KISAN QUEST

Smart Crate

Team: Swarali Raut & Labanya Dash

THE PROBLEM

30–40% of fruits & vegetables are lost post-harvest in India.

- Current crates:
- Bruising & spoilage
- Poor ventilation
- Cracking during handling-
- Virgin plastic (non-eco)

USER JOURNEY

Loss occurs at:

- Loading/unloading (impact)
- Transport (stacking pressure)
- Mandi waiting (spoilage)

Farm → Crates → Truck → Mandi → Retail → Consumer

CONCEPT IDEA

Current Crates: Issues

- Produce bruising from flat walls
- Crates crack on rough handling
- Poor ventilation → sweating & fungal growth
- No freshness monitoring
- Made from virgin plastic

The Smart Eco-Crate Concept

Features:

- Rounded reinforced corners
- Honeycomb vents for airflow
- Removable natural liner (banana/jute)
- Ethylene absorber slot
- Freshness strip
- Interlocking rim for stacking

Design Goal

- Our Smart Eco-Crate must be:
- Eco-friendly
- Shelf-life extending
- Freshness monitoring
- Strong & reusable
- Modular (2kg, stackable)

Materials & Tech

- Composite: 40% recycled plastic + 60% rice husk/bamboo fiber
- Natural banana/jute liner
- **Ethylene absorber insert (clay puck/sachet)**
- **Clip-on freshness strip** (color-based)
- **Optional QR traceability**

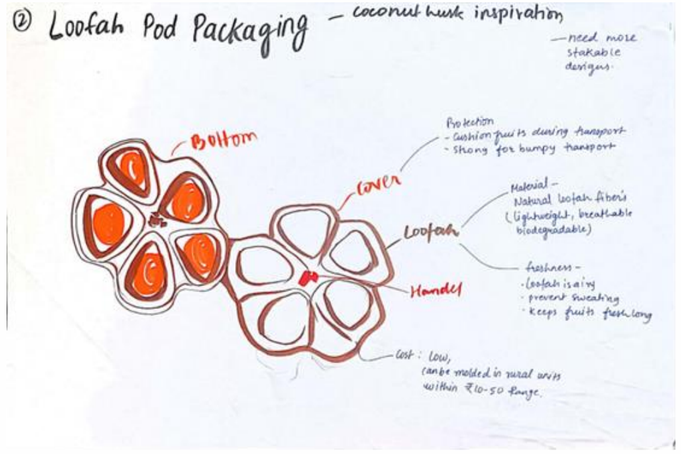
Key Features

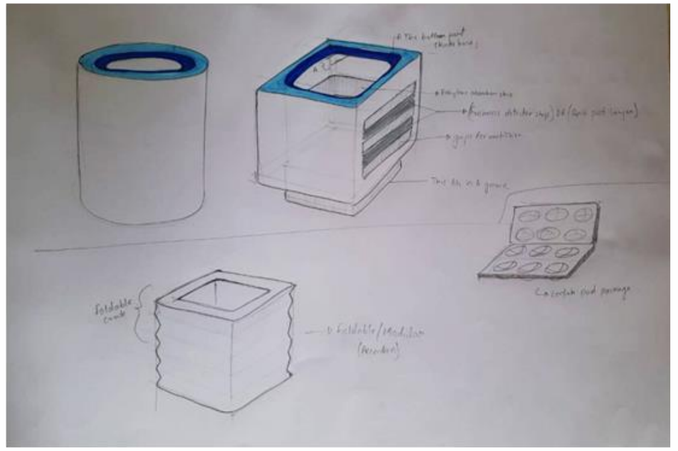
- Extends shelf life by 2–3 days
- **Stackable & nestable design**
- **Modular design**
- Ergonomic handles
- **Reusable for 5+ years**
- Flat lid doubles as retail display

