CGIAR

INITIATIVE ON
Rethinking
Food Markets

The Rethinking Market and Value Chains for Inclusion and Sustainability Initiative

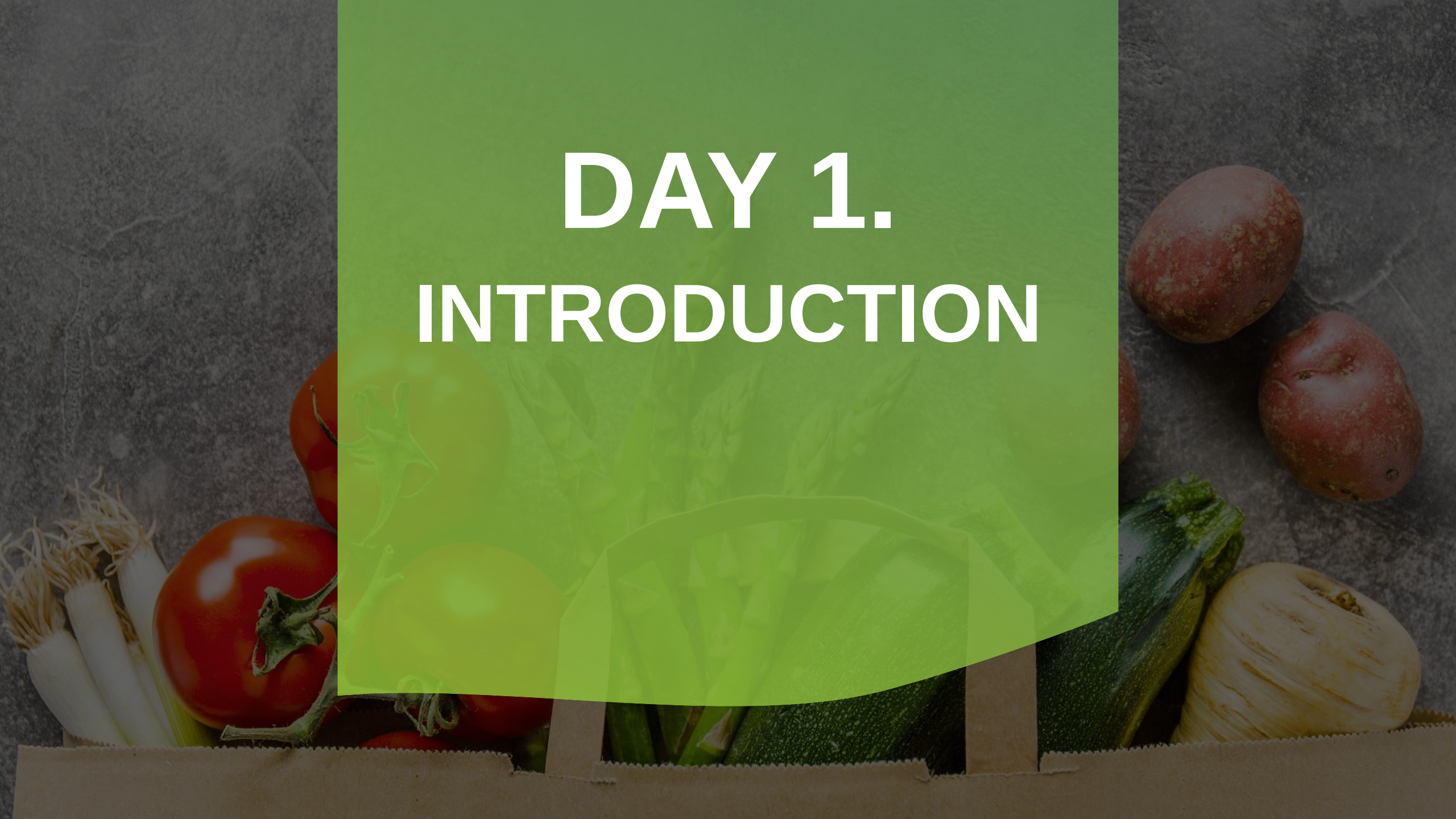
Stakeholder workshop on innovation scaling preparedness and strategy

Abuja, Nigeria
September 25-26, 2024

Objectives

Assess the bundled innovations' scalability and scaling potential, reflect on potential scaling impacts and tradeoffs, and develop the scaling strategy for the innovations.

- Reflect on challenges in implementing and scaling innovations as well as best practices, actionable ideas, and policy changes needed to enable the adoption of innovative interventions,
- Gathering feedback on the potential of these innovations
- Assess and identify scalable innovations,
- Co-design scaling pathways/strategies/actions,
- Mobilize stakeholders' buy-in, resources, and investments,
- Facilitate the forming of scaling partnerships and the innovation ecosystem and
- Enable visibility and uptake of initiative knowledge and other emerging food system innovations research.



DAY 1.

INTRODUCTION

Opening Session

- **Overview introduction:** Bedru Balana, country team
- **Welcome Address:** *Dr. Rob Vos*, Lead of Initiative Rethinking Food Markets
- **Opening Remarks:** Representative of the Permanent Secretary, FMAFS

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Overview

Rethinking Food Markets and Value Chains for Inclusion & Sustainability

Bedru Balana (IFPRI)

Stakeholders Workshop

25 Sep 2024 | Abuja, Nigeria

Challenges in the Food Sector

- **One fifth** of the global economy.
- Not only **largest source of employment** in general, but the livelihoods of most poor people depend on it.
- Food markets and value chains are **changing rapidly**: new products, modernizing distribution systems, and growing use of digital technologies
- **Enormous opportunities** for greater value addition and improving incomes and employment and recover from the COVID crisis, **but only** if we organize markets and VCs in more inclusive ways

➔ ***How can we leverage markets and VCs to address nutrition, livelihoods, and environmental concerns in food systems, all at the same time?***

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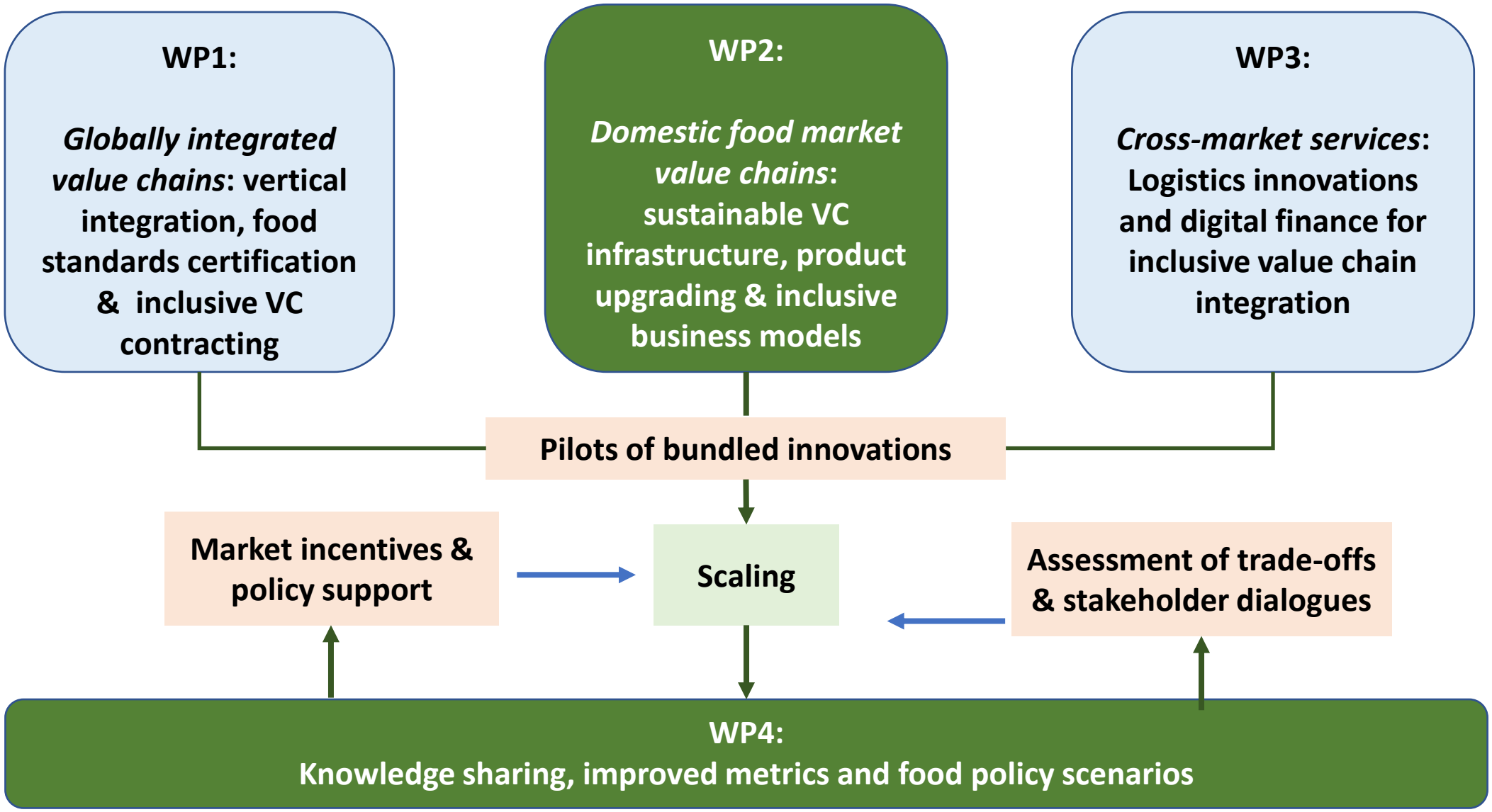
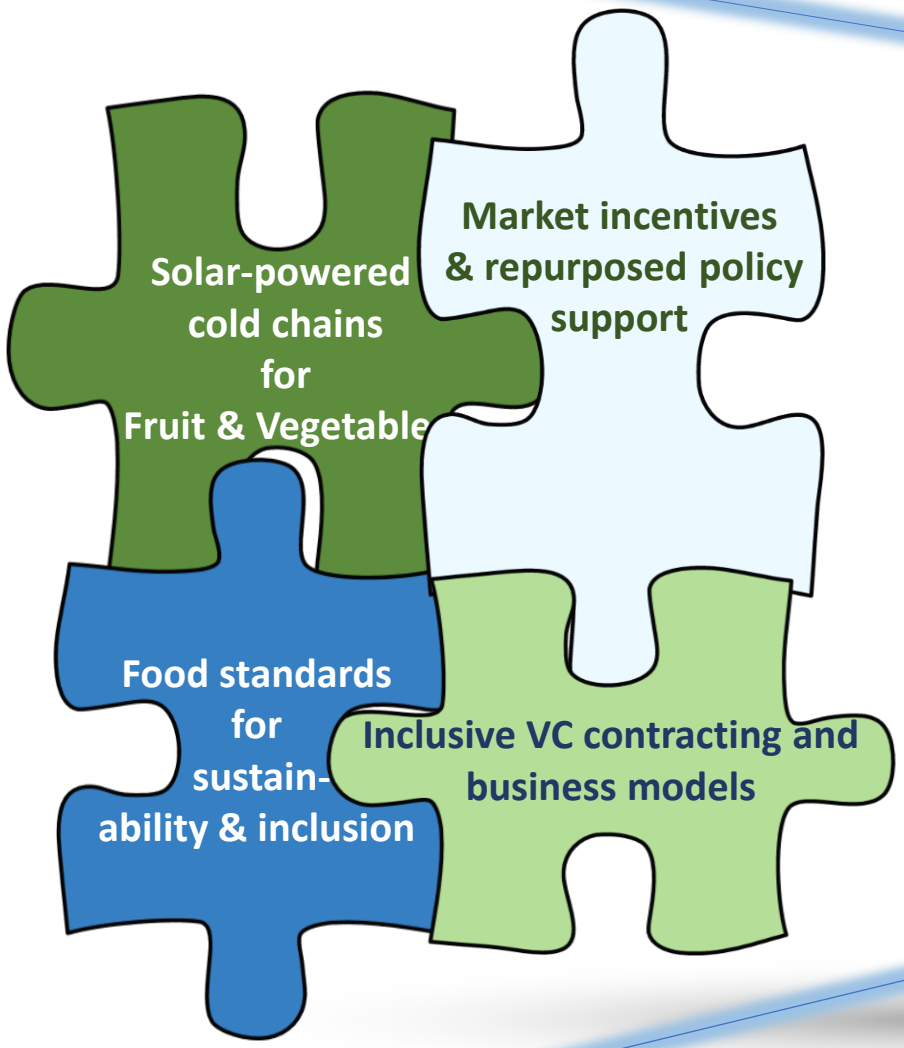
Initiative's Overall Objective

Influence policy and market behavior to create efficient, inclusive value chains with fairer income sharing, greater job creation, and adoption of sustainable practices.

Areas of research & innovation for behavior change in market



Approach: Bundling innovations and interventions



- *More employment and higher incomes (esp. for women & youth)*
- ***Less food loss***
- *Affordable healthy diets*
- ***Lower GHG emissions***

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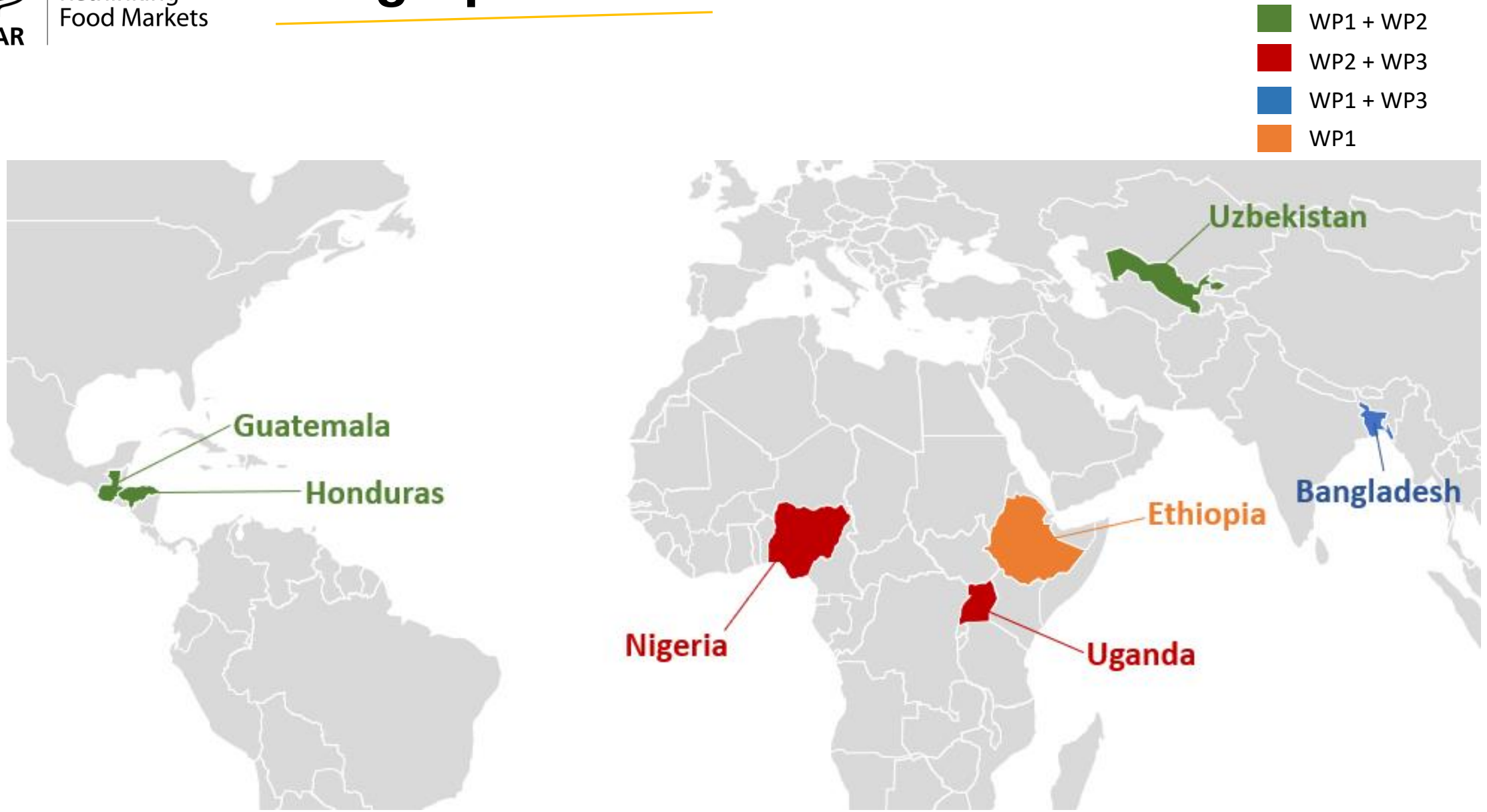
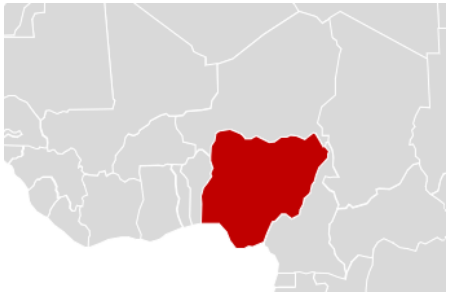
Geographic focus



Nigeria



WP2: Fruits & Vegetables Markets

WP3: Innovating logistics and digital finance

INNOVATION BUNDLES
Improved seeds
Cold chain, plastic crates
Remote monitoring
Solar dryer
Product certification
Improved market information

INNOVATION BUNDLES
Cold storage
E-value chain finance
Market information

CGIAR INITIATIVE ON Rethinking Food Markets

PARTNERS

Public sector:
-Federal Min. Agric. and Food Security (FMAFS)
-State Agric. (Kano, Kaduna, Jos, Bauchi, Gombe, Adamawa, Kebbi, Niger, Lagos/Mile12)

Research/Academia
World Vegetable Center
Wageningen Univ. & Research (WUR)
University of Jos
Nigeria Stored products Research Institute(NSPRI)

Private sector
EWS-KT
Bunkasa Ltd.
Crop2Cash Ltd.
Farmer Association/Group
ColdHubs Ltd.

Financial Sector
FCMB
Stirling Bank

CGIAR Centers
IFPRI, IITA, IWMI, CIMMYT

Rethinking Food Markets Initiative in NIGERIA

The Six Interventions/Innovations/Technologies

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Intervention/Technology 1: Cold transportation for Vegetables

Intervention/Technology 3: Solar dryer (food loss/food safety)

Intervention/Technology 2: Cold storge for perishables

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Intervention/Technology 4: Plastic crates+ plus (Training)

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Intervention/Technology 5: Improved seeds +plus (Training)

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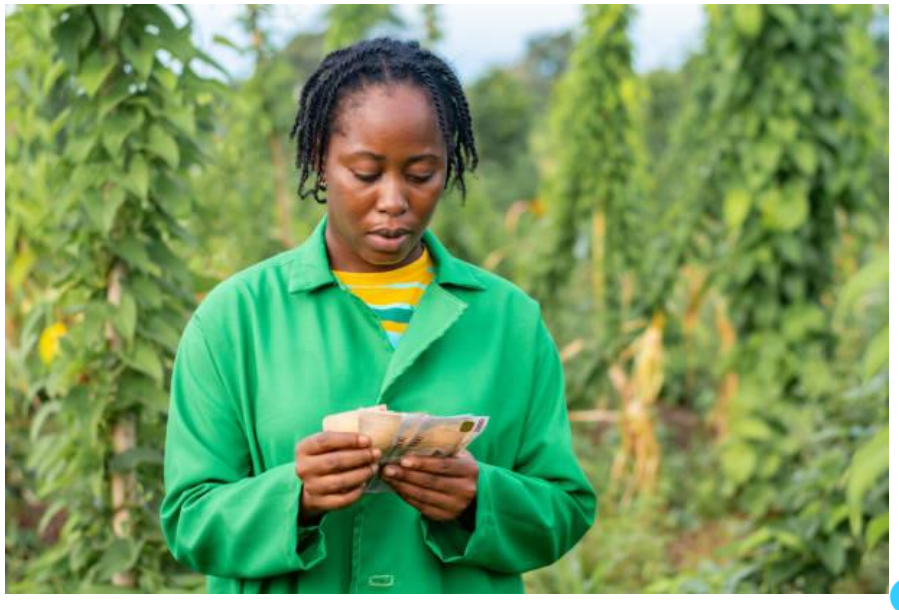
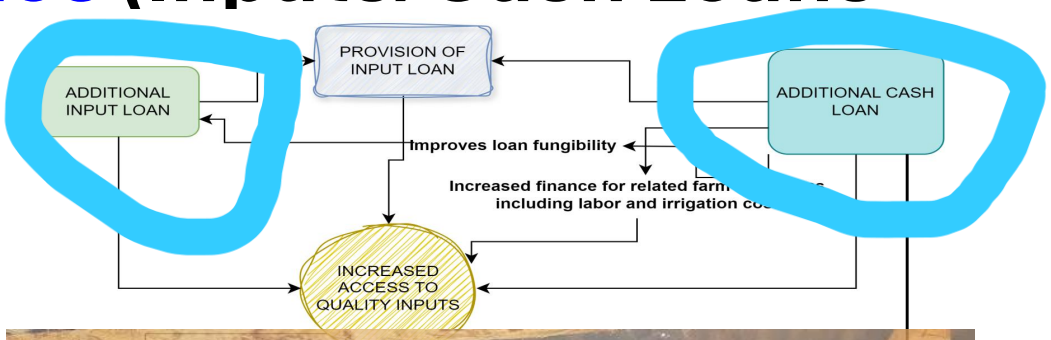
Intervention 6: Agric/Digital Finance (Inputs/Cash Loans





Thank You!

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Opening Session

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Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

STAKEHOLDER WORKSHOP NIGERIA

Abuja, 25 September 2024

Welcome remarks

ROB VOS, **INITIATIVE LEAD**

Food System Challenges

Rethinking Food Markets and Value Chains for Inclusion and Sustainability

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01

Food sector is largest source of income & employment but unable to provide decent livelihoods for billions depending on it

02

Rural and urban workers employed in the agrifood sector only get a small piece of the economic pie and are unable to afford a nutritious diet

03

Weaknesses & inefficiencies in VC are generating poor outcomes for the people and the environment

To address these challenges…

…the ***Rethinking Food Markets*** **Initiative** is generating evidence on innovations, incentives and policies effective for creation of equitable income and business opportunities.

