



THE SOYBEAN THROUGH WORLD HISTORY

LESSONS FOR SUSTAINABLE AGROFOOD SYSTEMS

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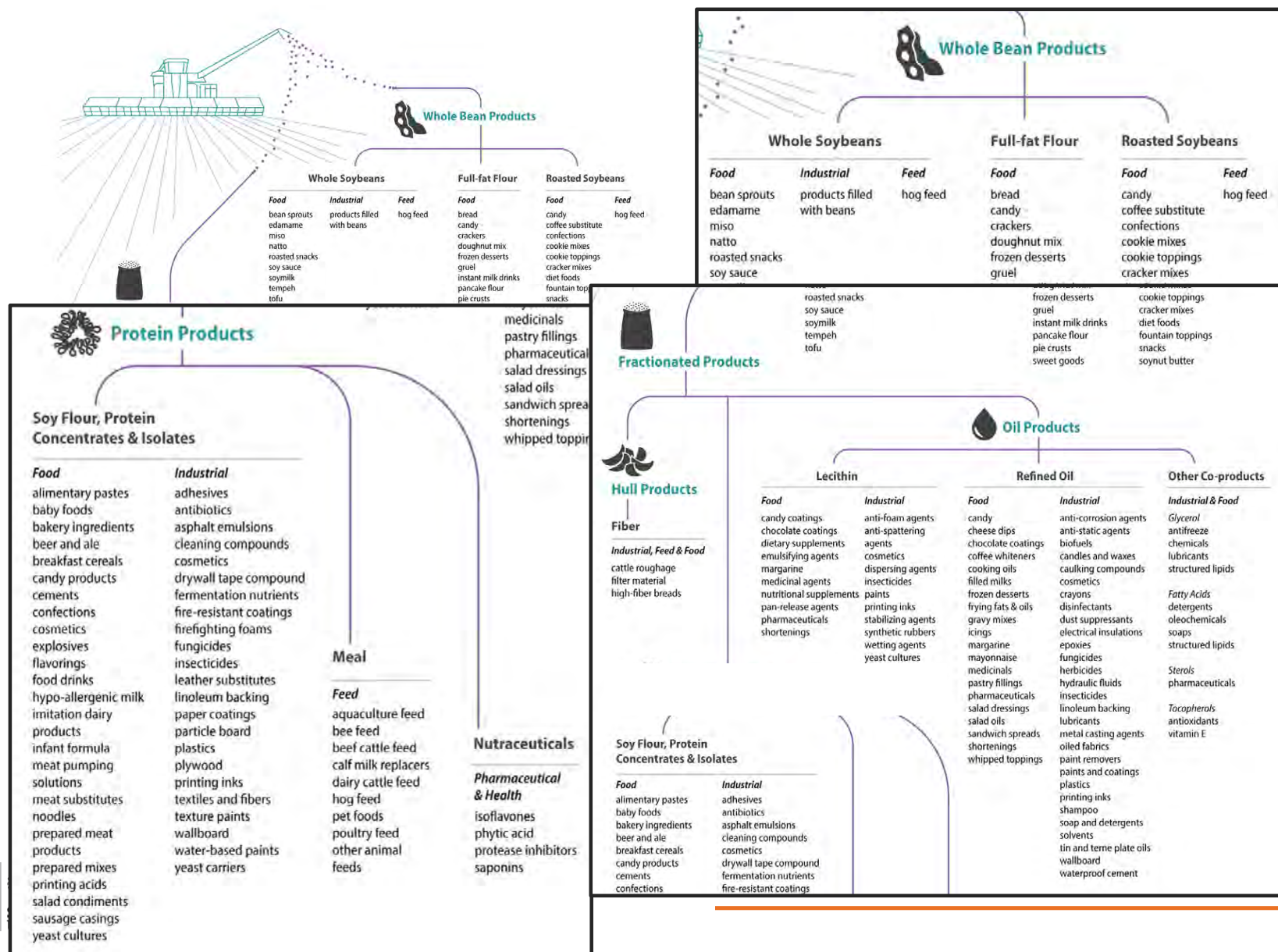


