Business model for the introduction and sustainable promotion of postharvest management technologies for smallholders

ZeroFly® Hermetic & Jumbo/ Vestergaard SA

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CoP on Food loss reduction online discussion
Introduction: Context of the business model

Overall goal of the project: Reduction of post harvest losses from 70%-100% to <10% in storage over 3+ months and make safe storage affordable for the most vulnerable – i.e. the future bread basket of the world.

Project Outcomes: Protect commodities for >3 months, allow farmers to sell food and use food at time points most appropriate to their business and personal needs. Create a protective storage bag that is retailing at approx. 1 USD; Create a jumbo bag that can provide a inexpensive (approx. 25 USD) replacement for metal and plastic silos for vulnerable communities.

Implementation timeline: All five trials are expected to run for approx. 9 month to 12 months.

Geographical Coverage: SSA & India, Nepal

Target population (number of households or beneficiaries) approx. 1 million: small holder farmers are the target group – including women’s groups

Budget:
- Overall project budget: approx. 90,000 USD accross five trials – this does not include product development or any staff or administrative costs.
- Budget for the activity related to storage equipment introduction and promotion of the equipment (trainings included and related costs): 30,000 USD (if the activity on post-harvest technologies is only one of the components of a broader project)
Approach and principles

1. Understanding the problem – designing a solution/ prototype tool that fits the target audience need/ project scope/ Target product profile;
2. Pilot scale testing - data generation;
3. Optimise solution/ tool for the user and the supply chain – including production activities to reduce aspects such as waste and processing to reduce costs;
4. Demonstrations & pilot scale testing;
5. Stakeholder advocacy and awareness building – FAO Category
6. Registration and market entry priming activities;
7. Sales related activities - large scale impact vs. pilot scale;
8. Product Launch and Scaling activities – affordability, availability, accessibility and adequacy of food.
Project Milestones

The project has followed the following steps;

• **Product Scope** – Defining the gap in currently available tools: an affordable postharvest loss mitigation tool that stops insects trying to enter the container AND kills insects already within the grain stored in the container, removing the need for hazardous application of further insecticides, particularly fumigation;

• **Prototype Development** – Defining from the product scope, key target pests, and the safest and most effective active ingredient to mitigate these pests; Defining the most affordable polymer carrier for the active ingredient, that also encompasses robust physical characteristics required; Defining any required additives for specific special performance parameters – such as Ultra-Violet resistance;

• **Data Generation** - Testing for any negative toxicological and residue impact on grain and consumers of grain that are stored in the container; rigorous, relevant physical, chemical and bioefficacy evaluations to ensure the product is fit for purpose and for the environment within which it will be used, for example at household level in India or Sub-Saharan Africa (SSA); Confirmatory evaluations of shelf life and lifetime of the product;

• **Stakeholder Advocacy/ Awareness Building**: Regional & Global awareness building activities; including creation of FAO Category for Long Lasting Treated Storage Bags (LB)

• **Production Activities** - Product optimization, reducing waste and improving efficiency; thus increasing affordability and availability.

• **Registration Activities** - Map regulatory guidelines and working with country regulatory bodies of the focus countries to define the new category of product being proposed and suitable testing methods – SSA, SE Asia, India, South America, Mexico, USA; Specification fixing, dossier finalization and submissions - following full testing of product;

• **Sales Related Activities** – Market research, understanding of the market segment, supply chains, competitor evaluation, pricing, placement, distribution networks, priming the market;

• **Product Launch** - Within the target country; marketing, training and wide spread workshops – organized with partners from the Government departments – country and regional level, USAID, and various NGOs.
ZeroFly® Portfolio

The ZeroFly® Portfolio is a family solutions to tackle global food insecurity with a focus on post-harvest storage loss.

The innovation is to use long-lasting slow release chemical incorporated polymers in combination with modified atmospheres to significantly reduce insect, rodent and fungal damage to food.

There are several tools and technologies on the market that offer some level of relief from post-harvest losses, however the majority are out of the reach of the small holder farmer who is the backbone of Food Security in Sub Saharan Africa.

An affordable and effective solution is still required by this most vulnerable and hard to reach group.
ZeroFly® Hermetic & Jumbo

- The ZeroFly® Hermetic & Jumbo are solutions aimed at tackling global food insecurity, focusing on post-harvest storage loss.
- Size specific innovations using long-lasting slow release chemical incorporated polymers in combination with modified atmospheres to significantly reduce insect, rodent and limit fungal damage to food.
- This technology has been modified to provide solutions that can protect all people facing food security issues; from the small holder farmer or household level, to food aggregators or medium size farmers, to country level strategic grain reserves.
Market Entry Strategies

The following strategies have been applied:

Seed, Import, Food Security Stockholding:
• Finished rolls sold to selected bag manufacturers

Small, medium and large holder farms:
• ZeroFly® with or without Hermetic inner liner
• ZeroFly® Jumbo Bags
• ZeroFly® Plastic Sheeting
**Market Entry points:**

- Bag importers or manufacturers
- Input distributors
- NGOs
- Government agencies
- Traders, Dealers, Processors, Exporters,
- Shipping lines
- Banks

