YVCCA-event - Cold chain viability

Webinar

22nd of October 2025 – Bas Hetterscheid

WAGENINGEN
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I625S
ecofrost LINK
SokoFresh
SOLAR POWERED COLD
& MARKET ACCESS SERVICES

Wageningen University & Research

THE COLD TRUTH: UNCOVERING THE SECRETS OF (UN)SUCCESSFUL COLD CHAINS

INTRODUCING THE POSTHARVEST ASSESSMENT METHOD

GROWING INTEREST FOR COLD CHAINS & WHITE ELEPHANTS

Source: https://efficiencyforaccess.org/wp-content/uploads/Keep-it-Cool_Oct-2023_2023-10-21-110734_xzds.pdf


ISOKO RYA 'GISENYI'

Dairy Cold Chain Assessment Ethiopia

Table 2: Distribution of milk coolers				
Regions	**No. of cooling tanks**	**Installed capacity (ltr)**	**Functional tanks**	**Utilised capacity (ltr)**
Oromia	88	240,300	37	98,500
Amhara	48	99,700	15	35,700
Tigray	22	47,000	3	6,000
SNNPRs	14	28,000	-	-
Sidama	5	18,000	1	2,000
Somali	1	3,000	-	-
Afar	1	500	-	-
Dire Dawa	1	500	-	-
Total	**180**	**437,000**	**56**	**142,200**

~70% not used

Source: https://a.storyblok.com/f/191310/906d8d8d95/bridge-20milk-20cooler-20survey-20brief.pdf

White elephants

White elephants

Governance & ownership

Technical Over/under design

Wrong product-market (Viability)

No market access (off-take uncertain)

Cheaper imports

Skills & capacity issues

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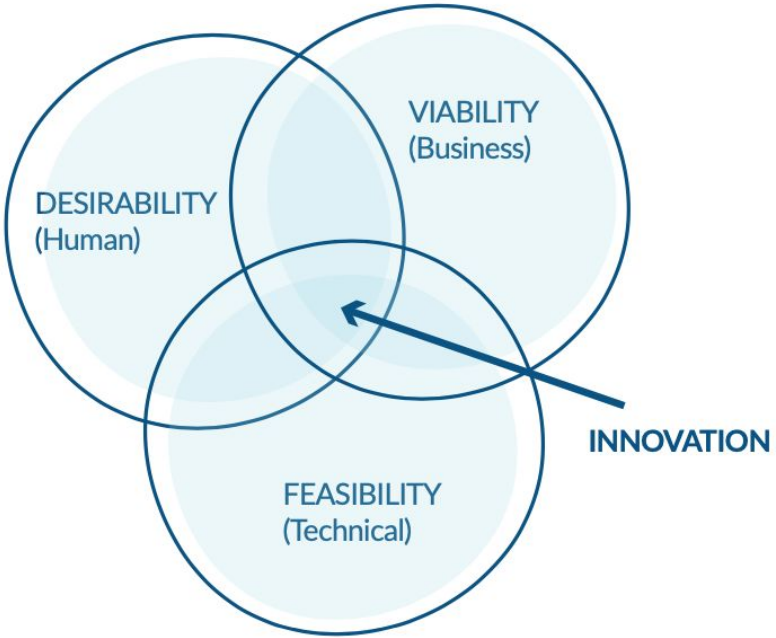
Product-market fit (start-up approach)



