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

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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)
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
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.

Support structure

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

Agropark

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

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.

Upcycling entrepreneurship

Innovative way of valorisation, converts low-value by-products into high-value materials.

Biogas plant

Bioenergy production from agro residues. Biogas, heat and digestate

Results: TYPES OF CBM IDENTIFIED
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)

Characteristics of agricultural 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

- 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 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 FOR YOUR ATTENTION

ANY QUESTIONS?

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