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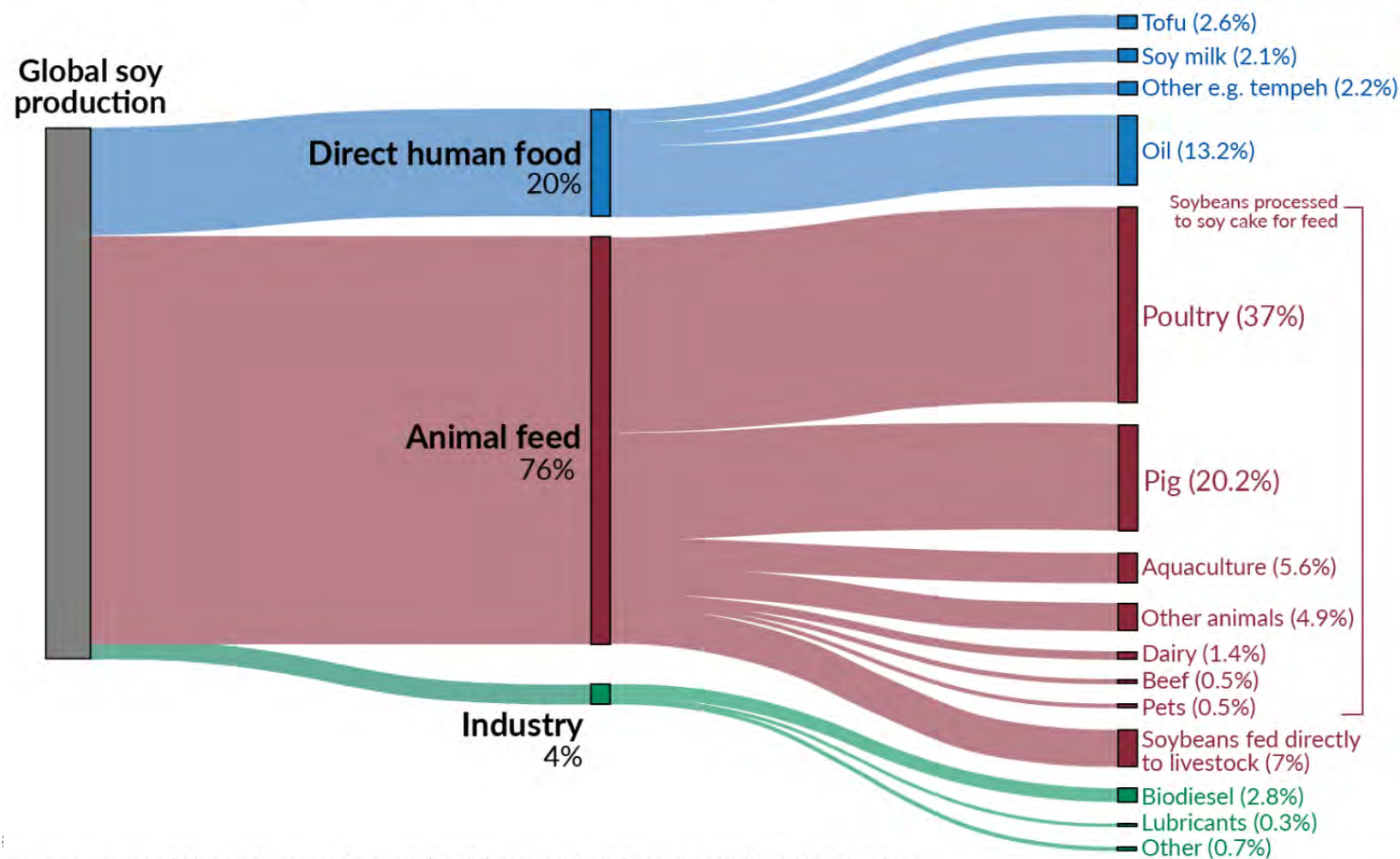
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The World's Soy: is it used for Food, Fuel, or Animal Feed?

Shown is the allocation of global soy production to its end uses by weight. This is based on data from 2017 to 2019.

Our World
in Data



Soy's roles in the agro-food system over three *Soybean Cycles*

The first soybean cycle: domestication to 900 CE

Roots: origins–200 BCE

Regime 1: 200 BCE – 200 CE

Rupture: 200–900 CE

- integral part of intensive North-Chinese agriculture
 - important food source (cooked, fermented, milled and sprouted) – particularly military rations
 - famine insurance
-

The second soybean cycle (1000–1860)

Roots: 1000-1650

Regime 2: 1650 – 1750

Rupture: 1750–1860

- kept traditional role in cultivation and expanded
 - became a central pillar of the East Asian cuisine - key food staples: tofu, soy sauce (even arrives in Europe), Japanese miso soup
 - bean cakes as fertilizer (South China and Japan)
-

The third soybean cycle (1860–today)

Roots: 1860-1950

Regime 3: 1950 – present

- expansion on US farms and South American frontiers
 - industrialization and commercialization
- trade booms
- feeding the “Cheap Meat Complex”
 - only 7% consumed directly by humans, 13% consumed as oil, almost 80% is animal feed

