

Identifying Innovations to Reduce Food Loss and Waste, Enhance Food Safety, and Promote Access to Nutrient-Dense Foods :

Methods and overview of FSN-IL's scoping of scalable innovations

Shibani Ghosh

Associate Director

Food Systems for Nutrition Innovation Lab



SCOPING EXERCISE

Step 1: Census generation

Review literature, conduct searches, knowledge and existing networks

Step 2: Prioritization-

utilize the adapted USAID Agricultural Scalability tool to prioritize innovations

Step 3

Internal feedback and consensus generation to finalize prioritized list

Step 4

Identification of evidence based 'on the shelf' innovations for FSN-IL geographies
Development of R4D strategy to support FSNIL R4D actions

Reduce Food Loss and Waste
Ensure Food Safety
Perishable Nutrient Dense foods



USAID
FROM THE AMERICAN PEOPLE

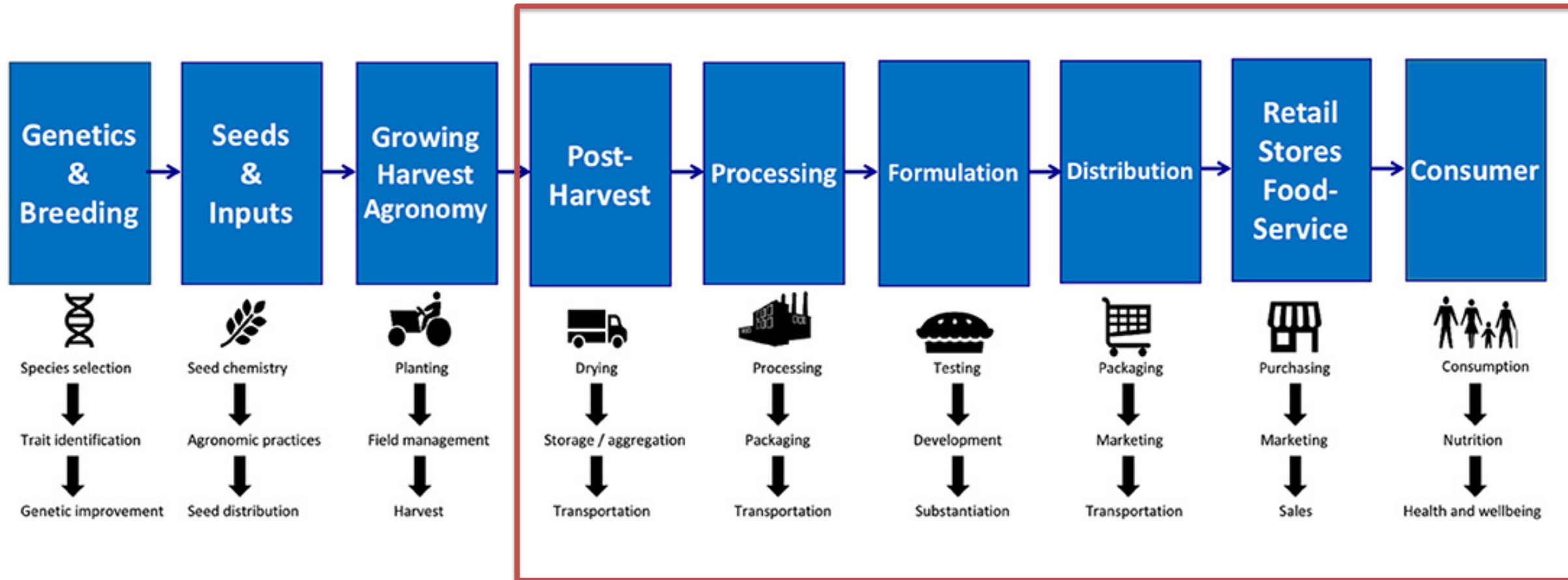
**GUIDE TO THE AGRICULTURAL
SCALABILITY ASSESSMENT TOOL**
FOR ASSESSING AND IMPROVING THE SCALING
POTENTIAL OF AGRICULTURAL TECHNOLOGIES

JUNE 7, 2018

This publication was produced for review by the United States Agency for International Development. It was prepared by Dr. Richard Kohl and Colm Foy of Management Systems International, A Tetra Tech Company, for the E3 Analytics and Evaluation Project.

