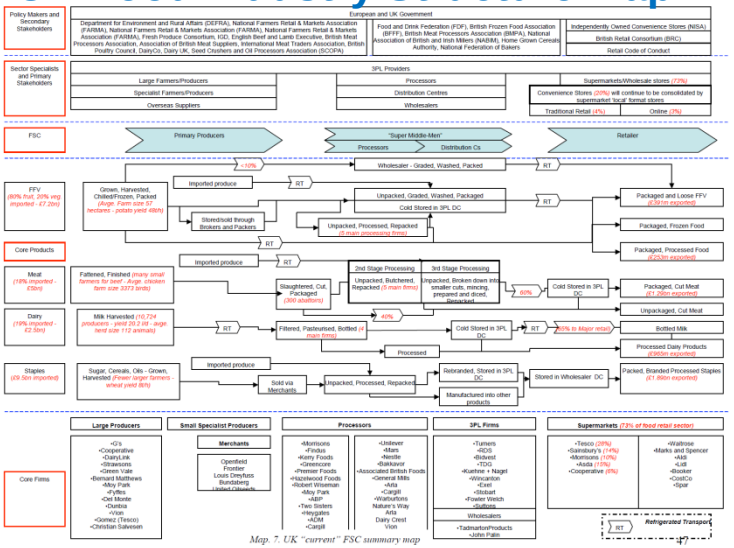
- Emerging market characteristics and supply network adjustments in internationalising food supply chains (Lorentz, Kittipanya-ngam and Srai, 2013)
  - Role of institutions, and primary and supportive actors in designing international food supply chain

- Set up a UK-India collaborative research platform in 2012

Industry Structure Mapping

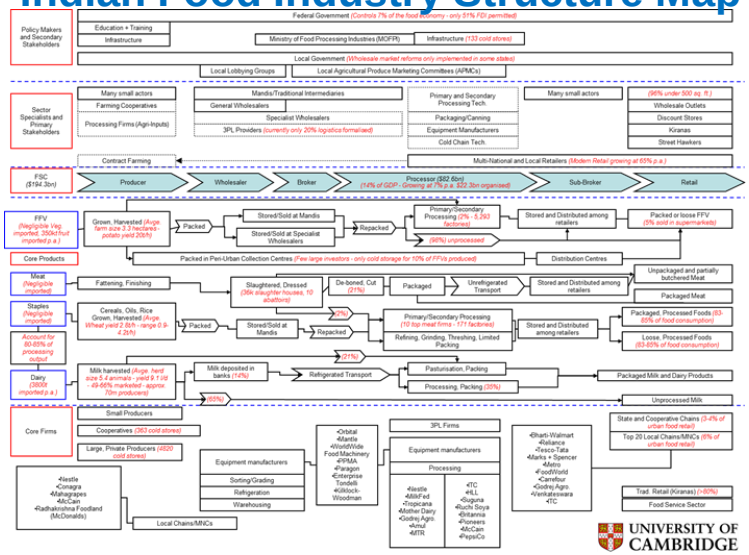
- Industrial system map on India and UK – Primary & secondary stake holders, value chain, supply chain processes, key actors
- In four product categories – Fresh products, Dairy, Meat and Staples

UK Food Industry Structure Map



Map. 7. UK "current" FSC summary map

Indian Food Industry Structure Map



Kumar, Mukesh, et al. (2013), "*Mapping of the UK food supply chains: capturing trends and structural changes.*" Journal of Advances in Management Research, Issue10, Vol 2, pp 299-326.

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Food safety concerns

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Indian state orders Maggi noodles recall

21 May 2015 | India

Maggi noodles are hugely popular in India

Indian food inspectors have ordered Nestle India to recall a batch of Maggi noodles from shops in the northern state of Uttar Pradesh, saying the product contains high levels of lead.

The state's Food Safety and Drug Administration (FDA) said excess levels of Monosodium Glutamate (MSG) were also found in tests on two dozen packets.

Maggi, the two-minute instant noodles, are hugely popular in India.

Nestle India has denied that their noodles are unsafe or unhealthy.

The company, a subsidiary of Swiss-based Nestle SA, said it had strict safety and

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More frozen berries recalled in Australia after hepatitis A contamination scare

At least five people have contracted the infection in the food scare, prompting Victorian company Patties Foods to expand its recall

The frozen berry mix that has been recalled contains strawberries, raspberries and blackberries from China and blueberries from Chile. Photograph: PA/PA

More frozen berry products have been recalled due to possible hepatitis A contamination, with at least five people contracting the infection in the food scare.

Victorian company Patties Foods announced on Sunday it was expanding its recall to include all 300g and 500g packs of Creative Gourmet Mixed Berries.