Key Objectives of the Rethinking Food Markets Initiative

CGIAR | Rethinking Food Markets and Value Chains for Inclusion and Sustainability

1

Poverty reduction

…through more employment and better incomes for smallholders and SMEs (especially women and youth)

2

Lower GHG emissions

….in domestic and global food markets and value chains

Less food loss

….and waste through improved quality control and logistics

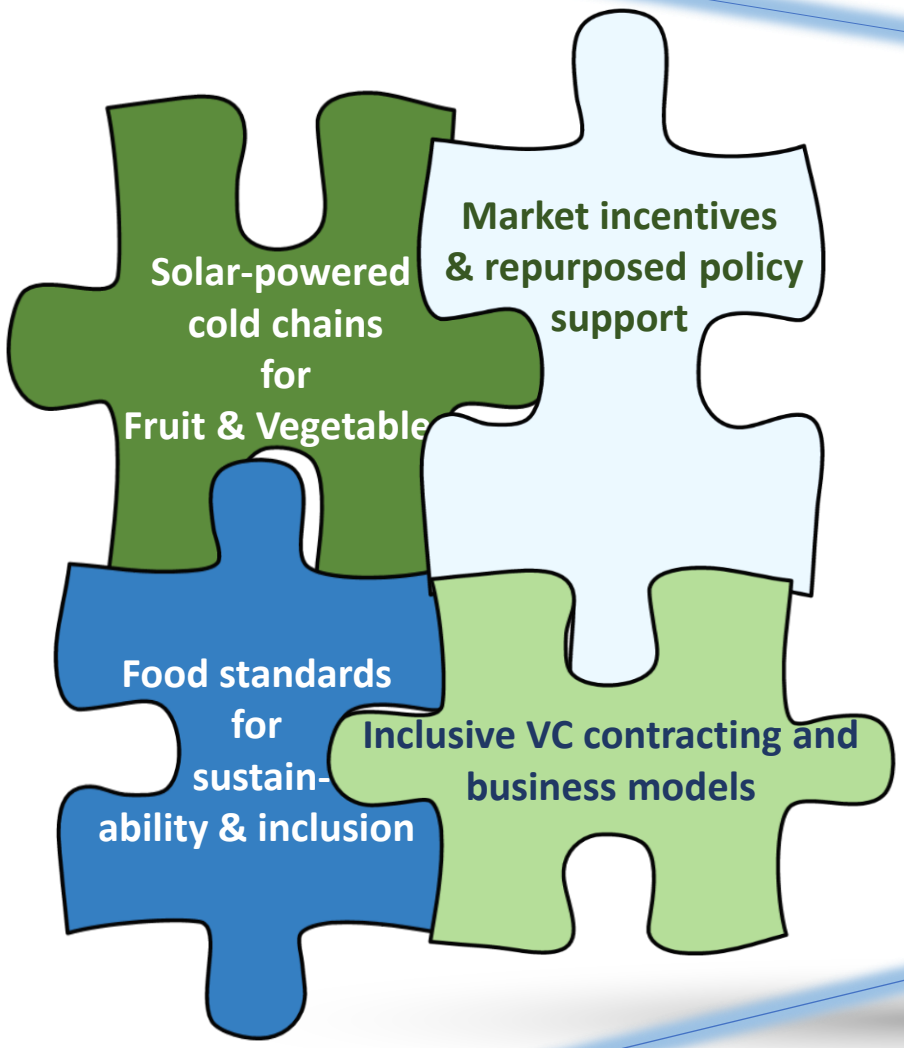
4

Affordable healthy diets

….for poor people and nutritionally vulnerable population

3

Approach: Bundling innovations and interventions



- *More employment and higher incomes (esp. for women & youth)*
- ***Less food loss***
- *Affordable healthy diets*
- ***Lower GHG emissions***

Nigeria

F&V value chain

Targets: Seeds, Logistics & Marketing innovations; Improving returns & efficiency in fruits & vegetables value chains , reduce food losses, improve livelihoods

Research Methods: Impact evaluations of 5 innovation bundles

Innovations:

- Improved seed& branding (WUR/EWS)
- Cool storage & transportation (ColdHubs, U.Jos)
- Labeling (ColdHubs, U.Jos)
- Solar dryers & Mktg/logistics (NSPRI)
- Plastic crates & Mktg/logistics (Bunkasa)

Partners: NSPRI, ColdHubs, Bunkasa, U. Jos, East-West Seeds

Nigeria

F

Flexible digital finance

Target: Increasing flexibility in digital credit products to access to inputs and markets and improve livelihoods

Research Methods: Pilot program evaluating feasibility of top-up loans: cash or inputs

Innovation: Crop2Cash input loan

- ✓ Control
- ✓ Input loan top-up
- ✓ Cash loan top-up

Partners: Crop2Cash, Sterling Bank

Rethinking Food Markets Initiative

Innovation Scaling Preparedness Workshops

CGIAR Rethinking Food Markets and Value Chains for Inclusion and Sustainability

Objectives

- Validate evidence on impacts
- Enhance knowledge sharing and adoption of innovative food system solutions
- Identify best practices & understand challenges in implementing and scaling innovations
- Develop actionable strategies to promote innovation adoption through policy changes
- Assess scaling preparedness and scalability of innovation models
- Identify possible trade-offs associated with scaling
- Co-design scaling pathways/strategies/actions
- Mobilize stakeholders' buy-in, resources, and investments

Country	Location	Dates
Nigeria	**Abuja**	**25-26 September**
Uganda	Kampala	30 Sep -1 Oct
Ethiopia	Addis Ababa	3-4 October
Honduras	Tegucigalpa	22-23 October

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Get to know each other

Program/ Agenda

Activity	Content
DAY 1	
Session 1 (morning)	Sharing and reflecting on innovations and interventions - Knowledge Platform for Inclusive & Sustainable Food Markets (KISM) seminar and survey - Innovation deep dive - Inputs for guideline “creating more and better employment in agrifood system”
Session 2 (Afternoon)	Assessing the innovations’ scalability - How to assess innovation scalability - Assessing the scalability of bundled innovations
	Workshop Dinner
DAY 2	
Recap (morning)	Day one’s activity and progresses
Session 3 (Morning)	Scaling deep dive: - Scaling scalable innovations or improving the scalability of the “not-yet scalable” innovation - Innovation survey
Section 4 (Afternoon)	Developing innovation scaling strategies/pathways
Session 5 (Afternoon)	Exploring collaboration and partnership possibilities
	Follow up action and closing remark

DAY 1. SESSION 1

Sharing and reflecting on innovations and interventions

KISM Seminar:
Sharing and reflecting on innovations and interventions

Introducing Session 1

www.kismfoodmarkets.org

Rajalakshmi Nirmal
Senior Program Manager – Rethinking Food Markets Initiative, IFPRI

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

IFPRI

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Short Survey on KISM

KISM SURVEY (Menti Meter)

This survey is to get users' feedback and understand benefits from the KISM platform and how it can be improvised.

Go to: **www.menti.com**
Enter the code: **4511 7222**

Or use the link below:
https://www.menti.com/alcnpot4xrok

Intervention presentations

INNOVATION DEEP DIVE

Background and Innovations/Interventions

Presentations

WP2: Background and Innovations/Interventions	Futoshi Yamauchi (IFPRI)
Innovation 1: **Cool transportation of perishables (vegetables)** for rural livelihoods and food security	Prof. Bawa Dauda (Uni Jos) Weilun Shi (IFPRI)
Innovation 2: **Cold storge** for perishable products for food loss management	Nnameka Ikegwuonou (ColdHubs) - online
Innovation 3: **Solar dryer** innovations for post-harvest food loss management and food safety	Olufemi Popoola (IFPRI) Kamaldeen (NSPRI) & Caleb (WVC)
Innovation 4: **Plastic crates+ plus** (training/capacity intervention)	Mesay Gurmu (IITA)
Innovation 5: **Improved seeds (tomatoes) + plus (**training/capacity strengthening)	Stellmaris Aju (Wageningen University)
Innovation 6: **Agricultural/digital finance** (Inputs & cash loans interventions)	Opeyemi Olanrewaju (IFPRI) Babafemi Adewumi (Crop2Cash)

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RFM Stakeholder workshop
September 25-26, Abuja, Nigeria

Work Package 2 Domestic Value Chain Vegetables

Futoshi Yamauchi (IFPRI)

Motivations – challenges and gaps

Innovations

- **Process** – new technology
- **Product** – new product
- **Information/coordination**

Bundling – capture complementarities

Interventions – create impacts

Scaling – incentives, development stage, economic environment, entrepreneurship, policy framework

Scoping Study 2022

- Extremely heterogeneous
- Micronutrient rich
- Growing consumption and demand, especially in urban areas in the South, while production hubs remain in the North (regional gaps)
- Significant employment potential along the VC
- Low **productivity** on farm
- **Seasonal plus spatial variations of supply**
- Significant l**oss and waste** at the harvest stage (due to insufficient cold storage, packing methods and materials, cool transportation, varieties used, and poor infrastructure)
- Limited use of modern **processing** methods (due to insufficient and unreliable supply; imported high-quality processed products)
- Weak/poor **market linkages** (coordination failure)

Key challenges / gaps - Stakeholder workshop Dec 2022

Production

- Insufficient access to suitable improved varieties and seeds
- High cost of seeds
- Poor harvesting techniques
- Low adoption rates of Good Agricultural Practices

Post-harvest handling

- Poor product handling at different nodes of the value chain – Improper handling of crates when loading and offloading stacked tomato crates
- Inefficient on/off-farm storage methods (e.g., storage under shady trees and non-ventilated buckets)
- Lack of modern storage facilities and erratic power supply

Cooling

- Insufficient access to cold storage and cool transportation
- High cost of storing in cold rooms
- Lack of appropriate packaging materials (e.g., plastic crates) to store in cold rooms and use cooling vans

Processing

- Lack of efficient processing facilities
- High costs of processing machines/equipment
- Limited technical-know-how
- Limited access to raw materials/varieties with good processing qualities
- High cost of packaging materials (for tomato paste and puree)

Key challenges / gaps (cont'd)

Transportation

- Poor packaging materials that does not support long distance transportation
- Poor condition of vehicles
- Lack of cooling vans to preserve products during transportation
- Multiple informal road taxes

Packing

- Insufficient access to quality packaging materials – poor quality crates in circulation
- High cost of quality packaging materials (e.g., plastic crates)
- Limited farmers and marketers' awareness on the benefits of using plastic crates
- Insufficient knowledge on how to handle plastic crates

Market linkages

- Lack of direct linkage between producers and final consumers
- Poor linkages between producers/marketers and small and medium scale processors
- High commission charged by middlemen
- High transaction and coordination costs for accessing markets (traders, food retailers, supermarkets etc.

Consumers

- Limited awareness on the health benefits of fruit juice as a substitute for carbonated drinks
- Limited awareness/preference for food safety and limited price premium for safe products
- Poor linkages and lack of trust among VC actors

Innovations

Process innovation – loss reduction

- Off grid cooling that reduces loss
- Cool transportation
- Plastic crates

Product innovation – quality enhancement

- Processing that adds values and reduces loss
- Improved seeds

Improved information and coordination

- Market information and linkages
- Certification and labels

Partners – IFPRI, IITA with CIMMYT, IWMI

Wageningen University & Research [WUR] (seeds, research)

East-West Seed [EWS] (seeds)

World Vegetable Center (solar dryer, scoping work)

ColdHubs (cool transportation, solar powered cold storage, plastic crates)

University of Jos (cool transportation, solar powered cold storage, research)

Nigerian Stored Products Research Institute [NSPRI] (solar dryer)

Bunkasa (plastic crates, market linkages)

Farmer groups and market associations (various)

Plant Health Initiative [PHI] (sola dryer)

Government of Nigeria

Government of Japan

RCTs in WP2 Nigeria

Intervention 1 – Improved seeds plus (WUR, EWS, IFPRI)

Innovations: (a) improved varieties and (b) signaling (better info/price → better incentive to adopt)

Intervention 2 – Off-grid cooling: cold storage (ColdHubs, Univ of Jos, IFPRI)

Innovations: (a) solar panels/battery + refrigeration, and (b) plastic crates (technological complementarities)

Intervention 3 – Off-grid cooling: cool transportation plus (ColdHubs, Univ of Jos, IFPRI)

Innovations: (a) refrigeration + transportation, (b) plastic crates, and (c) labelling (quality/price premium)

Intervention 4 – Solar dryer (processing) plus (WorldVeg, NSPRI, IITA, IFPRI)

Innovations: (a) solar dryer, (b) labeling, and (b) marketing/contract (better quality info/chains → premium)

Intervention 5 – Plastic crates plus (Bunkasa, IITA, IFPRI)

Innovations: (a) plastic crates and (b) market info (better market/info → increased returns to plastic crates)

Our interventions

	1	2	3	4	5
Elements bundled	Off-grid cooling – Cold storage	Cool transportation	Simple processing Solar dryer	Improved seeds	Plastic crates cum market infor/linkage
Cooling at markets	X	X			
Cooling in transportation		X			
Processing			X		
Production				X	X
Seeds/varieties				X	
Certification/labels	X	X	X	X	(X)
Plastic crates	X	X		(X)	X
Market (linkage, sales)	X	X	X	X	X
Renewable (solar)	X	X	X		
Coordination (spatial)		X			X

	1	2	3	4	5
Outcome areas	Off-grid cooling – Cold storage	Cool transportation	Simple processing: solar dryer	Improved seeds	Plastic crates cum market infor/linkage
Food loss	x	x	x		x
Add values			x	x	
Allocative efficiency		x			
Productivity				x	
Nutrition	x	x	x	x	x
Income	x	x	x	x	x
Employment	x	x	x	x	x
Scaling up	(x)	(x)	(x)	(x)	(x)

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RFM Stakeholder workshop
September 25/26, Abuja, Nigeria

Innovation 1. Cool Transportation

Dauda Bawa (Univ of Jos),
Weilun Shi (IFPRI),
Futoshi Yamauchi (IFPRI)
Partners: ColdHubs, FMAFS, Japan
WP2, NIGERIA

OBJECTIVES OF THE INTERVENTION

The cool transportation project aims to contribute to connecting spatially distant production/supply and demand (welfare gain), reducing food loss and increasing incomes (efficiency again), improving nutritional outcomes (health gain), and creating employment opportunities (labor market).

Improving spatial connectivity in horticultural value chain; potentially, to create macroeconomic gains through improved (spatial) allocative efficiency if scaled up in Nigeria, where production/supply and demand centers are distant from each other (north/northeast and south/southwest).

OBJECTIVES OF THE INTERVENTION (Cont'd)

Reducing food loss (increasing incomes) in production/supply areas located in north/northeast; if scaled up, increasing consumption and improving nutrition/health (better quality, increased volume and reduced price)

Potentially creating more employment opportunities at origin and destination markets (including transportation sector) and in horticultural production

BACKGROUND

Efficient food value chains from agricultural production to consumers are critically important to achieve a sustainable agri-food system that delivers fresh and healthy foods and human outcomes.

In many parts of developing world, a large portion of fruits and vegetables are reportedly lost and wasted due to lack of cold chain and transportation.

This contributes to post harvest food loss, food insecurity and malnutrition.

BACKGROUND

In Nigeria, about half of fruits and vegetable production is lost because of lack of an inadequate cold chain, cold storage and transportation.

As a result, not only the availability of fruits and vegetables is affected, but also safety and nutritional contents of the food that reaches to consumers.

Efficiency of food value chains, food safety and dietary diversity at the consumer level can be enhanced through cold transportation.

Cool transportation can reduce food loss and wastage which can deliver safer and healthier foods to consumers, especially in southern and southwest regions.

INTERVENTION (RCT)

Introducing cool transportation services with three 20-ton refrigerating trucks in 3 horticultural markets in Northeast Nigeria

Randomized control trial; treatment/control; impact evaluation

Bundled; plastic crates (quality enhancement) and labeling (improved quality signal)


MILE 12 INTERNATIONAL MARKET


NIGER
Lake
BENIN
NIGERIA
ABUJA
CAMEROO
Bight of Benin
Gulf of Guinea
Bight of Biafra
Sokoto
Katsina
Kano
Gusau
Dutse
Potiskum
Maiduguri
Zaria
Kaduna
Bauchi
Gombe
Jos
Minna
Bida
Suleja
Lafia
Jalingo
Shaki
Ilorin
Ogbomosho
Oyo
Ibadan
Abeokuta
Lagos
Lokoja
Makurdi
Benin
Enugu
Onitsha
Owerri
Port Harcourt
Calabar

RESEARCH DESIGN

15 rounds (trips) in each market (one round approximately 1 week)

Baseline (Oct 2023); 600 wholesalers interviewed; 331 willing to participate

Randomly grouped participants (wholesalers); 5 treatment groups (8 wholesalers in each group) being rotated; control group

RCT (Phase 1: Q1 2024 and Phase 2: Q4 2024); each round with a follow-up survey on outcomes in origin and destination markets

RESEARCH DESIGN

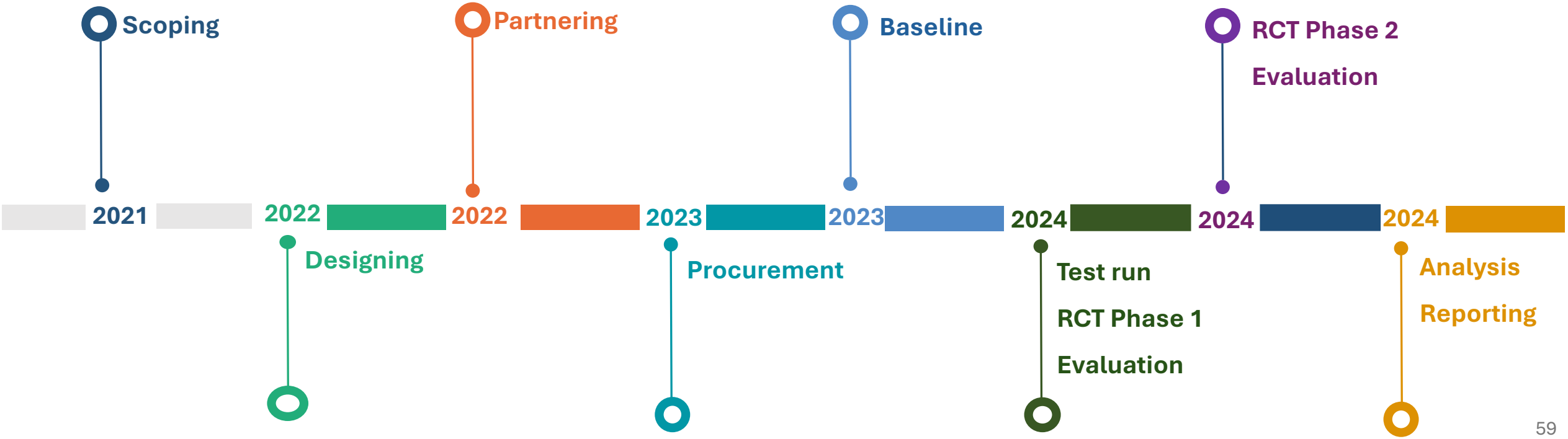
BUNDLED TO COOL TRANSPORTATION

Plastic crates

Labeling

Timeline

- Private sector partner: ColdHubs (2023)
- Government partner: FMAFS (2024)
- CT split into two phases: Q1 and Q4 in 2024
- Baseline: October 2023



Baseline

RCT participants (those who expressed interest in participating in the RCT) are randomly divided into treatment and control groups.

RCT participants and non-participants (both constitute baseline) show some differences; for example, participants are more likely to have access to cold storage, while non-participants with stronger market connections (wholesalers, trade associations).

Treatment and control groups are largely similar (five treatment groups randomly defined, that rotate by round, and control group, a subset of which to follow up).

Three markets

Variable	All markets	Jos	Bauchi	Gombe
Position(Owner)	99.17	97.5	100	100
Attended Training	56.83	37	96	37.5
Used cold-storage	27.67	11.5	51.5	20
Using cold-storage now	4.67	3.5	7	3.5
Is commission agent	67.83	93.5	50	60
Is Wholesaler	91.33	82	93	99
Grow crops by self	32.83	45.5	23.5	29.5
Surveyed in main market	96.33	97	97.5	94.5
Sell in other markets	62.17	58	78	50.5
Crop sole ownership(%)	93.67	96.5	85.5	99
Selling experience (years)	16.79	16.44	15.99	17.94
Producing experience (years)	3.24	4.68	1.76	3.29
Age	40.72	40	44.16	38.02
Household Size	9.19	8.56	9.72	9.28
State Native	86.33	71	97.5	90.5
Education (yrs)	9.08	9.63	8.23	9.26
Has commision agent among relatives	52.5	42.5	54	61
Is member of trade association	91.5	79.5	99	96
Sell tomatoes	60.33	86	19.5	75.5
Quantity of tomatoes sold (kg)	7968.16	12067.41	5192.31	4015.76
Purchase from someone	53.5	67	19.5	74
Store in cold-transport	2	0	4.5	1.5
Store in cold-storage	0.5	1	0	0.5
Store in non-cold container	49.5	70	15	63.5
Own a storage space	41.17	14.5	81.5	27.5
Storage space (tons)	24.09	5.66	34.96	1.56
WTP for cool-transport	1592.14	1884.64	1341.9	1549.9
Estimated current price (oer crate)	9025.5	7824	10767.5	8485
Estimated transportation capacity (crates)	129.32	146.32	91.42	150.22
Expected price (per crate)	26206.67	26030	28410	24180
Concerned about potential transportation loss	99.83	100	99.5	100
Willingness to participate	55.17	64	46.5	55
Number of observations	600	200	200	200

Some observations

Cold Storage and Infrastructure:

- Bauchi leads in cold storage usage (51.5%) and storage space ownership (81.5%) compared to Jos (11.5%, 14.5%) and Gombe (20%, 27.5%).

Tomato Sales and Production:

- Jos has the highest average tomato sales (12,067 kg) compared to Bauchi (5,192 kg) and Gombe (4,015 kg), suggesting larger-scale production in Jos.

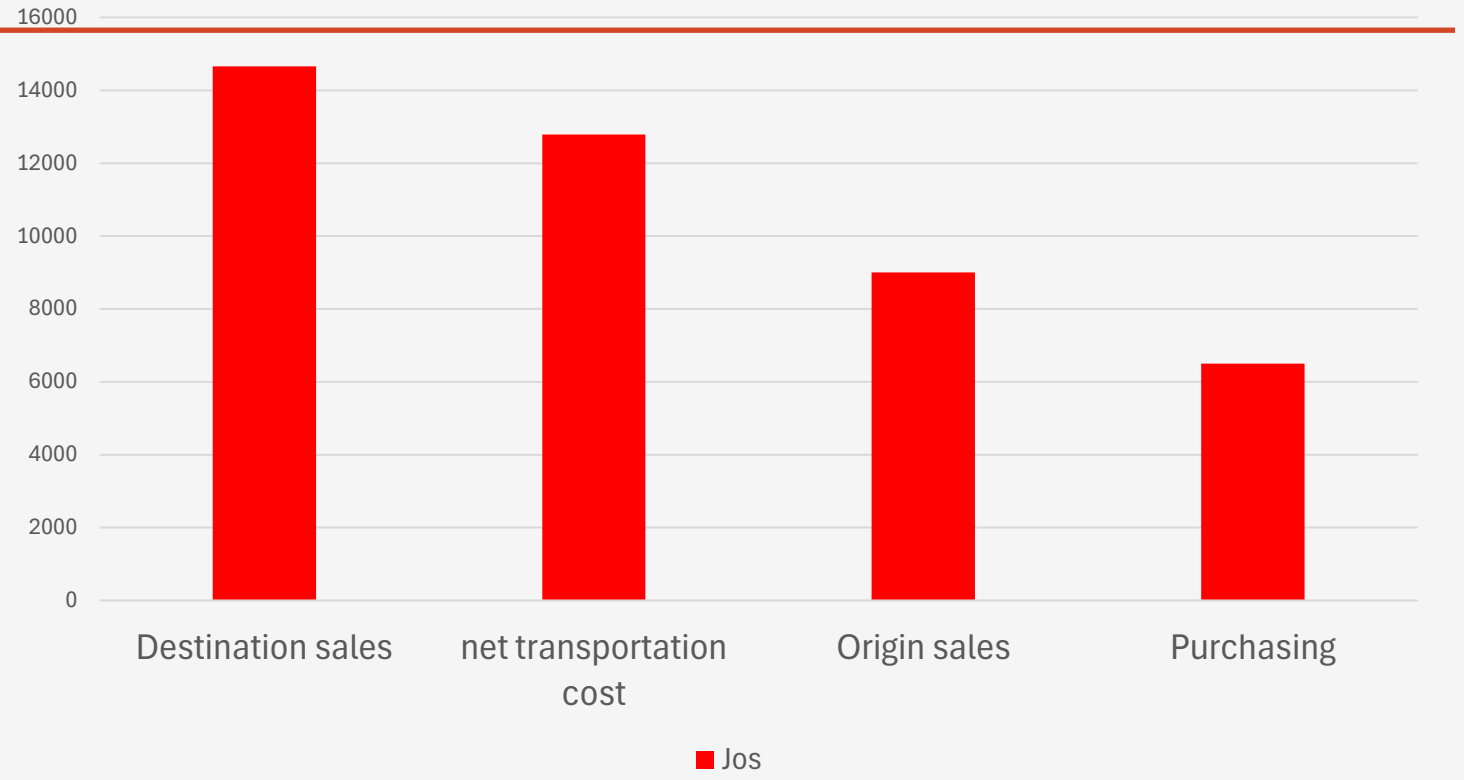
Market and Trade Association Membership:

- Bauchi has strong market integration with 99% trade association membership and 97.5% state natives, while Jos has lower figures (79.5%, 71%), indicating a more diverse workforce.

