



Evaluating Emerging Food Supply Chains from a Resilience and Cost Perspective: A Study on the Alternative Protein Industry

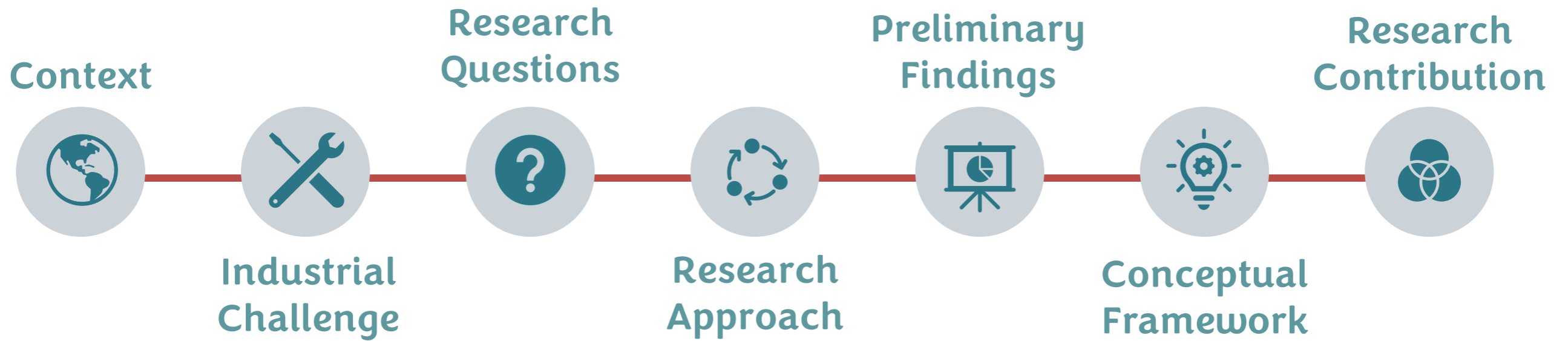
Presentation for 2023 IfM First Year PhD Conference

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Supervisor: Dr Mukesh Kumar

Advisor: Dr David Morgan

Agenda





Context

Our Global Food System

nature

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COMMENT | 08 May 2019

Fix the broken food system in three steps

Build a global network for mapping, modelling and managing agriculture, biodiversity, trade and nutrition, argue Guido Schmidt-Traub, Michael Obersteiner and Aline Mosnier.

[Guido Schmidt-Traub](#) [Michael Obersteiner & Aline Mosnier](#)



(Schmidt-Traub et al., 2019)

The Guardian
News website of the year

Food price rises around the world are result of 'broken' system, say experts

Surge of about 20% this year due to system that concentrates power and profits in hands of few companies



 Strawberry pickers inside a polytunnel. Photograph: Andrew Fox/Alamy

Food price rises around the world are the result of a "broken" food system that is failing the poor and concentrating power and profits in the hands of a few, food experts have said.

(Harvey, 2022)

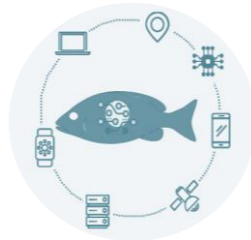


Context Opportunities



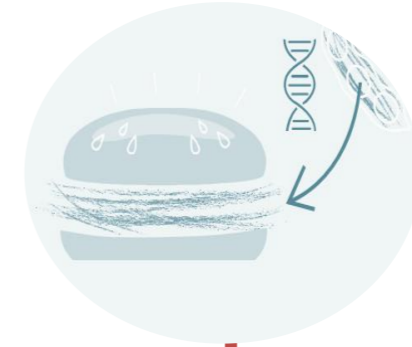
Nutrigenetics for personalized nutrition

(World Economic Forum, 2018)



IoT for real-time supply chain traceability

Alternative proteins



Offer a sustainable solution to bridge the supply-demand protein gap, as the global demand for meat rises.

Food sensing technologies



Precision agriculture for water use optimization



Plant-based protein



Mobile service delivery



Microorganism-based protein



Off-grid renewable energy generation and storage



Cell-based protein

(Good Food Institute, 2023)



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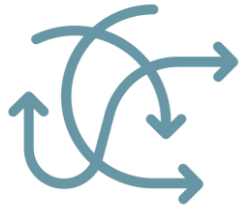


Industrial Resilience
Research Group



Industrial Challenge

Complex



Inefficient



Supply Chains?