Taiwanese Tycoon Faces Charges in Cooking Oil Scandal

By AUSTIN RAMZY OCTOBER 30, 2014 7:54 AM 1 Comment

Protesters in New Taipei City, Taiwan, holding signs calling for a boycott of Ting Hsin, a company accused of selling substandard cooking oil made from materials intended for animal feed. Sam Yeh/Agence France-Presse — Getty Images

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A Taiwanese food industry tycoon faces more than 130 charges carrying a possible sentence of up to 30 years in prison in connection with a scandal over the widespread sale of substandard cooking oil.

Wei Ying-chung, 57, is the highest-profile suspect to face

21st May 2015, BBC News

15th Feb 2015, The Guardian

30th Oct 2014, The New York Times

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Key Examples of Food Safety

Incident	Supply Chain Weak Link	Countries Involved	Source (Country)
UK-Ireland Horsemeat scandal (2013)	Food Labeling (Additive Ingredients Declaration)	13 European countries	Romania (Tier 3)
German E-coli contamination of bean sprouts (2011)	Farming (Contaminated seeds)	15 European countries, USA, Egypt (supplier)	Egypt
Irish pork dioxin crisis (2008)	Farming (Contaminated Feed)	Ireland (supplier), UK, South Kora, Singapore, China, Japan	Ireland (Tier 3)
Mad cow disease (2008)	Farming (Regulations - Inspection)	USA, Canada	USA
Chinese milk scandal (2008)	Processing (Adulteration)	USA, Denmark, Sweden, Japan, Taiwan, Hong Kong, Australia, Holland, Canada, Switzerland, China (supplier)	China (Tier 2)
Salmonella outbreak in peanut butter (2007)	Infrastructure (Plant)	USA, Canada	USA (Tier 1)
Chinese petfood Chemical Contamination (2007)	Farming (Chemical Contamination)	USA, Canada, South Africa - China (Supplier)	China (Tier 3)
Spinach E-coli outbreak (2006)	Farming (Water Contamination)	USA, Canada	USA (Tier 2)
Sudan I crisis in sauce (2001)	Processing (Adulteration)	UK, Europe, South Africa, India (supplier)	India, China (Tier 2)
Listeria outbreak (1998)	Infrastructure (Plant)	USA, Canada	USA (Tier 1)
Apple juice E-coli outbreak (1996)	Storage (Cross contamination)	USA, Canada	USA (Storage)
E-coli crisis (1992)	Processing (Temperature Monitoring)	USA, Canada	USA (Tier 1)
Rajneeshee bioterror attack (1984)	Retail (Adulteration)	USA Bioterror attack	USA (Retail)

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Sources: Verbeke, 2013, Karch et al., 2012, Casey et al., 2010, Schlenker & Villas-Boas, 2009, Pie at al., 2009, Maki, 2009, Ingelfinger, 2008, Kotewicz et al., 2009

