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# Unequal Resilience in UK- Connected Food Systems

Shock Propagation, Power, and the Politics of Adaptation

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Presenting Author: Dr. Umar Muhammad

Co-Author: Professor Louise Manning



Biotechnology and  
Biological Sciences  
Research Council



# Introduction & the Problem

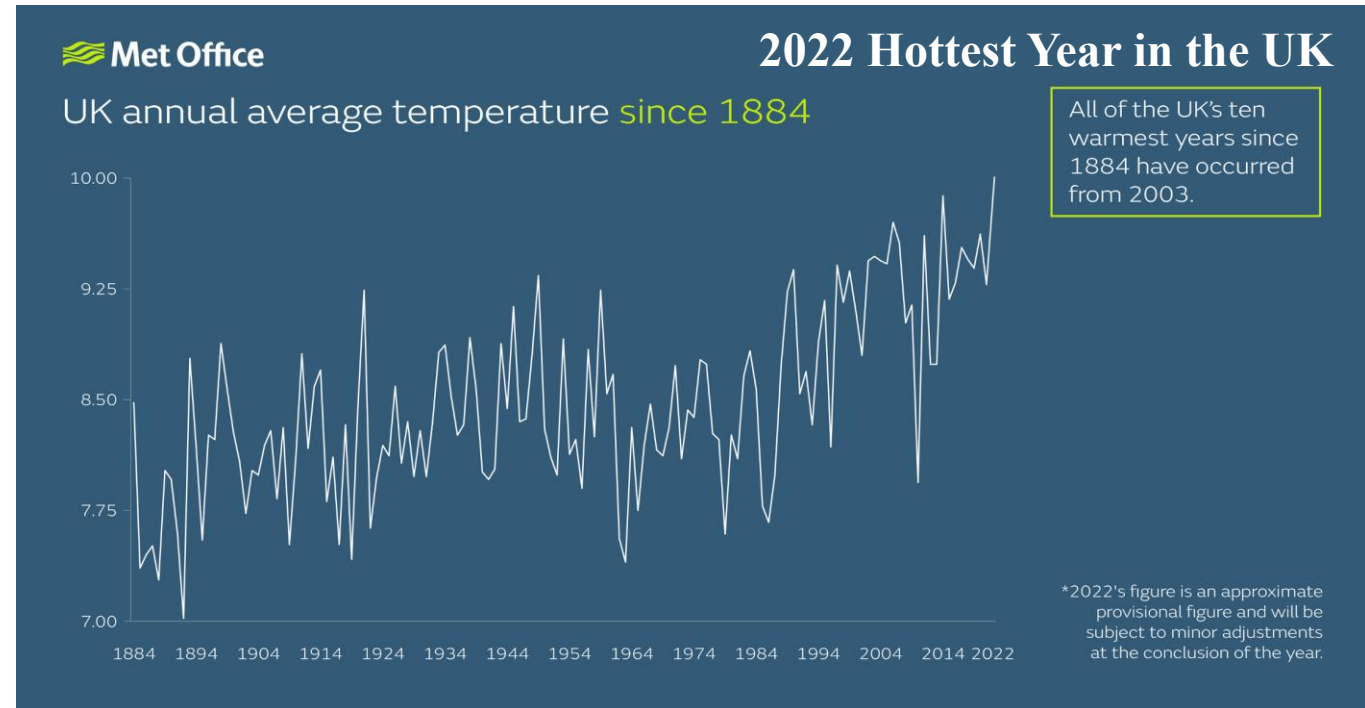
- The UK and global food systems are increasingly exposed to systemic disruptions

## Drivers include:

- Climate extremes and geopolitical conflicts
  - Energy and fertiliser price shocks
  - Import dependency (~50%)
- But these events are usually framed as **temporary disruptive shocks** (sudden disturbance with cascading system-wide impact) **requiring technical fixes**

## Example responses:

- Diversifying suppliers
  - Increasing efficiency
  - Substitution
- Yet these responses rarely ask: **Who bears the cost of resilience across agri-food value chains (AFVCs)?**



Source: Met Office (2023)

# The Problem: 2023 Tomato Shortage in the UK: Extreme Weather in Morocco and Spain



- Spain/Morocco Extreme Weather
- Tomato Virus Outbreak in Morocco (ToBRFV)
- Sanctions on Russia/Belarus
- Atlantic Bad Weather
- Brexit implications