The first soybean cycle (domestication to 900 CE)

Roots: a long prologue (origins–200 BCE)

The first soy regime (200 BCE–200 CE)

Soybeans in **cultivation**: an integral part of intensive North-Chinese agriculture

Soybeans in **trade**: relatively predictable and cheap

Soy for **human consumption**

Soybeans as starvation food

Early processed soy foods and ritual and medicinal uses

Rupture disintegration of the Han Dynasty and population decline in the North (**200 CE– 900 CE**)

The second soybean cycle (1000–1860)

Roots (1000–1650)

The second soybean regime (1650–1780)

Soybeans in **cultivation**: traditional roles alongside expansion

Soybeans in **trade**: expansion alongside restrictions

- Soy trade in China

 - Ambivalent trade regulations, peasants avoiding markets and greedy merchants

 - The European take over of intra-Asiatic trade

 - Trans-oceanic trade: soy sauce arrives in Europe

Soybeans as a central pillar of the East Asian **cuisine**

- Tofu: popular and protein-rich

- Soy sauce as flavoring – and Japanese Miso soup

- Other soy foods

Soybean cakes as **fertilizer**

- But how important was the bean cake, really? – a scholarly debate

- Bean cake as fertilizer in Japan

Soybeans as **animal feed**

Soy **enthusiasm** in Europe and the United States

The third soybean cycle (1860 - today)

Roots (1860-1949)

The regime of the third soybean cycle (1950–today)

The soybean's roles **on-farm**: snowballing across the US Corn Belt, pioneering into Latin American frontiers and stagnation in China

- Global soy production

- Creating an efficient commodity chain: the “US Soy Model”

- The US Soy Model goes South

- The Gene Revolution: the US Soy Model goes corporate

- Chain drivers in pre-cultivation: global concentration through vertical and horizontal integration

International soybean **trade**: whole soybeans, meal and oil

- The political economy of soy trade

- Trade with whole soybeans

- Trade with soy oil and meal

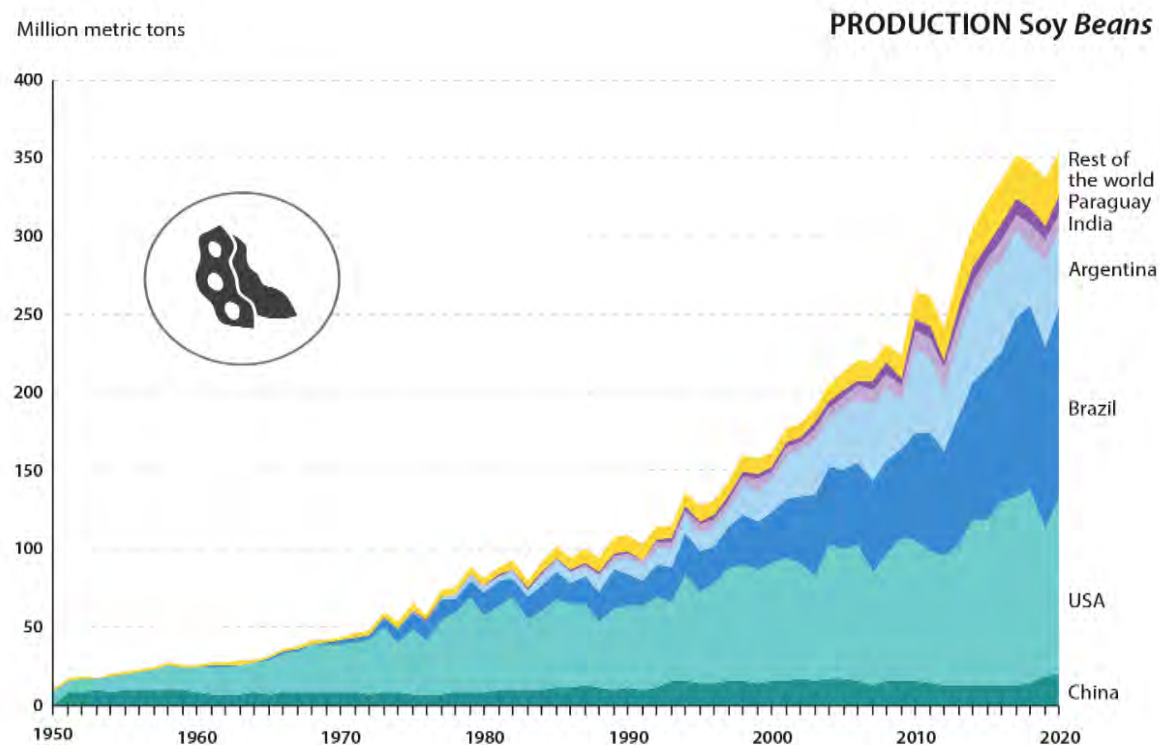
- Chain drivers in commercialization: vertical and horizontal integration of traders