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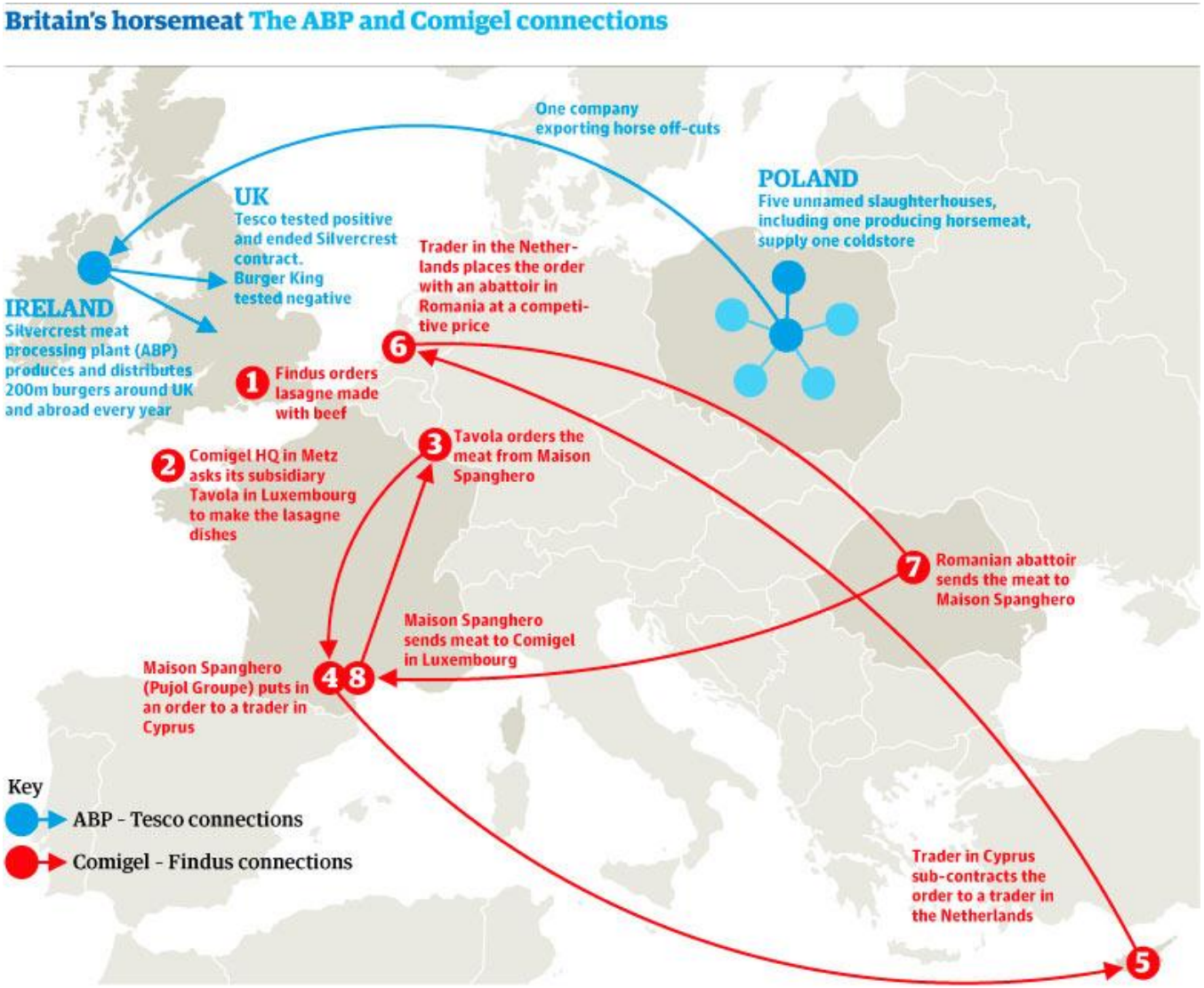
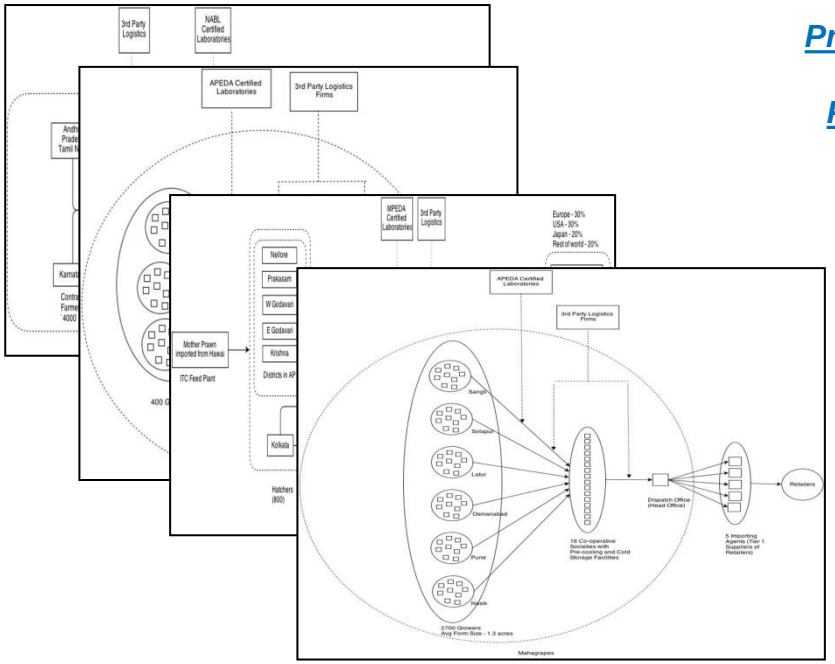
Horse meat Scandal – Supply Network Track



Source : Guardian.co.uk Investigation Report

Food Safety in Cross Border SC- Study of Indian Mfg exporting to UK

Network structure map



Product type

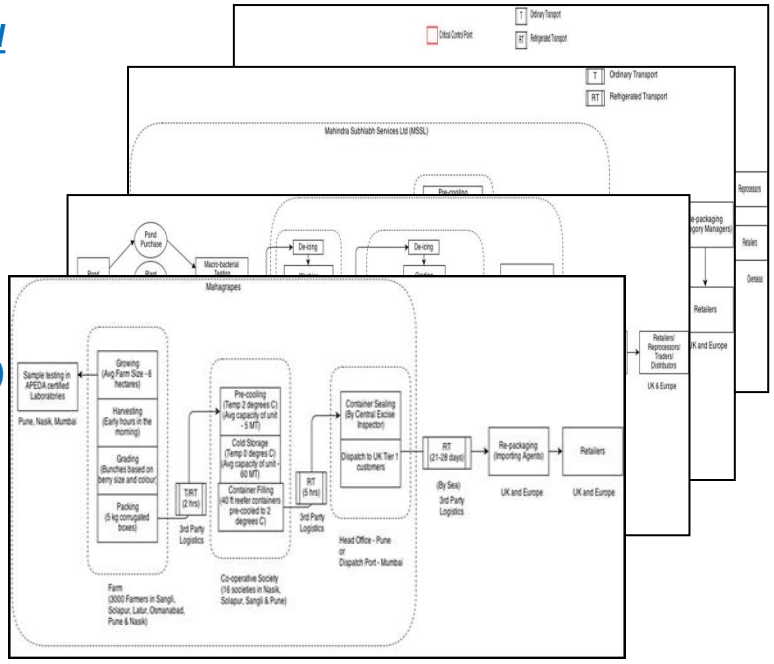
Processed food

Fresh Fruit (Company)