FOCUS OF SCOPING EXERCISE

Innovations along food value chains to support healthy diets



ADAPTATION OF AGRICULTURAL SCALABILITY TOOL

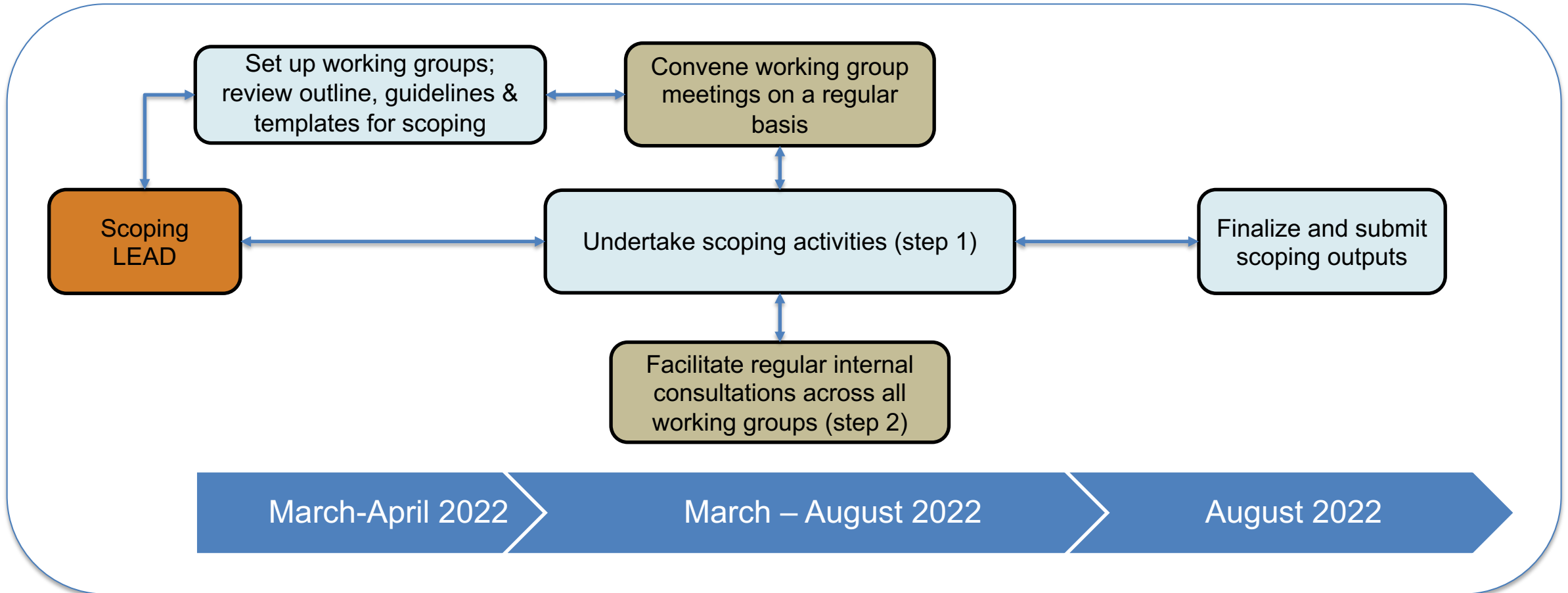


GUIDE TO THE AGRICULTURAL
SCALABILITY ASSESSMENT TOOL
FOR ASSESSING AND IMPROVING THE SCALING
POTENTIAL OF AGRICULTURAL TECHNOLOGIES

Adapted

- A. Importance of the Issue the Innovation Addresses
- B. Credibility and Observability of the Innovation
- C. Requirements for Adoption
- D. Potential Benefits or Risks for Potential Adopters
- E. Enabling Environment for commercialization

PROCESS & TIMELINE



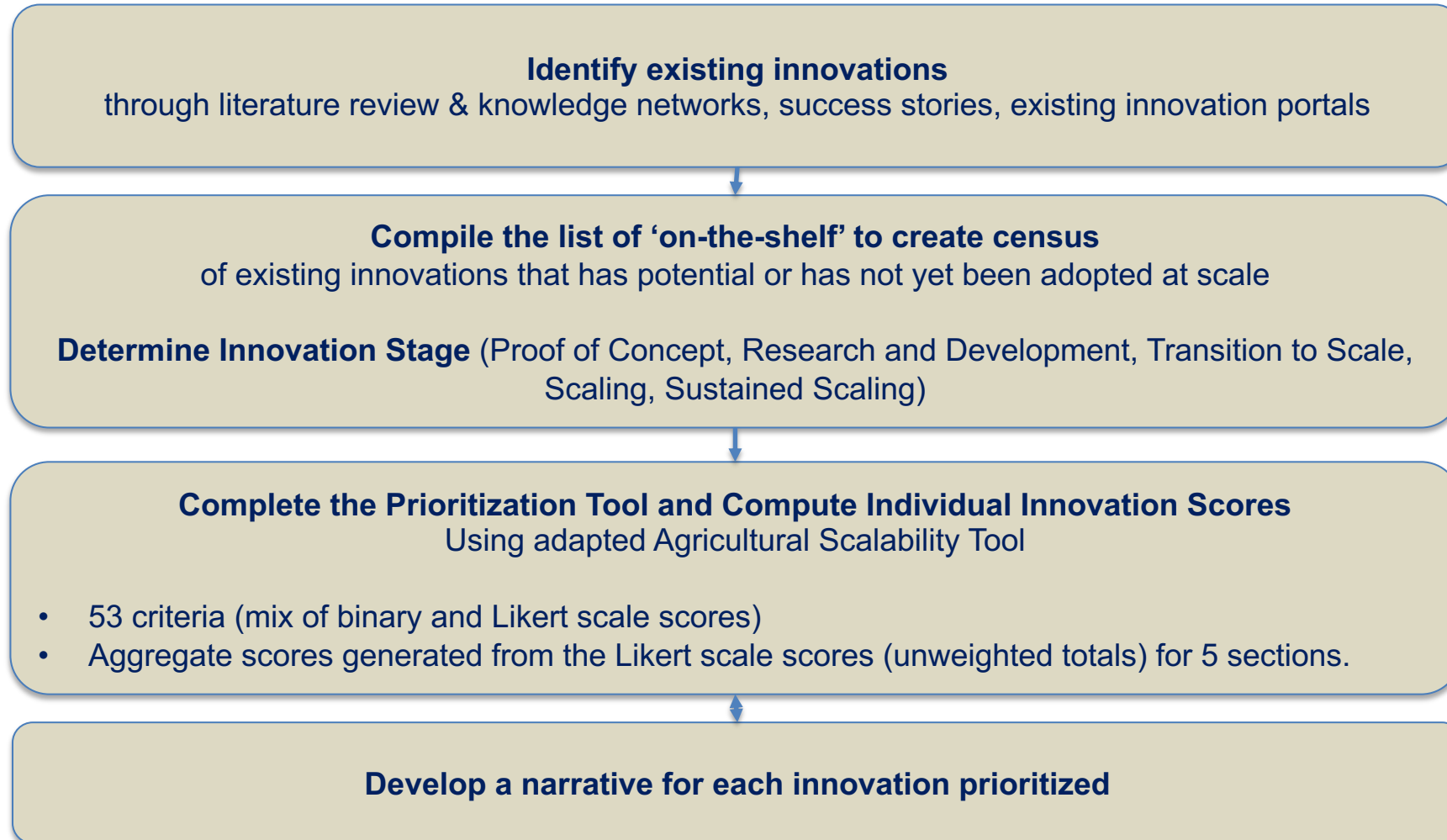
5 working groups, 10 members per group- partner institutions

