What types of circular business models for creating value from agro-waste?

Mechthild Donner, Romane Gohier, Hugo de Vries

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Introduction

The circular economy has been defined as an industrial system that is restorative and regenerative by intention and by design (EMF, 2013).

Shifting from a linear to a circular economy requires a change at system level, involving all actors of value chains within diverse economic sectors. At the enterprise level, innovative circular business models are needed that require:

- reverse logistics
- a new vision of customer-supplier relationships
- new forms of organization and strategies at the cross-road of various value chains

Research objective

Objectives

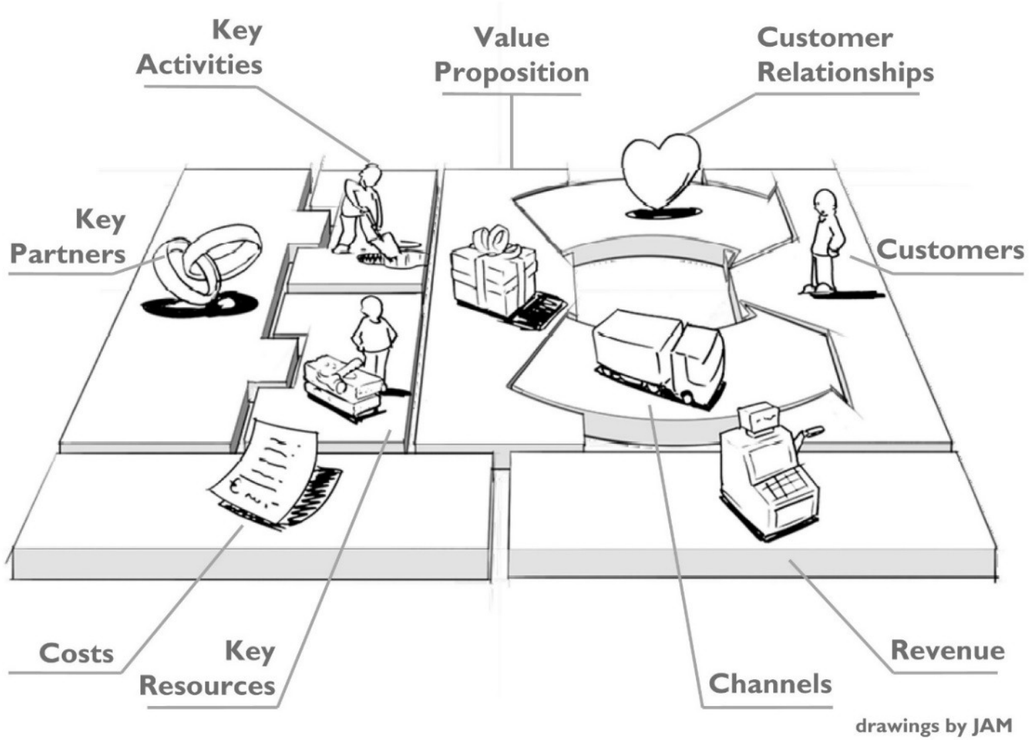
Identify and characterise the different types of existing circular business models (CBM) for valorising agro-waste

Business model “the rationale of how an organization creates, delivers and captures value” (Osterwalder & Pigneur, 2011)

BM Canvas: used to analyse the activities, objectives, methods and resources of a firm that ensure its viability

Circular Business Model: BM Canvas
+ Business ecosystem level
+ Sustainability impact
(Antikainen and Valkokari, 2016)

Business Ecosystem Level



CANVAS framework analysis (Osterwalder and Pigneur)