Product-market fit on business model canvas

Credits: Strategyzer by Alex Osterwalder

Product-market fit on business model canvas

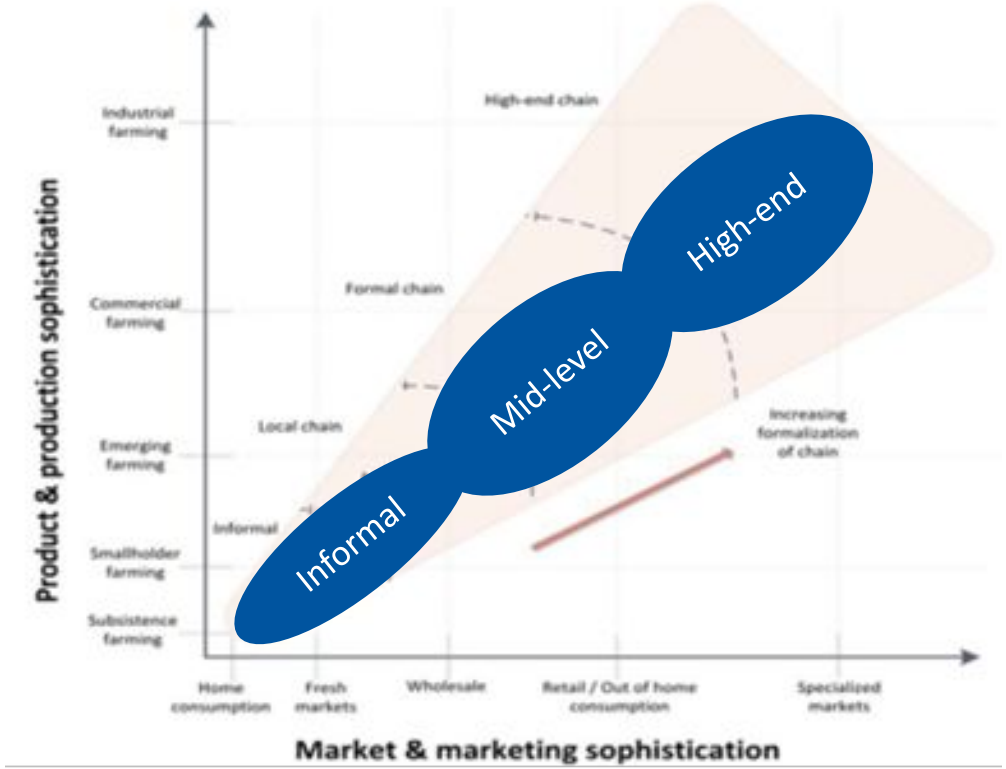
CAAS
Subsidies

Income
Nutrition
Food loss reduction

Credits: Strategyzer by Alex Osterwalder

One-size fits all approach?