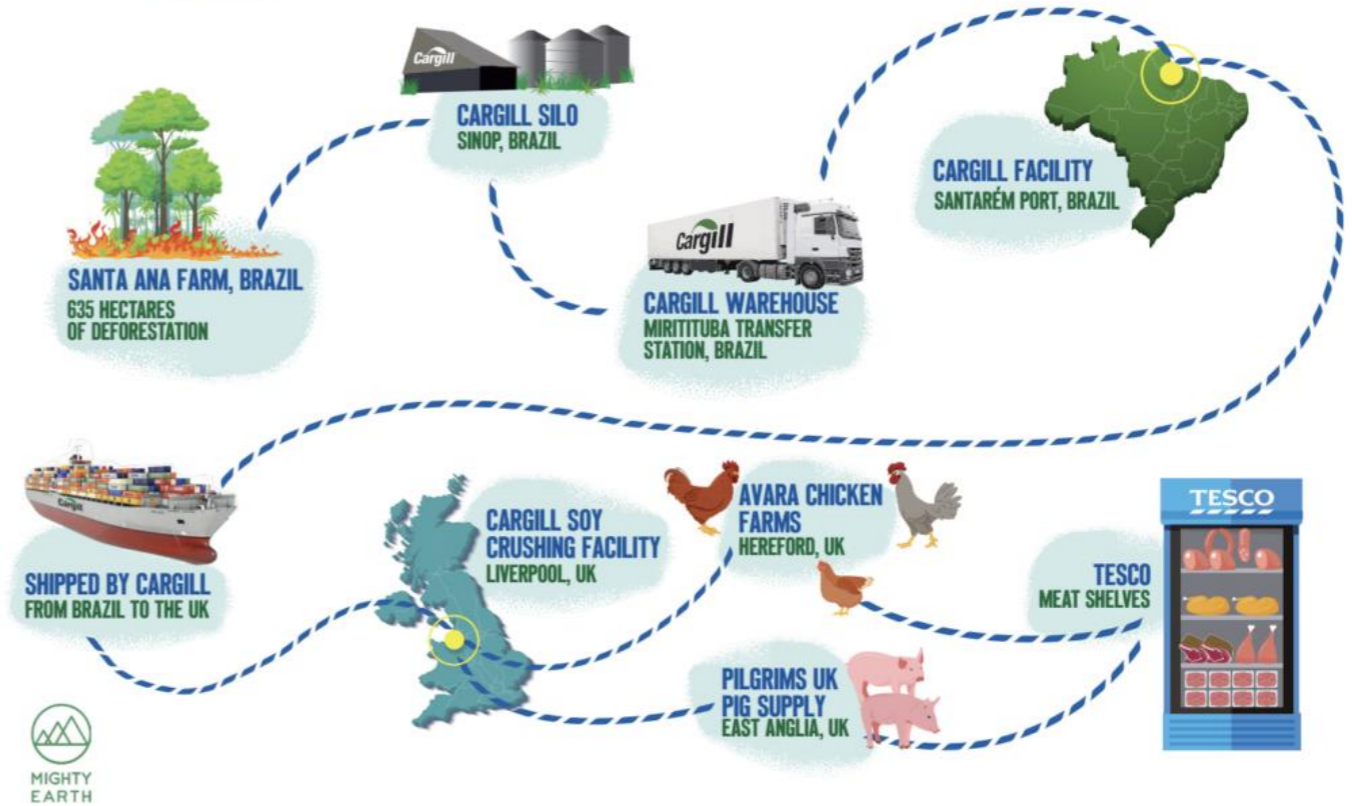
Vulnerable



Lack traceability



HOW TESCO'S SUPPLY CHAIN FUELS DEFORESTATION



The mapped journey of Tesco's soy supply risk of deforestation contamination, from the Amazon to Tesco in the UK.