Fish

Fresh Fruit (cooperative)

Process flow map



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Best Practices

Food Safety Management Practices			
Farming	**Pre-Processing**	**Processing**	**Dispatch**
Supply of permitted - Seeds/Feed - Pesticides/Agro-chemicals Quality audit - Soil - Water Sample residue testing - Govt. certified labs - Customer(country) specific Early hour harvesting Awareness of GAP	Monitored grading based on - Size - Color - Acid (foreign matter) content Cleaning/Icing - Permitted chemicals in water - Temperature monitoring Packaging - Permitted packing materials	Product specific equipment - Regular & monitored maintenance Environment monitoring - Water - Temperature - Air Permitted use of - Chemicals to increase product shelf life - Containers for product stuffing Adherence to - Country specific labeling standards	Container sealing - Presence of excise officer - Presence of quality manager - Country specific sealing information Environment monitoring - Temperature - Air

Traceability/Transparency - Data to record		
Product Information	**Vendor/Customer Information**	**Process Information**
Product family/type Bills of material list Customer specific information - GMOs - Allergens - Weight/volume/dimensions - HALAL material Batch/Lot number product shelf life	Vendor name/address Vendor approval documents Vendor certifications - GMO declaration - HALAL certified Specific residue levels requested Export/Import certification	Process flow Processing technologies Location of plant Date of processing Batch/Lot number

Trust
- Longer term relationships with vendors - Regular internal external audits - Facilitating shared quality objectives

Training	
Farm Level	**Processing**
GAP awareness Effective chemical usage Global safety/quality certification	GMP awareness FSMS training Global safety/quality certification Shop floor employees - Product handling training - Hygeine training Skill based training

Time
- Lower transit times - Optimum network disruption reaction time - Lower time between problem identification and reporting

Testability
- Use of govt certified labs - Tolerance of critical residues (products) - Adoption of critical control point quality checks

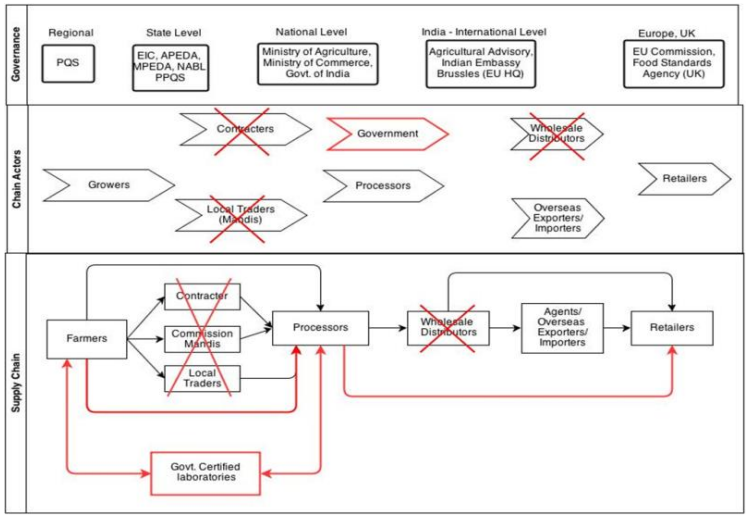
Key Vulnerabilities

		Vulnerabilities
Traceability	Network Level	• GrapeNet – database of regulatory compliance data rather than data to trace • Lack of testing of capture data - Missing network level attributes: Logistics Partners, Product Route(with-in country), Product Route(after port dispatch), Characteristics of origin, Testing certificates/types
	Process Level	Missing process level attributes: Manufacturing processes used, Detailed ingredients list(types/sources/testing)
Transparency	Network Level	- Visibility of transactions limited to : Exporter, Importer
	Process Level	• Information sharing system firm specific
Testability	Network Level	• Limited number of certified laboratories in the country (16-17) • Customer specific MRLs
	Process Level	Limited availability of • Permitted chemicals • Testing equipment
Training	Network Level	• Increasing pressure of certifications from retailers • Shortage of skilled labour
	Process Level	HACCP limited to few processing units
Time	Network Level	• Focus on transit time reduction only for perishable goods • Change of international regulations during transit of 1 month
	Process Level	
Trust	Network Level	Lack of direct consumer interaction
	Process Level	Burden of investments for customer specific trainings/certifications