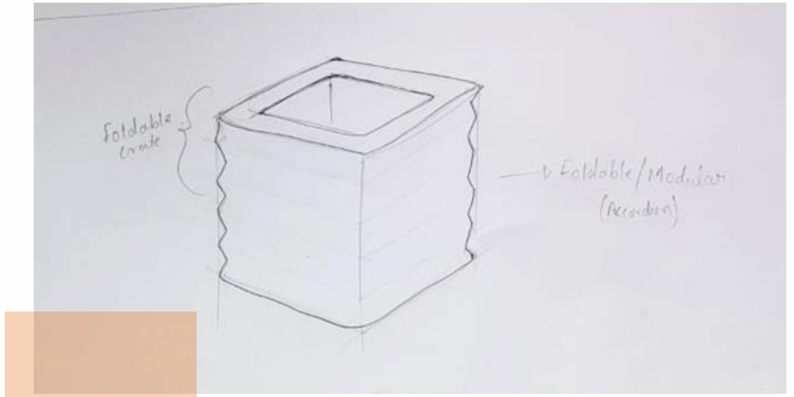
Value & Impact

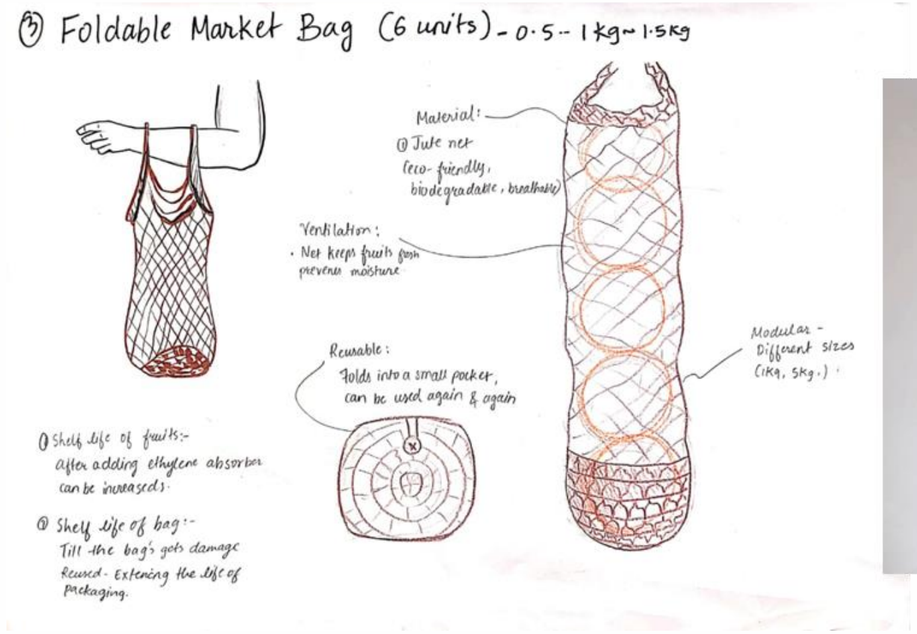
- **Farmers: Less loss, better income**
- Mandis/Traders: Easier transport, durable crates
- Consumers: Fresher, safer produce
- Environment: Eco-friendly, reduces plastic use

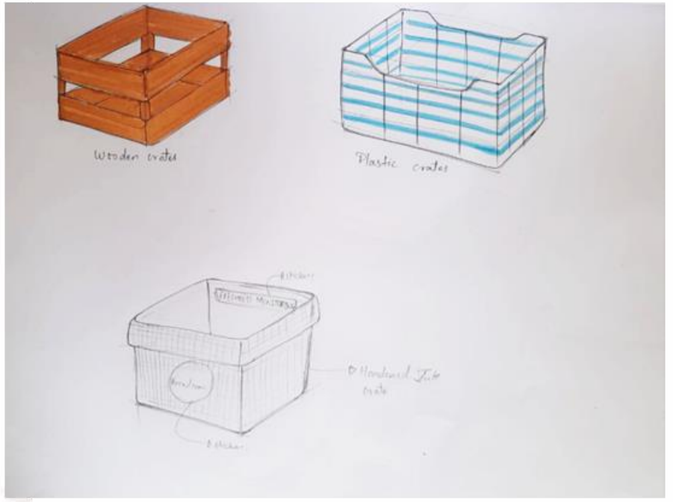
IDEATIONS

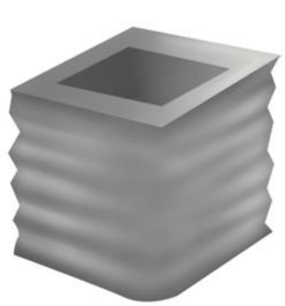

② Loofah Pod Packaging – coconut husk inspiration
– need more stakable designs.
Bottom
Cover
Loofah
Handel
Protection
- cushion fruits during transport
- strong for bumpy transport
Material –
Natural loofah fibers
(lightweight, breathable
biodegradable)
freshness –
- loofah is airy
- prevent sweating
- keeps fruits fresh long
cost : low,
can be molded in rural areas
within ₹10-50 range.