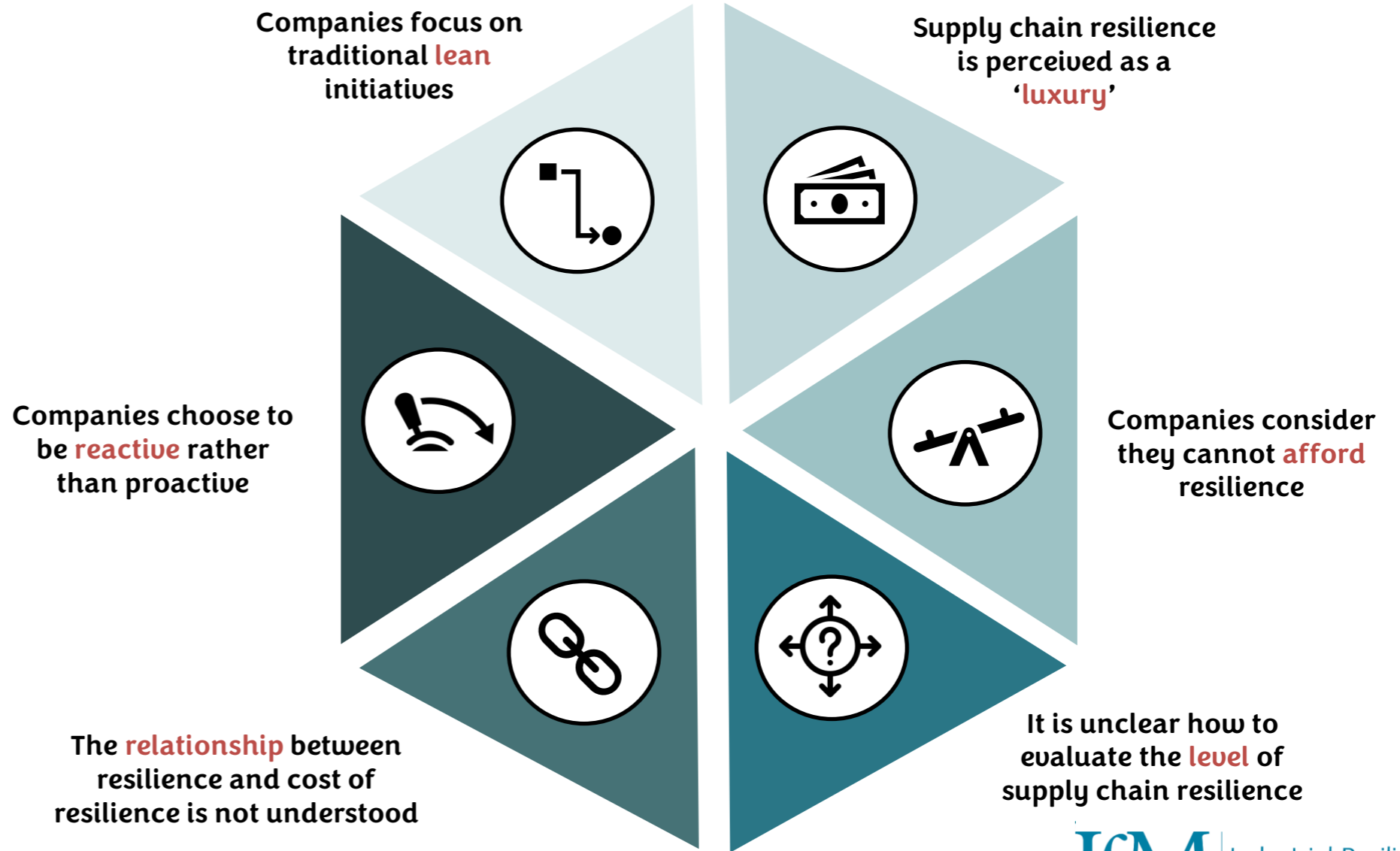


Industrial Challenge



Resilience?

Developing resilience in food supply chains is not only an operational requirement but also a social responsibility.



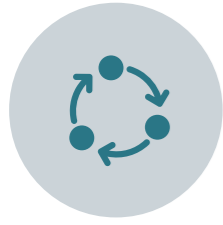
(Maslarić et al., 2013)