Conclusion

- Network structure reconfiguration:
  - Limiting supply network actors (Nodes)
  - Shortening distance between nodes
  - Developing strategies for critical node (Lab)
  - Trusted actors for connecting nodes
- Process reconfiguration:
  - Auditing nodes (farms, logistics partners)
  - National and international certification
  - Internal and external training
  - Integrated information system
  - New technology integration
- Network Governance:
  - Contractual relationship to Collaboration
    - Certification
    - Training
    - Technology adaptation
    - Knowledge/Information sharing

India Export Supply Chain Structure



Vulnerabilities in current food safety practices

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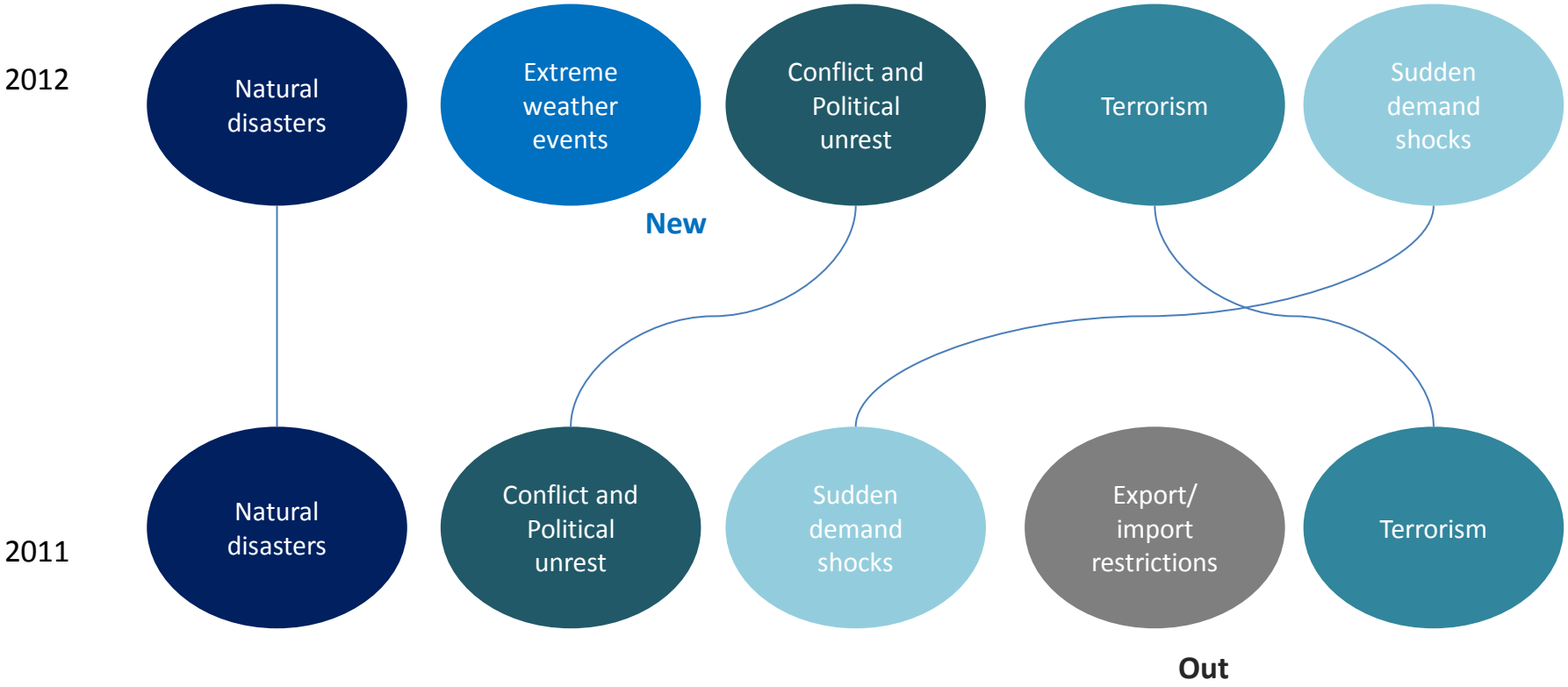
Implications of Climate Change on Global Supply Network: A study of Food Supply Chains