Group comparisons

Variable	Mean	Treatment	Control	t stat	Participants	Non participants	t stat
Position(Owner)	99.17	97.5	99.05	-0.98	98.49	100	-2.25**
Attended Training	56.83	55.83	50.24	0.98	52.27	62.45	-2.52**
Used cold-storage	27.67	36.67	27.49	1.7*	30.82	23.79	1.93*
Using cold-storage now	4.67	5.83	5.69	0.05	5.74	3.35	1.42
Is commission agent	67.83	69.17	71.09	-0.37	70.39	64.68	1.48
Is Wholesaler	91.33	85	86.26	-0.31	85.8	98.14	-5.9***
Grow crops by self	32.83	26.67	28.91	-0.44	28.1	38.66	-2.73***
Surveyed in main market	96.33	95.83	97.16	-0.61	96.68	95.91	0.49
Sell in other markets	62.17	57.5	55.92	0.28	56.5	69.14	-3.22***
Crop sole ownership(%)	93.67	99.17	97.63	1.15	98.19	88.1	4.78***
Selling experience (years)	16.79	17.48	18.22	-0.7	17.95	15.36	3.69***
Producing experience (years)	3.24	2.55	2.94	-0.63	2.8	3.8	-2.03**
Age	40.72	40.12	40.96	-0.73	40.65	40.81	-0.2
Household Size	9.19	9.92	9.79	0.2	9.84	8.39	3.37***
State Native	86.33	81.67	87.68	-1.43	85.5	87.36	-0.66
Education (yrs)	9.08	8.99	8.91	0.26	8.94	9.27	-1.4
Has commision agent among relatives	52.5	50	55.45	-0.95	53.47	51.3	0.53
Is member of trade association	91.5	86.67	88.63	-0.51	87.92	95.91	-3.69***
Sell tomatoes	60.33	55.83	63.98	-1.45	61.03	59.48	0.38
Quantity of tomatoes sold (kg)	7968.16	7954.4	7858.04	0.06	7890	8066.84	-0.14
Purchase from someone	53.5	49.17	56.4	-1.26	53.78	53.16	0.15
Store in cold-transport	2	0.83	1.9	-0.85	1.51	2.6	-0.92
Store in cold-storage	0.5	2.5	0	1.75*	0.91	0	1.74*
Store in non-cold container	49.5	42.5	51.66	-1.61	48.34	50.93	-0.63
Own a storage space	41.17	34.17	31.75	0.45	32.63	51.67	-4.76***
Storage space (tons)	24.09	20.55	25.43	-1.38	23.57	24.48	-0.24
WTP for cool-transport	1592.14	1454.17	1584.49	-1.9*	1537.24	1659.7	-2.5**
Estimated current price (oer crate)	9025.5	8795.83	8317.54	1.56	8490.94	9683.27	-4.95***
Estimated transportation capacity (crates)	129.32	161.17	167.89	-0.37	165.45	84.86	7.68***
Expected price (per crate)	26206.67	25570.83	23741.71	1.94*	24404.83	28423.79	-5.59***
Concerned about potential transportation loss	99.83	99.17	100	-1	99.7	100	-1
Willingness to participate	55.17	100	100		100	0	
Number of observations	600	120	211		331	269	

A snapshot from the first round in Jos



Returns to cool transportation

Naira per crate (20 kg)

Challenges and lessons learned: operation, research, policy

Challenges

- Seasonality risks: Profitability/returns depend on seasonal fluctuations of supply and price and spatial differences in demand/supply and cost, e.g., glut season
- Various risks: Fuel cost, mechanical/maintenance failure, cooling failure, road accident, police
- Behavioral risks: Moral hazard (driving, maintenance, temperature control)
- Trust: formal agreement, insurance provision
- Initial investment: Initial cost for truck
- Macroeconomic conditions: High inflation rate (32.15%)
- Insecurity/banditry

Policy interventions

- Infrastructure: road quality, road networks, safety reg, police/checkpoints
- Fuel cost & duty/tax: e.g., a subsidy for “cooling” (We are not driving only but also cooling/preserving)

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INITIATIVE ON
Rethinking
Food Markets

RFM Stakeholder workshop
September 25/26, Abuja, Nigeria

Innovation 2. Solar Powered Cold Storage

Futoshi Yamauchi (IFPRI),
Nnaemeka Ikegwuonu (ColdHubs),
Bawa Dauda (Univ of Jos)
Partners: ColdHubs, Univ of Jos

Background: From the scoping study

- Growing consumption and demand, especially in urban areas in South Nigeria (in contrast, production hubs are in North Nigeria)
- Significant employment along the value chains (e.g., household production as well as via enterprises on trading, processing, and transportation businesses, hired casual labor)
- Low on-farm **productivity**
- **Seasonal fluctuations** of supply
- Significant l**oss and waste at post harvest** stage due to insufficient **cold storage, packing methods and materials, cool transportation, variety used and poor infrastructure.**
- Limited use of modern **processing** technologies due to insufficient and unreliable supply (e.g., mango; tomato)
- Weak/poor **market linkages**
- Others

Background: From scoping study (more specific)

Lack of grid electricity

World Bank (2021)

- About 759 million people are without power, and most are concentrated in Sub-Saharan Africa

National Bureau of Statistics (2019)

- In rural Nigeria, only 30% of rural households had access to power in 2019 (this proportion significantly decreases in more remote areas).
- In the Northeast region, 79% of the households have no access to electricity.

Use of PV technology (solar panels)

- Substantial decrease in price for solar panels in the past decade
- Increased potential to electrify in non-grid rural areas

Cold storage intervention: Location, production, electricity by region

Horticulture production (2020)

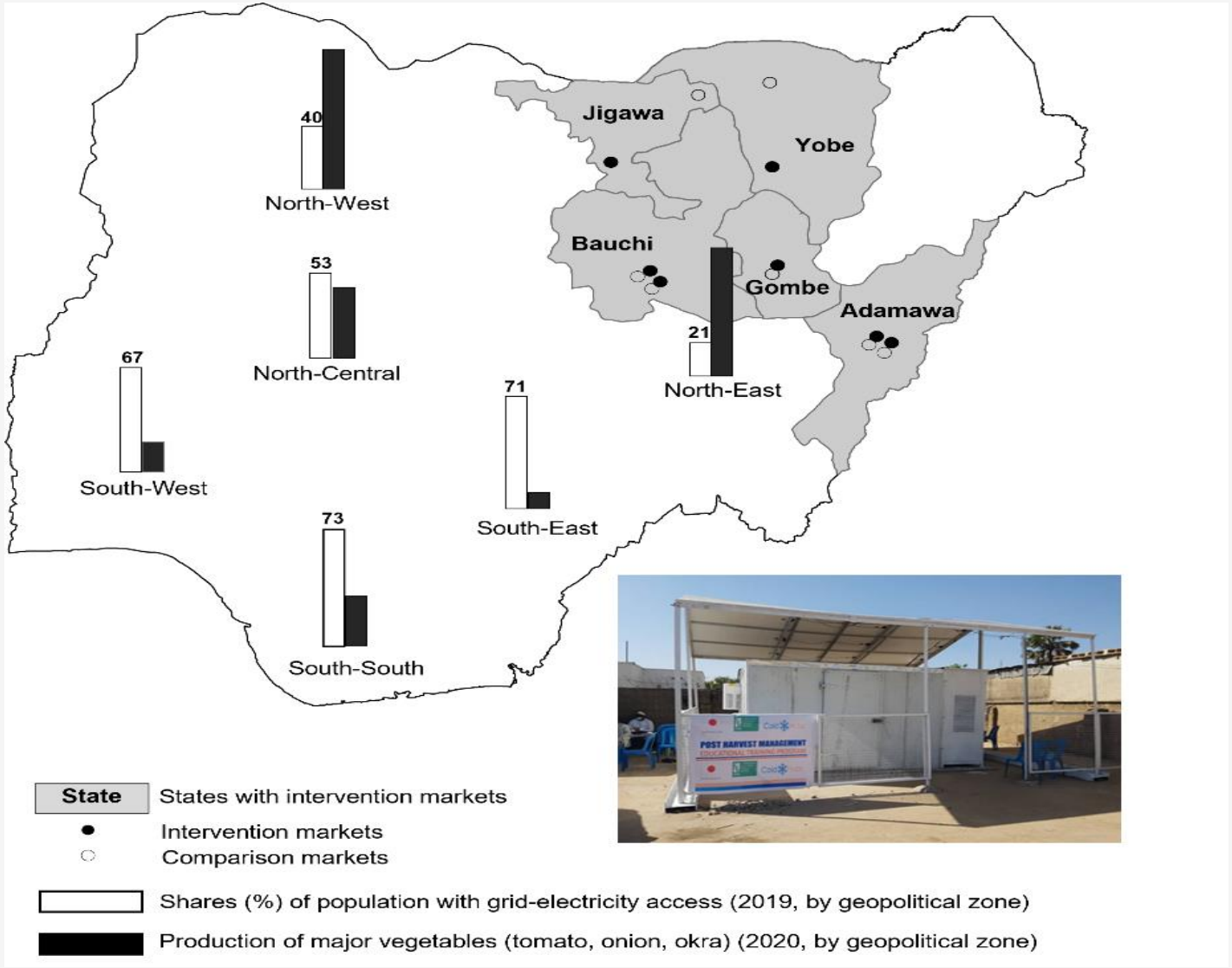
- Concentrated in the north

Grid electricity/coverage (2019)

- Lowest in northeast

Intervention in Q1 2021

- 2 in Bauchi
- 2 in Adamawa
- 1 Gombe
- 1 in Yobe
- 1 in Jigawa



Scenes


Cold Hubs


Cold Hubs


Cold Hubs


Cold Hubs


Cold Hubs


Cold Hubs


Cold Hubs

Utilization

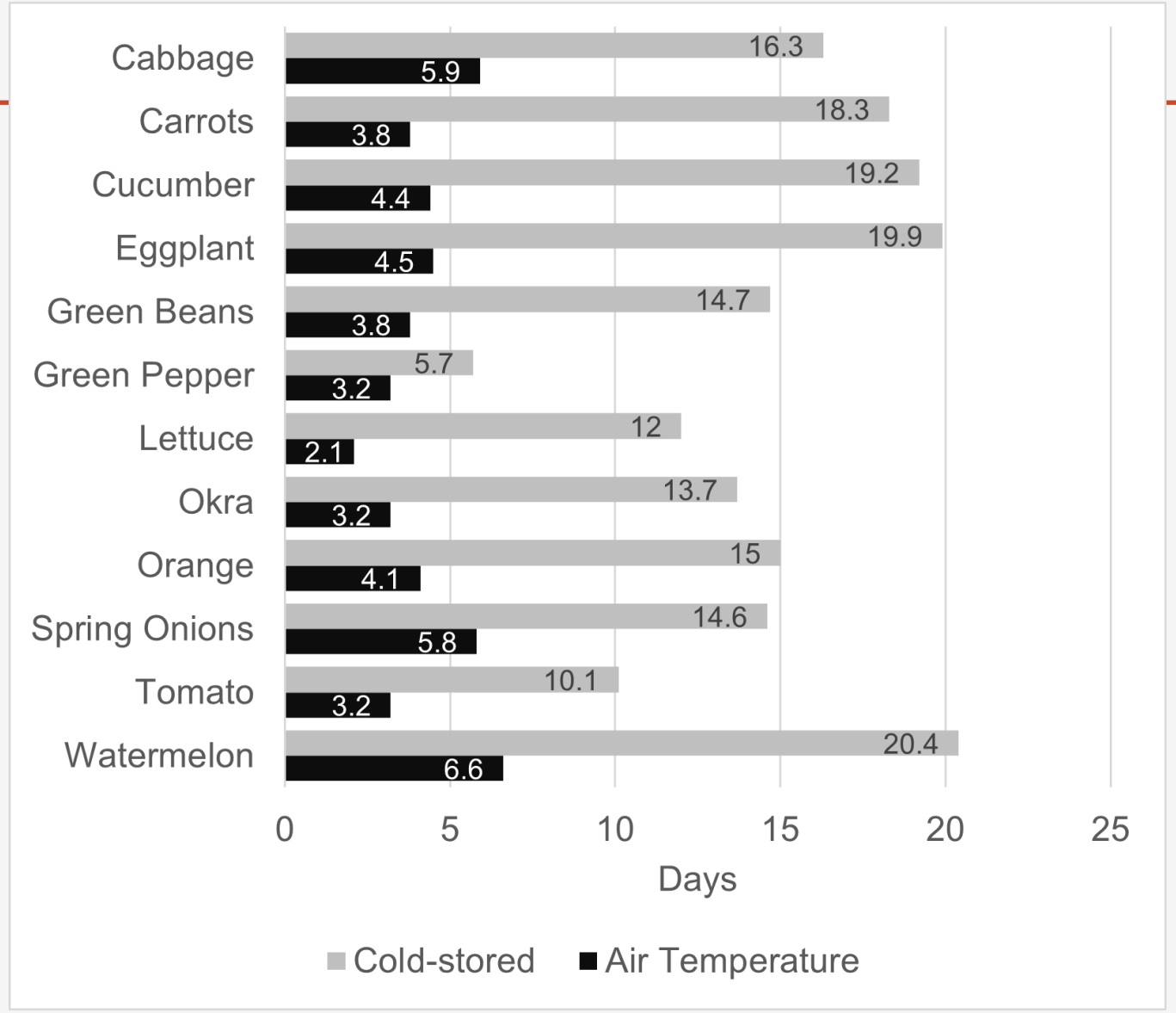
- Quantities of horticulture crops stored (kg)
- February 2022

Horticulture Crops

	Duste Daily Market	Gombe Main Market	Jimeta Ultra Modern Market	Muda Lawan Market	Potiskum Mamudo Town Main Market	Wunti Market	Yola by-pass Market	Total
Tomato	620	410	330	295	1,120	640	86	3,501
Cucumber	184	84	1,194	20	10	60	78	1,630
Lettuce	1,160							1,160
Spring onions (bulbs, green tops)	410	40	80	62	420	65	30	1,107
Spring onions (bulbs)	110	35	70	48	74	120	600	1,057
Cabbage	200	75	161	96	60	84	340	1,016
Carrots	440	60	125	122	94		40	881
Green pepper	42	202	110	84	220	74	7	739
Okra	280	62	10	98	70	140	30	690
Green beans	100	70	210		60		20	460
Pawpaw	140							140
Broccoli	120			20				140
Orange	10	60		30	2			102
Strawberry	60		30			3		93
Watermelon	41					15	10	66
Eggplant	50							50
Grape	30		20					50
Cowpea	10		4				35	49
Cauliflower	30							30
Pineapple	25							25
Spring onions (green tops only)					20			20
Pear			10					10
Total of major horticulture crops	4,062	1,098	2,354	875	2,150	1,201	1,276	13,016

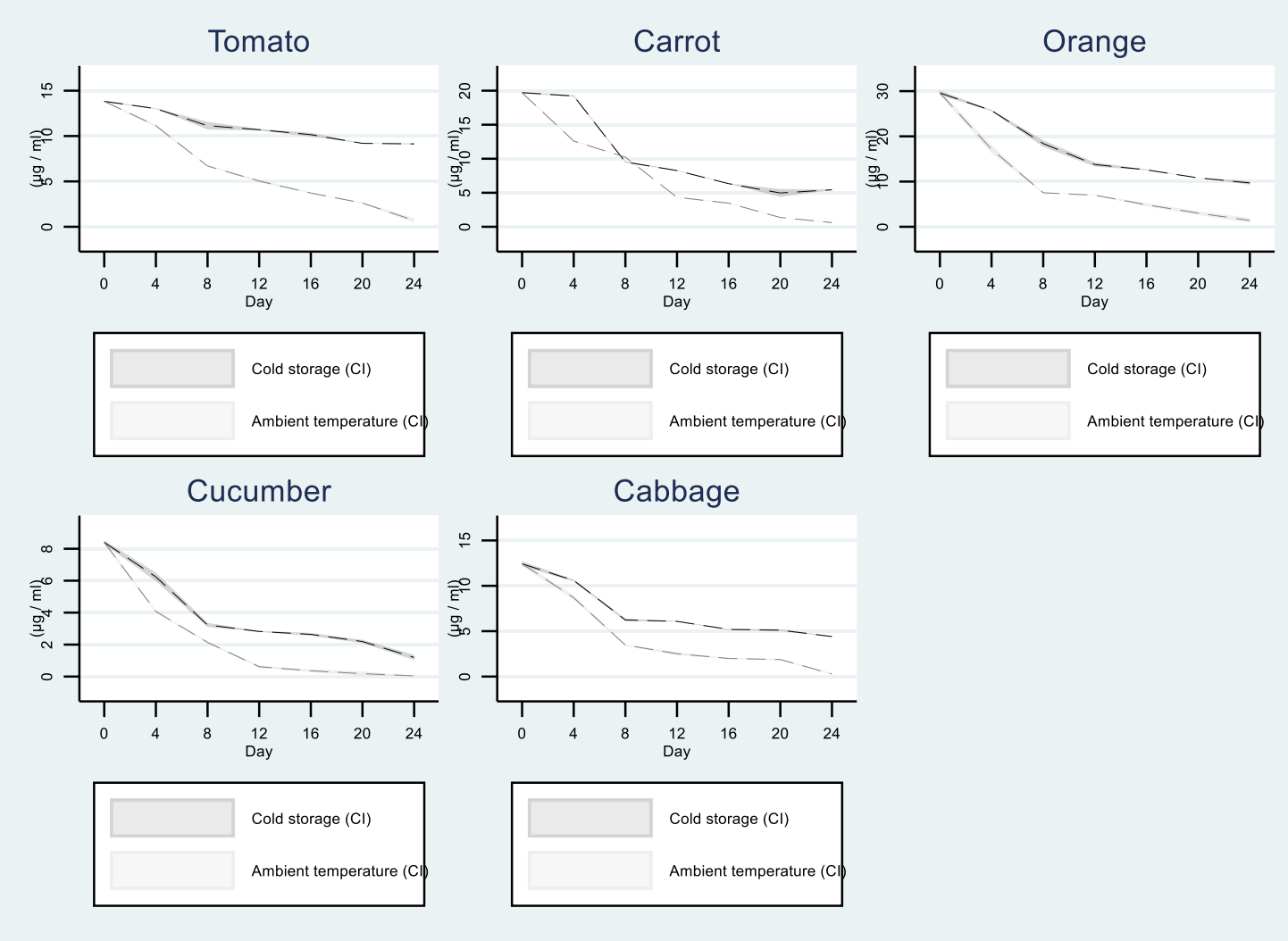
Shelf Life

- Substantial increase in shelf life
- Economic gain (loss, income)
- Food security
- More nutrients
- Health benefits



Vitamin C

- Other micronutrients show a similar pattern
- Retain more micronutrients for a longer period



Impacts: 2020 Dec (baseline) – 2022 Dec (2nd follow up)

Estimation methods	Revenue (gross)	Share (%) of net revenue to gross revenue	Sales volume	Share (%) of the value of loss to total gross revenue[a]	Share (%) of the value of loss to total gross revenue (among cold-stored items only)[a]
	Percent increase	Percentage point change	Percent increase	Percentage point	Percentage point change
Primary method					
Nearest neighbor (4) + caliper (0.01)	64.992** (25.968) [2.30]	7.977* (4.693) [1.40]	63.534*** (15.583) [3.10]	–5.917*** (1.574) [2.90]	–9.144*** (3.285) [2.80]
Robustness check using more consistent but less efficient method[b]					
Nearest neighbor (1) + caliper (0.01)	68.921** (26.426) [2.20]	11.284** (5.739) [1.40]	46.304*** (16.942) [2.00]	–5.477*** (1.866) [2.30]	–7.513** (3.467) [2.45]
Sample-size			678		

Internal rate of return (monthly)

February 2022: wholesale price and Dutse Daily Market utilization data, cost data

Three scenarios in loss %

Findings

- Solar option for refrigeration is comparable to the grid case
- However, the grid is not available in many areas

	Case 1	Case 2	Case 3
Electricity source	25% loss without cold storage, 5-day cycle (turnaround 6 times a month)	20% loss without cold storage, 5-day cycle	15% loss without cold storage, 5-day cycle
Generator with diesel	11.9%	8.3%	5.8%
Grid	39.5%	12.2%	9.0%
Solar	33.2%	11.4%	8.6%

Challenges

Findings

- Impacts: sales, revenues, food loss [Takeshima, Yamauchi, Balana & Bawa, 2024]
- Internal rate of return (private): solar option comparable to grid electricity [Yamauchi & Takeshima, 2022]

Challenges

- The current capacity of 3 tons is too small relative to the supply into markets esp during harvest/glut seasons
- Technological frontier: advanced battery technology as a trigger to enable a significant increase in capacity
- Alternatives to cooling to reduce loss, e.g., solar drying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RFM Stakeholder workshop
25 September, Abuja-Nigeria

Innovation 3. Solar Dryer Intervention

Olufemi Popoola (IFPRI-Nigeria)
Caleb Olanipekun (World Veg)
Kamaldeen Oladimeji (*NSPRI)*
WP2, Nigeria

Background

Problems

- To reduce post-harvest loss (and preserve products), smallholder farmers, market and aggregators actors rely on traditional drying practices such as sun drying on roads during glut seasons. However, traditional practices are inefficient and unsafe.
- Solar dryer provides a more controlled and consistent drying environment,
  protecting the products from exposure to dust, insects, and other contaminants
  maintaining product quality, nutritional value, and appearance,
  thus producing good quality products that can be sold at a better price

Research questions

- What are the impacts of introducing solar dryers on economic returns, quality preservation, aflatoxin contamination, and food loss?
- Who wants to use solar dryers when the technology is accessible?
- Do vegetables dried by solar dryers get a better price?
- What value is added by labeling solar-dried vegetables (asymmetric information)?
- What are quality improvements, including aflatoxin contamination?
- Markets provide enough incentives to make solar dryer systems sustainable.

Overview of intervention

- From our needs assessment study, we identified about 60 high-potential communities in Kano and then reduced that to 10 communities where the solar dryer can be installed.
- These communities are selected based on the two criteria:
  - ✓ Many farmers and processors are drying products using the traditional method. Therefore, the demand for solar dryer technology is (potentially) high
  - ✓ Access to large markets is good
- Randomize to have a treatment group from a pool of farmers and processors who wish to use solar dyer; the rest as the control group
- Rotate over 4 rounds (one round = 2-3 weeks); randomly group 1, 2, 3, …

Intervention process

Timeline

2022-2023
Scoping on F&V Value chains/Needs Assessment

Mar-May 2024
Solar Dryer Installation

May- June 2024
Baseline survey

Ongoing
Laboratory experiment on food safety

Nov- Dec 2024
RCT Implementation

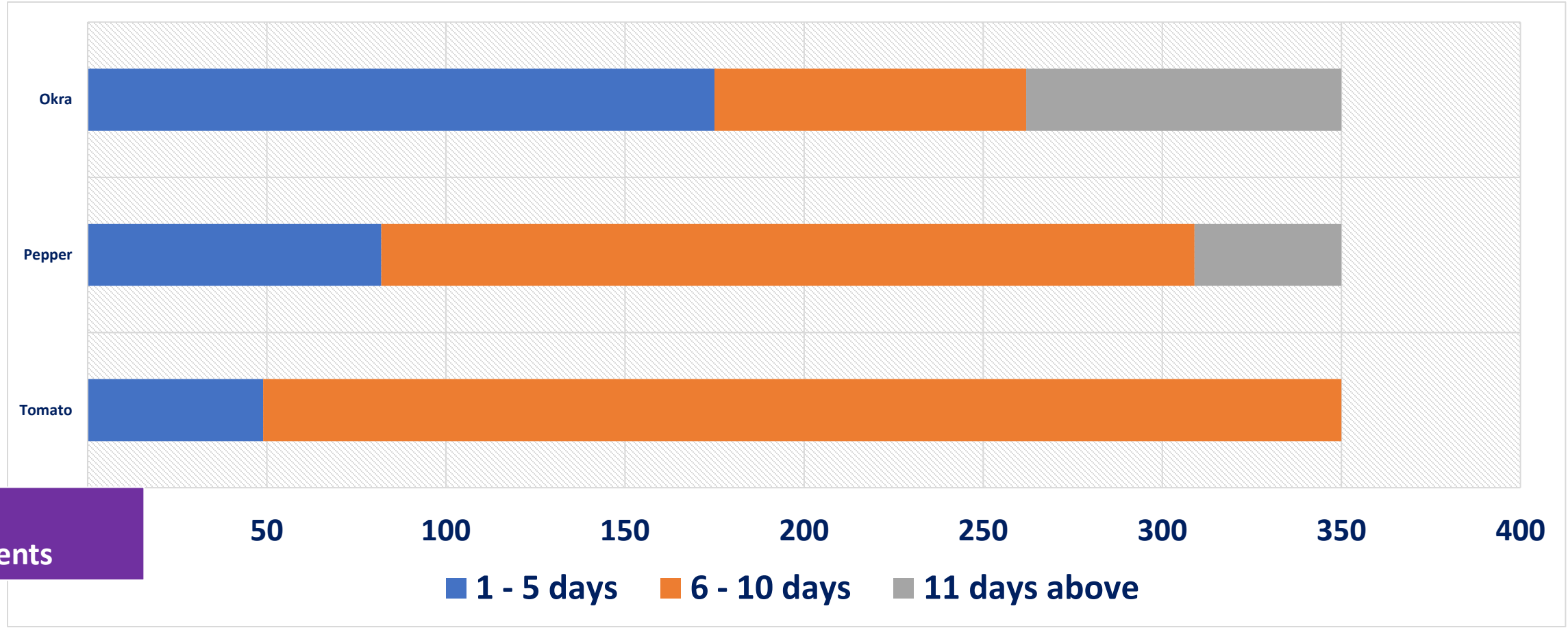
Findings from Needs Assessment

Current drying practices

- Open sun drying on the roadside, dedicated places in markets, e.g., rooftops, under shades, bare ground (with or without protection layer like floor mat).
- Individual farmers' farmland – harvest leftovers, market rejects, and harvest for drying, i.e., pepper.

