From World to Table

Uncovering food trade impact
Context
Challenges - How to...

... raise purchasing power of 2B people while relative poverty increases

... farm to market 7B people agri-business is more than just agriculture

... while 1/3 total food production is wasted 750$ B/yr

... and to diversify food intake while global crop standardisation is large-scale retail driven

... with increasing share of urban malnourishment
Food Security VS Global Food Trade

- 50%+ global food aid conditioned on bilateral trade agreements
- 65% soybean world-demand
- Half of world-population of pigs (1 each 2 people), fed from Brazil
- Land pollution - 70% antibiotics produced in Big-Pharma industry are for intensive farming, not human consumption
- 750M new people to feed by 2040
- Feed demand increasing 7% / yr
- 3° world largest green-house emissions
- 85% emissions: Palm-oil deforestation present in half of global supermarket products.
- Crop for Bio-fuels VS Food 50% palm-oil production for bio-fuel (3x emissions VS oil)

Redistribution of food for humanitarian aid (WPF) to re-adjust the supply chain

- Insufficient ports for global trade: food-on-hold cost 20K USD/day per vessel
- 83% food-crop transported on truck (most expensive logistic)
- Global demand of avocado booming deforestation in Mexico

- Purchased 2.2 M mt food (97 countries)
- Delivered 2 M mt food (70 countries)
- $35.4B / yr food import VS 65% world’s undeveloped arable land
- 840 M people depending on agriculture and non-farm rural enterprises
- Lack of access to capital for micro and small enterprises
- AfDB agenda $400 B invested by 2030
- 84% food-trade costs goes to transport and delivery companies (food is re-imported and re-exported several times)
- 750M new people to feed by 2040
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Food Security VS Large Retailers Dumping Risks

**Dependency**
on imported large-scale retail for lower prices

**Relative Poverty**
Urban Poor pays more for the food

**Weaker safety nets**

**Smallholder cannot compete**
VS free/subsidised imported food commodities

**Migration**
from rural to urban jobs

**Precarious Urban employment**
( high labour offer + lack to access to capital)

**Food Crisis, Price Shocks.**
Example from Haiti 2008.
Pandemia 2020 ?
Food Security VS Food Technology.

Calligram of Food Technologies.

Ideas and projects extracted from World Food Program accelerator website. viz.envisioning.io/zerohunger/
Roadmap
Economy as a technology.

Embedding Sustainability (environmental, societal) in food economics.

- Access to quality food is an in-kind capital. How value is distributed throughout the supply chain?
- Logistics and distribution plays a major role in food security. How does the topology of supply chain shape sustainability?
- Who own the logistics has higher negotiation power than producers. Who born the cost of negative externalities?
System design addressing Sustainability

Sustainability := Feedback mechanism between stocks and flows.

Food Network

- Stocks
- Flows
  - Prices
  - Type of Operations (processes)
    - Transportation
    - Land Use Change
    - Input / Output

Externalities

- Environmental (GHG Emissions)
- Inequality (Distribution of Value)
  -

Innovation Tech

- Incentives
  [decentralised tech, policies]
- Transparency
  [AI, network science, discovery]
Methodology
Communicating the impact of import / export

1. Analytics on food trade
   - trading patterns of commodities
   - patterns among Countries’ economies ...

2. Query products:
   - Semantic similarity
   - Discovery Engine to
Mapping food trade onto food discovery

Embedding Sustainability on economics networks.

A first trade impact indicator.

- Topology of global trade fluxes
- Mapping food commodities with ingredients of products and recipes
- Discovery Engines APIs
  - How to diversify own diet?
  - Which is the impact of my food choices, in this moment?
Coarse Grained Analyses

Entity-matching to map the World Food Knowledge.

- $10^2$ food commodities (HS2, HS4)
  - UN COMTRADE - Harmonised System
- $10^3$ meta ingredients
  - Council for Agricultural Research and Economics, Italy (CRA-NUT, former INRAN)
  - European Institute of Oncology (IEO)
  - United States Department of Agriculture (USDA)
- $10^4$ raw ingredients
  - 16K unique Recipes - estimated completeness of the Italian Food Culture
  - 200K Recipes, USA (test)
Trade Impact Index

How long food travelled across the World to reach your table.

- Which is the impact of eating a “Pasta Al Salmone” in December, in Italy?
- Which other options do I have to variate diet for taste and sustainability?

Features

- Volumes of traded stocks
- Value of traded stocks
- Travelled distance (haversine)

Metrics

- Travelled distance per quantity
- Seasonal correlation between transported quantity and transported value
Results & Discussion
Seasonality of commodities

Some commodities are more seasonal than others.

- Fresh food VS Processed food?
- Possible to increase efficiency by optimising import/export?
- Integrating data from local producers and data from national commodity production will offer better information.
Type of economies

Usually economies does not show significant correlations between distance covered to transport food, and value of transported food. But some does.

- Are market inefficiencies borne more from Countries than others?
- Havestain does not reflect well size of Countries to reach local destinations. Import/Export per squared surface?
Embedding sustainability in food discovery services

Discovery of sustainable food alternatives.

- Semantic distance.
- Contextual Research Platforms
- Discovery Engines (Nifty.works)
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https://nifty.works

Public demos
http://discovery.nifty.works/
http://food.nifty.works/

The value of making sense of structures.

Untangle knowledge with Discovery Maps.