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<thead>
<tr>
<th>Product/Segments</th>
<th>Distribution method</th>
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<tbody>
<tr>
<td>Seed Strategic Grain Reserves USD 0.80 / pcs</td>
<td>Direct sales via Agents and/or sales via country distributor</td>
</tr>
<tr>
<td>Small Holder Farmers USD 1 / pcs</td>
<td>Sales via distributor who sells to NGOs who runs subsidy scheme or who sells to farm institutions/outlets directly</td>
</tr>
<tr>
<td>Medium Holder Farmers USD 60 / pcs</td>
<td>Sales via distributor who sells to NGOs who runs subsidy scheme or who sells to farm institutions/outlets directly</td>
</tr>
<tr>
<td>Processors where one yearly harvest require storage USD 25/pcs</td>
<td>Direct sale via Agents or sale via distributor to processors who needs to store in order to produce all year around</td>
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Typical route of a storage bag - getting to the smallholder farmer
## Distribution model for ZeroFly® ex duty

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<th>Hermetic 1.0</th>
<th>1.20</th>
<th>1.50</th>
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<tr>
<td>Hermetic 2.0*</td>
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<td>0.63</td>
<td>0.75</td>
<td>0.98</td>
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### Donor funded subsidy

- Vestergaard SA
- Country importer & distributor
- NGO or small holder wholesaler
- Small holder retailer
- Small holder farmer

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- Hermetic 2.0* is marked with an asterisk (*) to indicate a specific condition or characteristic.
Key next steps to ensure success:

• Our key development target over the next 6 months is to focus on reducing the production cost of ZeroFly® Hermetic solutions. The main focus of this research is to reduce the amount of plastic used. Hermetic bags were made widely known through the PICs programme, with a triple layer technology that uses a relatively large amount of plastic. Double bag hermetic products, such as GrainPro have a multilayer liner, but it is required to be a certain thickness to remain effective, due to insect and rodent penetration from the outside.

• The prices of the currently available hermetic bags doesn’t allow much % profit for the trade of the bag along the value/ supply chain, this is unrealistic, particularly in these markets and arguably why they have not reached “scale” yet.

• ZeroFly® Hermetic & Jumbo offer an opportunity for having a thinner liner, since they have a protective outer barrier that reduces rodent attack and insect penetration. This means that the optimized product can less kilograms of plastic overall, this reduces price, impact on the environment, and supports optimizing production processes. It will provide a product with a price point similar to current storage bags, and a silo type bag that is one tenth of the price of other silos, and so they can follow the same/ similar value/supply chain and trading routes as standard polypropylene woven bags and post harvest protectants.
Challenges and solutions adopted

Global hunger affects nearly a billion people and, as we approach 50 years post the Green Revolution, it is clear food security remains a global problem with 1 in 8 people still going hungry. An estimated 10 to 30 percent of worldwide annual food production is lost during post-harvest processes. This impacts the farmer with loss of profitability and has a detrimental effect on global food security. According to the World Bank, a 1% reduction in post-harvest losses corresponds to a gain of USD 40 million, with farmers as key beneficiaries. The value of post-harvest losses in Sub-Saharan Africa alone is nearly USD 4 billion a year out of an annual grain value of USD 27 billion.

Storage is the most critical post-harvest operation.

- Deterioration of the grain quality during storage can be due to improper storing conditions, which leads to contamination with fungi or insect infestation.
- Using the same bins or bags year after year without proper hygiene, provides a continuous chain of infestation. Insects can hibernate or even continue to feed on wooden structures of the store or hide between holes and cracks in the walls. They can then re-infest the new crop in the same store and resume feeding.
- Storage of uncovered, previously harvested crops next to those newly harvested, can also result in insects spoiling the newly-harvested crops. A primary source of infestation of the stored crop is the field where the crop has grown.
- Limited success in reducing post-harvest losses at scale highlights the need to provide best practices, new technologies and practical recommendations to reduce losses.
- Current tools have challenges with correct use of pesticides and repeat intervention. Fumigation is common practice but it is a volatile pesticide. The most common deficiency in fumigation is the neglect of hygiene and stock management, resulting in the necessity of frequent fumigation. Consequently, there are hazards of excessive bromide residue accumulation in the grain.
Barriers to achieve impact/Key recommendations in terms of policy development & enabling environment for the business model to ensure success

1. Taxes and Duties in country for imported products increases the prices significantly
2. Subsidy schemes may have differential success in different countries, regions, markets and segments, and there will need to be a close tailoring process with each expansion of the project.
3. Further market knowledge of the segments will be required to prioritize product registration and initial sales efforts, to allow the required focus for success since the Food Security sales force is a relatively small team.
4. The storage bag market has a lack of regulation, for example for OTR there is no regulation on the product for current suppliers receiving donor funding. In the future it will important that there is a standard and it is enforced – even more so for products receiving public funding.
5. Product optimisation as the price on the current bags is too high for some segments compared to ordinary bags
6. Exploration of which “finished good” should be sold to the customers at different stages in the supply chain - providing rolls rather than finished bags or full in-country production to reduce lead times from getting orders to delivery of the product in time for sales before harvest.
List of tools/resources for awareness and technology promotion
9-11 Layer bag production from existing technology developed to preserve food using an oxygen barrier

https://www.youtube.com/watch?v=JiFNGAfmyeY
• Only product available in the market that kills insects (internal infestation and external infestation).

• Due to chosen technology the thickness of the hermetic inner bag can be reduced while maintaining same tear and bursting strength of the market norms. Escaping insects and insects wanting to enter bag will be killed prior to puncturing the bag – significant cost advantage due to two technologies chosen.

1 mm EVOH has same Oxygen Barrier properties as 10 meter of PE

This dual technology brings the potential of a unique price point of USD 1 retail product due to ZeroFly® technology protecting the hermetic inner liner.