Soymeal – the ultimate commodity to **feed** the “US Soy-Meat Complex”

Soybean **oil for food and fuel**: valuable coproducts

Soy as **nutritious food**

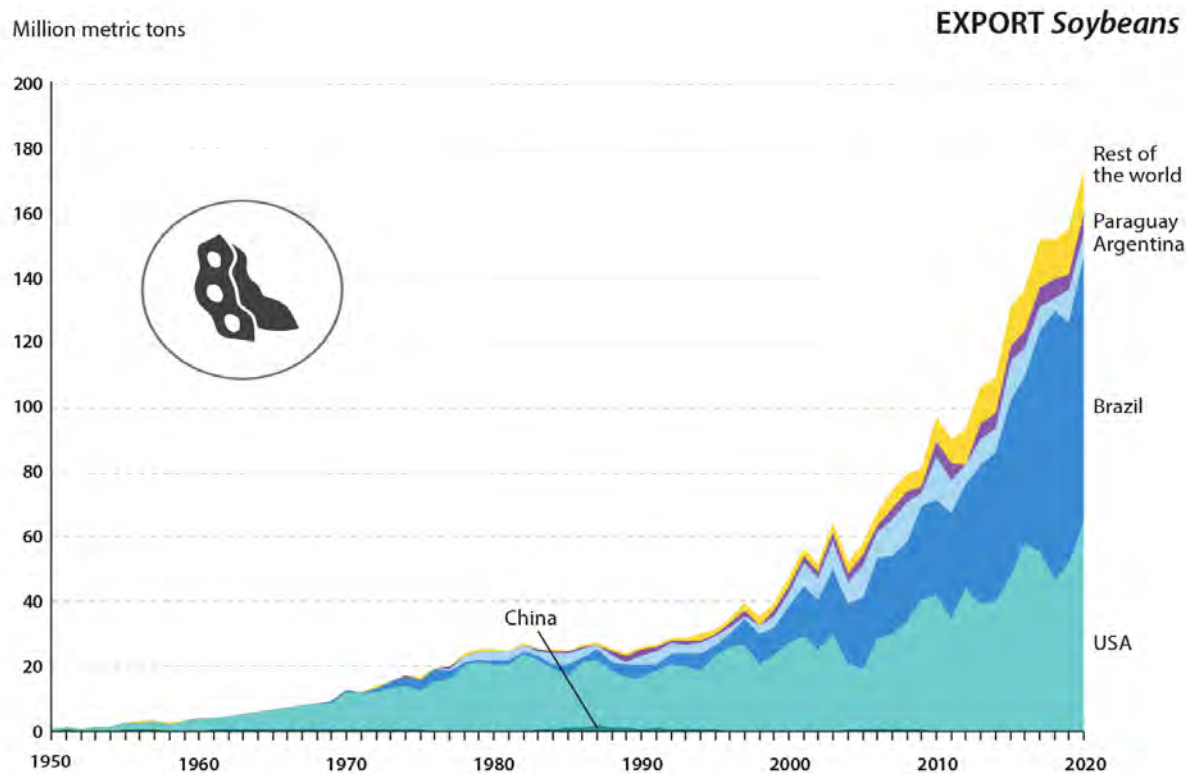
The Current Soy Regime through the Lens of History



A Great Acceleration 1950-2020

World soy production increased from 20 to 350 Mmt.

The Current Soy Regime through the Lens of History



A Great Acceleration 1950-2020

World soy exports increased from c. 1 to 170 Mmt.

Today, every other soybean is traded on the international market.

Key ingredient in animal feed
– the protein that fueled mass production of cheap meat



EXPORT COUNTRIES Soybeans 2020

Total: 64 billion USD



IMPORT COUNTRIES Soybeans 2020

Total: 64 billion USD



The Current Soy Regime through the Lens of History

1950-2020: World soy **production** increased from 20 to 350 Mmt.
World soy **exports** increased from c. 1 to 170 Mmt.

Key ingredient in animal feed
– the protein that fueled mass production of cheap meat

Frontier expansion in Latin America.
Brazil and the US clearly dominate bean exports with 85% of total export values – 64 billion USD.
China dominates imports.