SCOPING EXERCISE THEMES

Thematic Area	Scoping LEAD
Theme 1: Agriculture Production, harvest post-harvest losses (on farm)	Purdue University
Theme 2: Post farm-gate processing, packaging & storage	University of Colorado
Theme 3: Marketing and Distribution- Infrastructure, transport & markets	Action for Enterprise (AFE)
Theme 4: Food Environment, consumer choice, retail promotion	Global Alliance for Improved Nutrition (GAIN)
Theme 5: Nutrition Metrics	Harvard University

Approximately 10 members per thematic group ~ 50-60 experts from across 20 institutions participated

SCOPING ACTIVITY METHODOLOGY





FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



Government of Nepal
National Planning Commission



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



Theme 1: Agriculture Production, Harvest, and Post-Harvest Losses

Scoping Exercise Report

Food Systems for Nutrition Innovation Lab

August 14th, 2022



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



Theme 2: Post-Farmgate Food Processing, Food Packaging and Food Storage

Scoping Exercise Report

Food Systems for Nutrition Innovation Lab

August 15th, 2022



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



Government of Nepal
National Planning Commission

FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative



FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative



Theme 3: Infrastructure, Transport and Markets Scoping Exercise Report

Food Systems for Nutrition Innovation Lab
August 17th, 2022

Theme 4 - Food Environment, Consumer Choice, and Retail Promotion

Scoring Exercise Report

Food Systems for Nutrition Innovation Lab
August 15th, 2022

INNOVATION ASSESSMENT ACROSS ALL THEMES

Data Management and cleaning

Merging of data from four themes (value chain based)

Review and Data Standardization

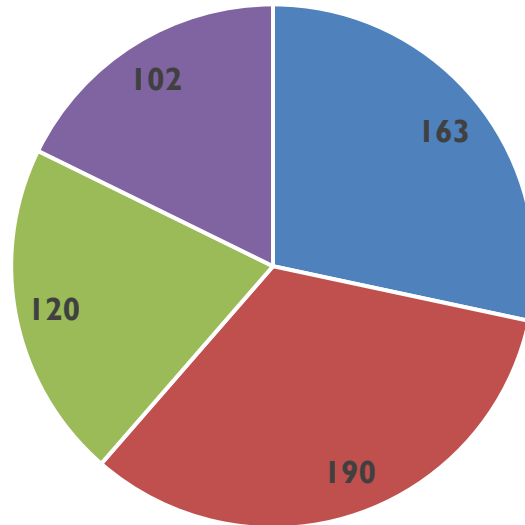
Coding data for Geography, Food Groups, Innovation Type (product, process, technology)



Use Innovation Stage and Aggregate Score for Research Question Prioritization, R4D Strategy Development and Development of the first RFA