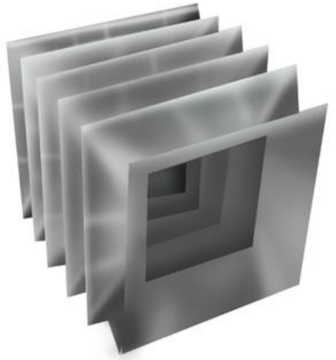

Foldable crate
Foldable/Modular
(Recyclable)


Foldable crate
Foldable/Modular
(Recyclable)

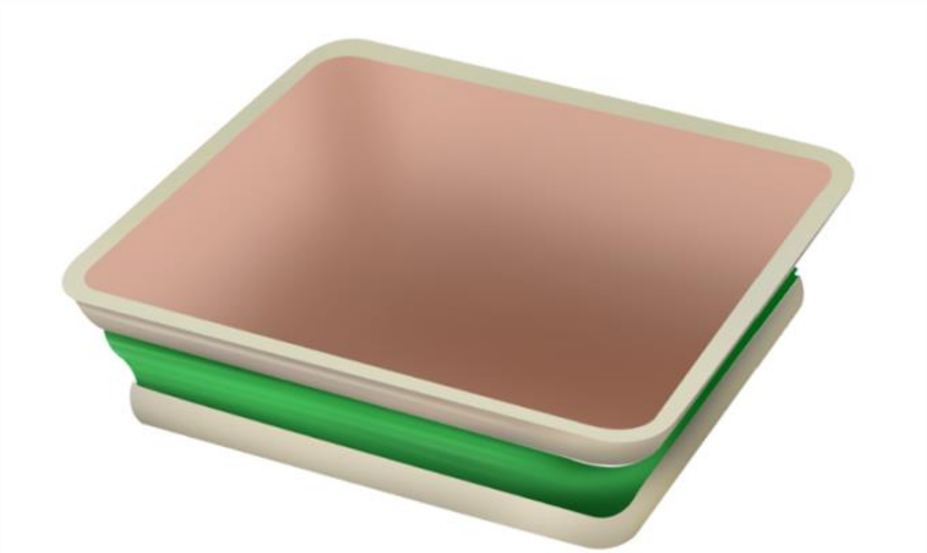

③ Foldable Market Bag (6 units) - 0.5 - 1kg - 1.5kg
Material:
① Jute net
(eco-friendly,
biodegradable, breathable)
Ventilation:
• Net keeps fruits fresh
prevents moisture
Reusable:
Folds into a small pocket,
can be used again & again
Modular -
Different sizes
(1kg, 5kg.)
① Shelf life of fruits:-
After adding ethylene absorber
can be increased.
② Shelf life of bag:-
Till the bag's gets damage
Reused - Extening the life of
packaging.


Wooden crates
Plastic crates





OUR CONCEPT



01 Our crate works like an accordion — pull it up when it’s full of tomatoes or beans, and press it down when it’s half-empty or on the way back. No wasted space, no awkward stacks.

02 Target Audience

- Small & medium farmers / Farmer Producer Organizations (FPO)
- Wholesale mandi vendors seeking reusable, collapsible crates
- Agri-logistics operators & cold-chain companies
- Urban retail chains & farm-to-home startups

03

- Keeps produce fresher, longer. Tiny sensors hidden in the top and bottom quietly track temperature and humidity so you can spot a bad batch before it spreads.
- Easier to move and store. When it folds down, it takes up a fraction of the space, which means cheaper transport and less clutter in storerooms.
- Planet-friendly. We can make it from recycled plastic or a strong plant-based composite—materials that last but don’t trash the environment.
- Made for real users. Farmers, transporters, and shopkeepers get handles that actually fit hands and a crate that stacks securely without wobbling.

04 Top Frame (HDPE plastic)

- Strong, food-safe,
- doesn’t break easily.
- Can be recycled 100%.
- Made using injection molding.
- Cost: around ₹90 per piece.

05 Base Frame (HDPE with anti-slip ribs)

- Holds the weight when crates are stacked.
- Resists water and moisture.
- Made using injection molding.
- Cost: around ₹100 per piece.

06 Side Panels (TPE foldable walls)

- Work like bellows – can fold and expand many times.
- Light in weight and recyclable.
- Made using extrusion or over-molding.
- Cost: around ₹120 for all side panels.

07

Sensor Pockets (top & bottom)

- Small slot to keep freshness strip (₹2–6 each).
- Optional: smart tag for temperature/humidity tracking (₹30–150).
- Helps detect spoilage early and track produce.

Ethylene Absorber Pocket

- A small compostable sachet that slows down fruit ripening.
- Cost: ₹3–5 per trip.

Locking/Stacking Rim

- Made of HDPE.
- Let's crates lock safely on top of each other during transport.

Manufacturing Flow

- Injection mold HDPE top and base frames with integrated sensor pockets and locking rims.
- Extrude TPE bellows and heat-weld or co-mold to frames.
- Add snap-fit handles and hinge pins.

Estimated production cost (pilot run, ~500 units): ₹350–450 per crate.

THANKYOU