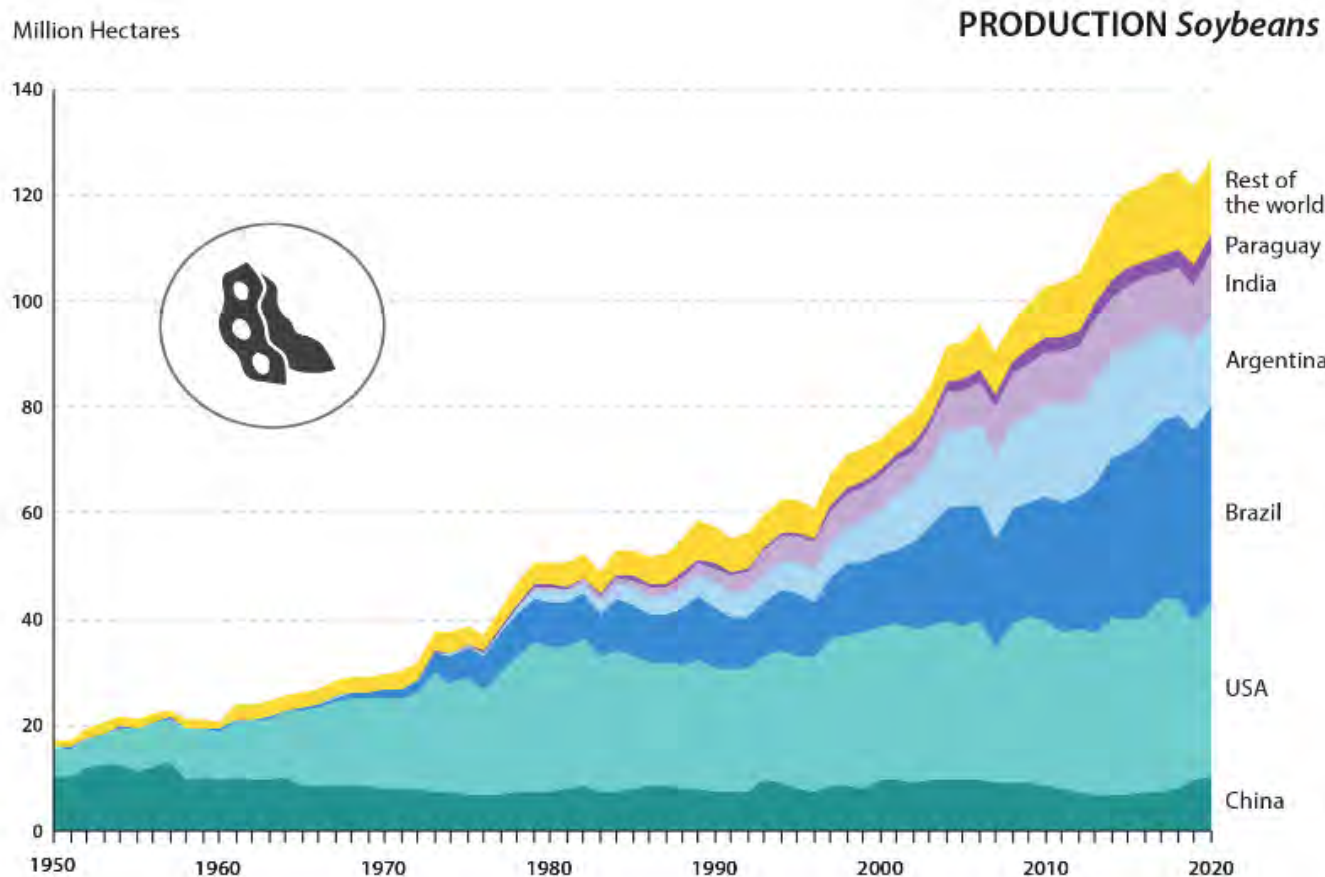
Signs of rupture ?

At first glance, there are no signs of a halt in the global soy expansion or intensification under the current regime. However, all regimes are historical in nature. Eventually, challenges, contradictions & limits trigger their end.

From the vantage point of historical legacies & breaks, we conclude with current challenges to the present regime:

1. **A crisis of structure?** limits to frontier expansion & ecological simplification
Soy frontiers in Ancient China, Manchuria, USA, Latin America... and now Africa?
Limits to Intensification – e.g. loss of biodiversity
2. **A crisis of profitability?** the end of “cheap” soy
The challenge to profitability from:
 - a. stricter regulations and traceability requirements
 - b. technological treadmill: weed resistance & soybean rust on top of broken nutrient cycles
 - c. law suits and bans
3. **A crisis of legitimacy?** The role of challengers and hegemonic shifts
Countermovements: alternatives and resistance
The rise of the East (... and the fall of the West?)