INNOVATION BY GEOGRAPHY

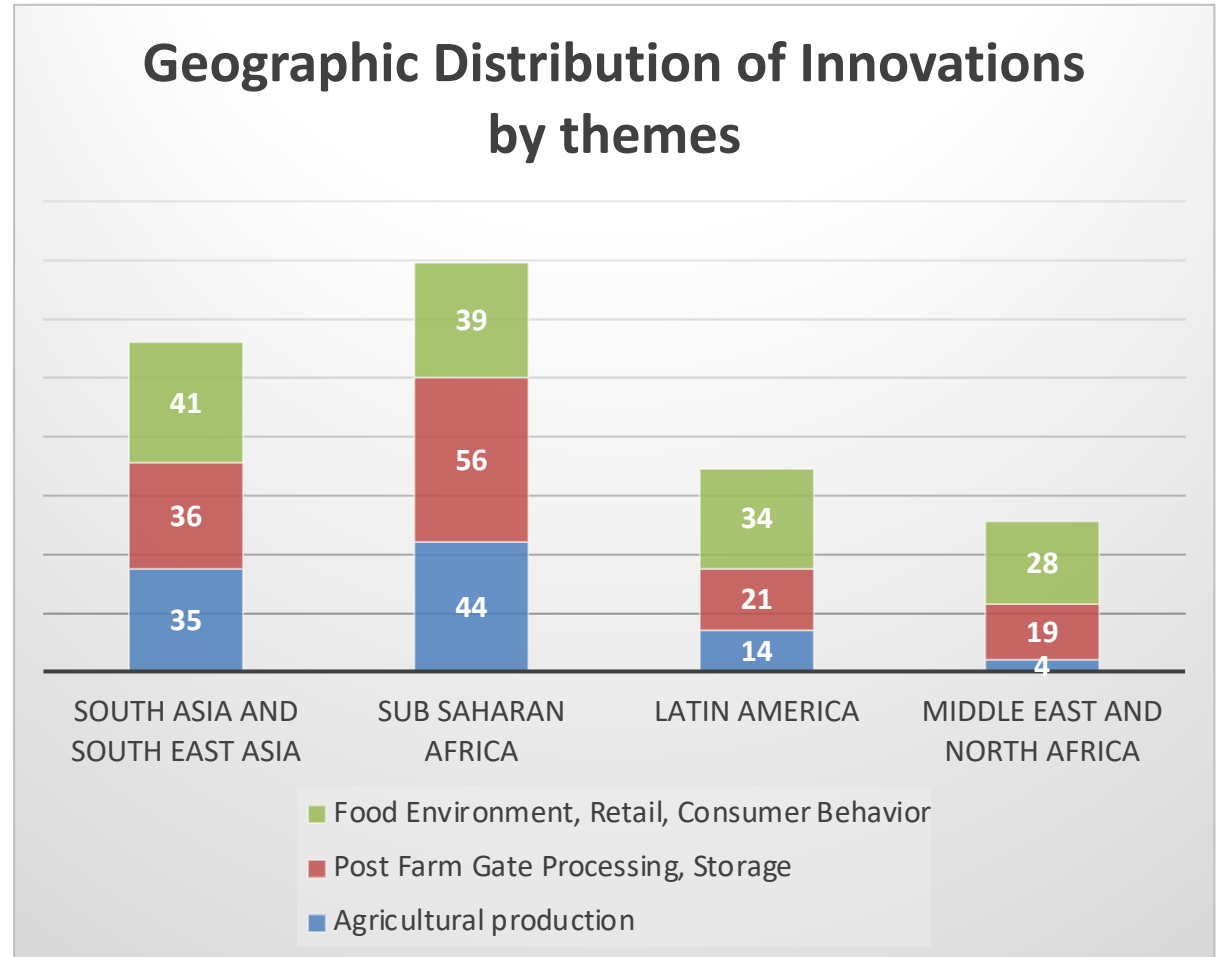
A total of 276 innovations focusing on nutrient dense foods, food loss and waste and food safety