Getty

UK tomato imports  
**400,000 tonnes**  
in 2022

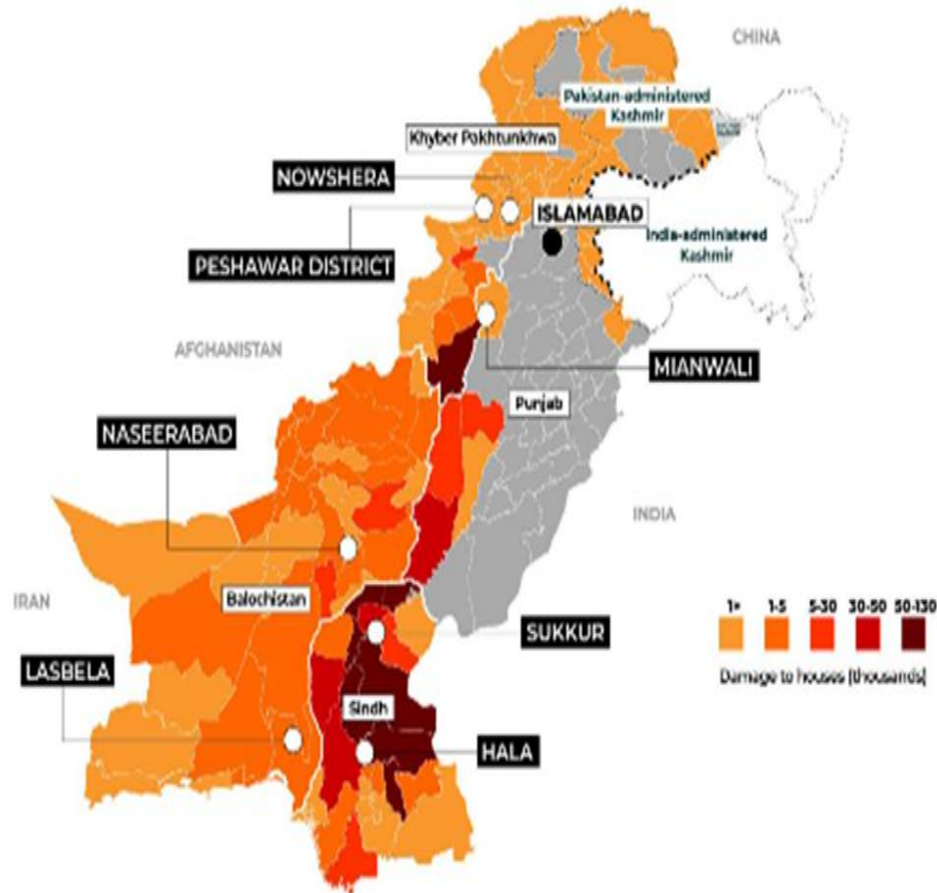
**35%** Morocco  
**34%** Netherlands  
**16%** Spain  
**15%** Other EU countries

Source: HMRC



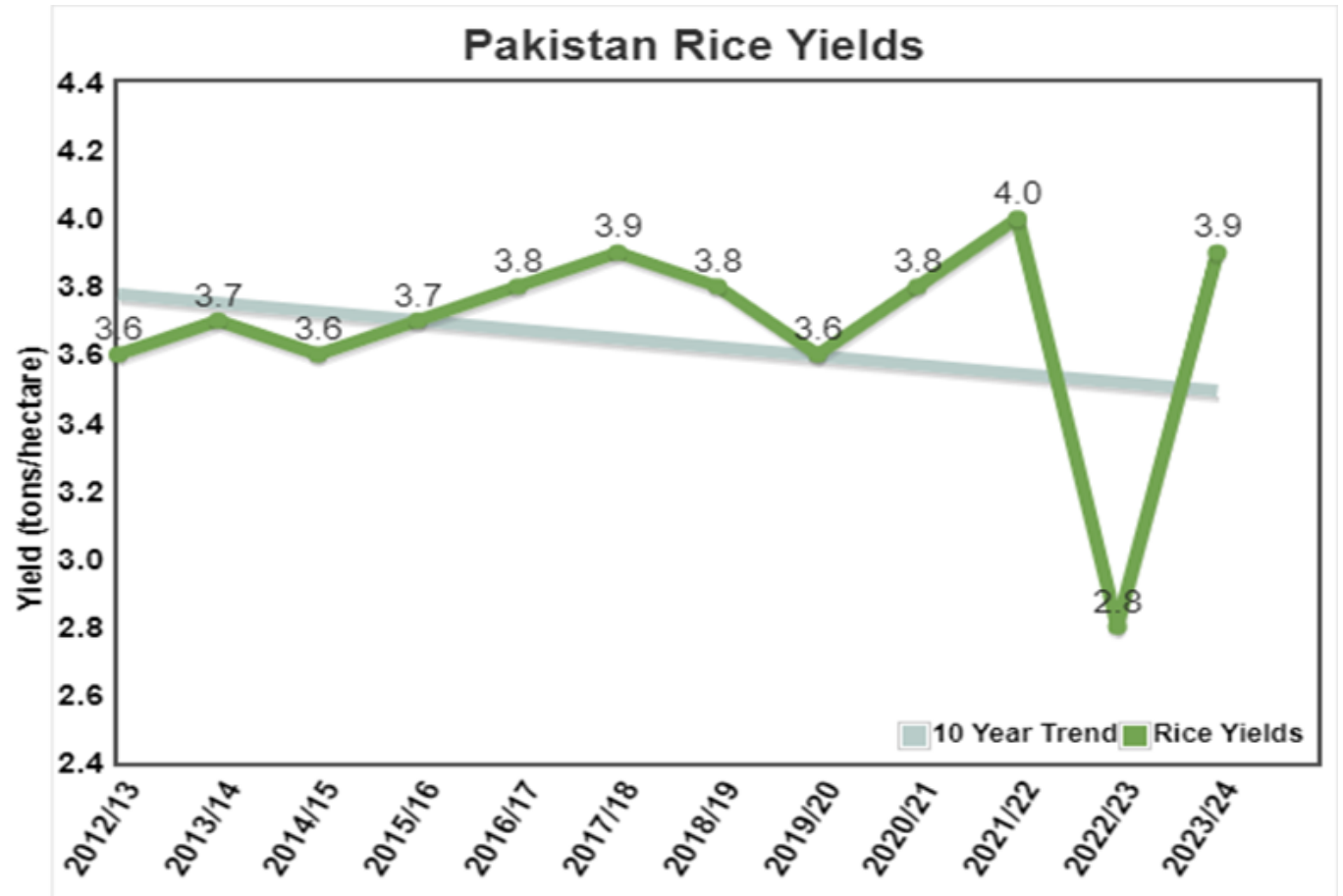
Empty Tomato shelves in ASDA in London in February 2023  
Source: BBC (2023)