1. A crisis of structure? limits to frontier expansion & ecological simplification



Frontier expansion and ecological simplification are structures in the *longue durée* - but accelerated in current regime.

World 1950 – 2020

- soy production increased 16 - 354 MT
a 2113% increase – 22.12 X amounts

- soy acreage increased 18 - 127 Mha
a 672% increase or 7.7 X the area

- yields increased 1.18 – 2.78 MT/ha
– 136% or 2.4 X

In Latin America – *Sojización* – meant more than 33 new Mha 2000-2020

1. A crisis of structure? Hitting biophysical limits

There are different frontier models in soy history (e.g. broadening & deepening)

Both approaches are evident in the soybean's history

- seeing land areas as “Great Frontiers” - EXPANSION
- the gradual move from circular agricultural systems towards specialized and industrial ones that rely on the cumulative use of external inputs - INTENSIFICATION

Today, as in the past, we are reaching absolute biophysical limits – but now they are at all scales - including planetary scale.



2. A crisis of profitability? The end of “cheap” soy?

Soy is only cheap because its full social-ecological costs remain hidden from its price. Carbon emissions, biodiversity loss, habitat degradation, land grabbing, polluted waterways and obesity are “externalized”.

The **ability to source soy anywhere** is the *sine-qua-non* condition of the model. This requires that competition between farmers is high enough to maintain a downward pressure on prices. Soy from “anywhere” must be easily mixed, to keep down logistics and transportation costs.

Traders have developed a highly efficient supply chain practice, organized in accordance with the logic of *Just-in-Time* (JIT) production.

But, cheap soy is now under threat on at least three different fronts:

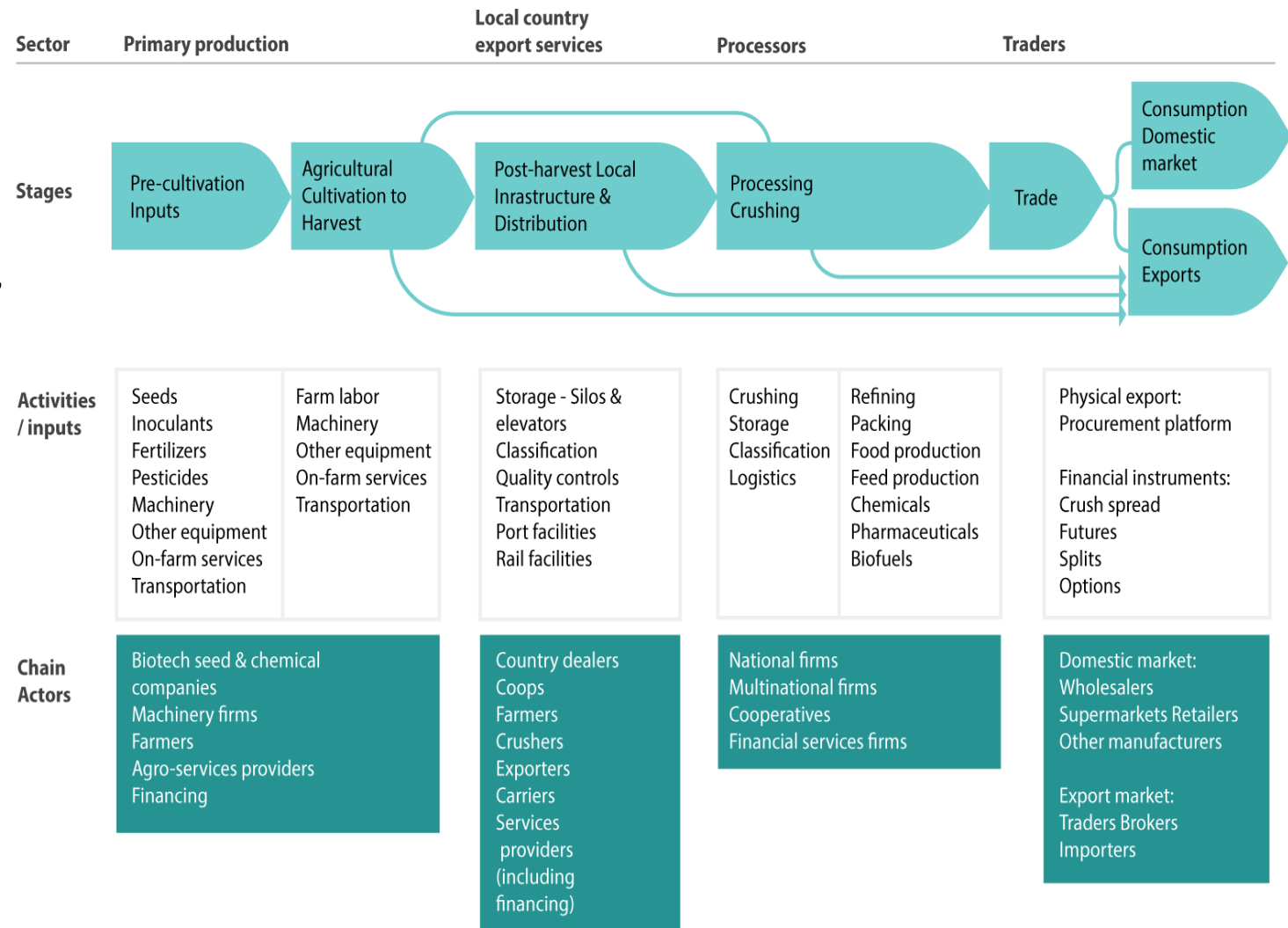


a. Stricter environmental regulations & traceability

Initiatives from international organisations, states, regions, NGOs and firms (CSR), e.g.:

- stricter environmental **laws**,
- deforestation **monitoring**
- RTRS
- due diligence (EU)

All threaten the ability to keep prices low

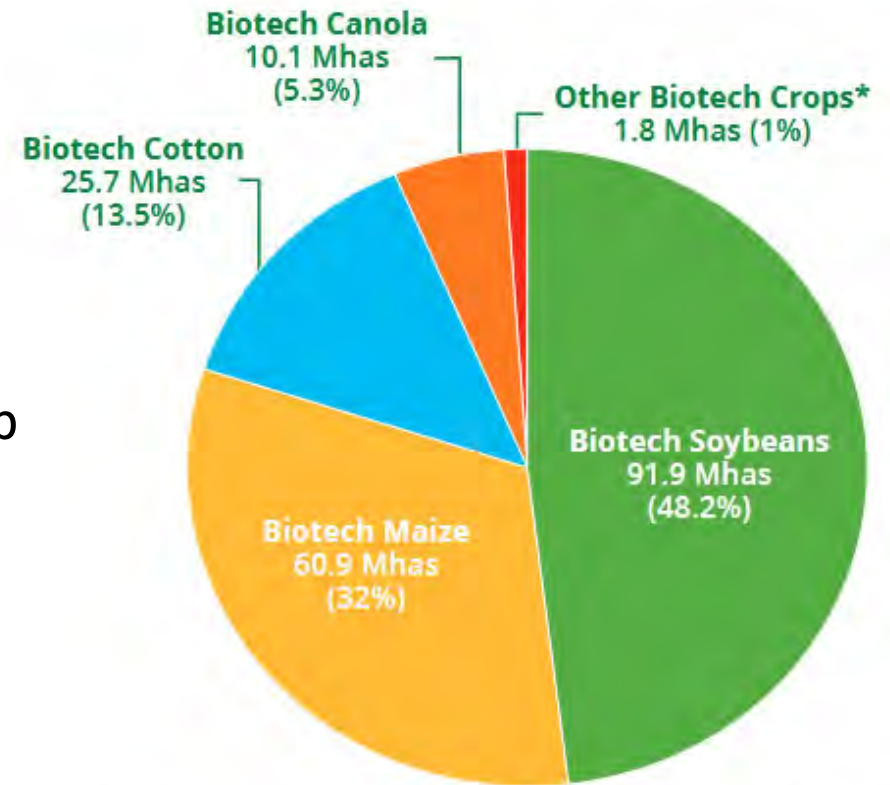


b. The Technological treadmill:

Soy is most cultivated biotech crop on Earth. Designed to be combined with specific agrochemicals. The phenomenal success of GE soy carried within it the seeds of its own destruction... resistant weeds - endless innovation/adoption loop – that's going too fast to secure profits.

c. Lawsuits and bans:

Bayer has had to pay settlements in lawsuits for USD billions. Several European states have unilaterally banned glyphosate ...but not the EU



* Biotech sugar beets, potatoes, apples, squash, papaya, and brinjal/eggplant.