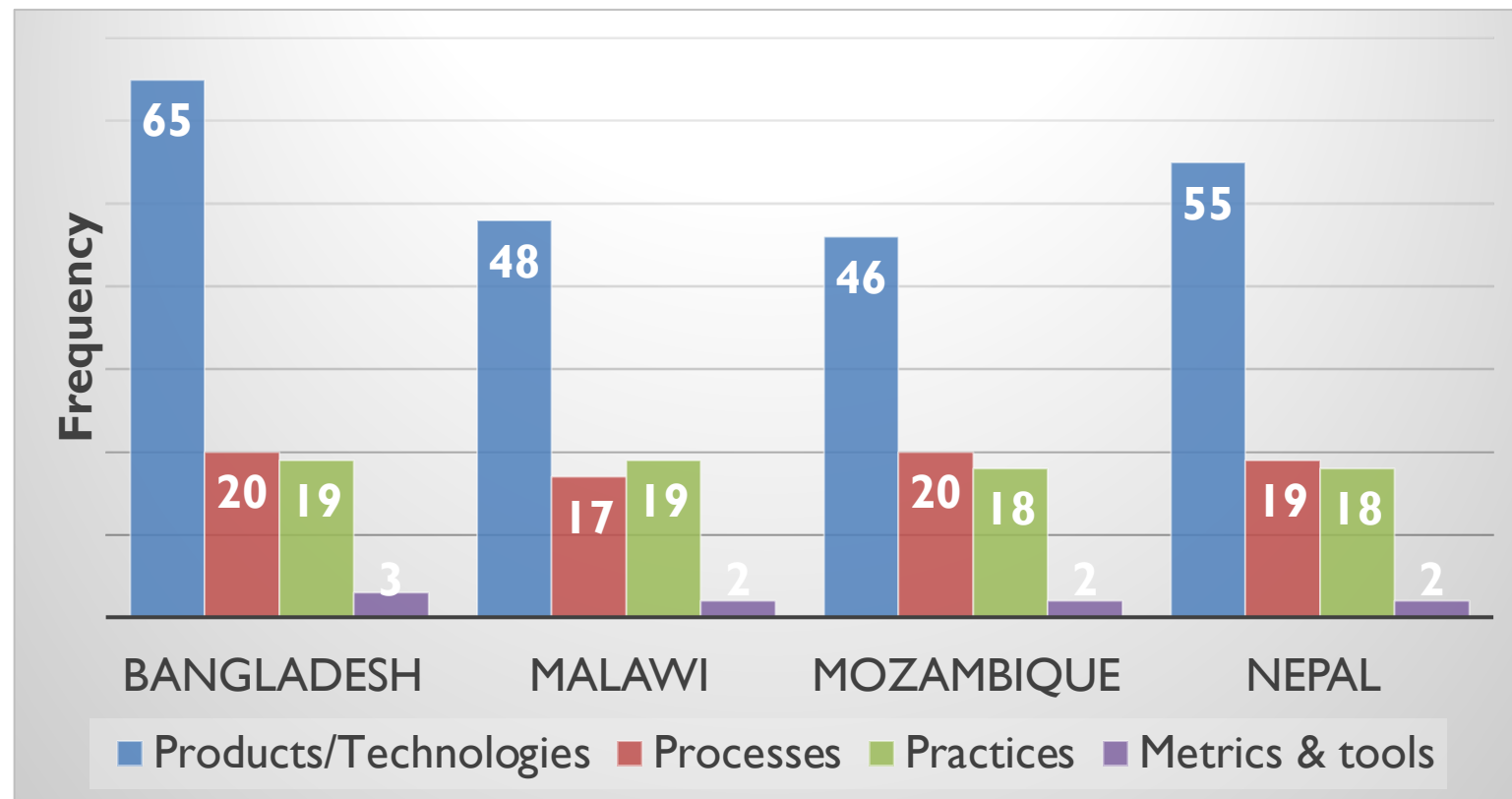
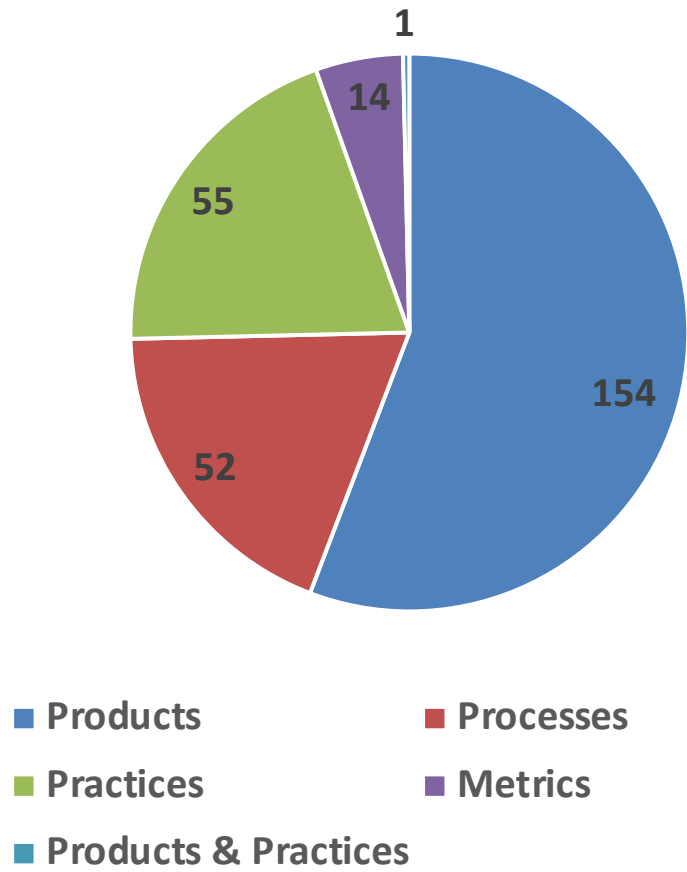
- South Asia and South East Asia
- Sub Saharan Africa
- Latin America
- Middle East and North Africa

76 Innovations are from the Global Innovation Exchange Database

Geographic Distribution of Innovations by themes



INNOVATION BY TYPES





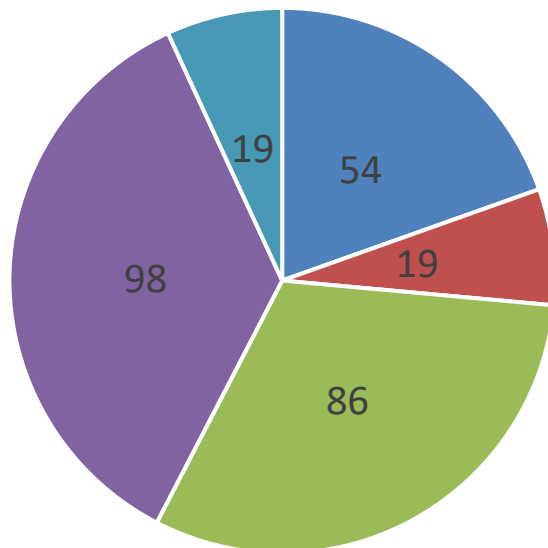
FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