Context

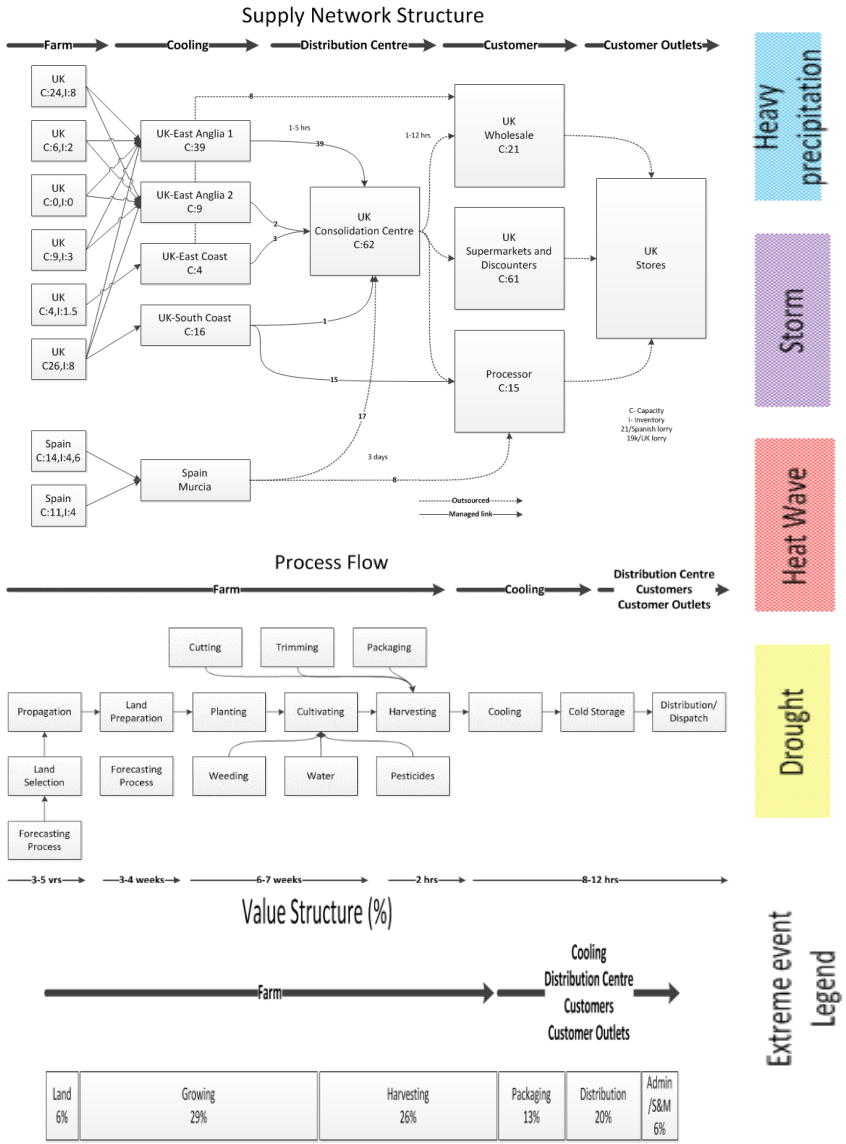
Top five supply chain disruption triggers 2011-2012



Source: Supply Chain Risk Radar Results, World Economic Forum 2012

Climate Change Risk Exposure

- Supply chain networks potentially face a variety of risks
- Severity of an extreme event will largely depend on supply chain exposure and vulnerability
- Impact of climate change will not evenly spread geographically and many organisations may revise their long term expansion plans with new climatic information
- Storage and inventory may be exposed to overheating or excess humidity
- Consider alternative supply chain configuration to seasonal precipitation events or make new investments in their vehicle fleet.



