Circular agriculture: a new perspective for Dutch agriculture

10 October 2019, Roel Jongeneel (WEcR) *)

WAGENINGEN UNIVERSITY & RESEARCH

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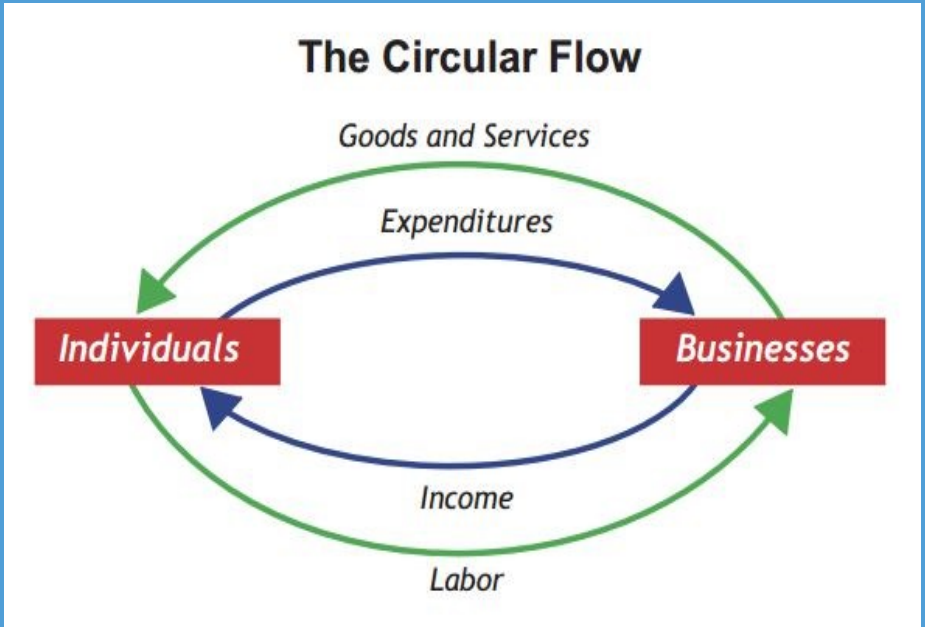
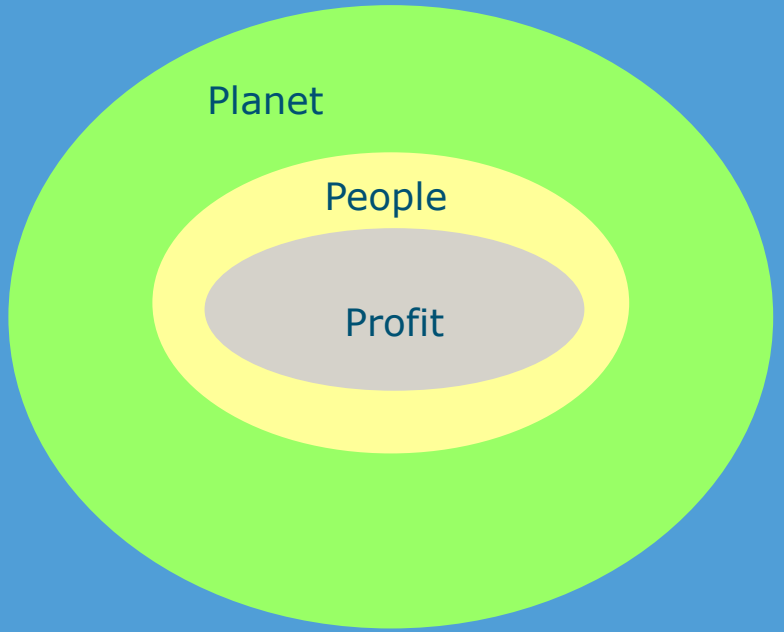
Introduction





This is how economics students start to learn (focus only on economic subsystem

CE = socially and ecologically embedded economy (PPP)

Set-up

- Looking back.... success did not emerge without side-effects
- A new way of looking.... key principles of circularity
- An eye on two highlights
  - Taking care of the soil as the basis
  - Reducing food waste
- Some concluding remarks





Success and side effects

- The Netherlands as a special case because of:
  - its high animal densities
  - its tremendous developments

Animal densities in selected EU Member States

Per square kilometer of land area	Cows	Pigs	Poultry
Netherlands	**103**	**286**	**1065**
France	30	20	239
Spain	12	58	246
Germany	35	77	272
Poland	**19**	**36**	**257**
Italy	21	28	334

The evolution of Dutch agriculture since 1950

	Unit	1950	1970	1990	*2010
Number of farms	x 1000	315	185	125	71
Labor	x1000 AWU	550	290	215	144
Land	x 1000ha	2328	2143	2006	1920
Capital	Index	100	129	196	270
Purchased input	Index	100	302	491	675
Gross production	index	100	206	408	367
Labour units/farm	AWU/farm	1.75	1.57	1.72	2.03
Land base/farm	ha/farm	7.4	11.6	16.0	27.0
Output/farm	Index	100	350	1031	1628
Capital/farm	Index	100	226	512	1198
Output/ha	Index	100	223	472	445
Purchased inputs/ha	Index	100	328	568	818

Labour productivity in 2010 is 14 times the labour productivity in 1950

(implies an increase of about 4.5% per annum)