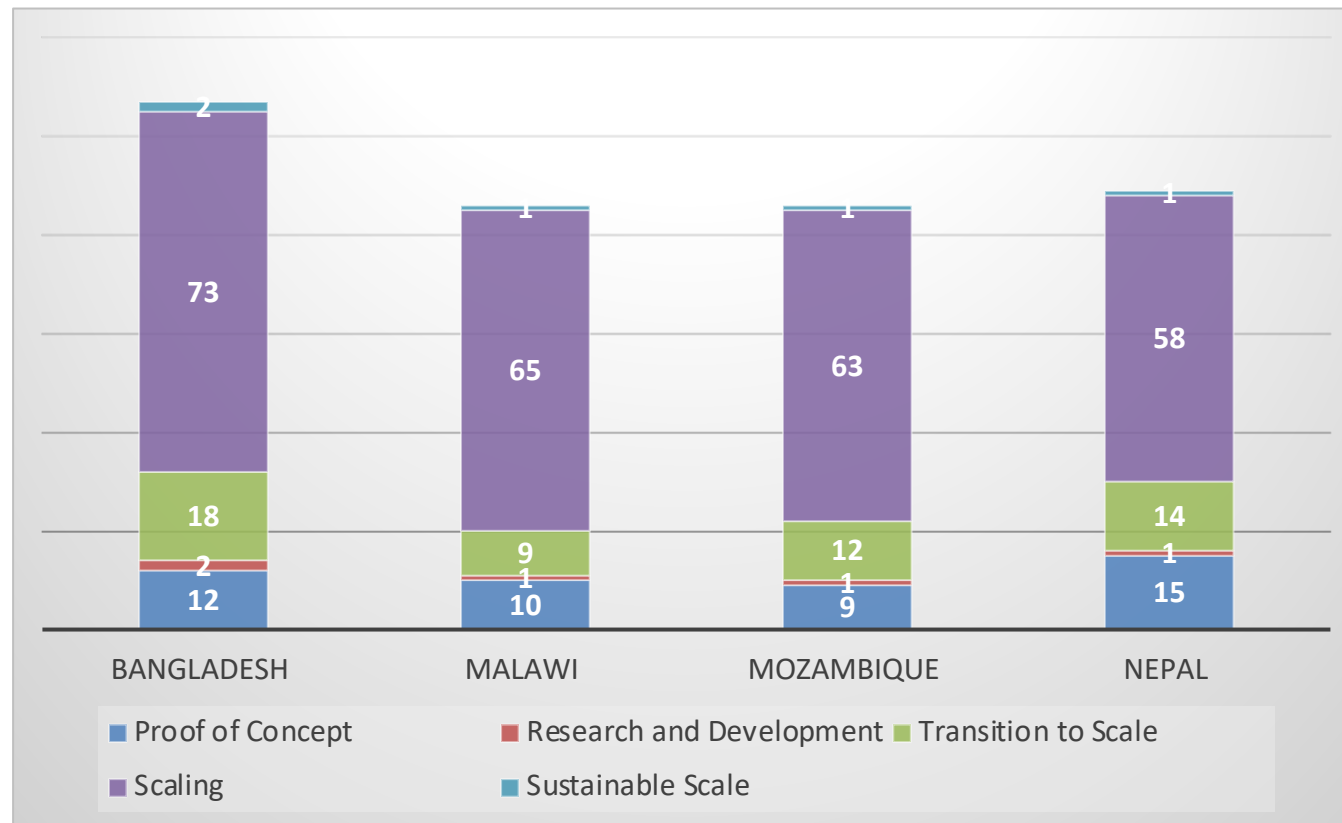


Government of Nepal
National Planning Commission

INNOVATIONS BY STAGE



- Proof of Concept
- Transition to Scale
- Sustained Scale
- Research & Development
- Scaling



EXAMPLES OF PRODUCTS, PROCESSES, PRACTICES

Products

- Driers (Solar and Non Solar)
- Cold Rooms and Cold Storage Tech
- Future Pump Solar Pumps
- Hermetic Storage
- Reusable crates
- Antimicrobial paper liners
- Fresh food vending machines

Processes

- Dry Chain Concept
- Bioactive packaging system
- Post-harvest toolkit
- Social Business ventures and SME development: Saving Grains, Root Capital
- Improved Nutrition Labeling
- Innovative food delivery systems
- Food traceability platforms
- Front of package labeling
- Taxes on unhealthy foods

Practices

- Scientific Animations Without Borders
- Warehouse storage practices for food grains
- Hub and Spoke Innovation System
- Trade shows
- Digital Marketing through policy restrictions on HFSS
- Elevating indigenous food systems

Processes: Market processes, support for development, policies/standards

COMPARISON OF SCORES FOR THREE FLW TECHNOLOGIES (SCALING INNOVATION STAGE)

Prioritization Tool Sections/Issues 5 sections (53 criteria); Total score: 5 points per section/issue	Illustrative innovation 1: Hermetic Storage Technologies	Illustrative Innovation 2: Chimney Solar Dryer	Illustrative innovation 3: Drying Beads
A. Issue the innovation addresses (4 criteria)	4.0	2.0	5.0
B. Credibility & Observability (8 criteria)	4.5	3.8	4.2
C. Requirements for adoption: Individuals and Institutions (18 criteria)	3.8	2.3	3.8
D. Benefits and Risks to Adopters (11 criteria)	3.27	2.8	3.9
E. Enabling environment for commercialization (12 criteria)	2.46	2.4	3

COMPARISON OF TWO FARM-BASED INNOVATIONS (SCALING INNOVATION STAGE)