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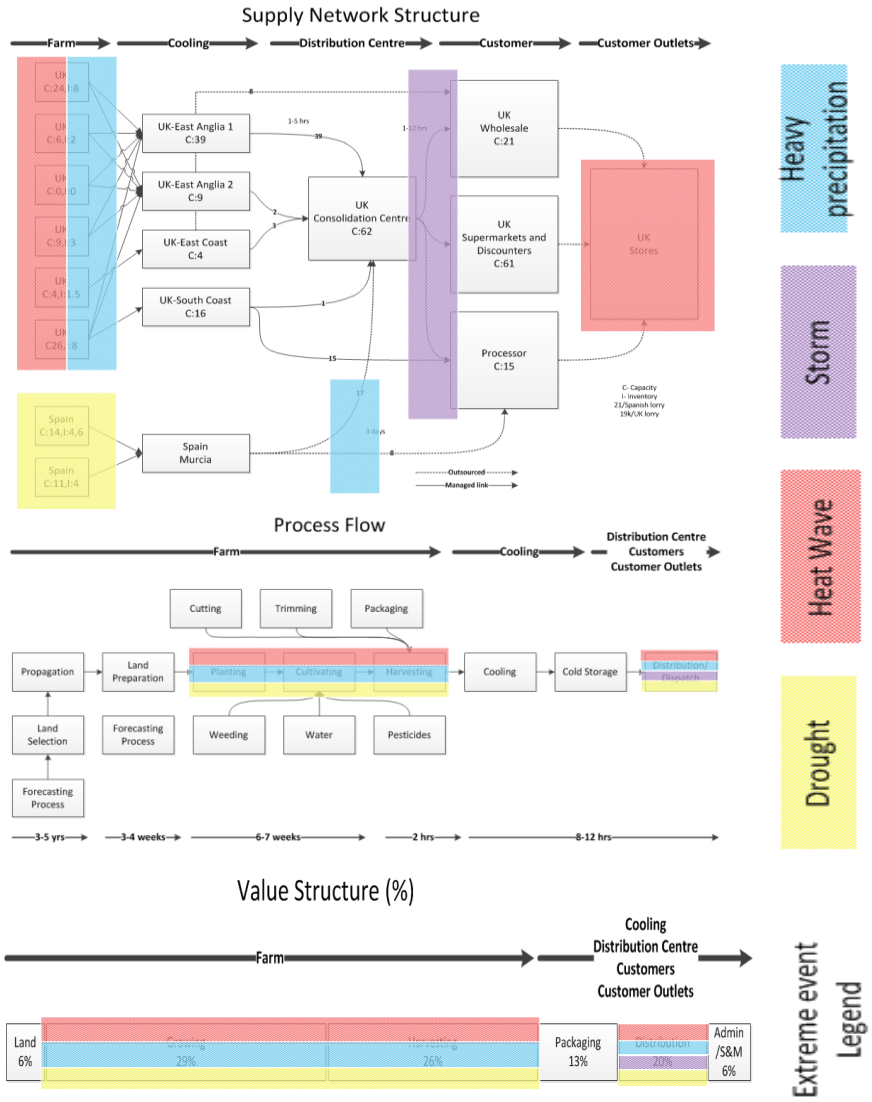
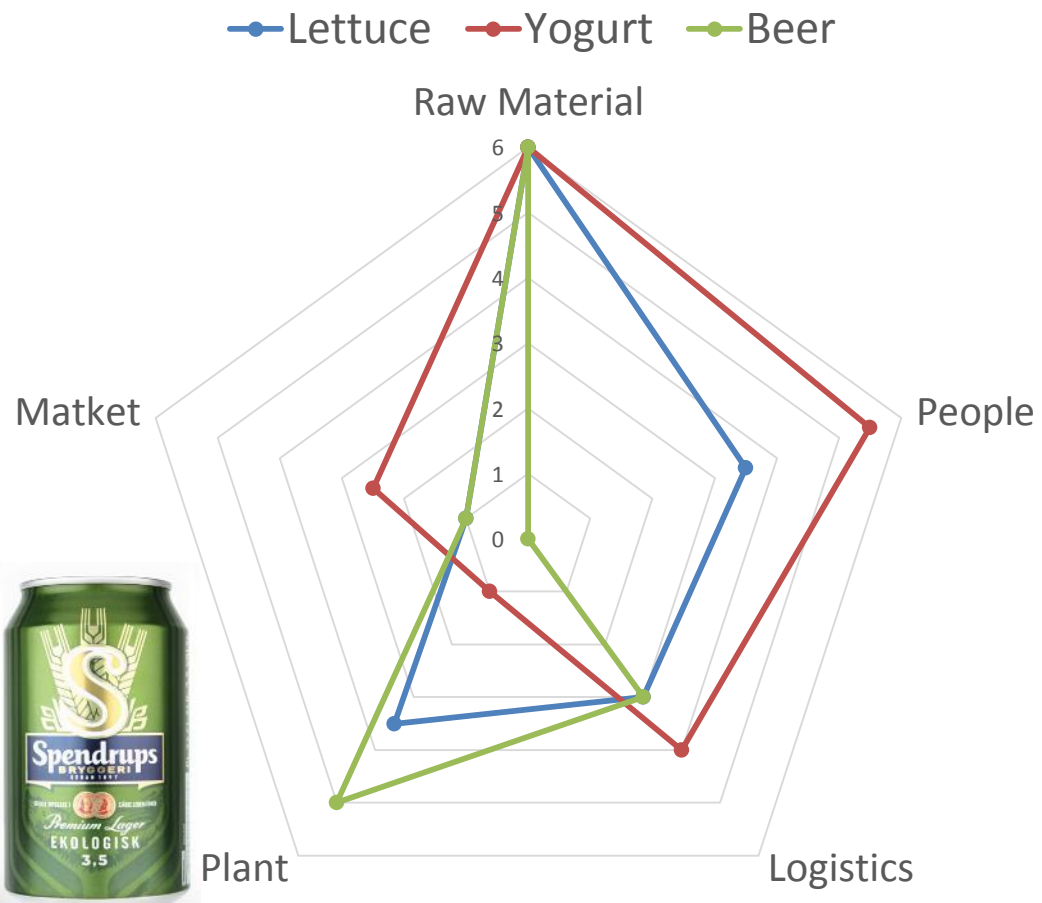


Impact Variation



Sustainable supply network design

EPSRC/DST India Workshop in Advanced Manufacturing Research Challenges Delhi and Mumbai, India – January 2012 highlights:

- UK/India complementarity in the supply chain (e.g. sustainable manufacturing and resource-efficient manufacturing in SMEs, small vs. large batch manufacturing).

