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

Mechthild Donner, <u>Romane Gohier</u>, 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**



Agrigentive an concorrectative ciation 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.

> Supportstructures to support a new way of valorisation, aims to enable stakeholders to develop their activities.

Spatial Pusters of agro functions and the related economic activities, agropark brings together highproductivity 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 pomace270 000 hl of lees600 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



### Collecte et distribution de biomasse agricole non alimentaire

- Creation of synergies between agricultural players • and valorisation units
- Balance the commercial relationship  $\bullet$
- 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

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### **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

Hohonloha)



- **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. : Rintrom)



### Agropark (e.g. : Food Valley of



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



- 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

### Biorafinery (e.g.: Pomacle

- 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 biobased products remains underexplored 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 : <u>romane.gohier@inra.fr</u>

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