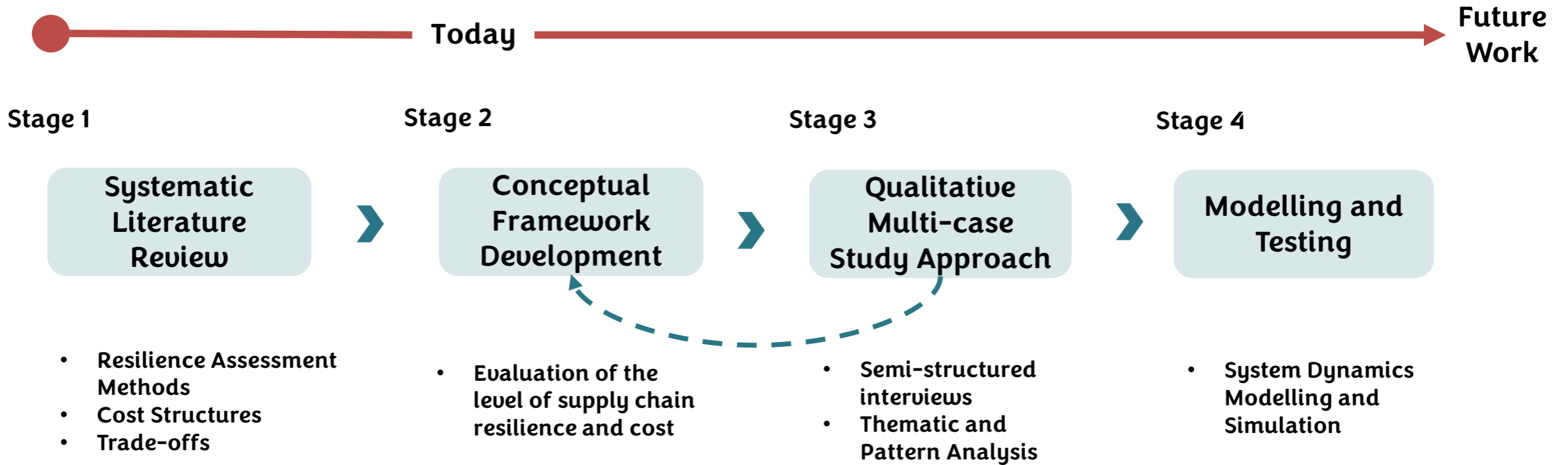
Research Questions

How do companies manage the trade-offs between resilience and cost in the context of emerging food supply chains?

- A** How do companies assess their level of supply chain resilience?
- B** What cost structures are associated with developing resilience?
- C** How do companies balance supply chain resilience and cost?