# The Problem: 2022 Floods in Pakistan



The extent of the flood across the country

Source: Al Jazeera (2022)



Pakistan rice yield declined due to the floods in 2022-23

Source: USDA FAS (2025)

# Reframing the Question

- **Aim:** To examine **how shocks propagate** through food AFVC systems, **who absorbs** shock impacts, and what this reveals about **power and equitable transformation**.
- Instead of asking: “How can the food system absorb shocks?”

- ✓ How do disruptions **propagate through food system nodes**?
- ✓ **Who absorbs the impacts** when shocks occur?
- ✓ What does this mean for **equitable food system transformation**?

- Disruptive shocks reveal the **political economy of resilience**.



December 11, 2025

Source: Edge Hill University, 2025



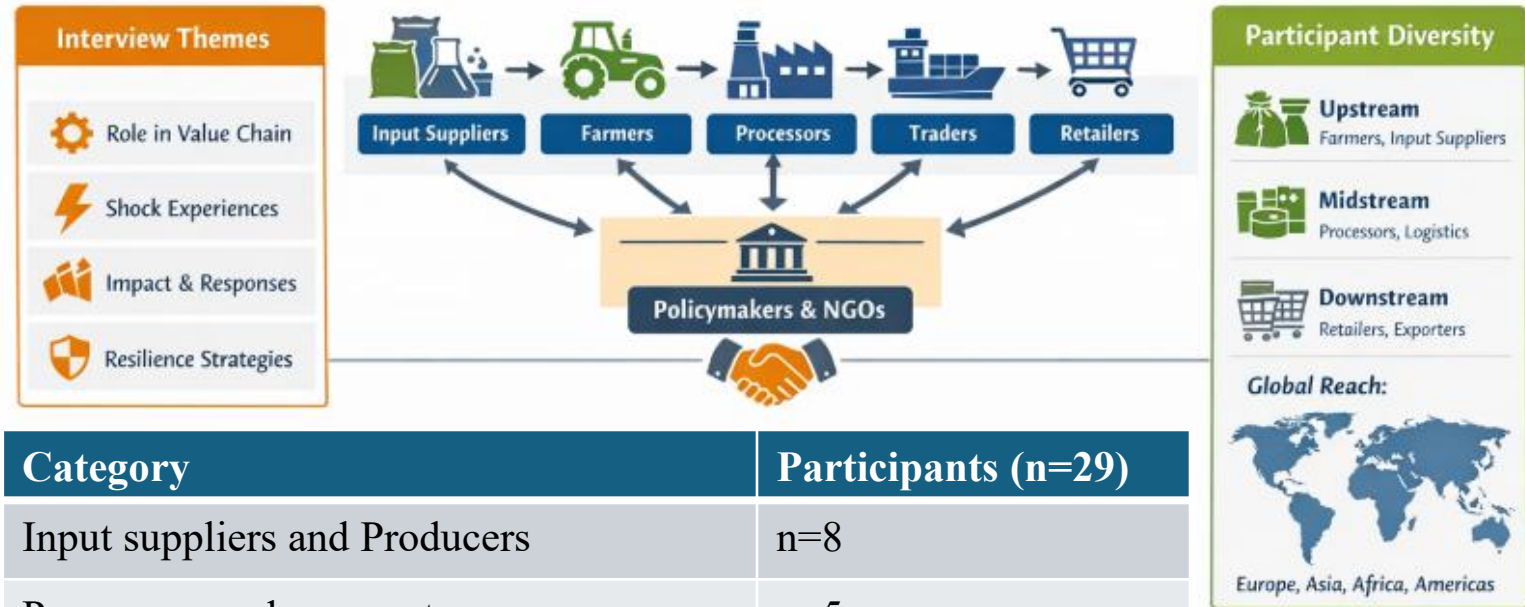
Source: Net Zero Group, 2026

# Methodology

- 29 semi-structured interviews with industry and policy stakeholders
- Focus: **how shocks propagate and how actors adapt**
- **Purposive sampling** to cover actors connected to the UK and global AFVCs
- Participants across **six global regions**, from Australia and Asia to the Americas
- Interviews conducted **March 2023 - July 2025**, 45-60 minutes via MS Teams
- Recorded, transcribed, coded (open & axial coding) in **NVivo**
- The analysis traced how actors **experienced and responded to disruption** across value chain nodes.
