

Designing Food Supply Chain for Nutrient Delivery and Traceability

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Background

Over **3 billion** people cannot afford a healthy diet.^[1] Obesity has **tripled** since 1975 to over 2.6 billion people.^[2] Over **30%** of the world's population are anemic.^[3] Current per person food production exceeds **2750** kilocalories per day while the per person requirement is **2200** kilocalories.^[4] We successfully trace the volume not functionality. There is a global paradox of **undernourishment** and **overproduction**.

Deaths from nutritional deficiencies per million person. Red: 366-1207, Yellow: 0-4.

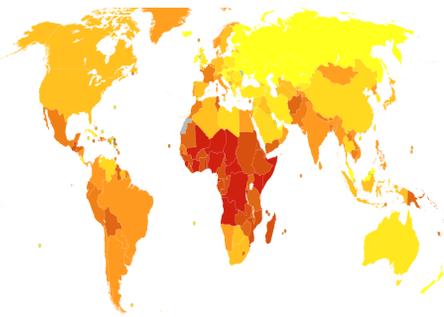


Image source: https://commons.wikimedia.org/wiki/File:Nutritional_deficiencies_world_map_Deaths_per_million_persons-WHO2012.svg

Volume index of production, food and beverages manufacturing, EU-27

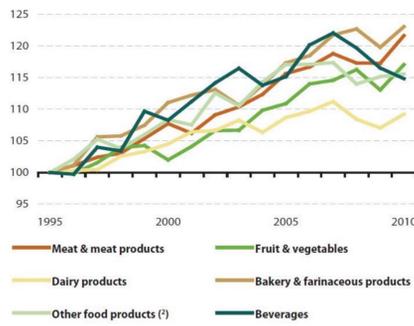


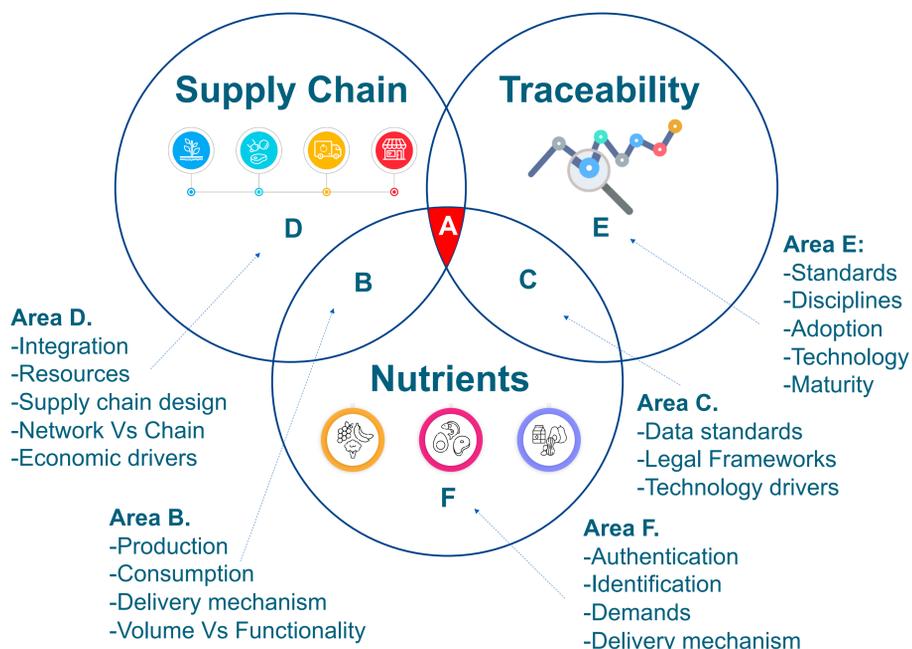
Image source: Consult, I. D. E. A., Econometrics, C., & Netherlands, E. (2015). Analysis of certain waste streams and the potential of Industrial Symbiosis to promote waste as a resource for EU Industry. Final Report, Brussels.

Challenge

- **Global challenge:** From mid 20th Century, **food supply chain** designed for **volume delivery** targeting **famine**, not **nutrient delivery**, targeting **health**
- **Traceability** models^[6] led by technological, societal, legal paradigms^[7] are **sparse, unspecific, reactive**. They are not adequate within **digital** supply chain lens
- **Academic challenge:** Food supply chain design from **raw material** and **technology** to product **functionality** perspective where there is very **limited** literature

Research Focus

3 Intersecting areas: extends **Configuration Theory**^[5]



Research Questions

How can supply chain be designed to deliver product functionality?

- I. What are the design factors needed to be considered?
 - i. What technologies are required for the traceability of product functionality in an end-to-end supply chain?
 - ii. What are the different supply chain design taxonomies that support different types of functionality configuration?

Working Research Design



Part A: Focus on traceability system development for product functionality

Part B: Testing and validating through qualitative means / demonstrator

Contributions

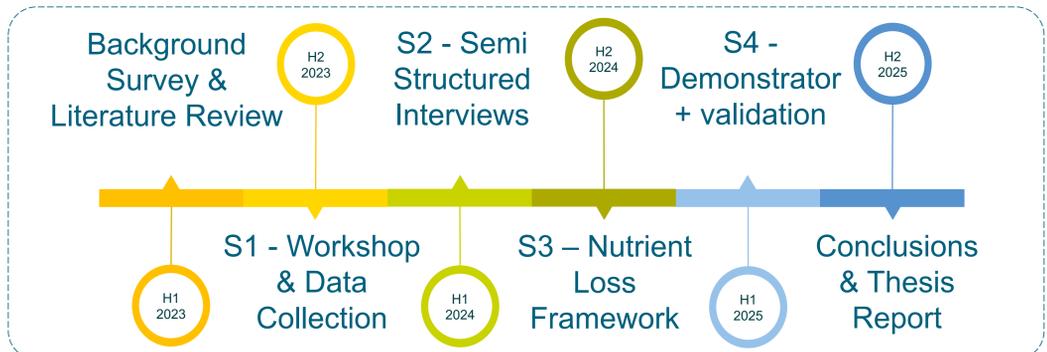
Theoretical Contribution

- I. Extend supply chain design and traceability framework from volume to functionality context
- II. Develop and extend the taxonomy for food supply chain design with functionality lens

Practical Contribution

- I. Extends firms competitive advantage via enhanced traceable nutrient delivery
- II. Helps firms deliver additional services founded around functional supply chain delivery

Future Work



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