Prioritization Tool Sections/Issues 5 sections (53 criteria); Total score: 5 points per section/issue	Illustrative innovation 1: Cell-phone based extension services	Illustrative Innovation 2: Video Animation for Extension dissemination
A. Issue the innovation addresses (4 criteria)	4.0	4.0
B. Credibility & Observability (8 criteria)	3.0	3.8
C. Requirements for adoption: Individuals and Institutions (18 criteria)	3.3	3.7
D. Benefits and Risks to Adopters (11 criteria)	3.6	3.5
E. Enabling environment for commercialization (12 criteria)	3	3.3

COMPARISON OF SCORES FOR THREE INNOVATIONS AROUND STANDARDS (SCALING INNOVATION STAGE)

Prioritization Tool	Innovation 1: Unhealthy food taxes	Innovation 2: Front of package labeling	Innovation 3: Improved labeling standards for nutrition
Sections/Issues 5 sections (53 criteria); Total score: 5 points per section/issue			
A. Issue the innovation addresses (4 criteria)	5.0	5	5
B. Credibility & Observability (8 criteria)	2.8	3.3	3.3
C. Requirements for adoption: Individuals and Institutions (18 criteria)	3.0	2.8	2.8
D. Benefits and Risks to Adopters (11 criteria)	2.9	2.5	2.5
E. Enabling environment for commercialization (12 criteria)	2.8	2.5	2.3

KEY TAKEAWAYS

- Innovations in LMICs focused primarily on production, less so around processes, practices and behaviors
- Rigorous empirical evidence on effectiveness, cost-effectiveness of innovations supporting reduction in loss and waste, food safety and nutrient density needed
- Unintended consequences of reducing food loss and waste (e.g., use of chemicals to preserve foods and the kinds of chemicals and pesticides and hormones often used to lengthen the shelf life) need due consideration
- Private sector, key contributors towards increasing accessibility and availability of a healthy diet, are inherently driven by profit. Policy actions and conducive enabling environment while ensuring regulatory oversight will be critical in engaging private sector.

Identifying Innovations to Reduce Food Loss and Waste, Enhance Food Safety, and Promote Access to Nutrient-Dense Foods :

Insights on Innovation Bundling: Examples from the Scoping Exercises

Shibani Ghosh and Robin Shrestha

Food Systems for Nutrition Innovation Lab



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



Government of Nepal
National Planning Commission



SOCIO-TECHNICAL INNOVATION BUNDLES

One thread that runs through the preceding, lengthy discussion of scores of exciting emergent innovations is that the scientific challenges, while formidable in many cases, may be the least of the obstacles to bringing promising innovations to impactful scale. The “best” or most scientifically elegant technologies only occasionally prevail, often floundering due to cultural, economic, ethical, or political counter-pressures. The agri-food transformations that capture attention are often too narrowly associated with a particular emblematic technology that was central to their success. The sociocultural, policy, and/or institutional changes that enable that new science to turn into transformative technologies are commonly overlooked but are equally important. Hence the importance of bundling.



OPEN ACCESS

palgrave
macmillan



GERALD J. AND DOROTHY R.
Friedman School of
Nutrition Science and Policy



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



Government of Nepal
National Planning Commission

“Science- and evidence-based innovations [be they] technological, financial, policy, legislative, social and institutional – are needed across agrifood systems.

These solutions often come as packages; for example, **scaling up a new technology may require conducive policy and legal frameworks, targeted financing, closing of the digital divide, social acceptance, and sound governance and institutions.”**



USAID
FROM THE AMERICAN PEOPLE

Tufts
UNIVERSITY

GERALD J. AND DOROTHY R.
Friedman School of
Nutrition Science and Policy

KEY POINTS EMERGING FROM FSNIL SCOPING

- Innovations
 - Products/technologies (Dry Cards, Cool rooms, PICS bags, biofortified seed varieties)
 - Processes (e.g., packaging, policies/strategies for cold chain, regulations and creation of an enabling environment, marketing strategies, innovative finance, taxation of unhealthy foods)
 - Practices (social behavior change communication/messaging/education, training programs to nudges)
 - Tools (digital marketing, apps etc.)
- Bundling of innovations across themes necessary to effect change across the value chain

INNOVATION BUNDLING: CORE MOTIVATION

- There is no *one-size fits all* innovation
- Minimize unintended objectives or expected adverse outcomes
- Uncoordinated actions of multiple actors across the value chain – bundling creates incentives or motivation for collective actions towards a common outcome
- A shared vision of healthy, equitable, and sustainable food systems for people, planet, and prosperity



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



Government of Nepal
National Planning Commission

INNOVATION BUNDLING –THOUGHT EXPERIMENT

- Bundling of innovation from a suite of innovations identified from the scoping exercises
- As a thought experiment, Innovation packages of products, processes, and practices that provide synergies to scale were bundled together taking into consideration the innovation assessment