- How the shock impact propagated or moved across various nodes

## Research Design & Participants

29 Semi-Structured Interviews Across the Agri-Food Value Chain



| Category                      | Participants (n=29) |
|-------------------------------|---------------------|
| Input suppliers and Producers | n=8                 |
| Processors and aggregators    | n=5                 |
| Exporters and traders         | n=6                 |
| Logistics and shipping actors | n=4                 |
| Retailers                     | n=3                 |
| Policymakers and NGOs         | n=3                 |

Source: Authors

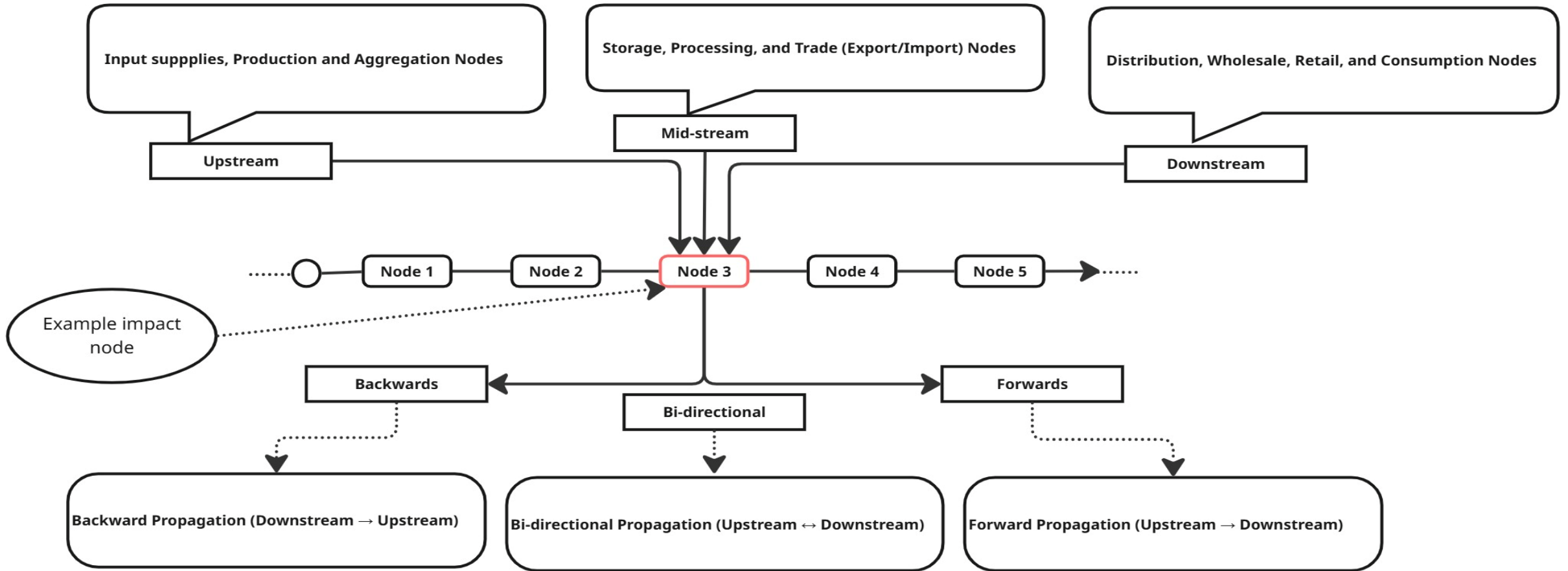
# Results: Shock Types and Frequency

- Six broader shock types were reported across 29 interviews
- Frequency of each shock type reported
- Examples include:
  - **Climate & environmental extremes** (production/yield shortfalls, etc.)
  - **Pandemics & public health crises** (processing & supply disruptions, supply renegotiations, cost rise, etc.)
  - **Input price volatility** (rising production costs, farm-level financial stress, etc.)
  - **Logistics and transport disruptions** (shipping delays, input shortages, commodity price spikes, etc.)
- Disruptive shocks therefore **reallocate costs across the system.**



