The Upcycling Potential of Fruit and Vegetable Rescue Programs

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Innovative Solutions to Address Food Loss and Increase Access

Reducing food loss & waste

Climate mitigation

Improving LIC nutrition

Research
- Formative research to inform solution design
- Assess landscape existing and emerging solutions
- Low income consumer demand research

Solution design
- Ideation with private sector partners and consumers

Solution Testing: DFV framework
- Desirability: User’s motivation, solves users needs.
- Feasibility: Possible to accomplish in the time and budget allocated
- Viability: Potential to generate revenue and scale
- Impact: Reduces FLW and increases access by LICs thus improving nutrition.

Pilot & scale
- Pilot & scale most promising innovations
- Capex & Opex financing
- De Risking product testing to prove business case.

Year 1 Findings
- In Kenya, 32%-35% of F&Vs produced is wasted e.g mangoes, tomatoes and African leafy vegetables
- Losses are driven by seasonality glut, poor transport and handling practices by aggregators, poor packaging, and limited cold storage.
- Tier 1 traders are priority market actors for FLW reduction initiatives.
- 80% of Kenya produce flows through informal markets changing hands multiple times before reaching consumers.
- Low levels of fruit and vegetable consumption in Kenya with only 2% of Kenyans consuming the recommended daily intake of 400g F&V.
- Average per capita F&V consumption currently at 140g.
- Consumer Products sold in low income consumer markets have <10% F&V.
- >70% % of consumer goods are sold through informal markets/general trade.

Source:
1. TechnoServe analysis and studies
2. World health organization
3. Bill & Melinda Gates Foundation
Most promising FLW technologies and innovations

Case Example of Tomato Value Chain In Kenya where 32% of tomato production volumes are lost along the value chain, equating to ~309K MT of waste in the glut months. Yet we import 6M MT of paste annually from Egypt and China.

**Loss points**
- Smallholder farmers
- Aggregators
- Wholesalers
- Formal retailers
- Informal retailers

**Losses**
- **10%** Fluctuating market access and demand may lead to unsold tomato produce
- **6%** Lack of (cold) storage increases chance of ripening and hence loss further downstream
- **16%** Unsold produce is used as animal feed and given to local communities

**Challenges**
- Fluctuating market access and demand may lead to unsold tomato produce
- Lack of (cold) storage increases chance of ripening and hence loss further downstream
- Unsold produce is used as animal feed and given to local communities
- Ill-equipped trucks and poor handling (e.g., overloaded wooden crates with limited air circulation) accelerate ripening process
- Inadequate handling (e.g., continued over stacking of wooden crates) and lack of proper storage (e.g., sun exposure) leads to spoiled produce
- Demand forecasting capabilities and a strong supplier network reduces waste at the formal retail level to a minimum
- Lengthy supply chain (e.g., high # of intermediaries) and lack of proper storage at retail level leads to quality deterioration and spoilage

**Solutions**
- GAP / Pest management e.g fruit fly traps
- Postharvest handling and storage solutions e.g ventilated packing containers, charcoal coolers, harvesting sheds, tarps, crates.
- Cold storage trucks
- Cold storage - solar
- Plastic crates
- Coating/waxing
- Digital platforms to redirect/rescue excess or unwanted produce.
- Processing solutions to smoothen supply curve
- Internet based platforms that connect buyers and sellers
- Waste rescue and distribution platforms - food banks
- Trucks with mobile processing equipment
- Digital inventory management, shelf life prediction, and business intelligence tools
Challenges and barriers hindering widespread adoption and scale-up

- **Complex supply chains:** Before fresh produce reaches consumers in Kenya, it often passes through a convoluted network of intermediary agents, resulting in price escalation and significant food loss along the way.

- **Data opacity:** While significant research has assessed and quantified food loss at the “farm-gate” level, less focus has been placed on understanding where and how this loss happens throughout supply chains.

- **Seasonality and markets:** Loss occurs inconsistently across time due to seasonality and market influxes, driving falling prices and supply gluts. Buyers are unable to fully incorporate these channels into their operating model due to the unpredictability of supply, and aggregators are often left with large fruit and vegetable volumes they must offload over a short period of time.

- **Infrastructure and technology:** Inadequate access to technologies, like refrigeration, hinders food preservation and production efficiency, while poor road networks and transportation systems limit the movement of food from rural to urban areas.
Tradeoffs implementing individual vs bundled innovations?

Case Example of Tomato Value Chain In Kenya: A phased approach - starting with individual innovations to build capacity and demonstrate value, followed by bundling complementary technologies depending on need and context as resources and expertise grow.

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<td>Enhanced Value Proposition: Comprehensive Solutions &amp; Customer Appeal</td>
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<td>Flexibility: Adaptability &amp; Incremental Adoption</td>
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Connecting Stakeholders to accelerate adoption of innovations

**Financers and Development Partners**
- Discovery/learning phase resource pooling and de-risking by development partners.
- Financers provide FLW/Nutrition loan products as incentives for quick adoption/change.

**Government**
- Create an enabling environment such as improve roads, policies and access to energy etc.
- Data sharing - Improved Supply Chain Coordination on a portal.

**Research partners**
- Contribute to knowledge to an information portal on leading practices that address food loss and waste, commercially viable solutions and impact measurement.
- Cheaper biodegradable material as food is currently distributed in plastic.

**Market development and Food safety**
- Creating Demand: Collaborative marketing efforts can create demand for sustainable products by LICs.
- Support food safety advisory.

**Local businesses**
- Pilot Projects - to test, prototype, pilot and scale solutions that will reduce FLW and improve nutrition.

**Industry leaders**
- Provide knowledge and expertise on FLW solution like cold storage, packing, coatings etc.

**Core partners**

**Supporting partners**
Innovating with the DFV methodology

Ecosystem actors collaborating together to pilot solutions in FLW can increase customer demand.

**DESIRABILITY**
Do consumers want it?

Prototype new products and innovations with consumers

**FEASIBILITY**
Is the solution possible?

Evaluate the technical / production feasibility of new products and innovations

**VIABILITY**
Is the solution financially viable?

Model the financial viability of new innovations over a five-year horizon

After DFV, businesses will need support to make their businesses “investment ready”