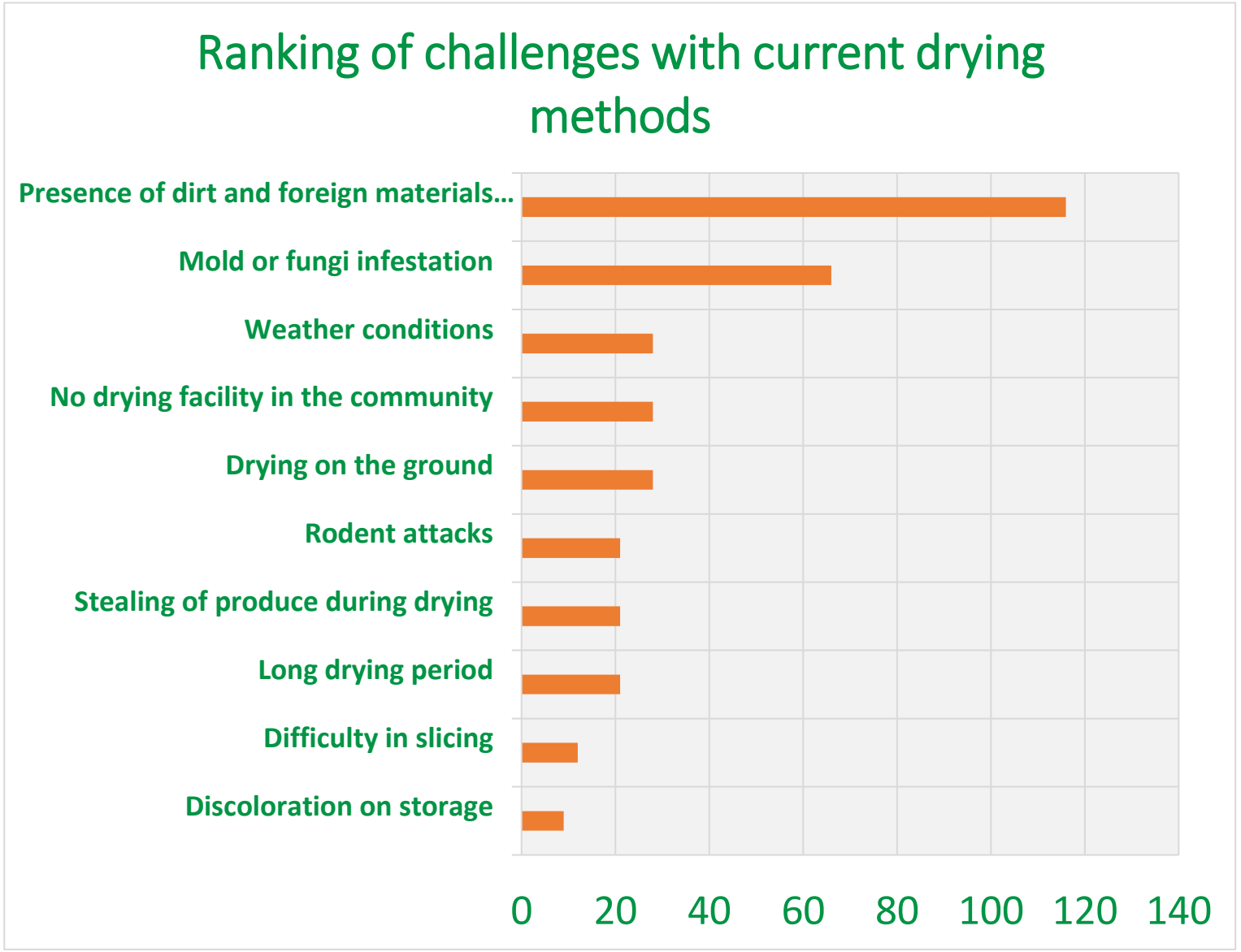
Effectiveness of current drying methods

Most respondents dry their produce for about 6 – 10 days but may at times due to a variety of traits, due to moisture content, weather conditions, etc.

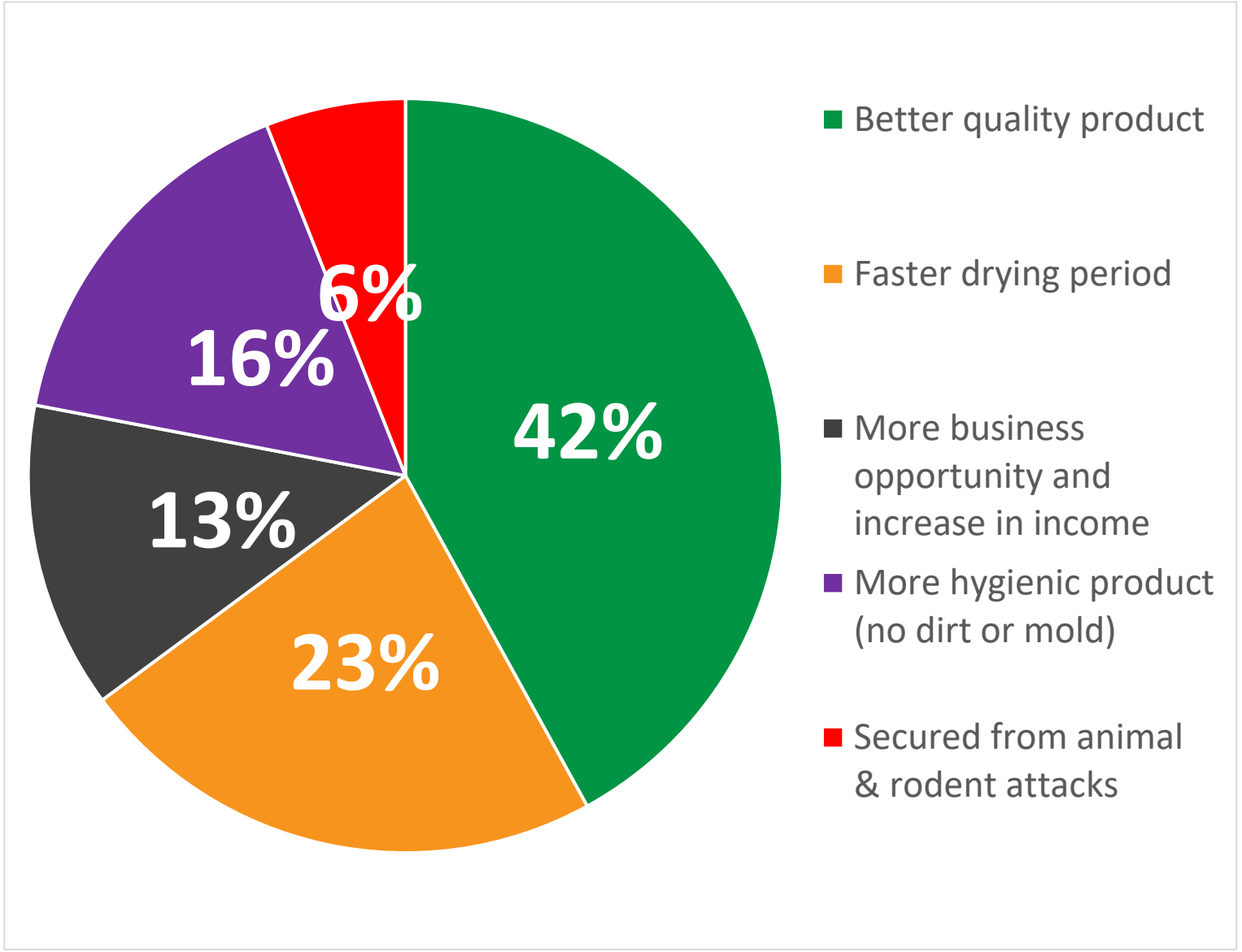


Number of days to dry okra, pepper, and tomato

Challenges with current drying methods



Expectations from an improved drying technology



Baseline survey approach

10

Of the 22 locations where the need assessment was conducted, 10 were selected based on the volume of tomato and pepper produced and the level of drying activity in the communities.

10

A total of 10 solar dryers were constructed (1 in each of the ten locations).

100 households

100 households were randomly selected and interviewed in each of the location during the baseline survey.

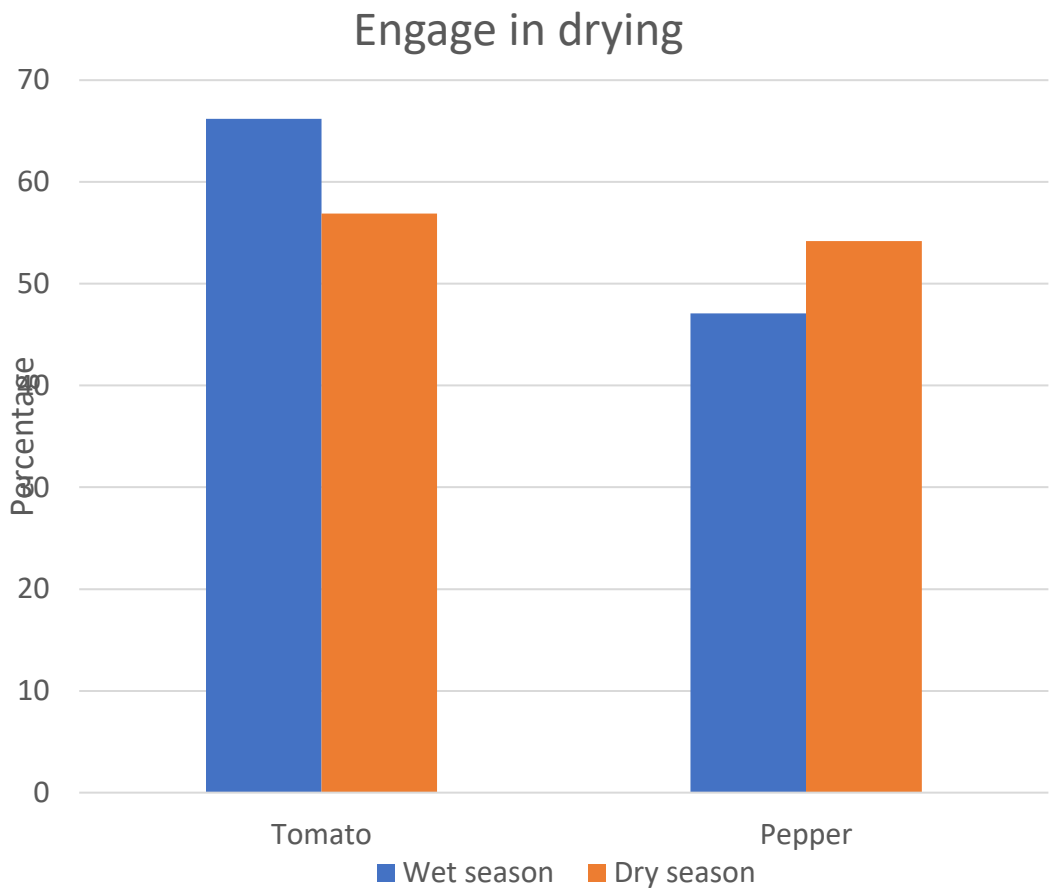
Sampled communities

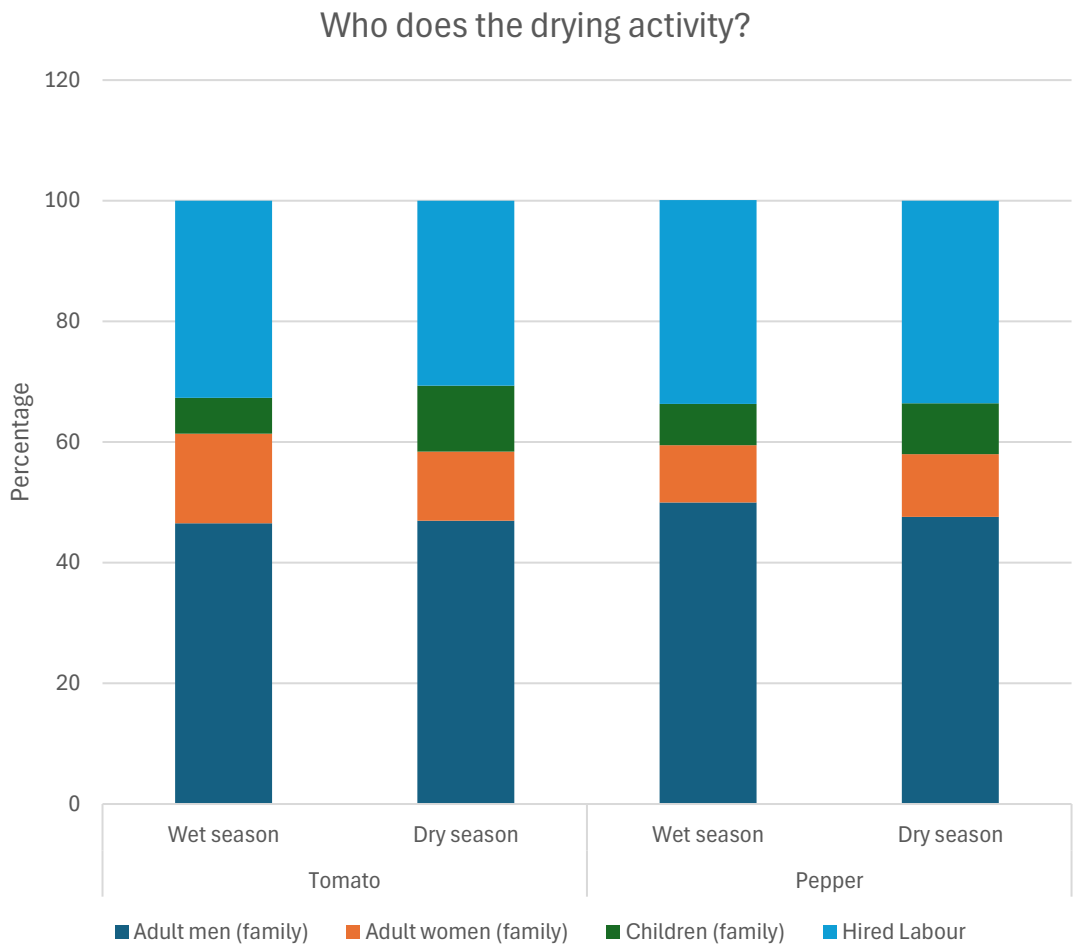
LGAs	Communities	No. of validated sampled
Bagwai LGA	Bagwai	100
	Kiyawa	92
Tsanyawa	Dan Isa	99
	Dumbulum	100
Makoda	Baban Ruga	93
	Laberiya	100
Danbatta	Gawon Bature	98
Wudil	Lajawa	100
Gaya	Gaya Balan	94
	Gaya Boda	96
Total		**973**

Baseline Survey Findings

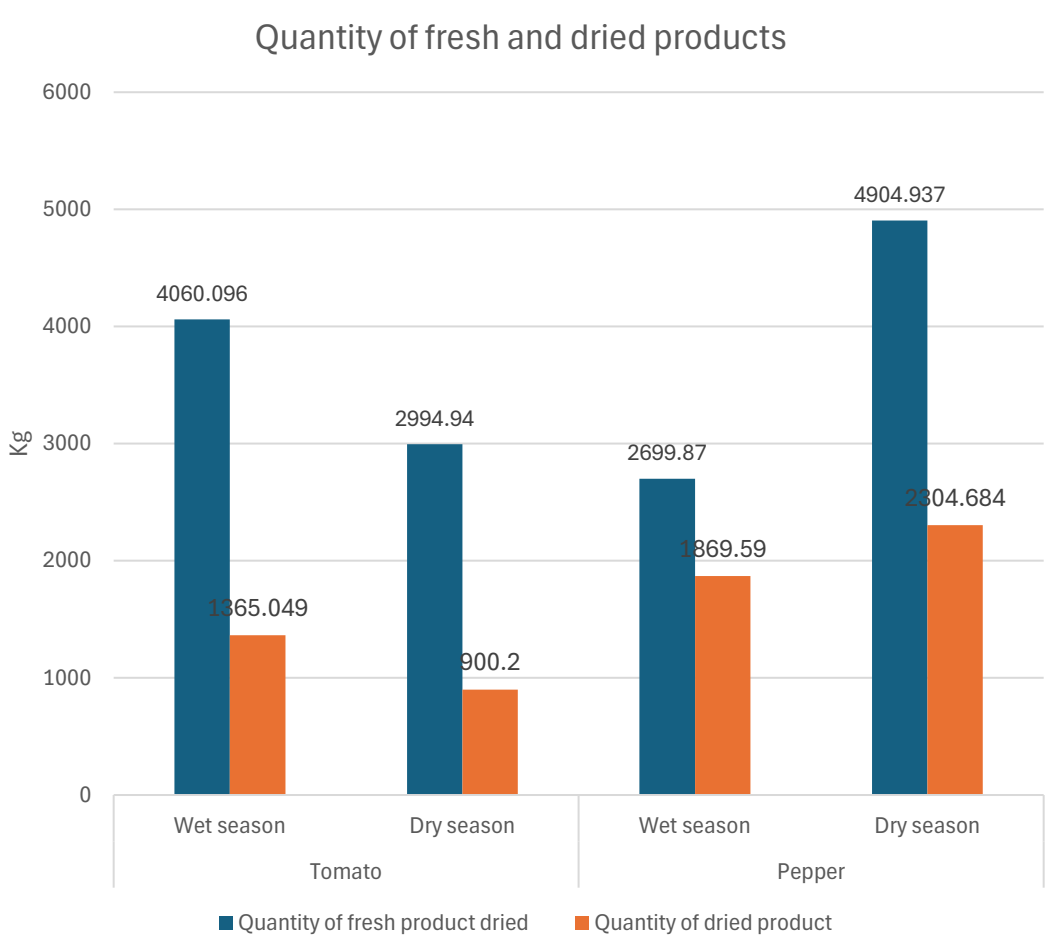
Conducted towards the end of May and Early June 2024

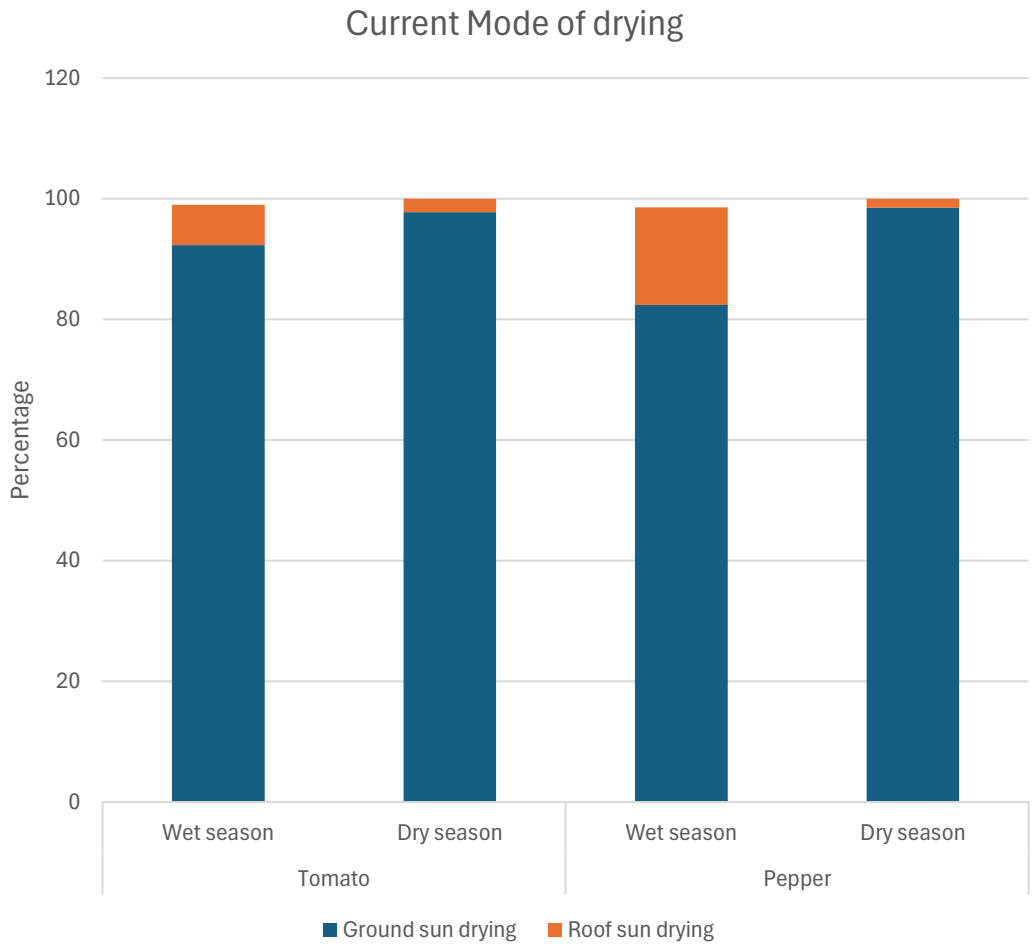
Drying and processing of tomato and pepper