Research Approach

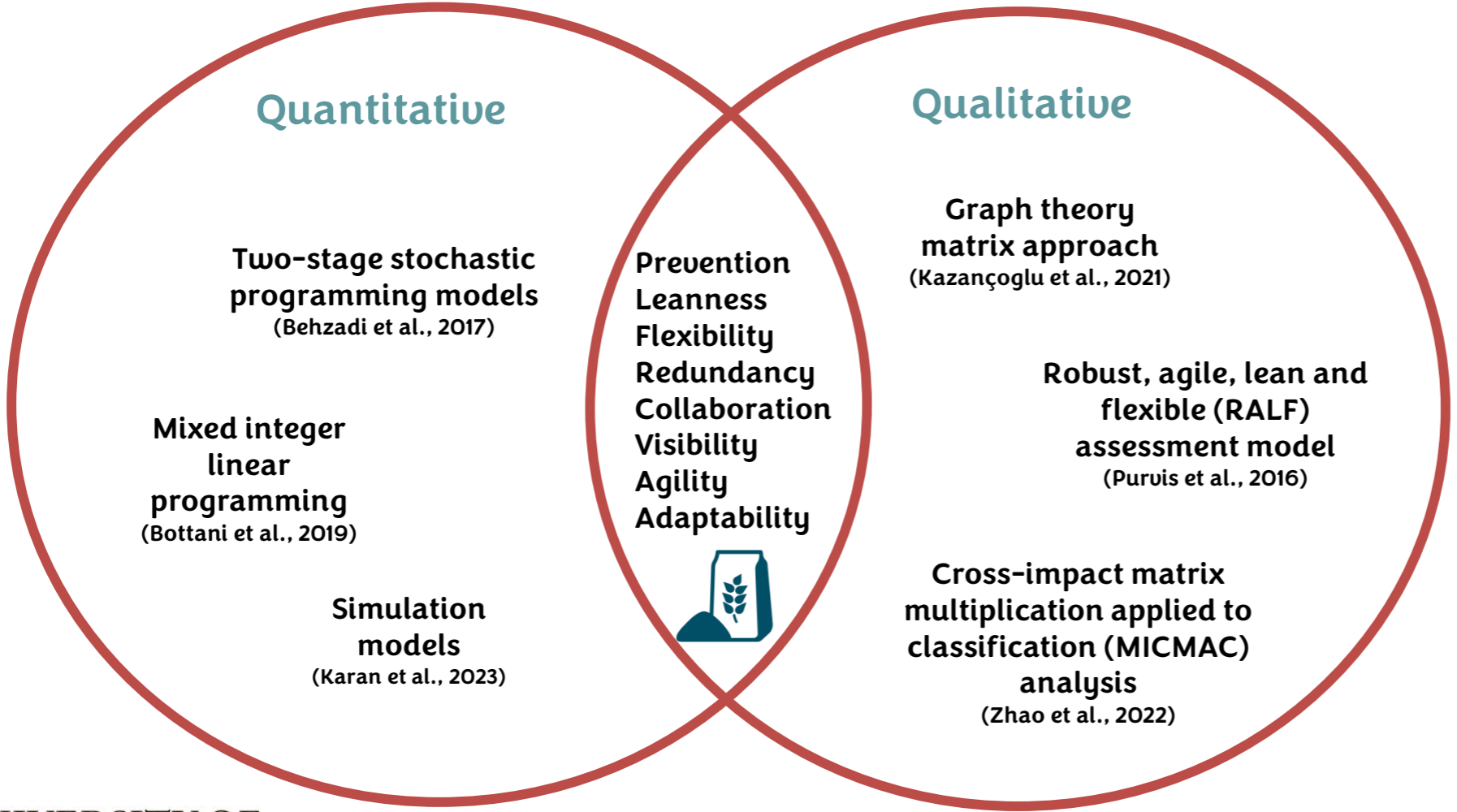




Preliminary Findings

Resilience Assessment Methods

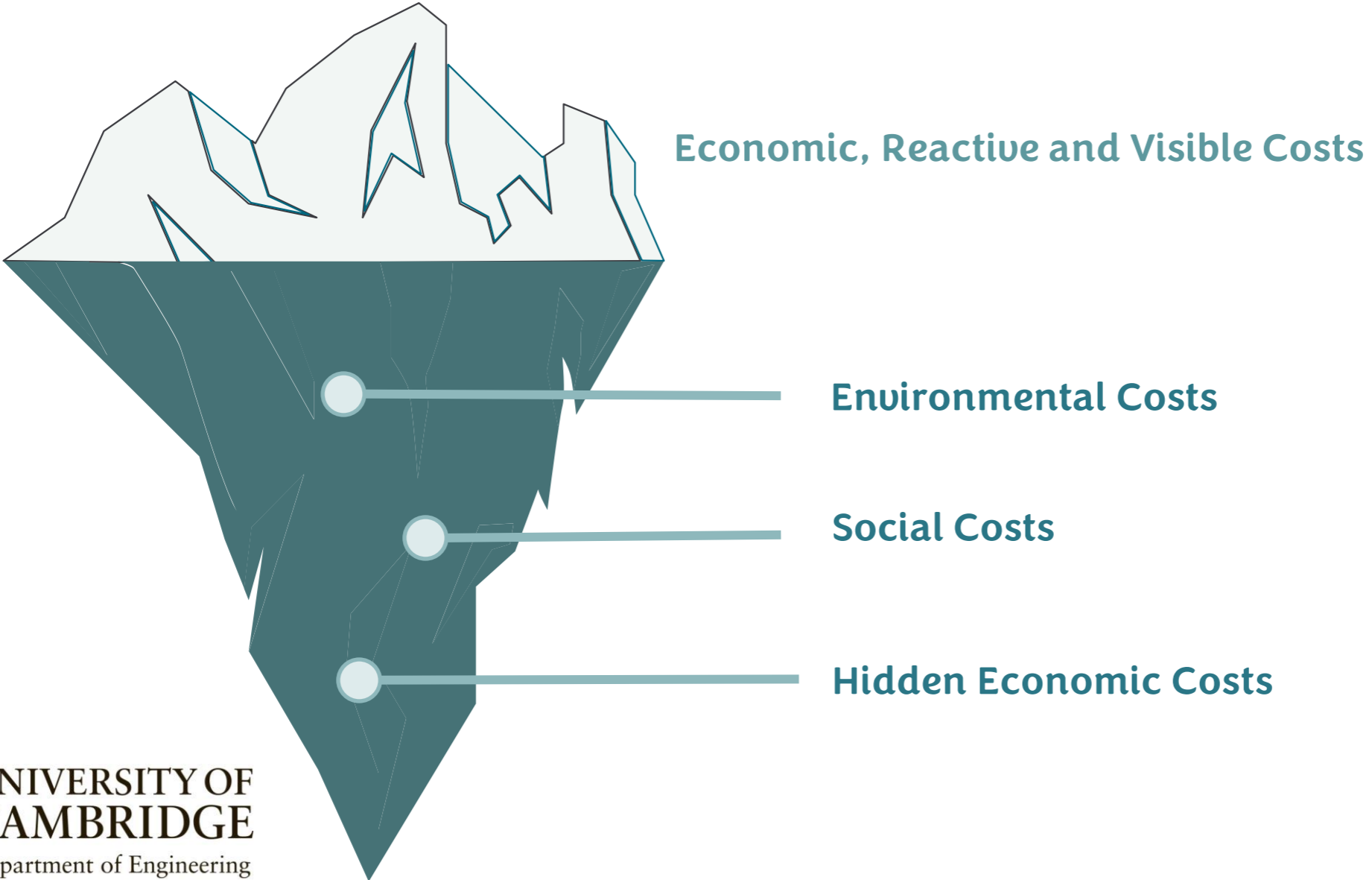
A