Sustainability impact

Methodology

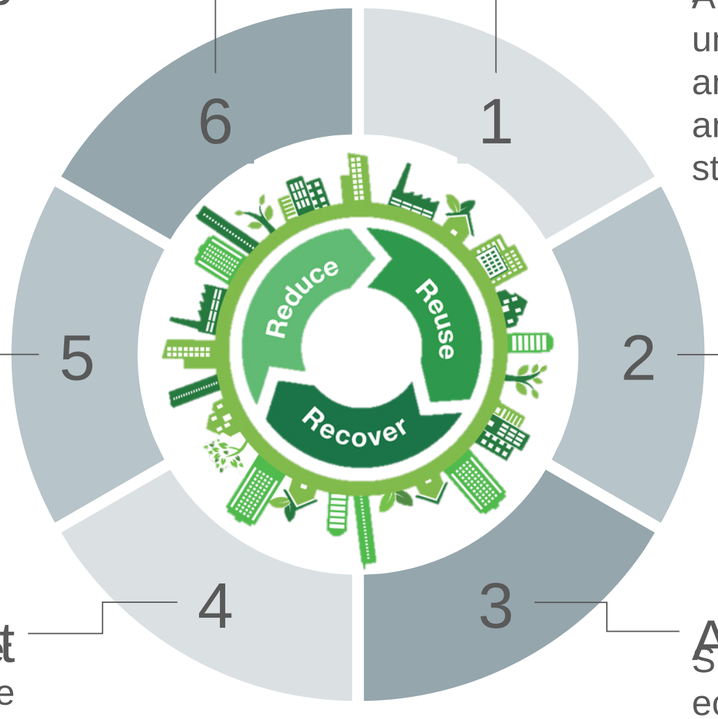
33 case studies with semi-directive interviews

Criteria for selecting case studies:

- Companies which convert agricultural by-products into valuable products
- Individual and collective initiatives
- From different countries in Europe and others continents
- Focus on three chains: cereals, wine and manure

Identify the main characteristics of the business model according to the analytical framework

Results: TYPES OF CBM IDENTIFIED



Upcycling entrepreneurship

Innovative way of valorisation to convert bio-low-value by-products into high-value materials.

Agricultural co-operative

A co-operative is an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned and democratically-controlled enterprise. The co-operative starts to valorise by-product of its activity.

Environmental biorefinery

Integrated bio-based industry, using by-products, residues and wastes as inputs and use a variety of technologies to produce chemicals, biofuels, food and feed ingredients, biomaterial and power.

Support structure

A support structure devotes to support a new way of valorisation, aims to enable stakeholders to develop their activities.

Biogas plant

Bioenergy production from agricultural waste biogas, heat and digestate

Agropark

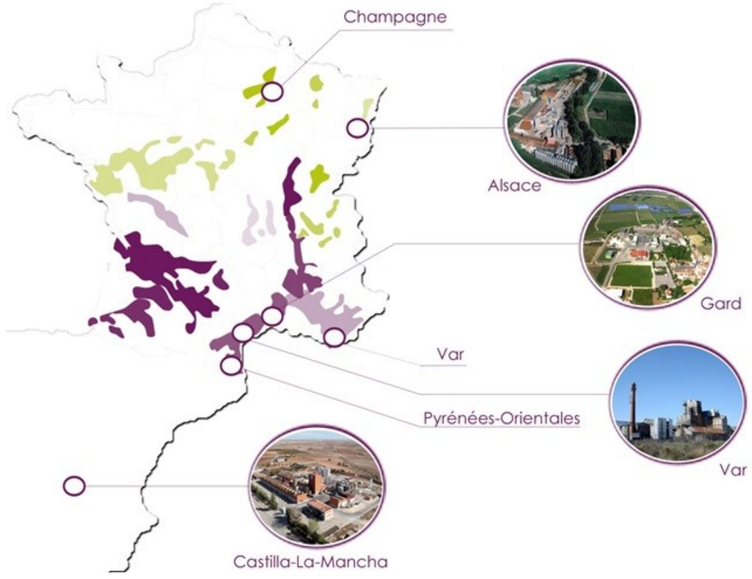
Spatial clusters of agro functions and the related economic activities, agropark brings together high-productivity plant-based production and processing along industrial lines.

