Business models for reducing greenhouse gas emissions from food loss and waste

Crates to transport tomatoes in Nigeria could reduce food loss and emissions by 36%

October 2018

Value proposition
Losses occur in transportation because tomatoes are placed in large woven baskets, and then stacked on top of one another for the journey to Lagos. Plastic crates can be stacked on top of one another without damaging the tomatoes at the bottom of stacks. Crates would also improve ventilation during transport. Losses can be reduced from 41% to 5% through use of crates. Furthermore, baskets are used on a one-time basis and must be replaced after each journey, and the crates are reusable.

Challenge
Nigeria is the second largest producer of tomatoes in Africa and are important for the rural economy. Tomatoes are also a critical source of vitamins. Despite being a large producer, up to 86% tomatoes are not consumed due to losses throughout the value chain: during production, harvest, local collection centers, cross-country transportation, and at retail markets. Approximately 41% of tomatoes are lost during transportation, as tomatoes are primarily produced in northern Nigeria and consumed in southern Nigeria, some 1,000 kilometers away.

Financial and GHG analysis for 25 kg crates (US$ 1 = NGN 364)

<table>
<thead>
<tr>
<th>Costs</th>
<th>Financial returns</th>
<th>Reduced losses</th>
<th>Climate change mitigation potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upfront cost: US$ 8.25</td>
<td>3 year NPV: US$ 6.70</td>
<td>Per crate: 756 kg over 3 years</td>
<td>GHGs per ton of tomato produced: 0.14 tCO₂e</td>
</tr>
<tr>
<td>Return trip lost revenue for transporter: US$ 4.17</td>
<td>3 year IRR: 33%</td>
<td>Country potential: 648,000 t/year</td>
<td>GHGs reduced with country-wide implementation: -0.09 MtCO₂e</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marginal abatement cost: - US$ 63 per tCO₂e</td>
</tr>
</tbody>
</table>

Barriers to adoption
- Crates have been distributed primarily through donor organizations, meaning that there are few businesses using crates commercially, and the business model needs to be further tested and refined. Profitability estimates of this analysis are highly uncertain and based on a number of assumptions with high variability.
- Crates would be passing through numerous actors in the supply chain, making it difficult to ensure that the crate owner is able to retrieve the crate.
- Purchase of crates – although more profitable than baskets in the long run – represents an upfront investment in a market with many cash-poor businesses and poor access to finance.
- Crate manufacturers will only take orders of 10,000 or more, while single traders only need 700 crates in one truck load.
- Traders must return to northern Nigeria with empty crates, decreasing the amount of sellable goods they can carry on the return trip.

Solutions
- Transition from donor-supported model to commercial business model
- Support the growth of businesses that center their business model around crates (i.e. crate leasing companies)
- Introduce local legislation around handling and quality standards in Lagos markets

Relevant actors
Farmer organizations, traders, crate manufacturers, local government, and existing crate promotion programs

More information
Please visit CCAFS Invest or contact Lini Wollenberg (lini.wollenberg@uvm.edu).

Duncan Gromko (Duncan.gromko@unique-landuse.de) from UNIQUE forestry and land use conducted the research in partnership with CCAFS. CCAFS is carried out with support from the CGIAR Trust Fund and through bilateral funding agreements. For details please visit: https://ccafs.cgiar.org/donors.