Preliminary Findings

Resilience Cost Structures **B**



↑ **Redundancy**
(Behzadi et al., 2017)

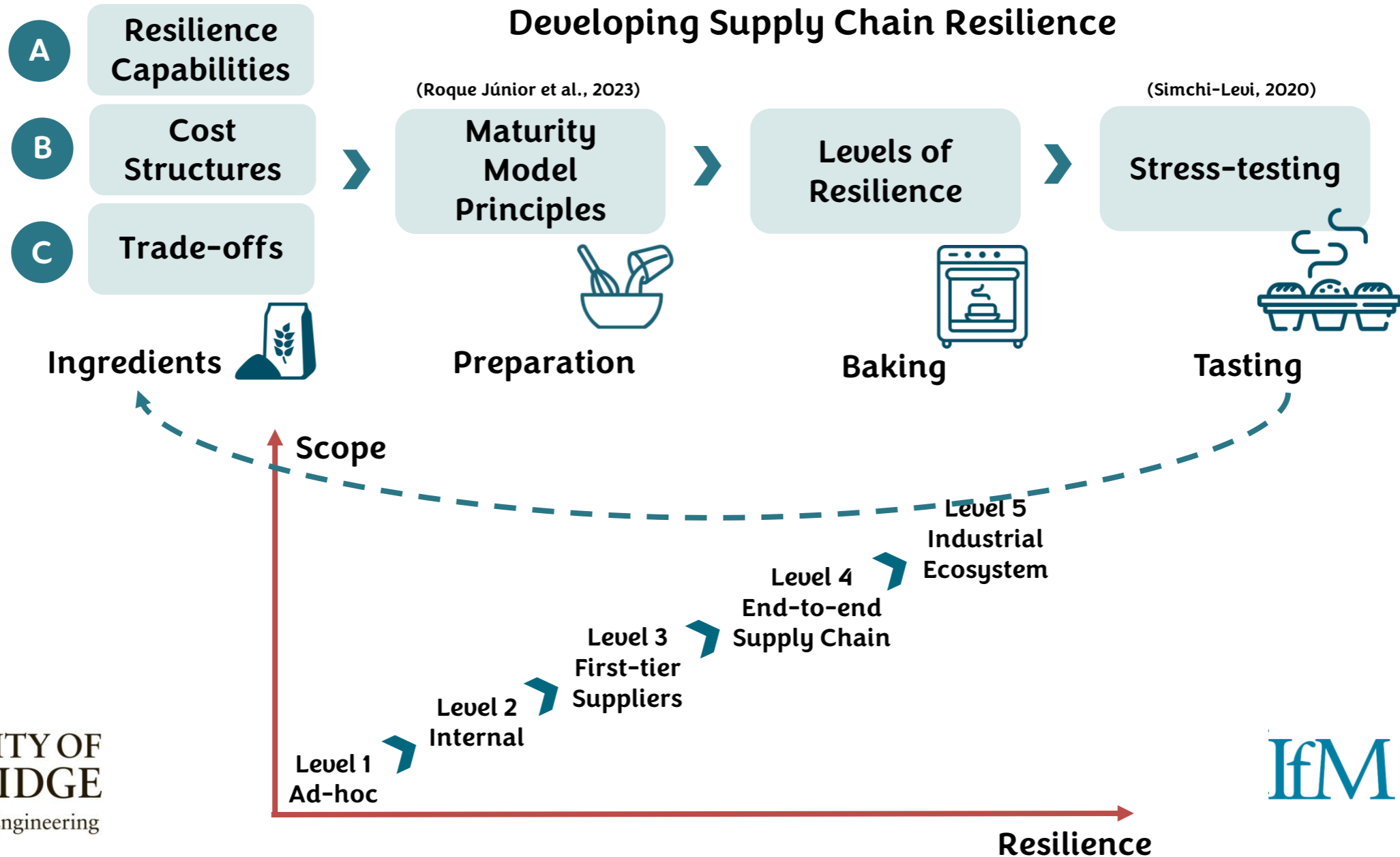
↓ **Leanness** ↑
(Karan et al., 2023)