BIOTECH CROPS IN 2019 (AREA AND ADOPTION RATE)

Source: ISAAA, 2019

3. A crisis of legitimacy? Countermovements: alternatives and resistance

“These companies grab our territories to expand, because as they expand over our communities and forests, they accumulate capital to maintain this production model (...) Meanwhile, there is the destruction of the environment, climate change, and the impacts on our production, as they steal our seeds, reduce local varieties, and cause intense droughts, cold, rainfall, and heat”.

Perla Álvarez, Paraguayan member of *La Via Campesina*’s Latin American steering committee in June 2022

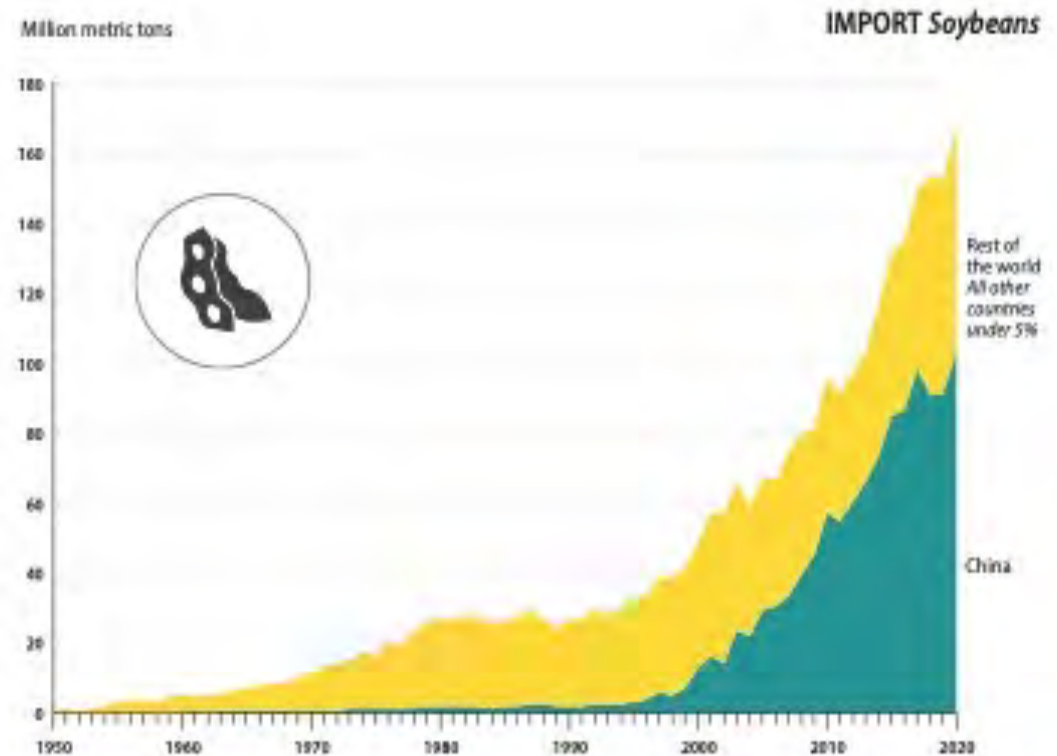


A crisis of legitimacy? The rise of the East (... and the fall of the West?)

Ruptures leading to regime shifts in previous soy cycles have occurred in tandem with wider geopolitical shifts. Today, free trade is increasingly contested and China is (re)gaining relative economic power.

China not only dominates imports, but is growing throughout the GCC.

- gradually re-starting to increase own production
- China is the world's largest soybean importer (60%). In the US-China trade war, soybeans accounted for the largest share of total trade loss. China seeks to decrease its US soy dependence by buying elsewhere.
- ChemChina merged with Syngenta: increased market share in chemical and seed inputs – became 2nd largest
- The ABCD companies have been challenged by COFCO in global purchasing, processing, warehousing and transportation. In fact, COFCO has become the largest grain exporter in Argentina, Paraguay, Brazil and Uruguay.



Some Lessons for Sustainable Agrofood Systems

The more unstable & uncertain the present - the more important history is in making sense of it

The present system does not take advantage of the many potential roles soy's can play in sustainable agrofood systems (e.g. nutrient-laden food, soil enrichment).

Changes over time in the food system were far from natural or spontaneous.

Huge investments, significant collaboration and intentional government policies got us to where we are now - not an invisible hand of the market, nor other myths

“Cheap” food is not cheap. Markets are designed to be economically efficient – not sustainable.

Going through animals involves huge resource losses. Who can “afford” this?

The inevitable rupture of the present food system ... not if, but when!

Regimes are “temporary constellations” & change is normal

The present system is not determined – and it can be changed.

Use history to make sense of the present and give us hope & options for the future

Questions?

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Thank you !



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