Frequency of Major Disruptive Shock Types Reported Across the 29 Interviewed Agri-food Industry Stakeholders (Source: Authors)

# Results: Shock Propagation

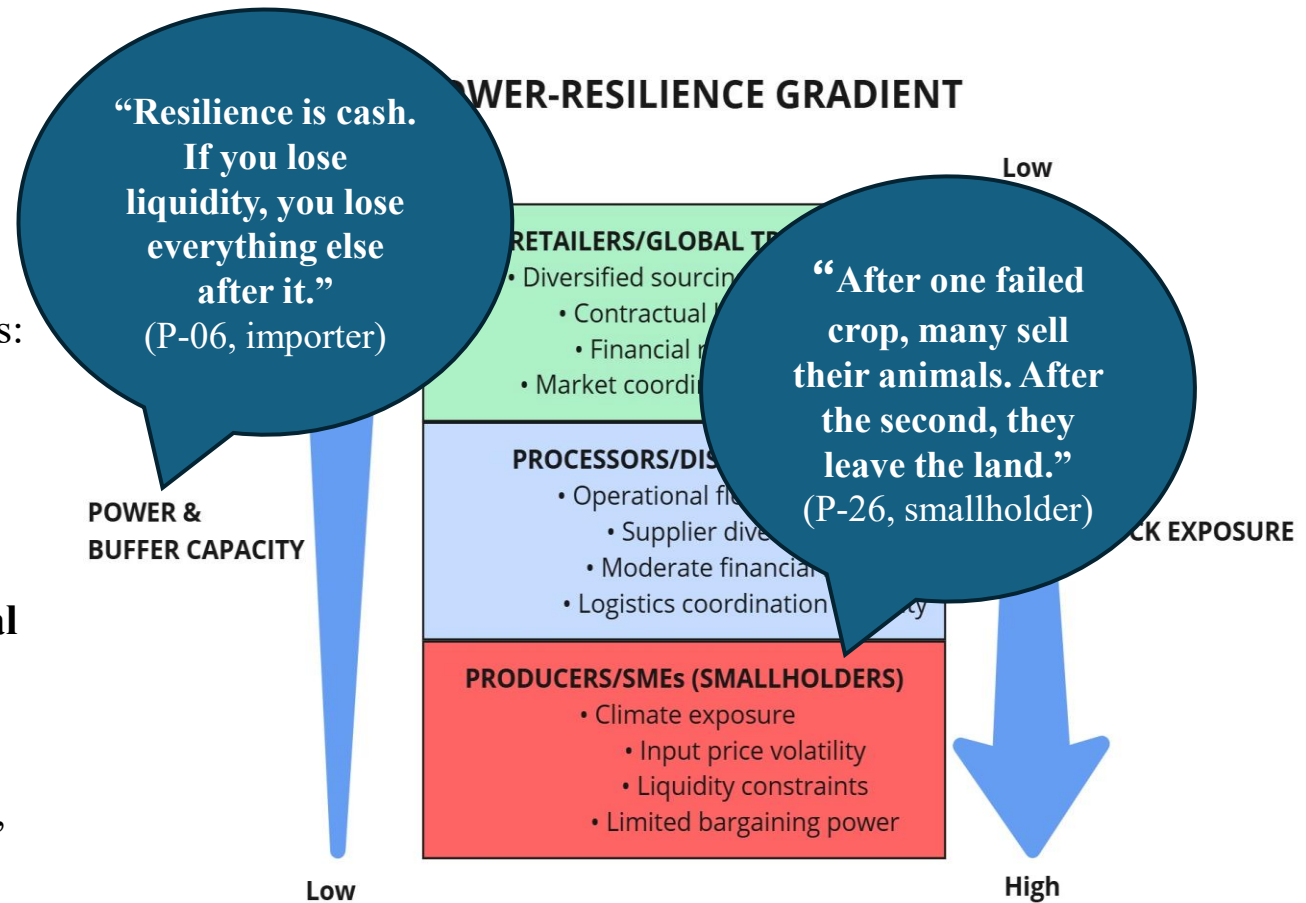


**Note:** In this figure, the value chain node or stage 3 is only shown as an illustrative example where disruptive shock(s) impacts are directed. However, in real-world scenarios, shock(s) can hit any of the one or more nodes across entire value chain under question.