Sector development



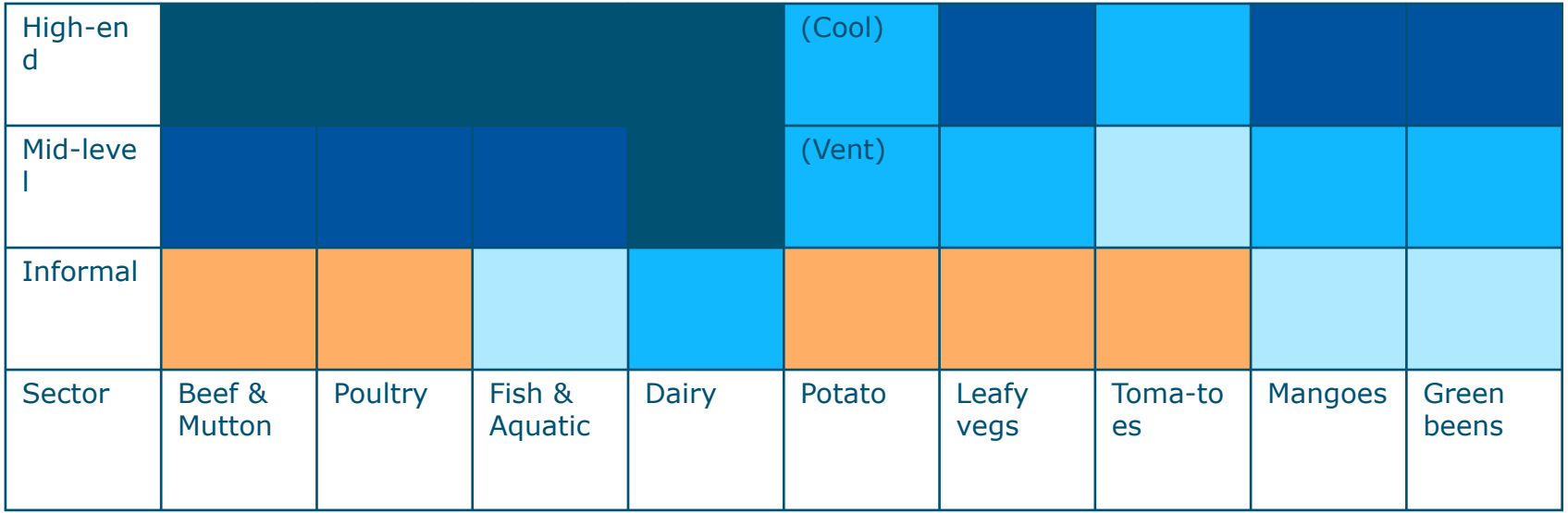
Sector development - Mango

Informal

Mid-level

High-end

Sector development & cold chains



Unlikely	Sporadic	Often	Highly likely	(Almost) always

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Viability of off-grid cooling per sector

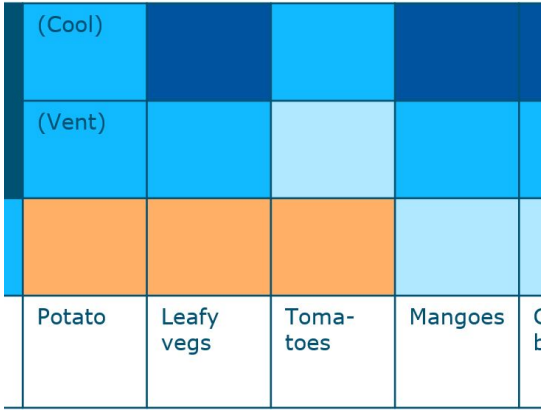
Sector	Off-grid cold rooms
Dairy	High
Fish	Relative high (formal markets)
Green leafy vegs, herbs, peas & berries	Relative high (mid/high-end markets)
Tomato, mango, banana	Low/medium – only for long value chains
Poultry & meat	Low – often connected to bigger capacity slaughterhouse
Potato & onion	Low – More economical alternatives: Passive cooling & ventilation

Source: page 21:

https://gogla.org/wp-content/uploads/2025/04/Beyond-Silos_Strengthening-Nexus-Collabor

3 key take aways

Many aspect influence viability cold chains



Different product, Different value chains

Different cooling need & competing solutions

Thorough assessment and validation needed

https://edepot.wur.nl/582556

Thank you!

More info?

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EFFICIENCY FOR ACCESS

energy saving trust

UKaid Transforming Energy Access

IKEA Foundation

Cold Chain Champion Innovators

YVCCA event –Promises and pitfalls of decentralised cooling

Florencia Azar Sales
Research Analyst
October 2025

ABOUT US

Energy Saving Trust is an independent organisation dedicated to promoting energy efficiency, low carbon transport and sustainable energy use. We aim to address the climate emergency and deliver the wider benefits of clean energy in the just transition to net zero.

Efficiency for Access is a global coalition dedicated to advancing high-efficiency appliances to enhance clean energy access for the world's most impoverished communities. It is co-managed by Energy Saving Trust and CLASP. Current Coalition members have programmes and initiatives spanning 62 countries and 34 key technologies.

LEIA: The Low Energy Inclusive Appliances (LEIA) programme is Efficiency for Access' flagship programme, focused on research and innovation. LEIA is co-funded by UK aid from the UK government, via the Transforming Energy Access platform, and IKEA Foundation.

EFFICIENCY FOR ACCESS RESEARCH AND DEVELOPMENT FUND

- We support innovators to develop affordable, energy-efficient solutions that can help improve clean energy access in sub-Saharan Africa and South Asia.
- To date, our R&D Fund has supported 38 organisations with over £5million in funding over 10 technology types and facilitated a further £1.5million to 12 electric cooking projects.

Efficiency for Access R&D grantee, Adili Solar Hubs

- Our Funding calls
  - Agri-tech call
  - Cooling call
  - Enabling technologies call
  - Open call

CHALLENGES IN OFF-GRID SOLAR COLD CHAINS

PRODUCT-MARKET FIT

Clear understanding of the end-user needs and its link with the value proposition is key. User and demand research, co-development and piloting are essential for design of fit-for-purpose solutions.

COMPLEXITY

Cold chain infrastructure in off-grid areas is very often non-existent. Companies need to develop end-to-end solutions and create market linkages to succeed.