Quantity of products dried and mode of drying

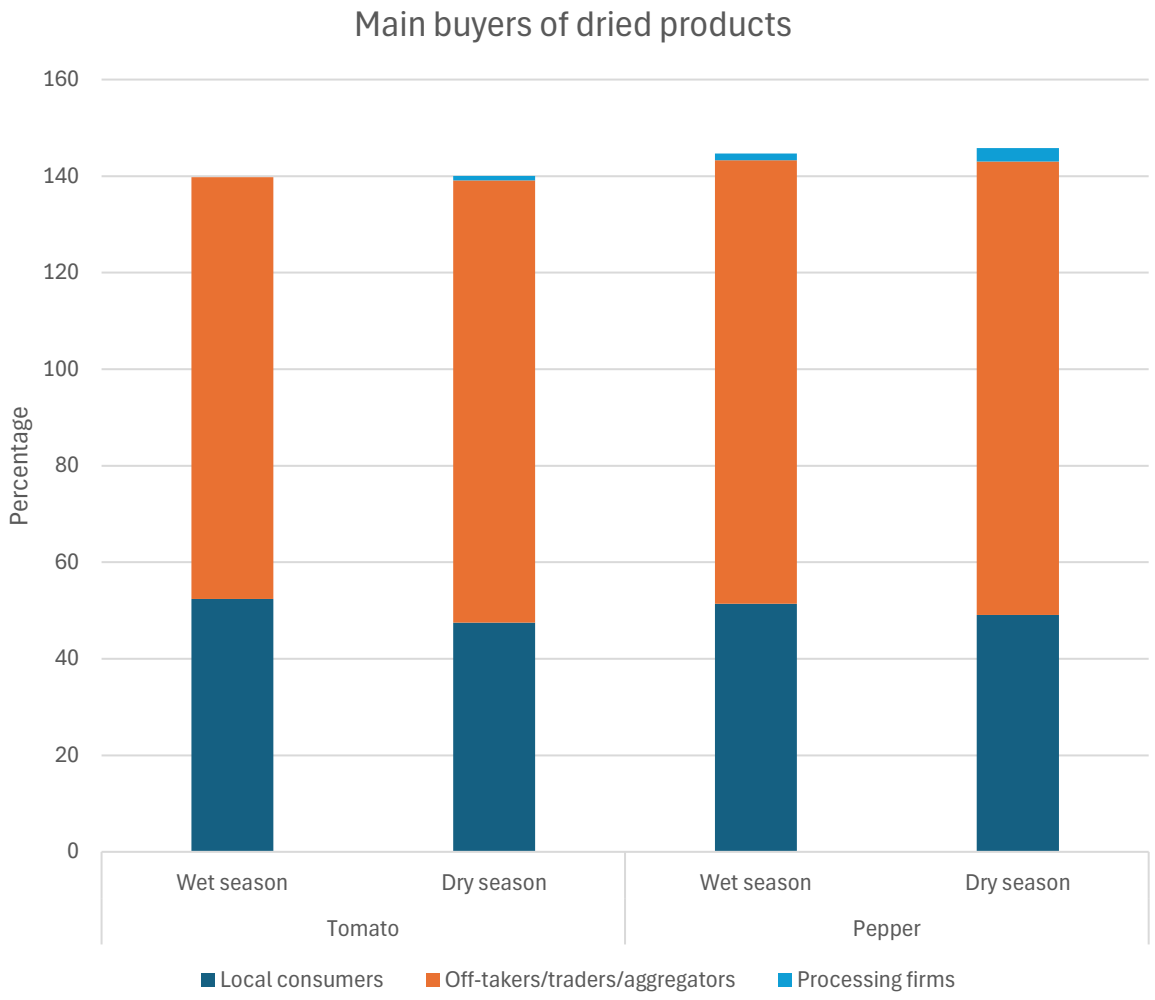


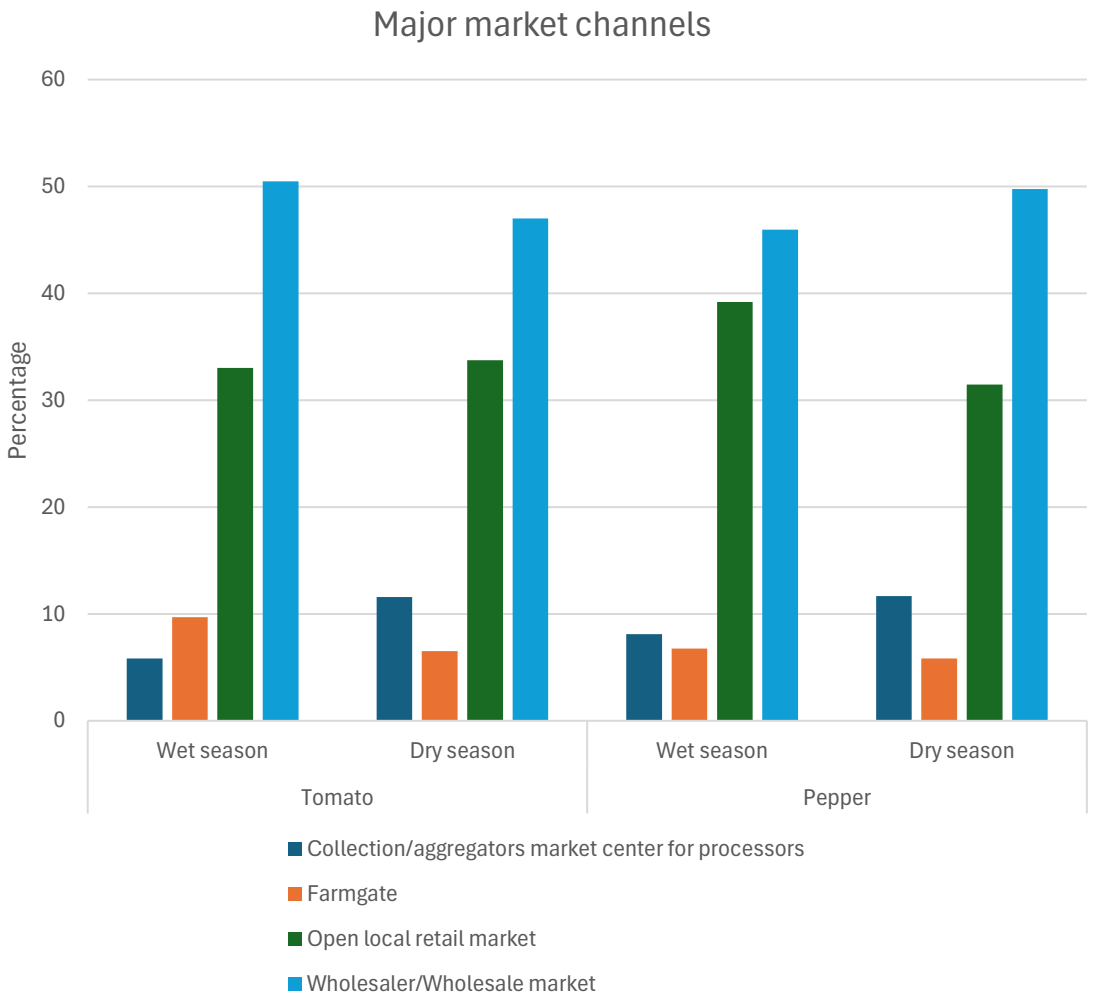


Drying experience and length of drying

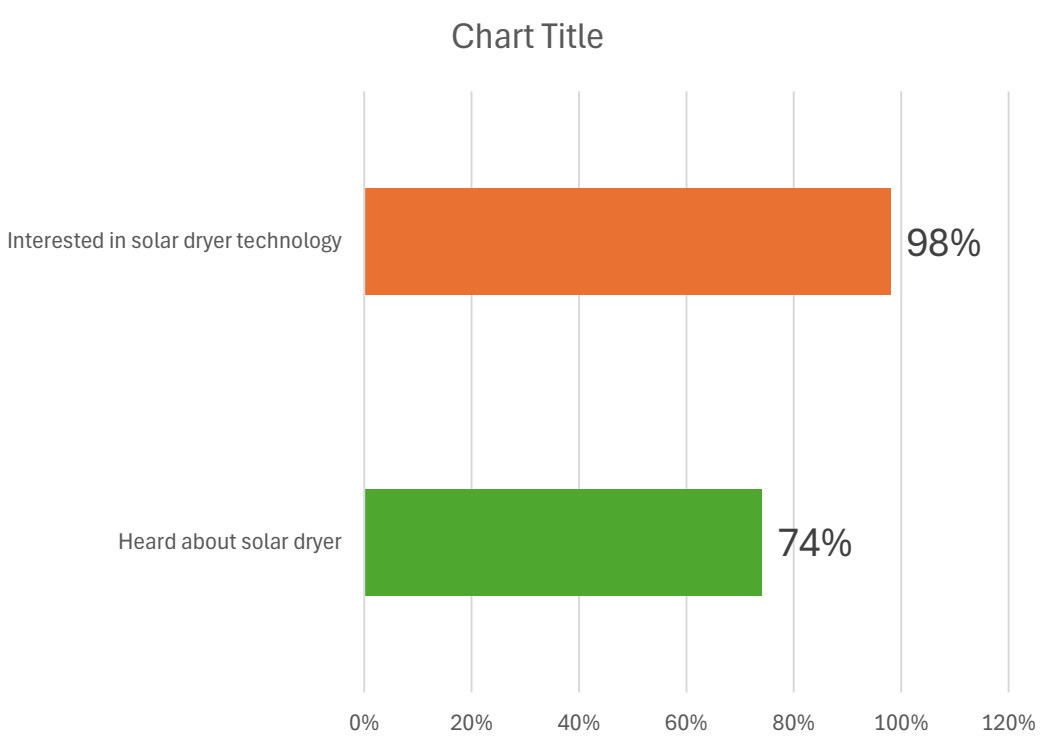
	Tomato		Pepper	
	Wet season	**Dry season**	**Wet season**	**Dry season**
Years of experience in drying	9.5	9.3	9.27	10.3
Drying cycle: Rounds per cycle	6.1	5.4	5.2	5.5
Average number of days for drying currently	9.7	10.1	10.2	13.2

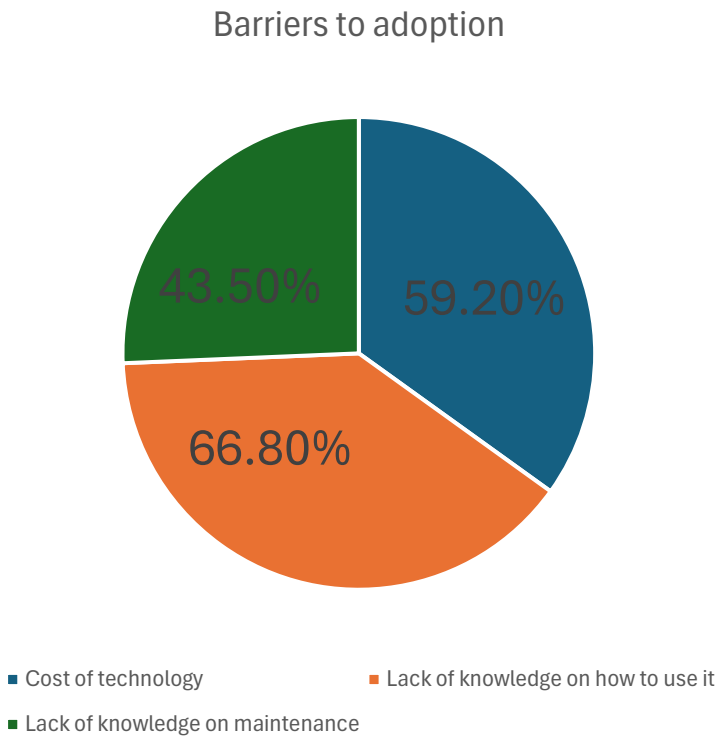
Marketing of dried products





Knowledge of and barriers to the usage of solar dryer technology





Installation of the Solar Dryer System

Installation of Solar Dryer

Engineering Steps for development of solar dryers

Basement

Erecting the frame

UV-light screen

Extractor installation

Solar system

Description of the solar dryer

Basement is tilled black to enhance heat absorption.

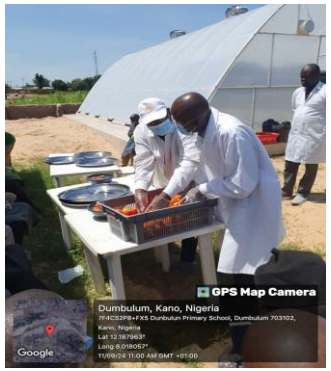
Frame is made parabolic for aerodynamic properties.

UV-light screen polythene is used to screen ultra-violent rays and enhance solar collection.

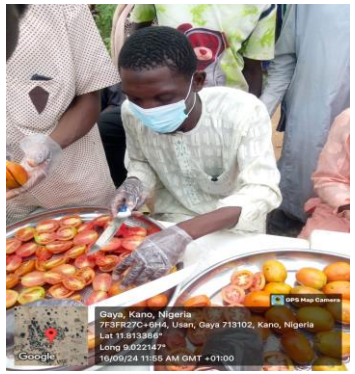
- Solar extractors are added to remove moist vapor from the system effectively.
- A heat exchanger is placed in the dryer for the accumulation of heat. This is to raise dryer temperature to desired degree.

Training of Farmers on Solar Dryer Utilization

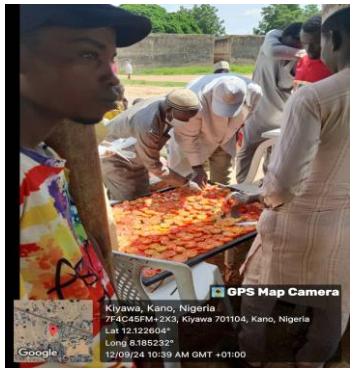
- Procedural Steps for tomato drying using solar dryer



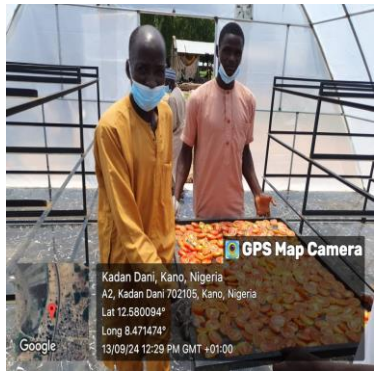
Sorting/washing



Slicing



Arrangement on trays



Loading of the dryer

Drying operation

Laboratory Experiment

Physical Parameters

- Drying rate
- Color change
- Output capacity

Chemical Properties

- Total soluble solids
- TTA
- Lycopene
- Carotene
- Vitamin C

Microbial Analysis

i. Aflatoxin contamination
ii. Bacterial count
iii. Fungi count

Inspection of the Solar Dryer

Conclusion

Challenges:

- Baseline survey: Interviewing was difficult as more people than the selected were interested in using the facility.
- Damage to the solar screen of the solar dryer in some communities.
- Maintenance of the solar dryer

Thank you

Questions and Comments

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RFM Innovation Scaling Stakeholder Workshop
25 & 26 September 2024
Abuja, Nigeria

Innovation 4: Plastic Crate + market support

Mesay Yami et al.
Partners: IITA, IFPRI, CIMMYIT & Bunkasa Agritech
WP2

Outline

- Background
- Design
- Key baseline findings
- Challenges and lessons learnt

Evaluation team

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MSU

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IITA

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Jordan Chamberlin

CIMMYIT

Background

- Tomato-poor packaging materials (raffia baskets) are a major cause of food loss.
- Switching from traditional raffia baskets to plastic crates reduces losses (Olusola et al., 2019).
- Small farmers don’t adopt beneficial PHT.
- Limited access at affordable prices is one reason for their low adoption.
- This study will evaluate if a private sector strategy to provide plastic crates for rent along with output market links can incentivize smallholder use of plastic crates and improve their welfare.
- Few studies to evaluate an existing private-sector innovation designed to address existing market failures.

Intervention design

Treatment 1. Guaranteed supply of plastic crates

- Communities provided with plastic crates on a rental basis.
- Eleven crate rental shops established in the four LGAs.

Treatment 1- Guaranteed supply of plastic crates

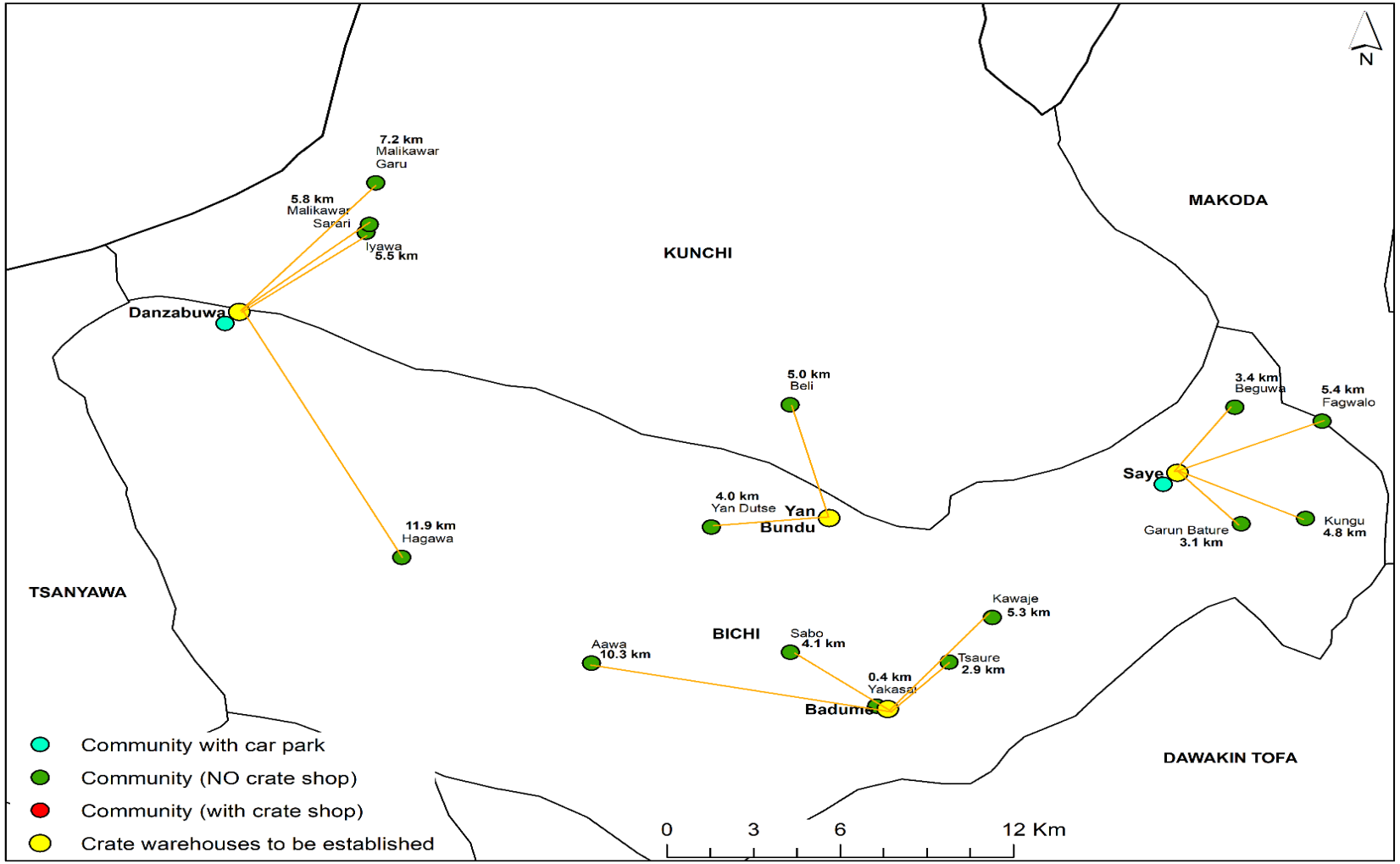


Fig.1. Crate shop locations in Bichi LGA

Intervention design

Treatment 2- Guaranteed supply + market access

- **Market Intelligence** - farmers receive price information via SMS
- **Aggregation and long-distance trading**

Farashin Tumatir Ayau
Lokaci-Safiya
Mile 12: ?13,000
Ile-Epo: ?12,000
Ogere: ?9,000
Akinyele: ?9,000
Karin Bayani ka kira Bunkasa a
08037047271

Study site

- The experiment is conducted in Kano State.
- We used cluster randomization to select 84 villages from four LGAs
- Baseline data were collected from **1680** farmers in July 2023.

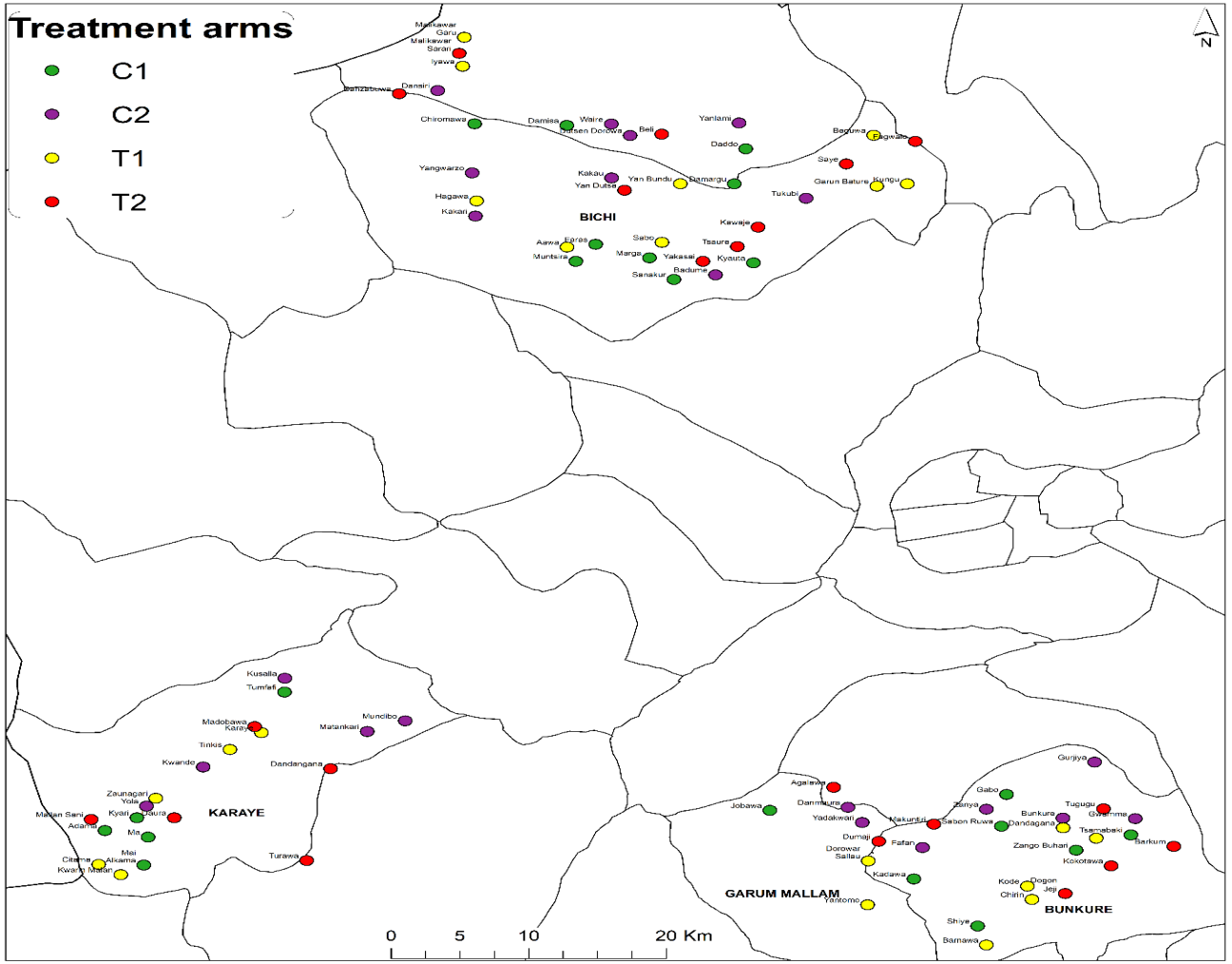


Fig.2. Map of treatment (T1 & T2) and comparison (C1 & C2) communities in Kano state

Intervention process

IITA Transforming African Agriculture CGIAR

COLLABORATION AGREEMENT

BETWEEN

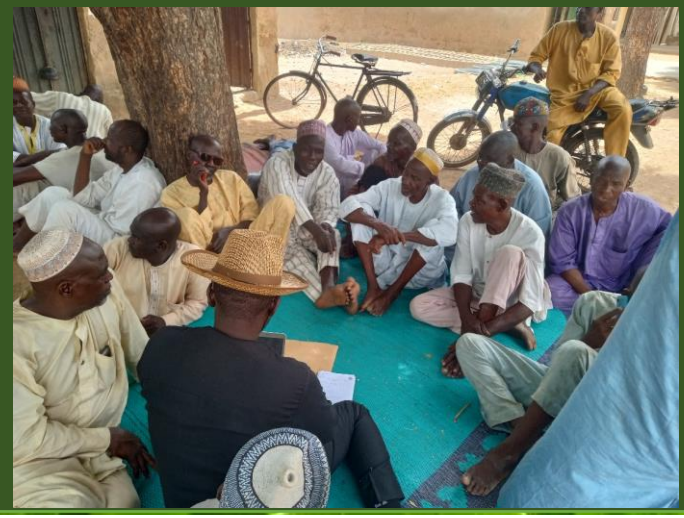
INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE (IITA)

AND

BUNKASA AGRITECH LTD

Under the Initiative:

Systems Transformation: Rethinking Food Markets and Value Chains for Inclusion and Sustainability



Timeline

- **2021** — Scoping
- **2022** — Co-designing innovation bundles
- **2023 Q1** — Partnering with SME (Bunkasa LTD)
- **2023 Q2** — Baseline data collection
- **2023 Q3**
  - Sensitization workshop
  - Kickstarted rainfed intervention
- **2023 Q4** — Launched rainfed intervention
- **2024 Q3** — Endline data collection (Irrigated)
- **2024 Q4** — Endline (Rainfe
  Evaluating