Example of an agricultural cooperative - Grap’Sud

Wine-making cooperative with 6 production units and 210 employees

By-products valorised per year:
125 000 tons of pomace
270 000 hl of lees
600 000 hl of grape must

 Large portfolio of value-added products issued from wine waste (B2B et B2C)



Charateristics of agicultural cooperatives:

- Specific for a production sector (cereals, wine, fruits, …)
- Able to reach a critical size and to collect sufficient amounts of by-products
- Permits to establish a long-term strategy in order to serve the members’ interests

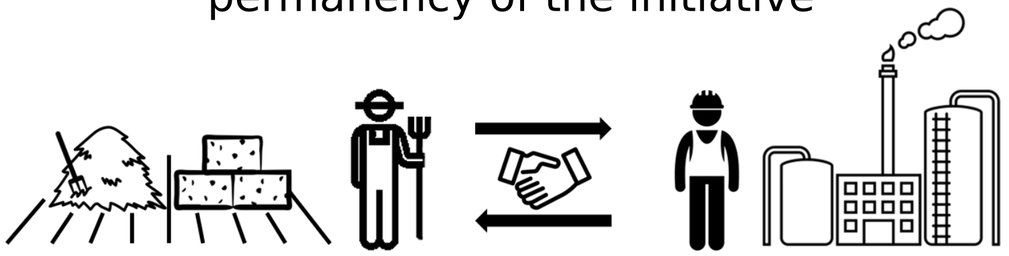
Example of a support structure - Agricarbone

AgriCarbone
Collecte et distribution de biomasse agricole non alimentaire

- Creation of synergies between agricultural players and valorisation units
- Balance the commercial relationship
- More than 3000 tons of non-food agricultural biomass valorised in its first year
- Offer also soil quality studies to analyse the need in organic matter

Characteristics of support structures:

- No valorisation within its internal boundaries but enable to develop new valorisation pathways
- Coordination, promotion, networking, technological intelligence, bringing together of normally disconnected players
- Three sub-types: geographical, valorisation pathway, waste flow
- Difficulties to capture the value created and ensure the permanency of the initiative



Other types of CBM

Biogas plant (e.g.: Agroenergie Hohenlohe)

- Biogas unit management and optimisation
- Highly dependant on feed-in tariffs, need for diversification if tariffs decrease
- Need to involve stakeholders to improve acceptance (especially the neighbourhood)

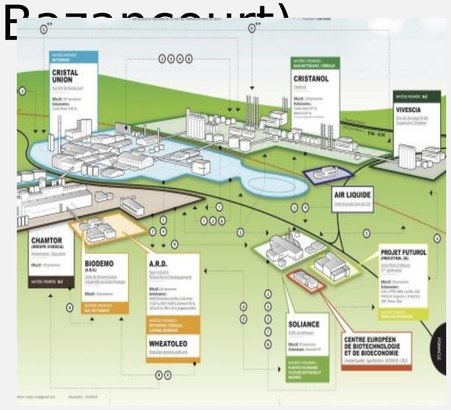
Upcycling (e.g. : Biotrem)

- Global eco-design approach
- Initiated by the need to find a solution for a large quantity of waste, or by the deployment of a technological innovation
- Main challenges: scale-up and secure supplies

Agropark (e.g. : Food Valley of Bjuv)

- The cycles for water, minerals and gaseous compounds are closed and the use of fossil energy is minimised
- Innovative partnership
- Mutualisation of know-how in production and commercialization of agro-products

Biorafinery (e.g.: Pomacle Bazancourt)



- Biomass cascading use: in time, in function and in value
- Mutualisation and substitution synergies are developed
- The economic model benefits from economies of scale, diversification and local know-how.

Conclusion and discussion

CBM typology

First proposition of typology in the agro-waste valorisation sector

Dynamic typology : possibility to evolve to another category according strategic orientation

The CBM are complementary and may work together to maximise the biomass cascading use

Management specificities

Intrinsic characteristics of agro-products impact the whole BM (securing supplies, storage, reverse logistics, infrastructure flexibility)

Traditional market constraints (e.g. chemistry markets)

Consumers perception of bio-based products remains under-explored

External factors

Climate change sensitivity

Low attractiveness in some rural areas (recruitments and investments)

Uncertain public policies evolution (e.g. biogas tariff)

THANK YOU I

FOR YOUR ATTENTION

ANY QUESTIONS ?

Contact : romane.gohier@inra.fr
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