Directionality and positional dynamics of shock propagation in agri-food value chains (Source: Authors)

# Results: Power Shapes Who Absorbs Shocks and Who Adapts

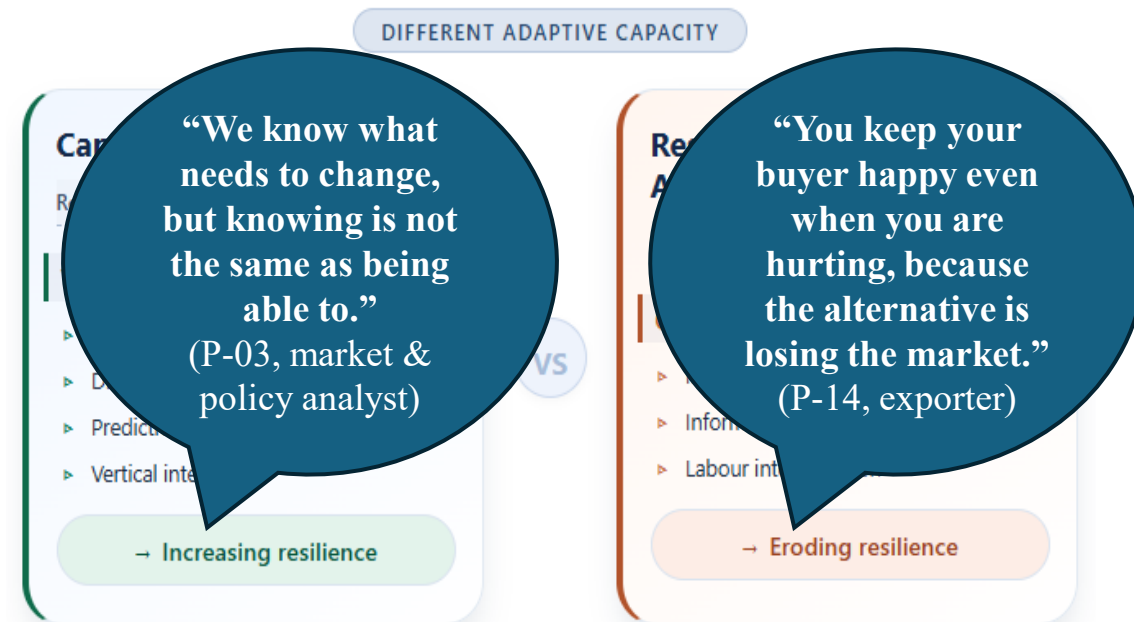
- Resilience capacity is **structurally uneven across the value chain**
- Although shocks affect the entire system, **the ability to absorb and adapt to disruption is highly unequal.**
- Empirical pattern emerging from interviews varied across:
  - **Downstream actors**
  - **Midstream actors**
  - **Upstream actors**
- Resilience capacity increases with **market power, capital buffers, and network centrality.**
- **Powerful actors can buffer shocks or redistribute risk, while weaker actors often absorb the costs.**
- Food system resilience is **not evenly distributed** — it reflects underlying power structures.



Source: Authors


# The Politics of Adaptation: Adaptation Strategies Can Reinforce Structural Inequalities

- Adaptive responses often **stabilise supply chains in the short term**, but they can simultaneously **shift risks onto more vulnerable actors**.
- Observed adaptation strategies included:
  - **Downstream actors:** supplier switching, cost pass-through, digital monitoring, contract renegotiation, and inventory buffers, etc.
  - **Upstream actors:** input reduction, debt accumulation, labour intensification, and crop switching, etc.
- Many adaptive responses function as **risk redistribution mechanisms** rather than systemic transformation.
- Resilience at one node can therefore **generate new vulnerabilities elsewhere in the system**. **What counts as successful adaptation?**
- Food system adaptation is inherently **political: it shapes who survives disruption and who bears the cost**.



Caption "Repeated shocks produce divergent adaptation pathways across the agri-food system."