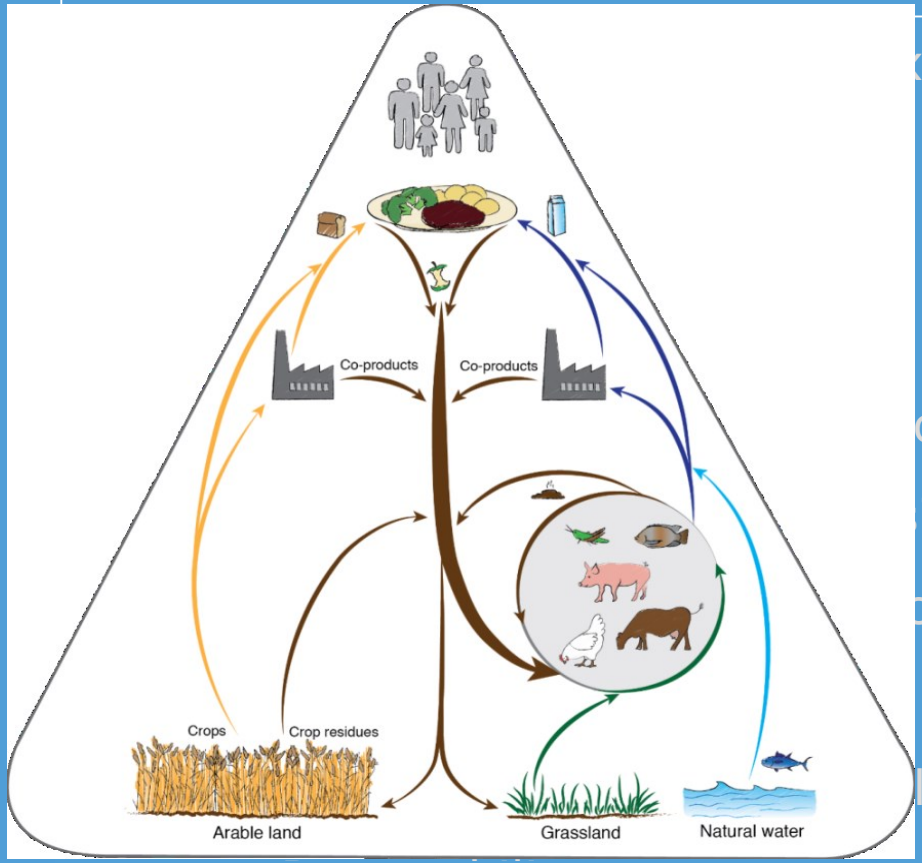
Success and side effects: EU

- Income support is distributed unequal: 81% of farmers receives 80% of the payments => progressive support contrasts with needs
- CAP had/has a productivist orientation, but lead to high production intensities in specific EU regions
- Agriculture is the major source of nitrogen loss (representing 80% of all reactive nitrogen emissions from all sources to EU environment
- Agriculture is a significant producer of greenhouse gas emissions and after a decline (-20% in 1990-2013) it started to increase
- About 45% of EU mineral soils have low or very low rganic matter content (0-2%)

Key principles of CE

- Three main actions w.r.t. CE: 3 x R
  - **R**euse
  - **R**ecycle
  - **R**educe
- The above links to cascading-valorization-approach
- EPR: extended producer responsibility (regl/CSR)
- Three additional principles (pré-care/precautionary principle)
  - Appropriate design
  - Reclassification of materials
  - Renewability

Key principles of CE



Source: Van Zanten (2016)

Circular Agriculture

The *four principles* of a circular food system:

1) Use arable land and natural waters primarily to produce food for direct human consumption.
2) Avoid or minimize food losses and waste.
3) Recycle co-products and inevitable food losses and waste back into the system.
4) Use animals for what they are good at, i.e. unlocking biomass with low opportunity costs for humans into value food, manure and other ecosystem services.

Source: De Boer and Van Ittersum (2018)

Highlight 1: Improving the soil

- A healthy soil is the basis of all agricultural activity
- Need for sustainable use of the soil and aimed at its proper functioning (regeneration, productivity, water, nutrients)
- Addresses physical aspects
    - Soil structure (e.g. avoidance of compaction) and soil life
    - Soil organic matter content
- Better soil management (incl. soil life) can pay of because of higher yields and reduction of environmental pressure (reduced use of fertilizers and plant protection products)

About 45% of Dutch soils suffer from compaction, which could lead to yield reductions between 10 - 35%

Source: Van den Akker and Hendriks 2015

Highlight 2: Reducing food waste

- Food waste leads to unnecessary losses to food system
- Food is cheap and common, but need to be properly appreciated

Food waste: It usually starts already early in the chain (39%)
Loss: Worldwide 1.3 bn tons; NL 2 mill. tons, of which retail 5%, restaurants 14%, consumers 42%
Source: Instock

- Actions to reduce food waste
  - Increase consumer awareness and knowledge
  - Provide incentives to consumer and food supply chain actors to reduce food waste
  - Adjust user-standards (social, legal)

Concluding remarks

- We need to think in terms of an 'embedded agriculture' and economy => circular approach & connecting systems approach
- Agriculture is a special sector where circularity has its own relevance and application
- 2 Highlights
  - Improving soils: health care needed
  - Reducing food waste: double dividend
- Smart policies needed to induce a transition
  - Every journey starts with fist steps
  - A revisited policy approach (TF Verdienmodellen)

Thanks for your attention

... Questions .... ?

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