Critical Success Factors for Circular Business Models within the Agricultural Sector

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EU H2020 Project NoAW (No Agricultural Waste)

Innovative approaches to turn agricultural waste into ecological and economic assets

• NoAW (2016-2020): a EU-financed project involving 32 international partners, coordinated by INRA (France)

• NoAW develops a circular economy approach applicable to agricultural wastes on a territorial and seasonal basis

• NoAW investigates the potential of agro-waste and by-products to be converted into a portfolio of eco-efficient products: bio-energy, bio-fertilizers, bio-packaging and bio-molecules

➢ WP5: New business concepts for a cross-sector valorization of agro-waste and by-products

http://noaw2020.eu/
Valorizing agricultural waste and by-products

• Agricultural waste and by-products = plant or animal residues that are not (or not further) processed into food or feed (Gontard et al. 2018)

• Estimated amount of agro-waste annually: 998 million tons (Obi et al. 2016)

• Different valorisation opportunities in alternative sectors leading to new products and applications, with a lower or higher value, depending on volume (Rood et al. 2017)

• Challenging because of heterogeneity of resources, changes in volumes and quality over time

> Here, circular business models are meant to find innovative management and marketing solutions for adding value to agricultural waste and by-products

Figure: Value pyramid for biomass valorisation

Source: www.betaprocess.eu/the-value-pyramid
Research question and methodology

Under which conditions can business models for the valorisation of agro-waste and by-products successfully contribute to the transition to a circular economy?

- 33 case studies in 12 different countries:
  - Mainly in project-partner countries from Europe and Asia
  - Companies valorizing agro-waste and by-products
  - Three chains: wine, cereals, manure

Semi-structured interviews and elaboration of factsheets for each case
Example factsheet: Association Bâtir en Balles

Association Bâtir en Balles / Marseille, France/
Valorization of grain by-products (husks) / Status: started in 2015 / Initiative leader: Association Bâtir en Balles

Key triggers of the initiative at the origin:
- An einkorn farmer started to valorize einkorn husk together with École des Mines d’Ales in 2009 – leading to the creation of the enterprise Archibale in 2013
- At the same time, since 1993, the Association Le Village valorized rice husk
- A meeting between einkorn husk and rice husk actors led to creation of Association Bâtir en Balles in 2015,combining various cereals

Key objectives of the initiative at the origin:
- Create a cooperation between the cereal and the eco-construction sectors
- Inform and train people in using by-products of cereals (rice, einkorn, spelt, buckwheat, barley)

Key historical milestones between origin and today:
- Performance of quality tests for insurances, promotional activities, construction of several houses

ORIGINATION

ORIGINATION

KEY IMPACTS (current)
- Agro Waste valorized
  Until now, mainly rice and spelt husks
- CAPEX required / TRI
- Job created / typology
- Other expected impacts
  Contribution to local economic development, reduction of environmental impact by waste-valorization, creation of jobs

KEY ACTORS & PARTNERS

<table>
<thead>
<tr>
<th>Category/Expertise</th>
<th>Motivation / Fears</th>
<th>Responsibility in initiative</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Loïc Rosso and Pierre Delot as chairmen of the association</td>
<td>Foster a new cross-sector cooperation; Fear; be able to get the initiative financed (until now voluntary work)</td>
<td>Initiators and leaders of the initiative</td>
</tr>
<tr>
<td>4 other members of the Association</td>
<td>Administrative and advisory support</td>
<td>Administrative and advisory support</td>
</tr>
<tr>
<td>Farmers, cooperatives, huskers</td>
<td>Waste disposal</td>
<td>Waste delivery</td>
</tr>
<tr>
<td>Constructors</td>
<td>By-product valorisation</td>
<td>Eco-construction</td>
</tr>
<tr>
<td>Architects, research institutions</td>
<td>Technological support</td>
<td>Technological support</td>
</tr>
</tbody>
</table>
# Example factsheet: Association Bâtir en Balles

## Organizational Model

<table>
<thead>
<tr>
<th>Governance / coordination</th>
<th>The Association works as facilitator between the 2 sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared infrastructure / financing</td>
<td>Voluntary work until now</td>
</tr>
<tr>
<td>Cooperation with Science &amp; technology</td>
<td>Cooperation with research institutes (e.g., Écoles d'Ingénieurs)</td>
</tr>
<tr>
<td>Support mechanisms</td>
<td>Difficult to get public financial support as the initiative is not yet considered to be sufficiently mature</td>
</tr>
</tbody>
</table>

## Key Side-Stream Valorization (Agro waste)

| Waste typology / Yearly volume / Seasonality | 150 tons of einkorn husk
15,000 tons of rice husk |
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Valorization processes / key technologies</td>
<td>Husking + insulation of houses</td>
</tr>
<tr>
<td>Maturity of technologies used / critical size for feasibility</td>
<td>Immature technology for husking</td>
</tr>
<tr>
<td>Key outputs and markets</td>
<td>Panels and bricks for insulation or decoration of houses</td>
</tr>
</tbody>
</table>

## Example of cascade of valorization:

![Example Illustration](image1)

## Success & Failure Factors

<table>
<thead>
<tr>
<th>Organizational / Spatial</th>
<th>Technical / Logistic</th>
<th>Economic / Financial / market</th>
<th>Social / skills</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build on existing clusters e.g. of rice farmers / cooperatives in the Camargue</td>
<td>Public financial support is difficult to get, particularly compared to the straw chain which is already established</td>
<td>High motivation; interest by various actors</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Key links:

[http://www.batirenballes.fr/index.html](http://www.batirenballes.fr/index.html)
The success of circular business models depends on various internal + external factors:

<table>
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<tr>
<th>Category</th>
<th>Success factors</th>
</tr>
</thead>
</table>
| (1) technical and logistic        | - innovative and proven technologies for agro-waste conversion  
- optimal in and out logistics adapted to the specificities of agricultural resources (variable, perishable, seasonal) |
| (2) economic, financial and marketing | - economies of scale for clusters  
- strong public-private partnerships with long-term contracts  
- co-investments and/or financial support  
- open and differentiating communication  
- price competitiveness of new bio-based products |
| (3) organisational and spatial    | - successful cooperation  
- geographical proximity of actors  
- sufficient space with efficient infrastructure (clusters) |
| (4) institutional and legal       | - awareness creation for ecological products among consumers  
- transparent and traceable production processes |
| (5) environmental, social and cultural | - acceptance by or even involvement of local stakeholders  
- creation of local jobs |

Most often named: factors from category 2, followed by 3 and 4, then 1 and 5
Conclusion

1. **Success factors specific for the agricultural sector:**
   - innovative technologies for agro-waste conversion
   - flexible in and out logistics
   - stakeholder acceptance of bio-based products and production processes
   - price competitiveness for bio-based products as substitutes

2. The transition from linear chains to closing loops in the agricultural sector let individual business models evolve towards **new, dynamic and integrated business models**, in which the macro-environment sets the boundary conditions (context-dependent)

3. Examples of circular business model types for agro-waste and by-product valorisation: biogas plants, upcycling entrepreneurship, environmental biorefineries, support structures, agricultural cooperatives and agroparks (**next presentation**)
Thank you very much for your attention!

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