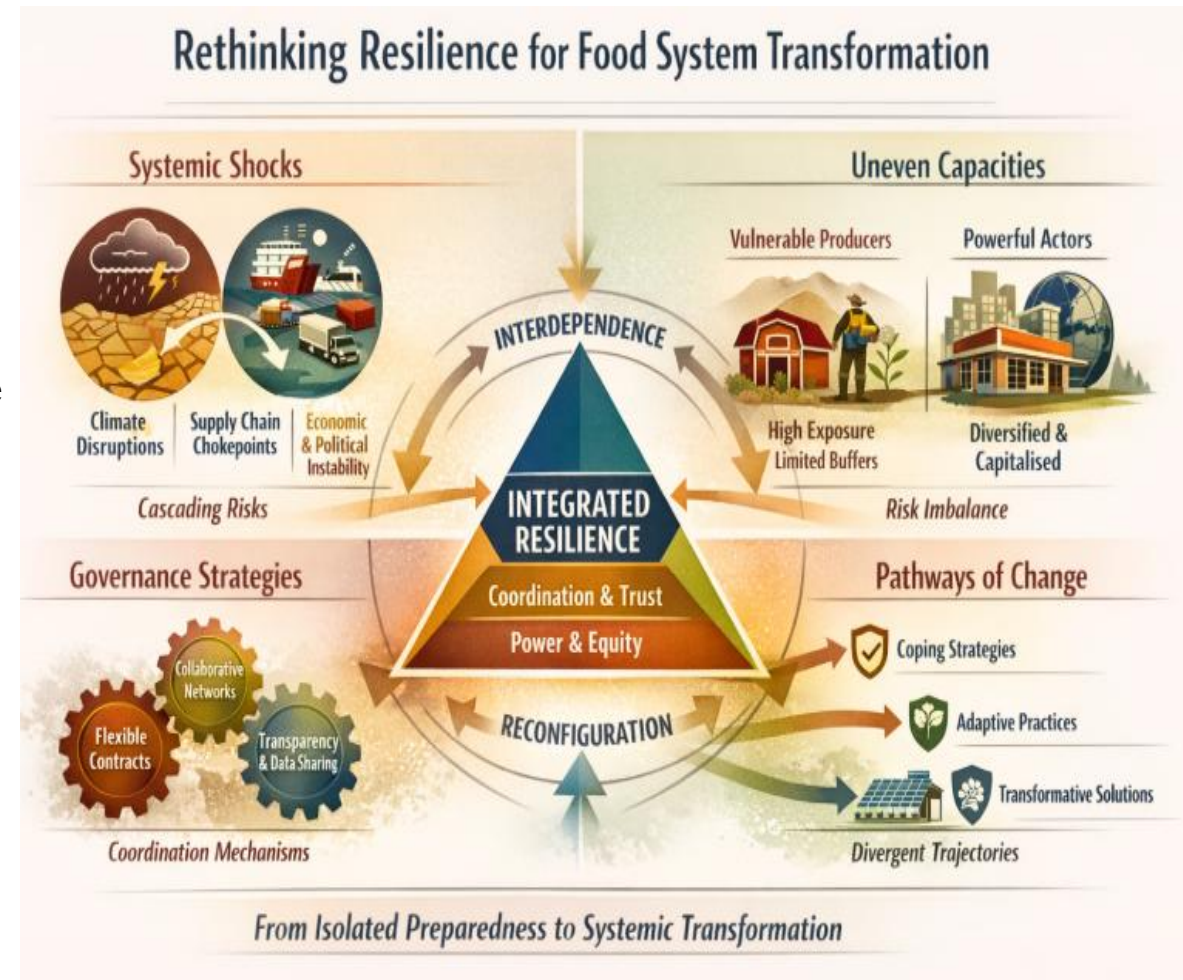
Source: Authors



**What does this mean for  
transforming the UK and global  
food systems?**

# Rethinking Resilience for Food System Transformation (FST)

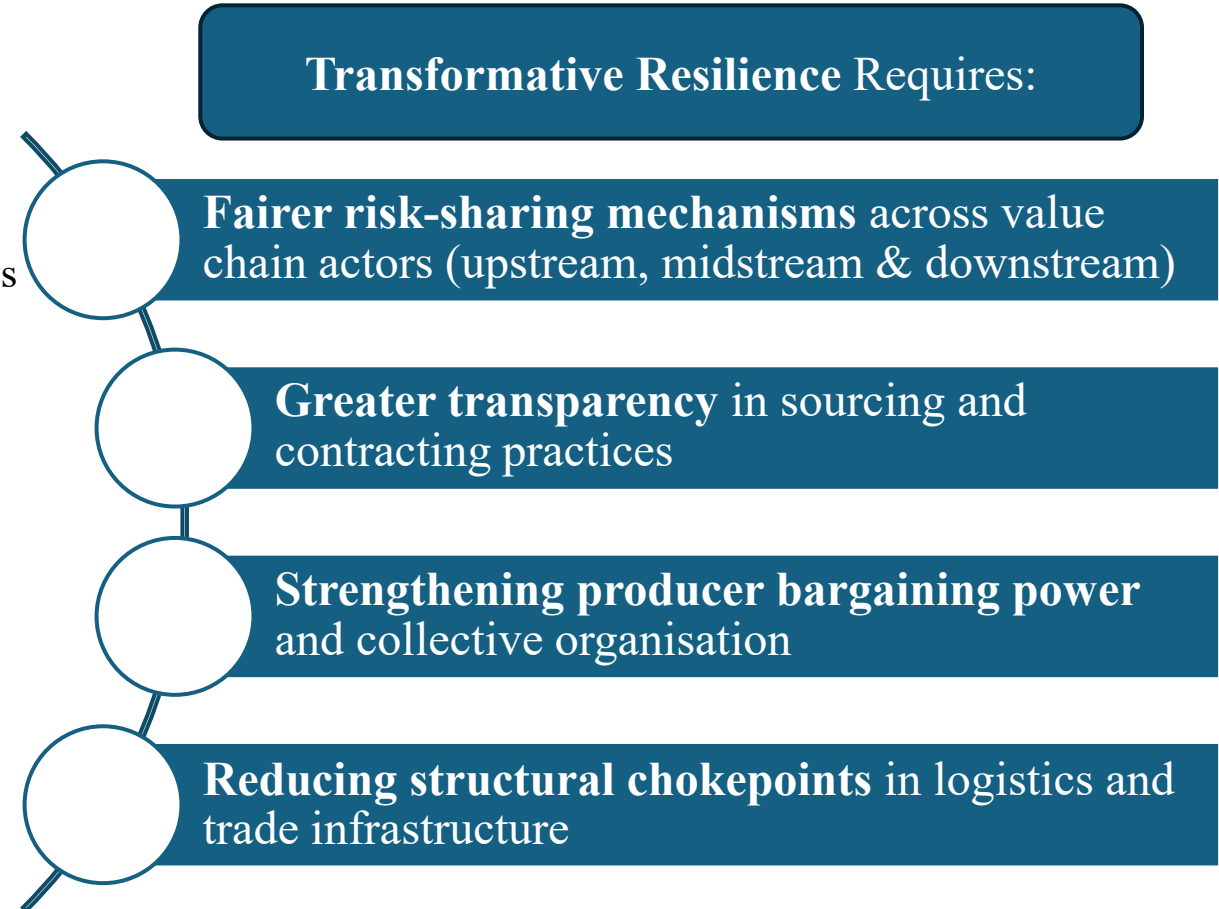
- From **firm-level resilience** to **systemic food system governance**
- Interviews showed resilience does **not reside within individual actors**, but emerges through **interdependent networks**
- Evidence showed **actors cannot secure resilience independently** (inter-dependent) — **a systemic property of the network.**
- **Policy and industry strategies** often **focus on firm-level resilience tools** (e.g., risk insurance, diversification, or inventory buffers)
- However, the findings suggest that **system-level coordination matters more than isolated capacity.**
- **FST, therefore, requires:**
  - **Stronger coordination and shared risk governance**
  - **Transparent data and early-warning systems**
  - **Institutional platforms** for cross-actor **collaboration**
- Food system resilience must shift from **individual preparedness** to **system-wide coordination and governance.**