Key findings

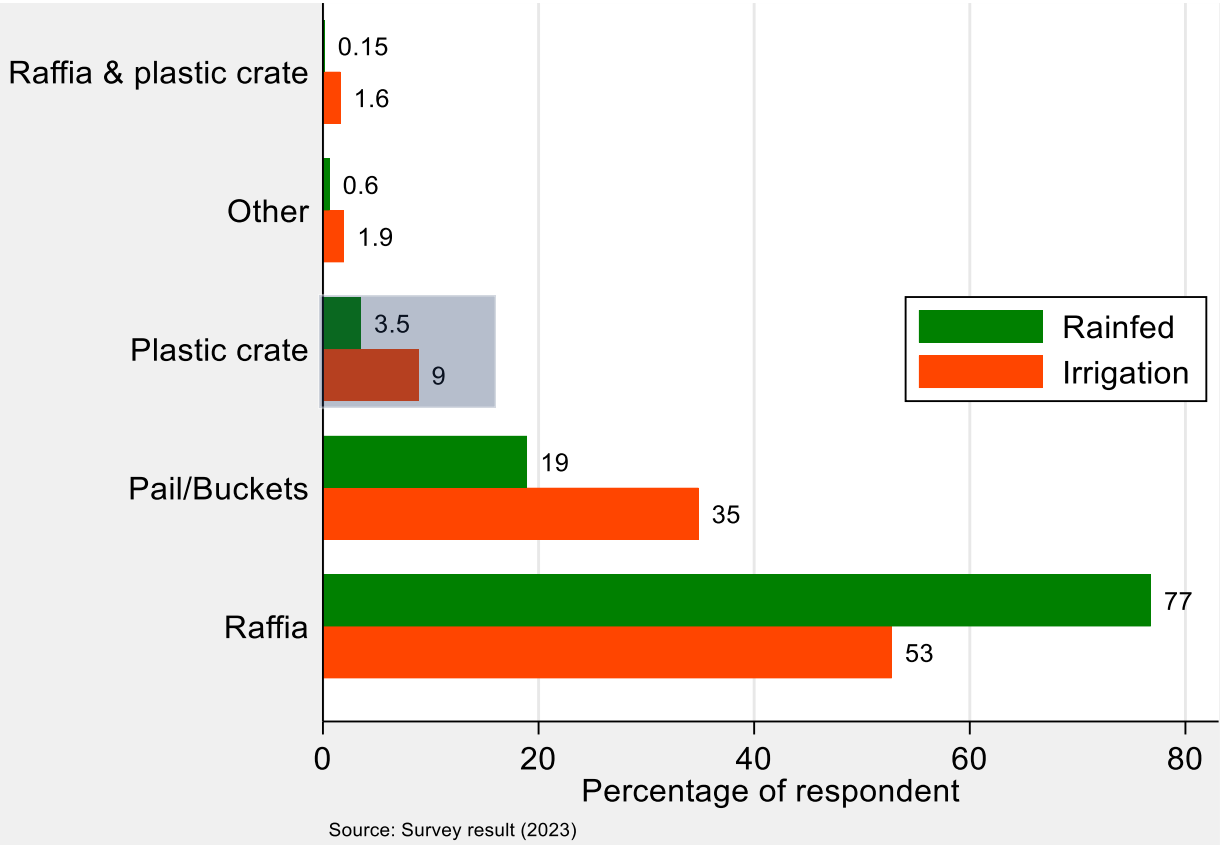
Table 1. Baseline balance test between control (C1) and treatment groups (T1)

Variable	Control		Treatment		Mean difference	Pooled	
	Mean	SE	Mean	SE		Mean	SE
Panel A: Outcome variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Adoption of postharvest technology (yes=1)	0.19	-0.04	0.15	0.03	0.04	0.17	0.02
Sold quantity (kg)	6046	311	6100	209	-53.88	6073.	186
Effective sales price (Naira)	75.22	5.33	83.03	5.98	-7.81	79.15	4.01
Farm income (Naira)	459218	19549	461838	20499	-2620	460534	14082
PHL at harvest (kg)	401	41.01	357	26.83	48.08	381	24.46
PHL in transit (kg)	3.82	1.13	7.40	1.61	-3.57*	5.62	1
Seed type (=1 if HH planted the hybrid seed)	0.66	0.03	0.73	0.02	-0.07*	0.69	0.02
Market participation (= 1 if HH engaged in distant market)	0.04	0.01	0.05	0.01	-0.01	0.04	0.01

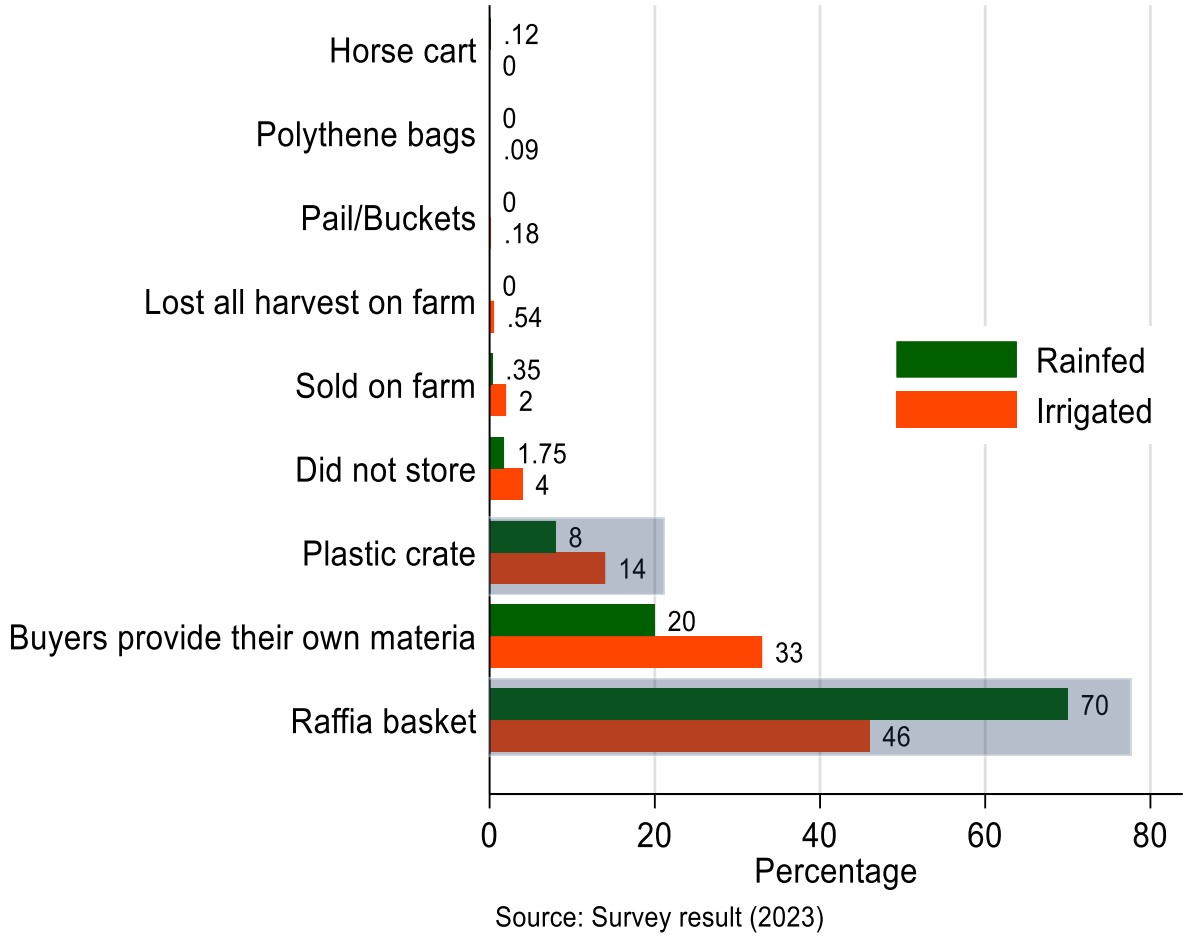
- ~17% used improved postharvest packaging and transportation technology.
- PHL was higher during harvest than transportation.
- 4% of farmers participated in long-distance markets.

Findings cont'd ...

Adoption of PHT



Harvesting



Storage & packaging

Findings cont'd ...

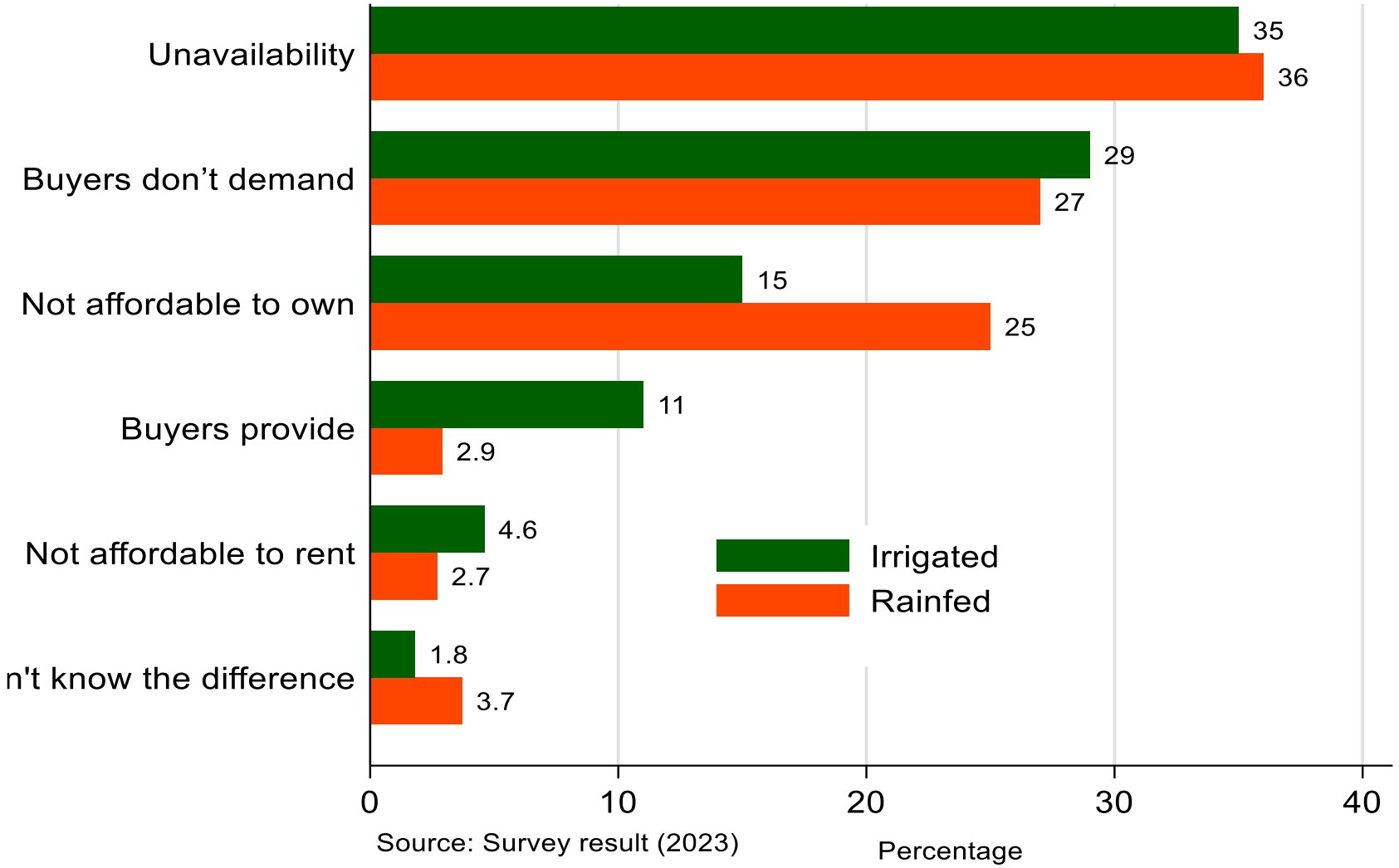
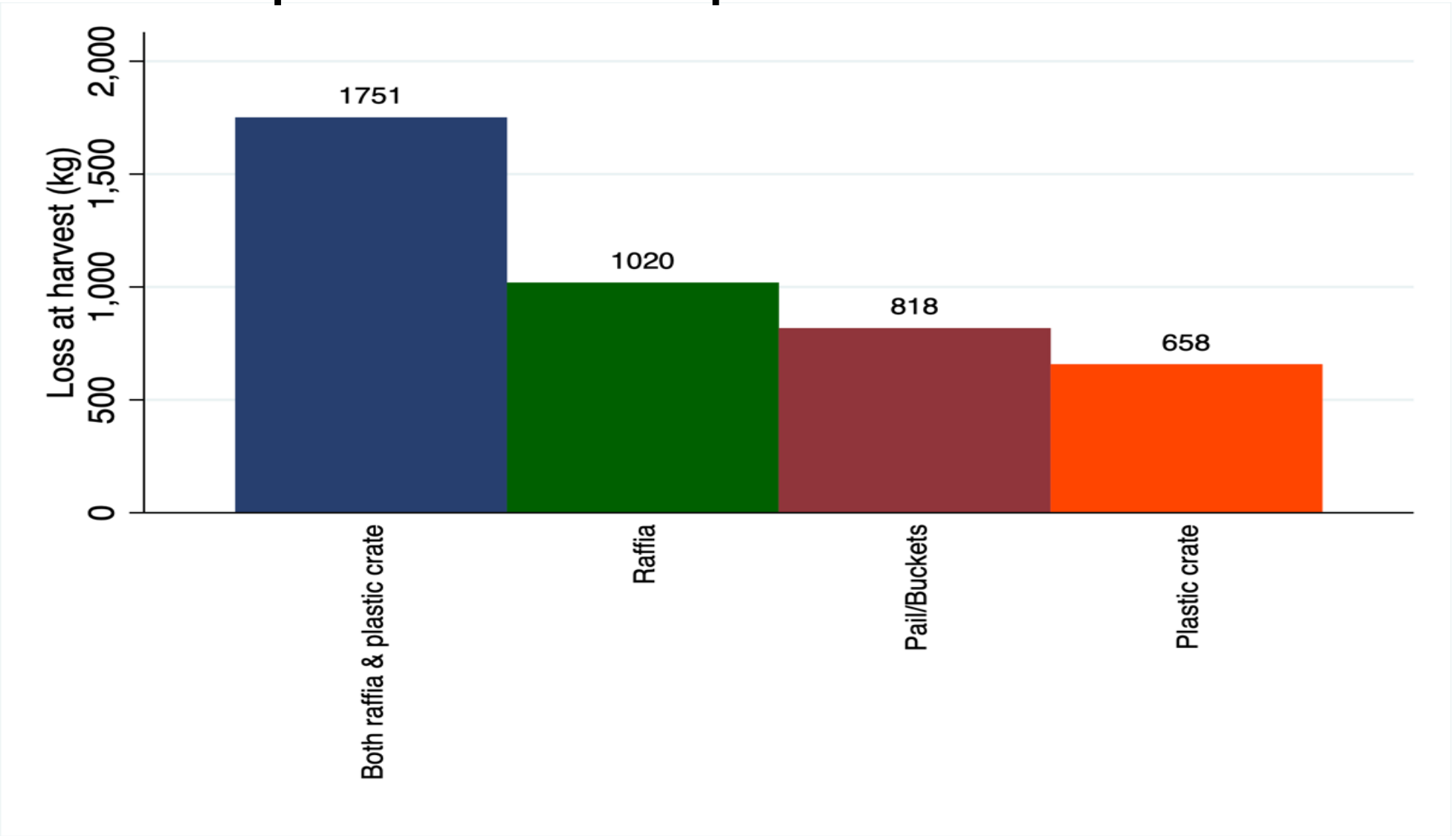


Fig. Reasons for not using plastic crates

Findings cont'd …

Relationship between PHT adoption & loss



Choice of market outlet

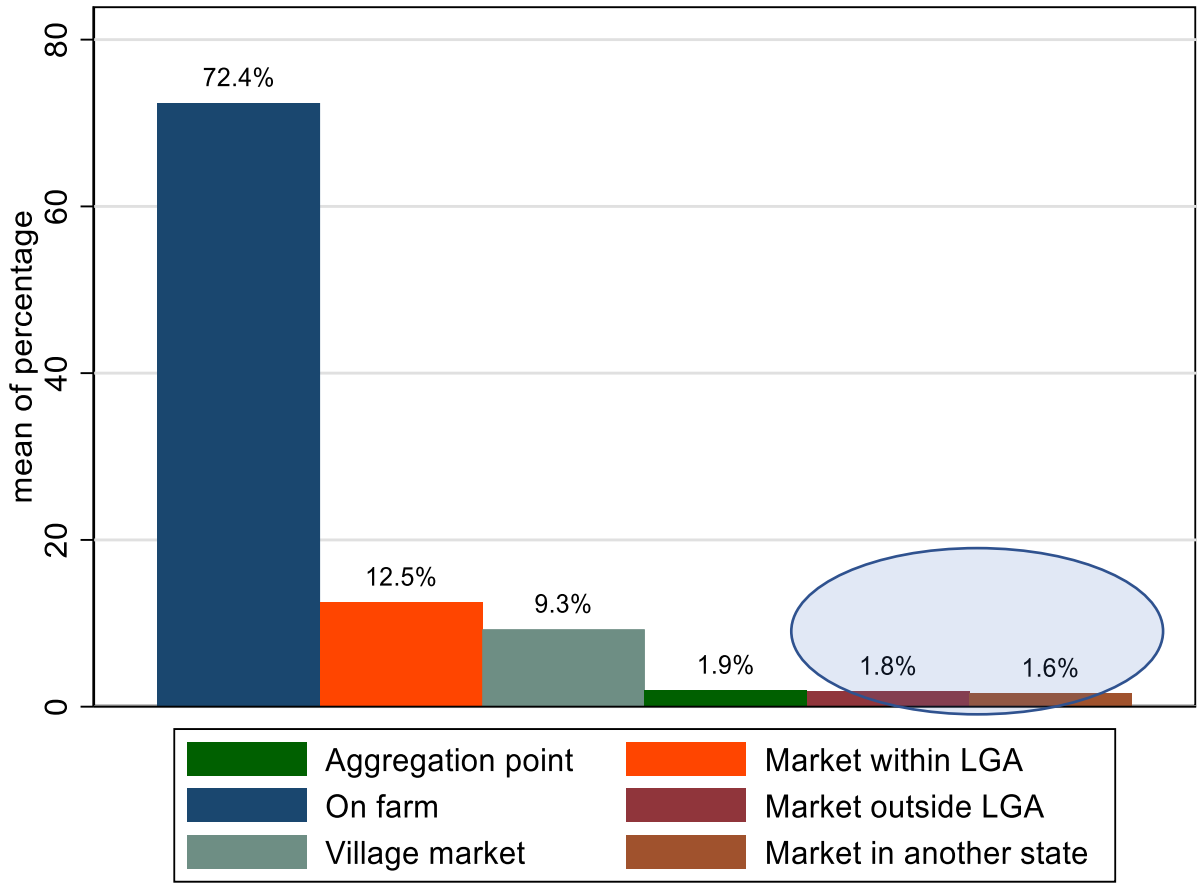


Fig: Place of bulk sale

Table. Main off-takers by production system (percentages)

Top buyers	Production system			
	Rainfed (N=655)	Irrigation (N=870)	Both (N=179)	Total (N=1704)
Wholesaler	66.31	59.98	63.69	62.79
Agent/ Aggregator	23.93	32.16	27.37	28.50
Retailer	9.15	5.70	8.38	7.30
Did not sell	0.15	0.80	0.00	0.47
Exporter	0.15	0.34	0.00	0.23
Processor	0.15	0.11	0.56	0.18

Operational challenges

- On-time procurement of intervention materials
- Low take-up due to production loss resulting from pests (tuta absoluta)
- Lack of trust by farmers as they are new to Bunkasa service
- Lack of reliable vehicles to transport tomatoes to distant markets on time
- Lack of an aggregation center

Lesson learned

- **Improved Efficiency**: Using the crates made transportation more efficient and reduced the amount of produce lost after harvest, confirming how vital good logistics are in the supply chain.
- **Need for Awareness**: We realized that farmers and traders needed ongoing training and education to fully understand how using crates, instead of traditional methods, helps reduce damage to their produce.
- **Infrastructure Issues**: The lack of proper aggregation centers became a challenge that limited the crate rental program’s full potential.
- **Potential for Growth**: The success of the initial phase showed us that there's real potential to scale this service to other areas as long as we can address the existing logistical challenges.

Lessons learned cont'd...

Lessons learned cont'd...

Mile-12 international market, Lagos

Ogere market

Knowledge products

(1) Status quo of postharvest innovation adoption in Nigeria: Implications for targeted intervention – *Technical report*

(2) Synergies or tradeoff? Market channel and other drivers of tomato farmers production and handling practices – *Under review in Food Security Journal*

(3) Farm level micro-drivers of adoption of sustainable agricultural production and marketing practices in Nigeria - *Under review in Heliyon*

(4) Farmers' Pesticide Use and Disposal Practices: Evidence from Nigeria. *To be submitted for a special call in Frontiers in Sustainable Food Systems*

(5) Heterogeneous effects of adoption of postharvest loss technology on performance of tomato production in Nigeria. *Draft manuscript*

Thank you!

INITIATIVE ON
Rethinking
Food Markets

CGIAR

RFM Stakeholder workshop
24 September, Abuja-Nigeria

Peer-to-Peer Learning on Vegetable Production and Implications for Value Chain Development in Nigeria (Improved seeds)

Stellamaris Aju and Marrit van den Berg
Wageningen UR
WP 2

Background of the intervention: Overview

Key attributes:

- Research question: How (critical mechanisms) do agricultural extension programs positively impact the livelihoods of smallholder vegetable farmers
- Intervention users: Smallholder (current and potential) vegetable household
- Study location: Kano and Kaduna states, Nigeria (**70** communities across **Kubau, Kudan, Makarfi,** and **Soba** in Kaduna state; **80** communities across **Dawakin Kudu, Dawakin Tofa, Minjibir**, and **Rimin Gado** in Kano state)
- Core interventions: Agricultural extension service (AES), Branding (Skill-specific public graduation ceremony), and Gender sensitization training (Edutainment)

Partnerships:

- Innovation developers: Training seeds developed by East-West Seed (Commercial)
- Scaling partners: East-West Seed Knowledge Transfer (Foundation)

Background of the intervention: Mechanisms and interventions

Research objectives:

1. Adoption: AES

Motivation:

- Improve vegetable farming and food security
- Introduce and promote adoption of agrarian technologies - improved seeds and GAPs (**Aremu & Reynolds, 2024; Wossen et al., 2017**).

TOC: Rogers (1962; 1995) Diffusion of Innovations (DOI) theory: didactic, social, and experimental learning

2. Information dissemination and technology diffusion: AES+Branding

Motivation:

- Criticisms of AES to sustain information dissemination and innovation diffusion; information friction, few natural info flow
- Social network matters; network density (Board & Meyer-ter-Vehn, 2024)
- Concentrated efforts on supply-led extension approach; intentionally exploit demand-led approaches

TOC: Theory of Planned Behavior (TPB) (Ajzen & Fishbein, 1977), SCT (Bandura, 1989), B/H Econs. (Kremer et al., 2019)

Background of the intervention: Mechanisms and interventions…

Research objectives:

3. Women agency and intrahousehold collaboration: Gender sensitization and intrahousehold training

Motivation:

- Improve household welfare; stress intrahousehold collaboration
- Increase women's agency; intrahousehold position and income capacity
- Using edutainment to elicit expected behavioral change: Drama 1 and 2

TOC: Theory of intrahousehold bargaining and cooperative household models (Vermeulen, 2002)

Design and expected outcomes

Case study: East-West Seed Knowledge Transfer Extension Module

- Key and Peer (→ core) farmers (Modification: Neighboring farmers included in sample and creation of women groups)
- 5 trainings over 2 cropping cycles in a farming year (Modification: 6 training for men group and 7 for women)

Methodology: 3-arm RCT (Field experiment) → 2 treatment groups and 1 control group

- TG1 (Training only) = Impact of AES on livelihoods via increased adoption levels (productivity/incomes)
- TG2 (Training + Branding) = Impact of skill-specific graduation ceremony on adoption levels and information dissemination
- CG (Control) = Nothing; comparison group for TG1 and TG2






➔ Sub-groups (Cross-randomized from TG1 and TG2 only):

- SG1 (Spouse treatment arm) = Impact of spouse training and intrahousehold sensitization on women's empowerment (Pro-WEAI)
- SG2 (Control for SG1) = Nothing; comparison group for SG1

Intervention process

Timeline

Scoping/Key farmers' survey

Nov 2022 - Feb 2023

March 2023- July 2024

Intervention implementation

Baseline Survey

Aug – Oct 2023

Oct – Nov 2024

Endline Survey

Project report/papers

Q1 2025

Data and Analysis

Insights from the baseline data analysis:

➔ Descriptives:

- 72% male and 28% female respondents; Mainly within the 18-60 age range; Average household size of 10 members; Mainly without formal education - 59% of farmers with primary education or lower.
- Farmers cultivated a median parcel size of 5 acres for both seasons; Top three vegetables grown were tomatoes (36%), chili (23%), and onion (21%); Low use of improved seeds for vegetable farming (a mean of 1 for vegs; 4 for staples).
- Low participation in agricultural training - NGOs, peer farmers, and EWS-KT are main information sources; some indication of spill-over effects

➔ Balance test:

- Treatment and control groups highly similar.
- Anomalies added as control, including baseline outcomes

Conclusion

Challenges:

- Scoping study outcome (Difficulty penetrating the farmer-trader link).
- Demanding price premiums requires more than increased productivity (Inaccessible markets, risk averse, economic crisis, etc.).
- Alignment of interventions; smallholders' categorization.
- Deforestation (Negative impact from GAP training).
- Land system and consequences for women.