Further our research shows that:

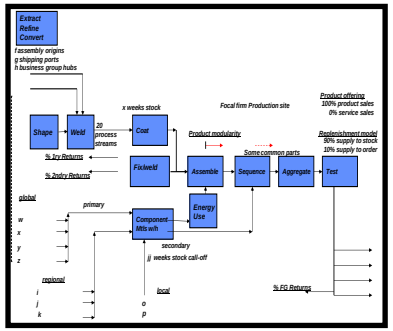
- The design of industrial systems has been traditionally driven by operational drivers of cost, quality, timeliness, and dependability of supply.
- Developing sustainable operating practices in industrial network design are now becoming increasingly critical for manufacturing industries.

This project seeks to integrate capabilities in design, simulation, manufacturing, and supply network optimization (IIT Ropar and IIM Lucknow) and industrial supply network mapping and capability assessment (Cambridge) towards the development of an **Engineering Driven Sustainable Network**.

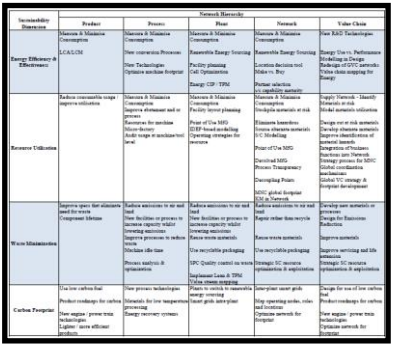
Importance of proposed research

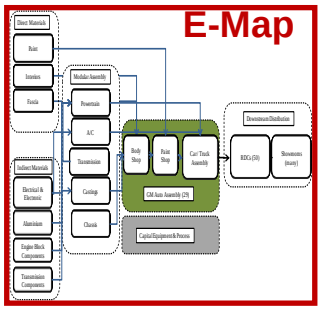
- Resource scarcity (energy, water, materials) , imperatives of reducing waste, stringent regulations are creating **significant challenges for manufacturing industries worldwide**
- Companies must be able to attain **superior performance in sustainability dimensions** while simultaneous **improvement in cost, quality and delivery responsiveness**
- Many organizations consider **apparent trade-offs between the above measures and may treat sustainability as an additional burden** and only as a reactive response to regulation
- There is a need to **demonstrate that optimal supply networks can be designed which can help meet cost, quality, responsiveness and sustainability dimensions simultaneously** and also for different types of industries (discrete/process, large lots/small lots etc)
- Have **large policy implications** for both India and UK

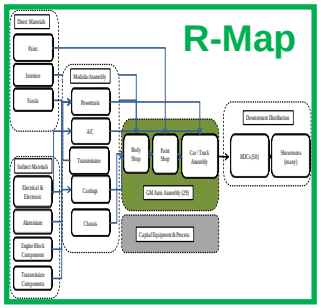
Network Configuration

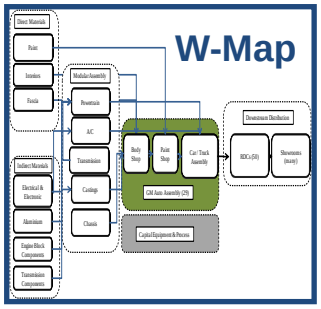


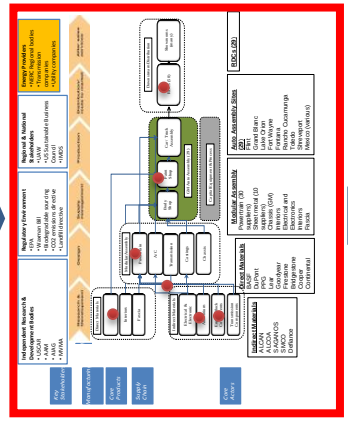
ERW-Network context

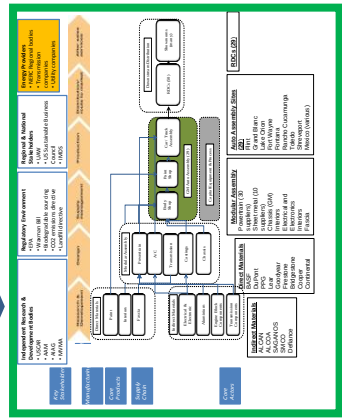


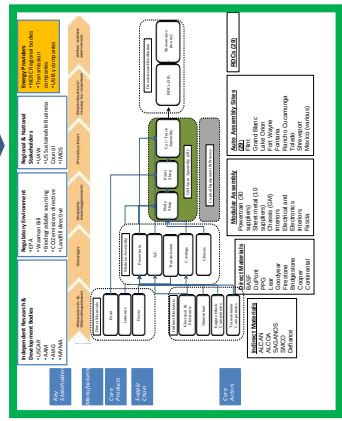












1 Established Methodologies

2 ERW Config Mapping

3 Hot Spot Analysis

4 Maturity Model Capability Assess

5 Reconfiguration Options

What next

- Linking our food supply chain research to existing research projects such as sustainable chemical feedstocks
- Water scarcity and food supply chains
- Extending our research to risk and resilience of global food supply chains
- Sustaining and developing academic and industrial research collaborations

Thank you