Source: Authors

# FST: Addressing Power and Risk Distribution

- **Resilience is a political question: who absorbs the disruptive shock?**
- The findings show that resilience is **structurally uneven** across AFVCs.
- Without addressing **power asymmetries**, resilience strategies risk:
  - stabilising supply chains **while deepening upstream vulnerability**
  - transferring climate and market risks **onto producers and workers**
  - **reinforcing inequalities** across global supply networks
- **FST requires redistributing resilience capacity — not just improving efficiency.**
- **And moving beyond crisis management toward equity-oriented resilience.**



Source: Authors

# Three Takeaways/Lessons for Transforming UK-Connected Food Systems

## 1. Food system disruptive shocks behave as network cascades

- Disruptive shocks **do not remain localised**. Instead, they **propagate and become systemic crises**.
- **Implication:** Resilience strategies must move beyond **node-level fixes** toward **system-wide risk governance and coordination**.

## 2. Resilience is structurally uneven

- Downstream actors can buffer shocks, while upstream actors often **absorb the greatest exposure to climate and market volatility**.
- **Implication:** FST requires addressing **power asymmetries and risk distribution across the chain**.

## 3. Transformation requires governance (equity-oriented resilience), not just technology

- **Technical solutions** — digital logistics, controlled-environment production, traceability systems — **alone cannot resolve systemic vulnerability**.
- Resilience depends on **coordination, trust, flexible contracting, and shared risk management** across actors.
- **Implication:** FST must prioritise **institutional innovation, equity, and collective governance**.

# References

- **Al Jazeera** (2022). *Mapping the scale of destruction of the Pakistan floods*. Available at: <https://www.aljazeera.com/news/longform/2022/9/16/mapping-the-scale-of-destruction-of-the-pakistan-floods>
- **BBC News** (2023). *Food supply and price pressures in the UK*. Available at: <https://www.bbc.co.uk/news/business-64718826>
- **Edge Hill University** (2025). *The UK's food supply is more fragile than you might think: Here's why it should be a national priority*. Available at: <https://www.edgehill.ac.uk/news/2025/12/the-uks-food-supply-is-more-fragile-than-you-might-think-heres-why-it-should-be-a-national-priority/>
- **Met Office** (2023). *2022 provisionally warmest year on record for the UK*. Available at: <https://www.metoffice.gov.uk/about-us/news-and-media/media-centre/weather-and-climate-news/2022/2022-provisionally-warmest-year-on-record-for-uk>
- **Net Zero Group** (2026). *Researchers call for urgent action to prevent UK food system collapse*. Available at: <https://netzero.co.uk/news/researchers-call-for-urgent-action-to-prevent-uk-food-system-collapse>
- **USDA Foreign Agricultural Service** (2025). *Pakistan: Grain and Feed Update*. Available at: <https://www.fas.usda.gov/data/pakistan-grain-and-feed-update-30>

# Results: Shock Propagation