Next steps:

- Impact assessment (after endline data collection)
- Result reporting

Questions and Comments

INITIATIVE ON
Rethinking
Food Markets

CGIAR

RFM Stakeholder workshop
25th Sept, Abuja and Nigeria

Innovation 6.
Digital Finance Intervention

Opeyemi Olanrewaju (IFPRI) &
Babafemi Adewumi (Crop2Cash)
WP3

Background of the intervention/innovation

- Access to credit—especially formal credit from financial institutions in rural Nigeria—is limited.
- Less than a third of households in rural Nigeria report using credit in the previous 12 months, and only two percent of rural households borrowed credit from a financial institution (EFInA 2020).
- Lack of credit constraints agricultural production and contributes, in part, to the significant gaps in agricultural productivity between high-income and low-income countries around the world(Gollin, Lagakos, and Waugh 2014)

Background of the intervention/innovation (Cont.)

Our partner: Crop2cash (C2C)

C2C is a local digital financial technology startup company, was launched in response to smallholder farmers credit need.

Products enable farmers to: (i)save money,(ii) get paid by buyers digitally,(iii) receive market price updates via SMS text 2message, (iv) build a financial identity to improve their credit worthiness, and (v) buy farm inputs on credit.

C2C build each farmers' agricultural activities database, and then partners with commercial banks or other funders to finance input purchase directly from agricultural input companies.

Farmers must (i) be an active user of C2C platforms, (ii) have no history of C2C previous loans payment default and (iii) deposit a cash guarantee (typically 30%) of loan value in C2C digital wallet

Background of the intervention/innovation (Cont.)

- In May 2023, IFPRI Nigeria team conducted a series of focus group discussions with more than 40 farmers actively engaged in Crop2Cash services in Kebbi State.
- Farm inputs on credit proved to be most popular (70%) and in demand by C2C farmers and 40% having received farm input loan
- Despite farmers' positive experience with C2C input loan quality, farmers reported that a small cash loan would help them meet other farm production costs, such as for labor and equipment, and help them maximize their input investment.
- Commercial banks (funders) have limited funds and hold a negative perception about the risks involved in lending cash to farmers.

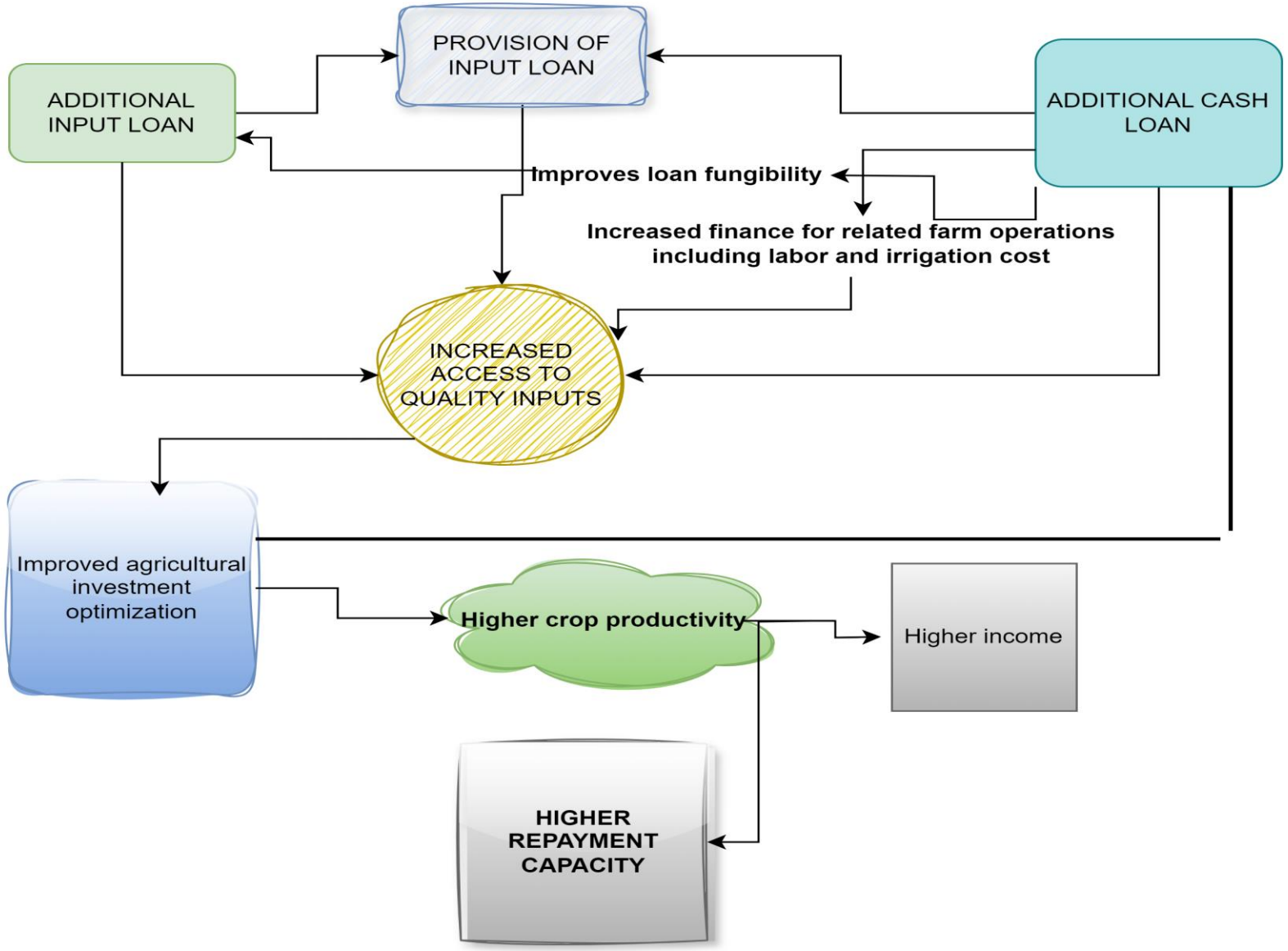
Research Objectives

►Assess whether providing access to a small cash loan can improve loan repayment rates and reduce the overall risk of the banks' input loan portfolio.

►Assess whether increased loan fungibility can boost farmers' productivity and profitability by allowing them to make other investments in the farm to unlock the full potential of their input investment.

►Evaluate whether traditional assessments made by commercial banks and aggrotech firms to estimate the adequate loan amount for a farmer are too restrictive.

Theory of Change



Locations/Target Population Beneficiaries

- Kaduna State (Soba, Anchau and Dandaura)
- 324 C2C 2023 Dry season farmers
- 100% cover of the cash loan amounts by IFPRI

Design/Roll out of Interventions/innovation

Randomized the list of 324 C2C smallholder farmers into two treatment groups and a control group, as follows:

- Treatment group 1 (T1): Received a 10 percent cash loan offer in addition to their C2C needs assessment-based input loan.

- Treatment group 2 (T2): Received a 10 percent input loan offer in addition to their C2C needs assessment-based input loan.

- Control group (C): Received C2C needs assessment-based input loan.

C2C needs an assessment-based input loan for this pilot intervention:

- ❑ *a fixed bundle of inputs valued at 200,000 Naira that was the same for all farmers.*
- ❑ *All farmers across T1, T2 and C, by default received these fixed inputs (valued at 200,000 Naira)*

Design/Roll out of Interventions/innovation contd.

Randomization into the treatment and control groups was at the individual (i.e., farmer) level.

Original goal was for each treatment arm to be limited to roughly 100 farmers.

In practice, T1 includes 95 farmers, T2 includes 94 farmers, and the control group consists of 97 farmers, giving us a total sample size of 286 farmers.

The experimental design is to estimate the effect of receiving either an additional cash loan offer or an additional input loan offer by simply comparing repayment rates between each of the treatment groups relative to the control group.

Assess loan performance as measured by loan repayment rates.

KEY FINDINGS AND RESULTS

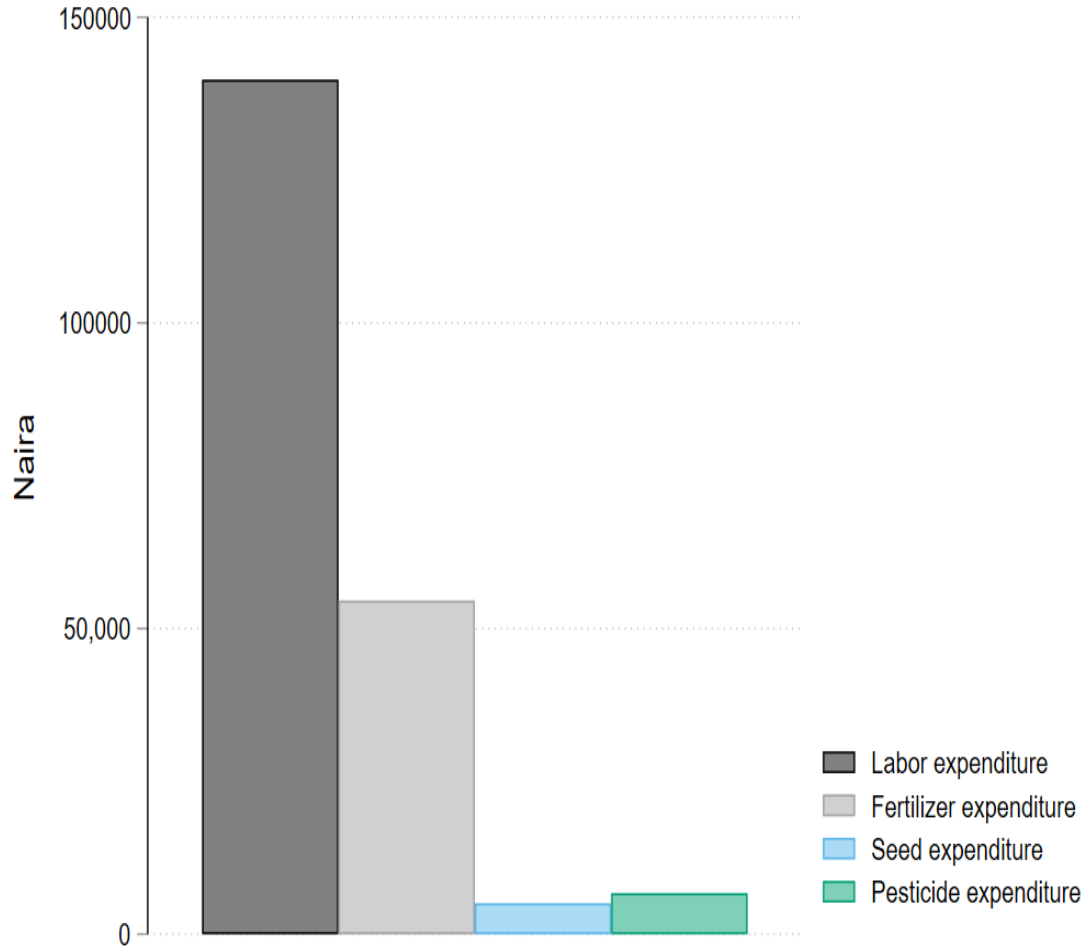
Data Sources

- Mid season survey aimed at understanding low take up

- Administrative data from C2C to look at repayment results

Descriptives statistics

	Treatment status		
	T1: Cash	**T2: Input**	**Control**
	(N=93)	**(N=91)**	**(N=92)**
Age	39.98 (9.10)	42.26 (9.27)	39.87 (8.95)
Gender			
Female (0/1)	13 (14.0%)	11 (12.1%)	11 (12.0%)
Male (0/1)	80 (86.0%)	80 (87.9%)	81 (88.0%)
Education (years)	9.06 (4.53)	9.36 (4.60)	8.34 (4.19)
Household Size	9.01 (4.88)	10.80 (7.28)	8.67 (4.27)
Farm size (hectares)	1.48 (1.32)	1.73 (1.51)	1.55 (1.78)
Number of men hired	6.04 (3.36)	5.71 (3.16)	5.92 (3.02)
Number of women hired	0.13 (0.63)	0.16 (0.78)	0.24 (1.17)



Reported Cash and Input Loan Needs

	Treatment status		
	T1: Cash (N=93)	T2: Input (N=91)	Control (N=92)
Is 200,000 Naira input loan enough?			
Enough (0/1)	32 (34.4%)	38 (41.8%)	35 (38.0%)
Not enough (0/1)	61 (65.6%)	53 (58.2%)	56 (60.9%)
More than enough (0/1)	0 (0.0%)	0 (0.0%)	1 (1.1%)
Is labor used enough?			
Enough (0/1)	49 (52.7%)	64 (70.3%)	56 (60.9%)
Not enough (0/1)	43 (46.2%)	27 (29.7%)	35 (38.0%)
More than enough (0/1)	1 (1.1%)	0 (0.0%)	1 (1.1%)

Five to six out of every ten farmers report that the initial 200,000 Naira input loan was not enough to meet their agricultural input needs. Potentially and partially attributed to the high inflationary situation.

Five and six out of every ten farmers report that the labor they used was enough

Take-up Analysis by Treatment Status

	(1) Full sample	(2) Female	(3) Male	(6) Farm size < 1 hectare	(7) Farm size > 1 hectare
T1: Cash loan	0.398***	0.308**	0.412***	0.333***	0.556***
	(0.051)	(0.134)	(0.055)	(0.0585)	(0.0975)
T2: Input loan	0.604***	0.818***	0.575***	0.623***	0.567***
	(0.052)	(0.122)	(0.056)	(0.0625)	(0.0923)
T1 = T2 (p-value)	0.005	0.008	0.040	0.001	0.934
Observations	276	35	241	198	78
R-squared	0.282	0.461	0.267	0.307	0.256

Two out of every five farmers who received an offer for an additional cash loan accepted this offer. By contrast, three out of every five farmers who received an offer for an additional input loan accepted this offer (Full sample)

This difference in the take-up rates between T1 and T2 types of loans is substantial—at roughly 20 percent points—and is statistically significant.

High heterogeneity in gender and farm size in take-up rates between T1 and T2

Survey Responses Among Input Loan Offer Group (T2)

Response to input loan offer (survey response)			
	Decline (N=22)	Accept (N=56)	Total (N=78)
Response to input loan offer (C2C data)			
Decline	21 (95.5%)	6 (10.7%)	27 (34.6%)
Accept	1 (4.5%)	50 (89.3%)	51 (65.4%)
Declined because…			
… do not use the additional inputs offered	0.45 (0.51)	N/A	0.45 (0.51)
… already have the additional inputs offered	0.55 (0.51)	N/A	0.55 (0.51)
… worried about not being able to repay	0.18 (0.39)	N/A	0.18 (0.39)
Response if offered 10% cash loan			
Decline	4 (18.2%)	2 (3.6%)	6 (7.7%)
Accept	18 (81.8%)	54 (96.4%)	72 (92.3%)

The most cited reason for declining the input loan offer, indicated by half of farmers who reported declining the offer, is that the farmer already had the additional inputs offered or because they do not use the additional inputs offered.

About one out of every five farmers who declined the input loan offer did so because they were worried about being unable to repay the loan.

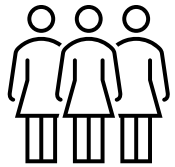
The overwhelming majority of farmers responded by saying that they would accept the additional 10% loan, contrasting sharply with the “real-world” take-up results of the cash loan presented in Table 3.

The results highlight a discrepancy between stated and revealed preferences for cash loans and support the view that tends to be skeptical about what people say they will do.

Key findings/results

Wet season plans

	Treatment status		
	Cash	**Input**	**Control**
	(N=93)	**(N=91)**	**(N=92)**
Which additional loan would you prefer (wet season)?			
Input	72 (77.4%)	85 (93.4%)	85 (92.4%)
Cash	21 (22.6%)	5 (5.5%)	7 (7.6%)
Neither	0 (0.0%)	1 (1.1%)	0 (0.0%)



- Seven and eight out of every ten farmers indicated that they would prefer the input loan.
- These results align well with our core findings reported ,showing higher rates of take-up for the additional input loan than for the additional cash loan.

Key findings/results

Loan Recovery and Performance

- Low recovery rates and loan performance among the farmers in the pilot study sample,

- Low recovery rates are not influenced by our experimental treatments that provided additional loan offers

Key challenges

- A combination of factors—such as high rates of inflation and a volatile agricultural input pricing environment—likely contributed to the low loan repayment rates.

- Inflation rates during pilot study peaked at 43 percent and drove up the cost of production for farmers.

- Gasoline, which powers irrigation pumps, tripled in price in the aftermath of the removal of the government's fuel subsidy, making farmers face multiple needs requiring payment and many chose to delay the repayment of their loans.

- Results does not reflect any policies or practices of Crop2Cash. Indeed, many other organizations that provided credit in the 2023-2024 dry agricultural season in Nigeria faced similar challenges

Lessons learned

- Despite solid interest in an additional cash loan to help cover additional expenditures associated with agricultural production, the take-up rate of the additional cash loan was lower than the take-up rate of the extra input loan.
- Additionally, when given a hypothetical choice between an additional cash loan or an additional input loan, most farmers choose the additional input loan. This suggests that more work could be done by offering different amounts of the cash loan or distributing the cash loan using different mechanisms to aid in the availability of these funds.
- Despite higher take-up rates with the additional input loan than with the additional cash loan, a 40 percent take-up rate for the additional cash loan suggests a meaningful demand for cash loans, indicating a significant demand for cash loans.
- A substantial share of farmers offered the additional cash loan accepted it.

Lessons learnt

- Heterogeneity in take-up rates of the additional cash loan and the extra input loan, except for farmers with more than one hectare of cultivated land. This motivates further investigation into heterogeneity by farm size.
- The primary stated reason for declining the additional input loan offer was that they did not need the provided inputs, suggesting the need for an expanded “menu” within the C2C input loan product.
- The repayment rate of the loans, measured at the end of the loan period, is very poor (as against 80-90%) reported in preliminary discussions with C2C)

CONCLUSION AND WAY FOREWARD

- The additional loan offers provided in the pilot study did not influence these repayment rates.
- Several factors could explain this poor loan performance.

- Future research will focus on understanding the source of the challenges farmers face in repaying loans during the 2023-2024 dry agricultural season.


THANK
YOU

Questions and Comments

INTRODUCTION TO GUIDELINE

“Creating more and better employment in agrifood system”

Guidance development

Naomi Black
Project Manager –
ISEAL Alliance & Evidensia

CGIAR | INITIATIVE ON Rethinking Food Markets

KISM

Deepening research on employment

What we are trying to achieve in this session:

- Translating this 2023 meta-study into guidance that is tailored to different country contexts
- Getting your perspective on the reality in Nigeria

See the study and all knowledge products at www.kismfoodmarkets.org/node/2495

CGIAR INITIATIVE ON Rethinking Food Markets

KISM

Employment in agri-food systems

The meta-study methodology:

- A synthesis of ~300 journal articles, working papers, reviews, reports, and book chapters
- Documents were organised into a matrix of 10 employment drivers & 9 employment effects
- Themes were then identified

The report is structured around 9 sections:

The structural transformation revisited	Employment in agrifood systems	Rural employment diversification
The "hidden middle"	Intensification, automation, and digitalisation	Contract farming
Working conditions and social protection	Female, employment, gender and AVC	Youth

See the study and all knowledge products at www.kismfoodmarkets.org/node/2495

Main messages

1. Agrifood systems in much of the Global South evolving within a structural transformation "lite"

2. Agrifood systems represents a substantial source of employment in low-and middle- income countries

3. Agriculture is the main agrifood systems employer, but non-farm activities are increasing their share in total agrifood system employment

Where we will focus today

4. While there are general patterns towards better employment conditions, situations vary greatly, and innovations and policy options must be tailored to each context

5. The better employment options mainly benefit better off, middle-aged men to the detriment of women and young people

6. Successes in agrifood systems are overrepresented in the literature, with a large focus on modern value chains

See the study and all knowledge products at www.kismfoodmarkets.org/node/2495

Value chain innovation groups & interventions

INNOVATIONS	EMPLOYMENT EFFECTS	INCLUSION EFFECTS
Mechanisation	MOSTLY +	NOT CLEAR
Digital innovations	MOSTLY +	MOSTLY +
Food standards that include labour provisions	MIXED RESULTS	MIXED RESULTS
Contract farming	MOSTLY +	MIXED RESULTS
Small-scale irrigation	MOSTLY +	MOSTLY +
Agroecology	MOSTLY +	MOSTLY +
Flexible labour contracts	MOSTLY +	MIXED RESULTS

See the study and all knowledge products at
www.kismfoodmarkets.org/node/2495

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KISM

Policy and institutional innovations or interventions

INNOVATIONS	EMPLOYMENT EFFECTS	INCLUSION EFFECTS
Investment in infrastructure	**MOSTLY +**	**MOSTLY +**
Modernisation of wholesale markets	**MOSTLY +**	**MOSTLY +**
Social protection linked with agricultural development interventions	**MOSTLY +**	**MOSTLY +**
Expanded social protection	**MOSTLY +**	**MOSTLY +**
Labour market regulation	**MOSTLY +**	**MOSTLY +**
Collective action organisations	**MOSTLY +**	**MOSTLY +**

See the study and all knowledge products at
www.kismfoodmarkets.org/node/2495

CGIAR INITIATIVE ON Rethinking Food Markets
KISM

Deepening research on employment: your perspective

- Join at Menti.com

Next steps

- Development of guidance on this issue and 2 other resources
- Launched on the KISM platform in December 2024

See the study and all knowledge products at www.kismfoodmarkets.org/node/2495

Image courtesy of Livier Garcia

CGIAR INITIATIVE ON Rethinking Food Markets

KISM

Employment guideline survey

KISM is developing 3 pieces of guidance for practitioners. This survey focuses on getting in-country perspectives for our 1*st* piece, which is being developed from the 2023 meta-study on "Creating more and better employment in agri-food systems".