C **Trade-offs**

↓ **Collaboration**
(Purvis et al., 2016)



Conceptual Framework





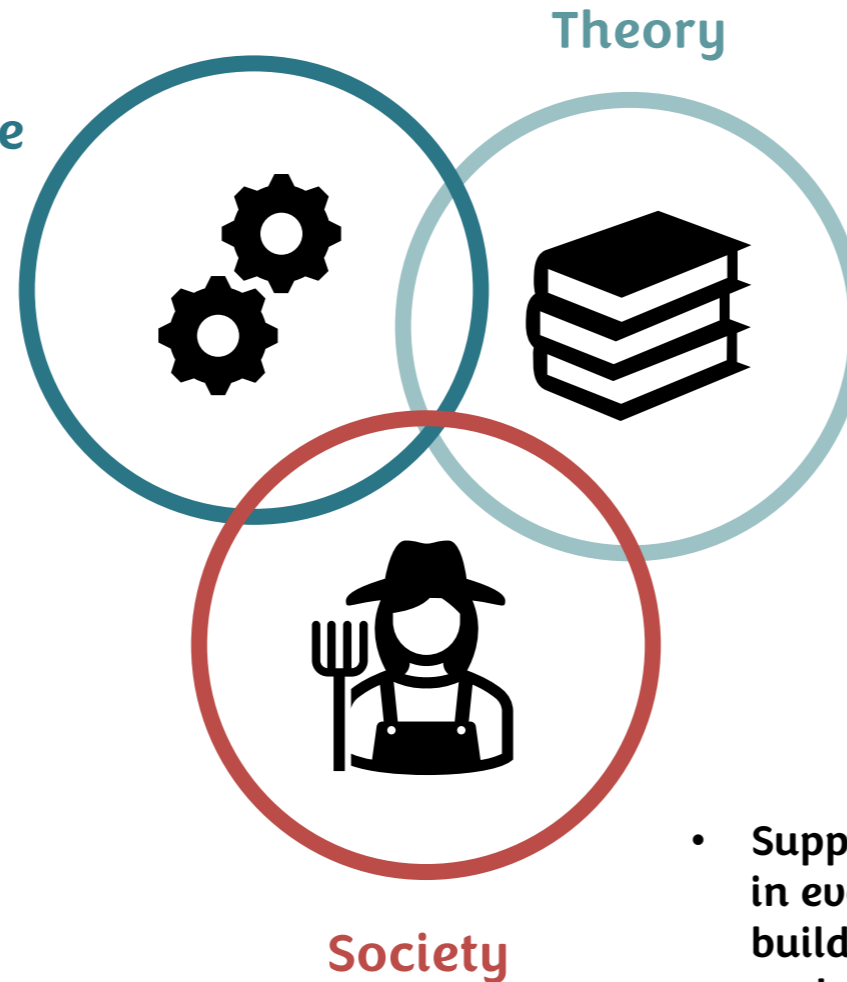
Research Contribution

- Provide a robust decision-making approach to assess the level of supply chain resilience.

Practice

- Provide clarity on how to estimate the costs of resilience.

- Provide a systematic approach to stress-testing supply chain resilience performance.



- Expand supply chain resilience theory by providing empirical evidence on the relationship between supply chain resilience and cost.

- Provide a theoretical lens on how to assess the level of supply chain resilience.

- Support the development of resilience in evolving food supply chains, to help build a more sustainable, affordable, and secure food system.

Thank you.

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