AFFORDABILITY

Affordability remains the biggest challenge hindering a wide deployment of cooling solutions in off-grid areas. Technology and business model innovation need to work hand in hand to close this gap.

PRODUCT-MARKET FIT

- Understanding the gaps in the value chain where cooling can add value through reducing post-harvest losses is key

Savannah Circuit developed a cold chain system fit for rural, first-mile end users through

- Glycol-based cooling technologies for fish cooperatives and dairy farmers
- Co-design and piloting with end-users
- Local partnerships for increased trust and demonstration
- Flexible payment models – Cooling-as-a-Service (CaaS) and leasing

Fish traders carrying Savannah Circuit's EcoSav bag

Mobile milk chiller with Nomad Cans

An Adili Solar Hubs worker moving ice generated by the solar-powered ice maker

COMPLEXITY

- A whole systems approach is required to develop an end-to-end off-grid cold chain
- **Adili Solar Hubs** provides cold-chain services to fishing communities at Lake Turkana.
  - Located at the source of the produce
  - Local community needs at the centre
  - Aggregator of fresh fish model
  - Addressing supply chain gaps
- Impact on the local community:
  - Fisherfolk experienced a five-fold income increase
  - Enhanced access to clean water

AFFORDABILITY

- Low uptake of off-grid solar cooling technologies to date
- Refrigeration based technologies are not a silver-bullet solution
- **CoolVeg's** forced evaporative cooling chambers are low-cost and energy-efficient for pre-cooling of fruits and vegetables.
  - Use of off-the shelf evaporative coolers and locally available insulation panels
  - Careful design of airflow pathway
  - Fit-for-purpose storage capacity for low-income users
  - Partnership with local partners for end-user research and commercialisation

A portable cooling chamber at the farm ga

Extended shelf-life of peppers
Six days inside a cooling chamber vs outs

KENYA COLD CHAIN ACCELERATOR

- Ecosystem approach:
  - Providing financial support for cold chain companies – business model testing and scaling
  - Additional support – technical assistance, research or workforce and skill initiatives
  - Cross-sector dialogue to create an enabling environment

Learn more here

Storage of French beans in Cold Hubs' solar walk-in cold room in Nigeria.

Thank you!

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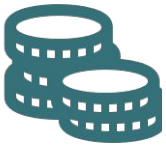
EFFICIENCY
FOR ACCESS

Innovex Cold Chain Experience

- Innovex is a Ugandan technology company that leverages IoT to enable distribution, operation and maintenance of off-grid equipment.
- Remote monitoring system provider for Off-grid Cold Chain Challenge 2022 & Koolboks. Developed AI based predictive maintenance technology under Efficiency for Access R&D grant
- Remote monitoring in cold chains can be used for **distribution, usage optimization though forecast data, predictive maintenance, DMRV, food product traceability, solution sizing though usage tracking**, etc.

INNOVEX
Creating Technologies for Africa

Lessons learned & pitfalls

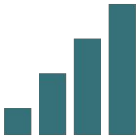


COST

The cost of the remote monitoring solution must fit appropriately in the business model. Functionality must be limited to only crucial features.

POWER CONSUMPTION

The power and energy consumption of the remote monitoring solution must be negligible relative to the overall energy budget of the appliance.



CONNECTIVITY

Connectivity is often unstable, as such, efficient protocols such as MQTT, data minimization strategies and local data buffering must be employed to maintain data integrity.

CARBON CREDITS

Accessing carbon markets typically depends large integrators, digital monitoring and size of project.

TRAINING & ONBOARDING

Training/onboarding of stakeholders is important. Continued support is also key

TRUST & DATA SAFETY

Data security is a huge concern for stakeholders. Standard procedures must be adhered to.

Lessons learned & pitfalls

PREDICTIVE MAINTENANCE & ANALYTICS

Predictive maintenance and other analytics are possible but very data intensive. Necessary parameters include internal and external temperature and relative humidity, power consumption, door state, compressor temperature & vibration intensity.

USER INTERFACING

The best way to communicate with users is though notifications through familiar channels as opposed to dashboards which are still relevant.

INTEROPERABILITY

Interoperability is essential due to high variability of cold chain solutions. It can be achieved using standard interfaces, protocols and modular design.

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