Go to: **www.menti.com**
Enter code: **8570 9734**

Or use the link below:
https://www.menti.com/alfdxhxg5anu


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DAY 1. SESSION 2

Identifying scalable innovations

INITIATIVE ON
Rethinking
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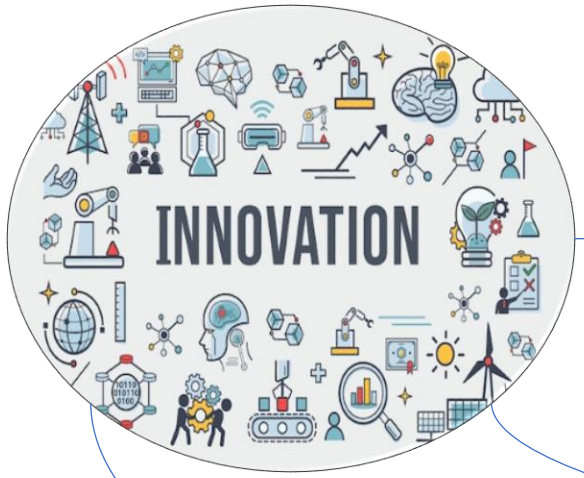
CGIAR

RFM Stakeholder workshop

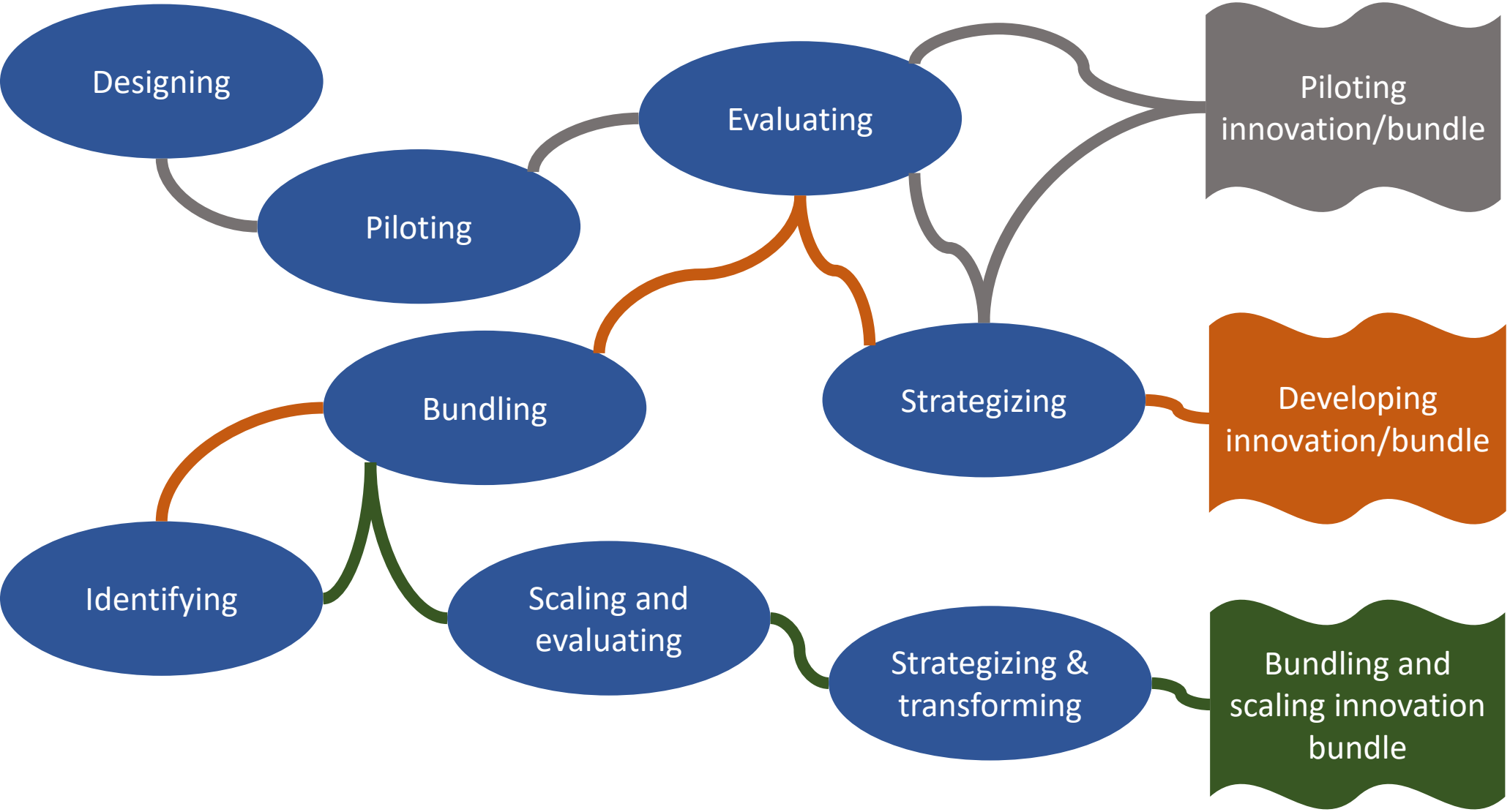
Innovation scalability and scaling preparedness

Thai Thi Minh, MELIA
IWMI, t.minh@cgiar.org

Key building elements for innovation and scaling



Different intervention processes in RFM Initiative



Innovation scope and research design: Innovation and/or innovation bundles

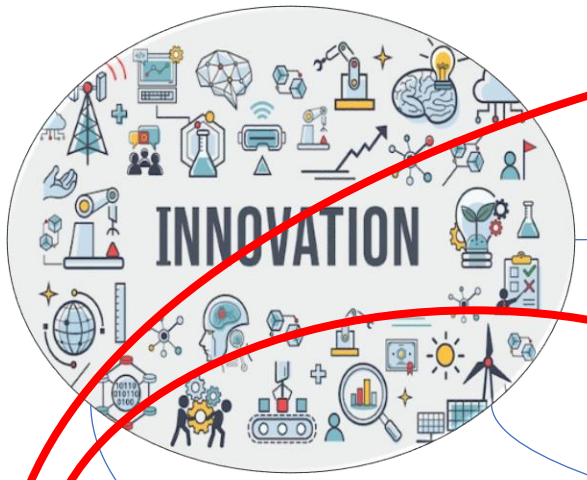
Intervention scope: Testing and/or bundling and scaling

Stakeholder engagement: Targeted VS broad stakeholders

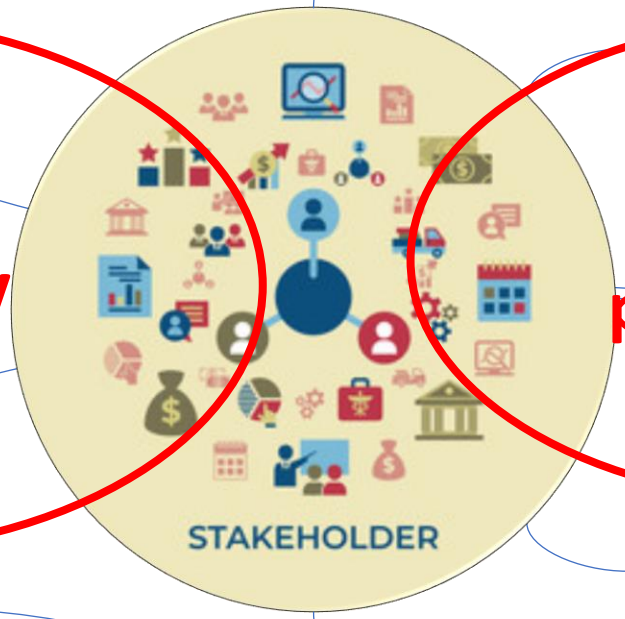
Scaling preparedness: Coverage and level of scaling ability, ownership, buy-in, investment, and commitment

Impacts Beneficiaries at large scale and/or systemic changes

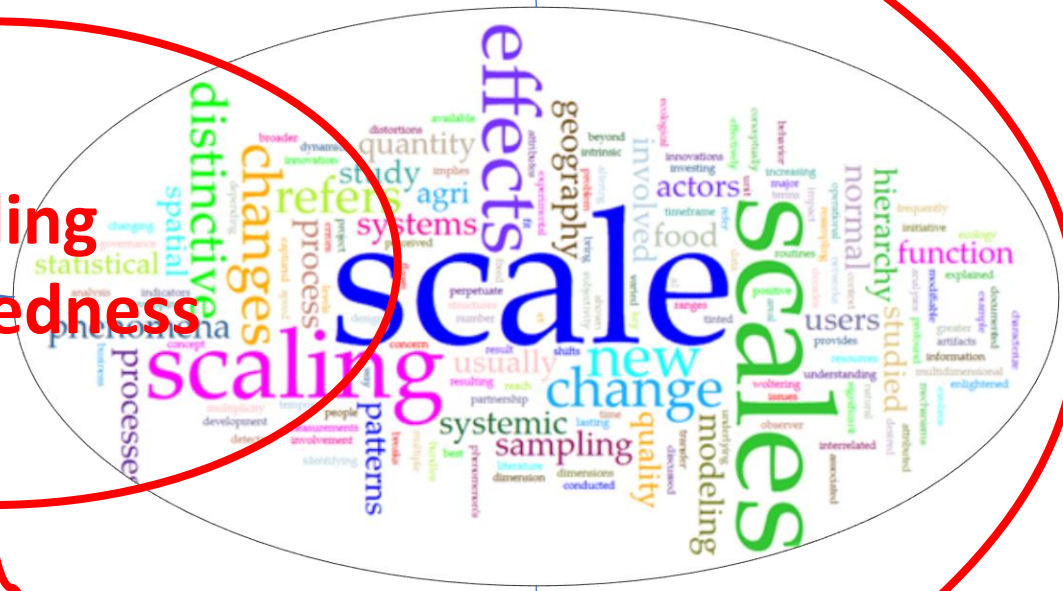
Key building elements for innovation and scaling



Scalability



Scaling preparedness

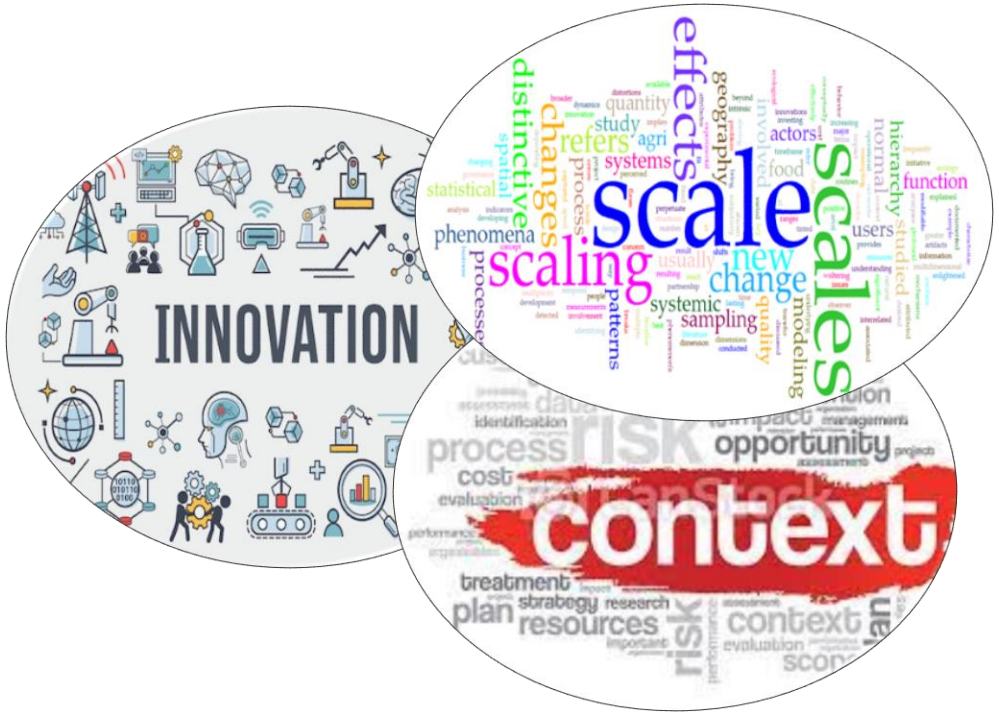


Innovation scaling is a multi-faceted process that organically happened yesterday.

Innovation scalability

Innovation Scalability is the ability of **innovation** to adapt to the contexts and changes during the scaling process as well as anticipated performance, impact, and trade-offs when going to scale

- **Type of innovation**: Incremental, radical, disruptive
- **Innovation attribute:** Maturity availability in the market**,**
- **Intervention:** Timing of intervention, investment needed, required resources, return on investment
- **Desired impacts**: Nutrition, health and food security; Poverty reduction, livelihoods, and jobs; Gender equality, youth & social inclusion; Policy and institution)



- **Potential new conditions**: Demands, challenges, opportunities, potential risks,
- **Ability to adapt to new conditions**:

- **Status of adoption:** current users, their accessibility and affordability to the innovation, drivers to adopt
- **Extent and speed of scaling the innovation:** Other user segments, potential geographical reach, time frame for scaling
- **Unintended negative outcomes of scaling**: Undesired impacts/trade-offs, possible adjustments of innovation/intervention to reduce the trade-offs

Scaling preparedness

Scaling preparedness is a process of developing actors' and stakeholders' **abilities** to catalyze innovation and accelerate investment/adoption. It is embedded in innovation and scaling processes and requires **interactive stakeholder engagement.**

For and with:

- Intervention partners
- Scaling actors (private and public sector, NGOs)
- Innovation developers (Businesses, universities)
- Innovation ecosystem (networks, partnerships)
- Knowledge partners
- Accelerators (policymakers, investors)
- Beneficiaries (farmers, farming communities, consumers, labour)

Stakeholder engagement

- Stakeholders involved: Diverse actors and stakeholders
- Engagement degree: Stakeholder interests, attitude, and acceptance to participate

Stakeholder commitment

- Stakeholder ownership: Stakeholder participation in intervention activities, stakeholder commitment to achievement of intervention goals, stakeholder demand for accountability
- Buy-in and continuation: Investment in innovation, intervention, and scaling

Accountability

- **Resource contribution and investment:** Available resources, time investments, budget and staff contribution
- **Adaptability:** Available capacity, ability to adapt to new contexts, ability to adjust to meet new demands

Identifying scalable innovations

Innovation scalability

- Innovation
- Context
- Scaling

Scoring

1. Very low
2. Low
3. Neutral
4. High
5. Very high

Scaling preparedness

- Stakeholder engagement
- Commitment
- Accountability

Identifying Scalable Innovations

What indicators should be used to identify scalable innovation?

- Assess innovation scalability
- Assess scaling preparedness

BREAKOUT DISCUSSION TO IDENTIFY SCALABLE INNOVATIONS

Breakout discussion: Groups

GROUPS

- **Group 1:** Cool transportation and cold storage
- **Group 2:** Solar dryer
- **group 3:** Plastic crates+ plus (training/capacity intervention)
- **Group 4:** Agricultural/digital finance (Inputs & cash loans interventions)
- **Group 5:** Improved seeds (tomatoes) + plus (training/capacity strengthening)

Breakout discussion

Discussion: (60 minutes)

- Assess innovation scalability
- Assess scaling preparedness
- Identify scalable bundles

Facilitation: Each group should appoint

- A facilitator to facilitate the discussion
- A representative to report back

Reporting back: (5 minutes for each group)

- Using the template to guide the discussion and reporting back
- 5 minutes reporting back
- 5 minutes of clarification and comments

Suggested template for reporting back on scalable innovation

1. Innovation scalability

Indicators	Description	Scoring (1-5)
1.1. Innovation		
Type of innovation: Incremental, radical, disruptive		
Innovation attribute: Maturity**,** availability in the market, target value chains		
Intervention: Timing of intervention, investment needed, required resources, return on investment		
Desired impacts: Nutrition, health and food security; Poverty reduction, livelihoods, and jobs; Gender equality, youth & social inclusion; Policy and institution		

1. Innovation scalability (Cont.)

Indicators	Description	Scoring (1-5)
1.2 Context		
Potential new conditions: Demands, challenges, opportunities, potential risks, new value chains		
Ability to adapt to new conditions: Demands, challenges, opportunities, potential risks, new value chains		
1.3 Scaling		
Status of adoption: Current users, their accessibility and affordability to the innovation, drivers to adopt		
Extent and speed of scaling : Other user segments, potential geographical reach, time frame for scaling		
Unintended negative outcomes of scaling: Undesired impacts/trade-offs, possible adjustments of intervention to reduce the trade-offs		

2. Scaling preparedness

Indicators	Description	Scoring (1-5)
2.1. Stakeholder engagement		
Stakeholders involved: Diverse actors and stakeholder		
Engagement degree: Stakeholder interests, attitude, and acceptance to participate		
2.2 Stakeholder commitment		
Stakeholder ownership: Stakeholder participation in intervention activities, stakeholder commitment to achievement of intervention goals, stakeholder demand for accountability regarding innovation/intervention		
Buy-in and continuation: Investment in innovation, intervention and scaling		
2.3 Accountability		
Resource contribution and investment: Available resources, time investments, budget and staff contribution		
Adaptability: Available capacity, ability to adapt to new contexts, ability to adjust the innovation to meet new demands		

Concluding remark from identifying scalable

Ranking	Score and remark
Very low	
Low	
Neutra	
High	
Very high	

Innovation readiness

Level 9 - The innovation is validated for its ability to achieve a specific impact under uncontrolled conditions.
Level 8 - The innovation is being tested for its ability to achieve a specific impact under uncontrolled conditions.
Level 7 - The innovation is validated for achieving a specific impact under semi-controlled conditions.
Level 6 - The innovation is tested for its ability to achieve a specific impact under semi-controlled conditions.
Level 5 - The innovation is validated for achieving a specific impact under controlled conditions.
Level 4 - The innovation is being tested for its ability to achieve a specific impact under fully controlled conditions.
Level 3 - The innovation's key concepts have been validated for their ability to achieve a specific impact.
Level 2 - The innovation's fundamental concepts are being formulated or designed.
Level 1 - The innovation's basic principles are being researched for their ability to achieve a specific impact.
Level 0 - The innovation is at the idea stage.

DAY 2. SESSION 3

Deep dive into bundling and scaling of (scalable) innovations

RECAP OF DAY 1

DAY 1. Highlights

Session 1. Sharing & Reflecting on Innovations and Interventions

- **Bundling is critical for successful interventions (e.g., combining solar dryer and cold storage services**; cool transportation and cold storage will improve synergies and benefits to users).
- **Partnerships are essential for the sustainability and scaling of intervention:** Multiple partnerships are needed, including those with farmer organizations, the private sector, public institutions, and research.
- **Effective trade-off management is required to achieve multiple objectives** (e.g., in addressing post-harvest losses using plastic crates, we need to manage job losses by women who weave raffia baskets, which were previously used).
- **Capacity strengthening ensures** the long-term impact and sustainability of innovations/ interventions.

DAY 1. Highlights

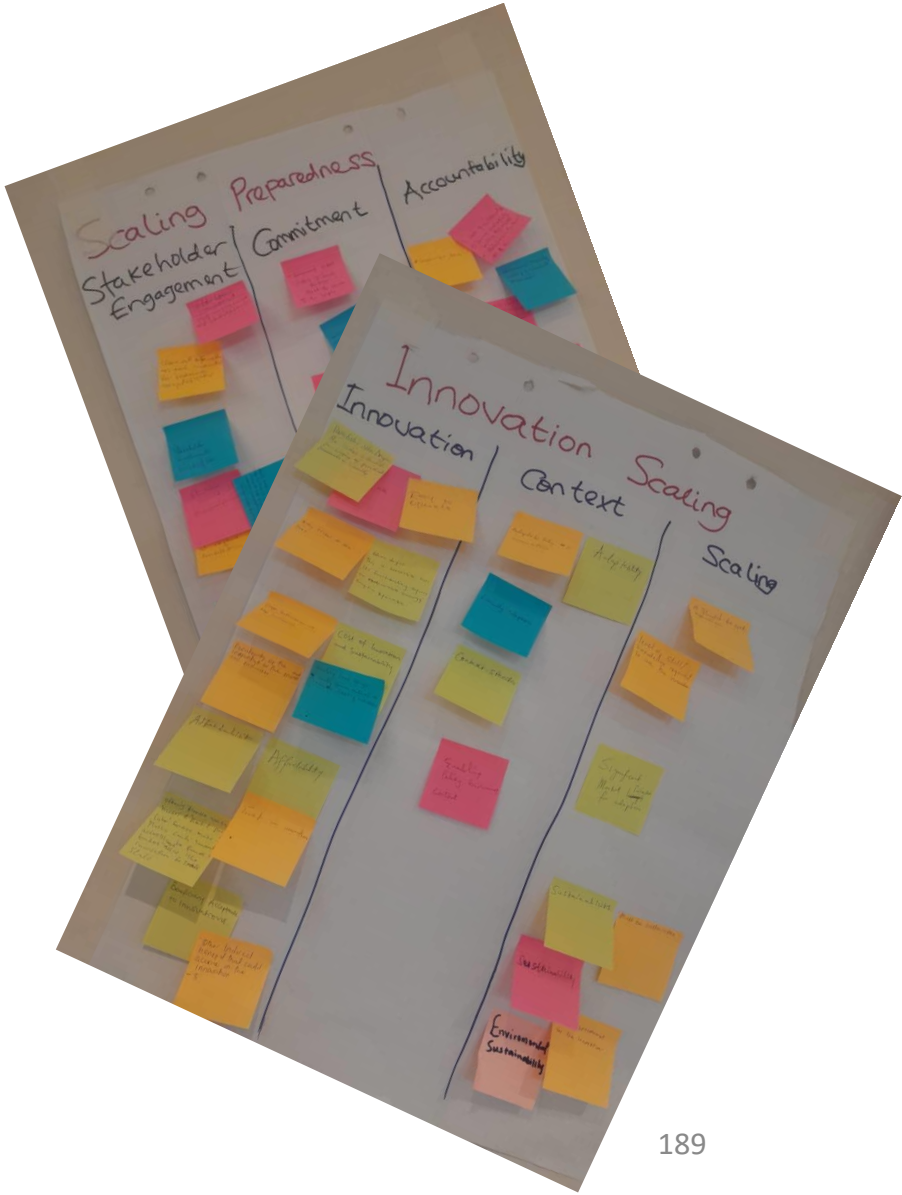
Session 2. Identifying scalable innovation

- Cool transportation and cold storage: **???**
- Solar dryer: **High (3.75)**
- Plastic crates+ plus: **High (4.0)**
- Agricultural/digital finance: **High (4.55)**
- Improved seeds + plus: **???**

UNDERSTANDING OF KEY TERMS

Can you share your thoughts about:

- Scalable innovation
- Scaling preparedness
- Innovation scaling



BREAKOUT DISCUSSION

UNDERSTAND NEW CONTEXTS, RESOURCES, AND IMPACTS OF SCALING

Breakout discussion: Groups

GROUPS

- **Group 1:** Cool transportation and cold storage
- **Group 2:** Solar dryer
- **group 3:** Plastic crates+ plus (training/capacity intervention)
- **Group 4:** Agricultural/digital finance (Inputs & cash loans interventions)
- **Group 5:** Improved seeds (tomatoes) + plus (training/capacity strengthening)

Breakout discussion

Discussion: (60 minutes)

- Understand the new contexts for the scaling of (scalable) innovations
- Identify resources and conditions/requirements needed for the scaling
- identify existing factors/products/services/supports/interventions for bundling with the scalable innovation
- Assess potential scaling impacts and tradeoffs

Facilitation: Each group should appoint

- A facilitator to facilitate the discussion
- A representative to report back

INNOVATION TITLE:

Contexts

Bio-natural-physical-climatic characters

- Natural
- Physical
- Climatic

Socio-economic-institutional characters

- Demographic
- Value chain
- Market
- Platforms, communities
- Incentives
- Policies

Resources needed for innovations

- Natural
- Physical
- Financial
- Social
- Human
- Organizational/Institutional

Available resources

- Resources
- Existing solutions/services for bundling
- Existing investments

Scaling

- Impact
- Trade-offs

Stakeholders and Networks

- Stakeholders related to innovation
- Networks related to innovation

Initiatives and investments

- Initiatives related to innovation
- Investment related to innovation

UNDERSTANDING OF KEY TERMS

Can you share your thoughts about:

- Scalable innovation
- Scaling preparedness
- Innovation scaling

INNOVATION SURVEY (Menti Meter)

Bedru Balana and
Saadia Bobtoya Owusu-Amofah

INNOVATION SURVEY (Menti Meter)

The innovation survey assesses innovations/interventions and generates evidence for the WPs and end-of-initiative outcomes.

Go to: **www.menti.com**

Code: **4343 4126**

DAY 2. SESSION 4

Developing innovation scaling strategy

Scaling strategy and pathways

Overall goal:

Pathway(s)

Intervention(s):

- What
- How
- Where
- When
- Who

Breakout discussion (Continue)

Discussion: (60 minutes)

- Identify scaling strategies/pathways

Facilitation: Each group should appoint

- A facilitator to facilitate the discussion
- A representative to report back

Reporting back:

- 5 minutes reporting back
- 5 minutes of clarification and comments

DAY 2. SESSION 5

Exploring collaboration and partnership possibilities

POTENTIAL PARTNERSHIPS AND COLLABORATION FOR SCALING

Matching interests and expectations

- Identify one scalable innovation that YOU are interested in the most.

- Form an interested group around the innovation

What partnerships, collaboration, and investments are needed to ensure “success”?

Outputs of this interaction

- Potential (scaling) partners
- Potential partnerships
- Potential investments in scaling innovation (by organizations/partnerships)

Sharing key action points

FOLLOW UP ACTIONS AND CLOSURE

Feedback on the stakeholder workshop

- Three things from this workshop that impressed you the most
- Three suggestions for the improvement