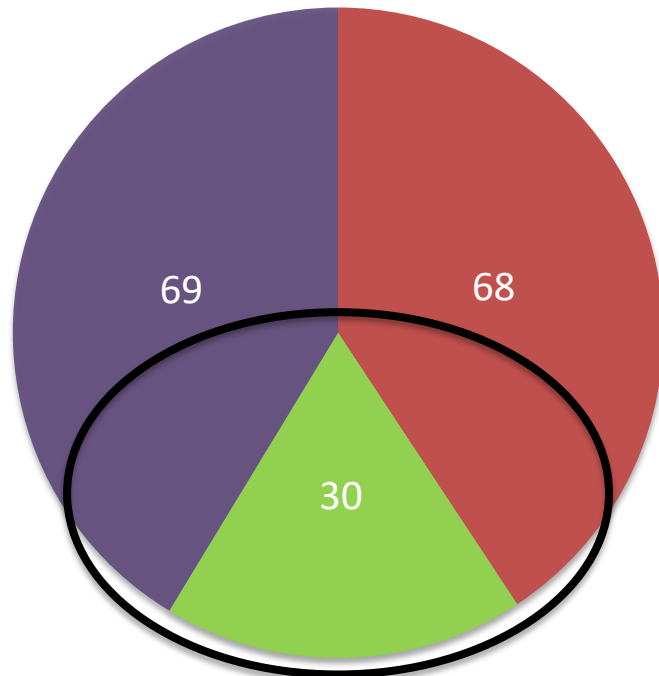
USAID
FROM THE AMERICAN PEOPLE

Tufts
UNIVERSITY

GERALD J. AND DOROTHY R.
Friedman School of
Nutrition Science and Policy

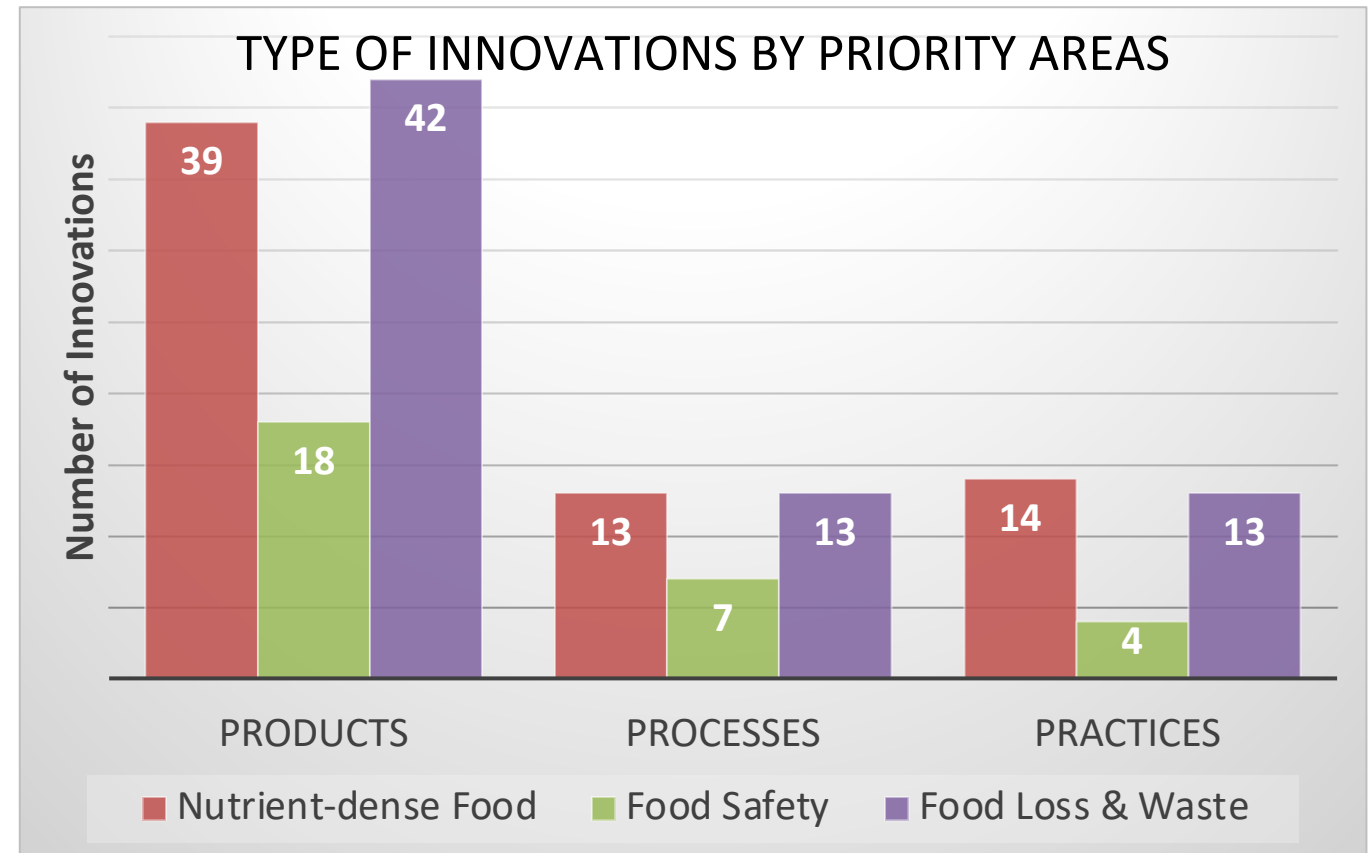
KEY SCOPING FINDINGS - NEPAL

Out of 276 innovations, 89 had evidence of implementation in Nepal

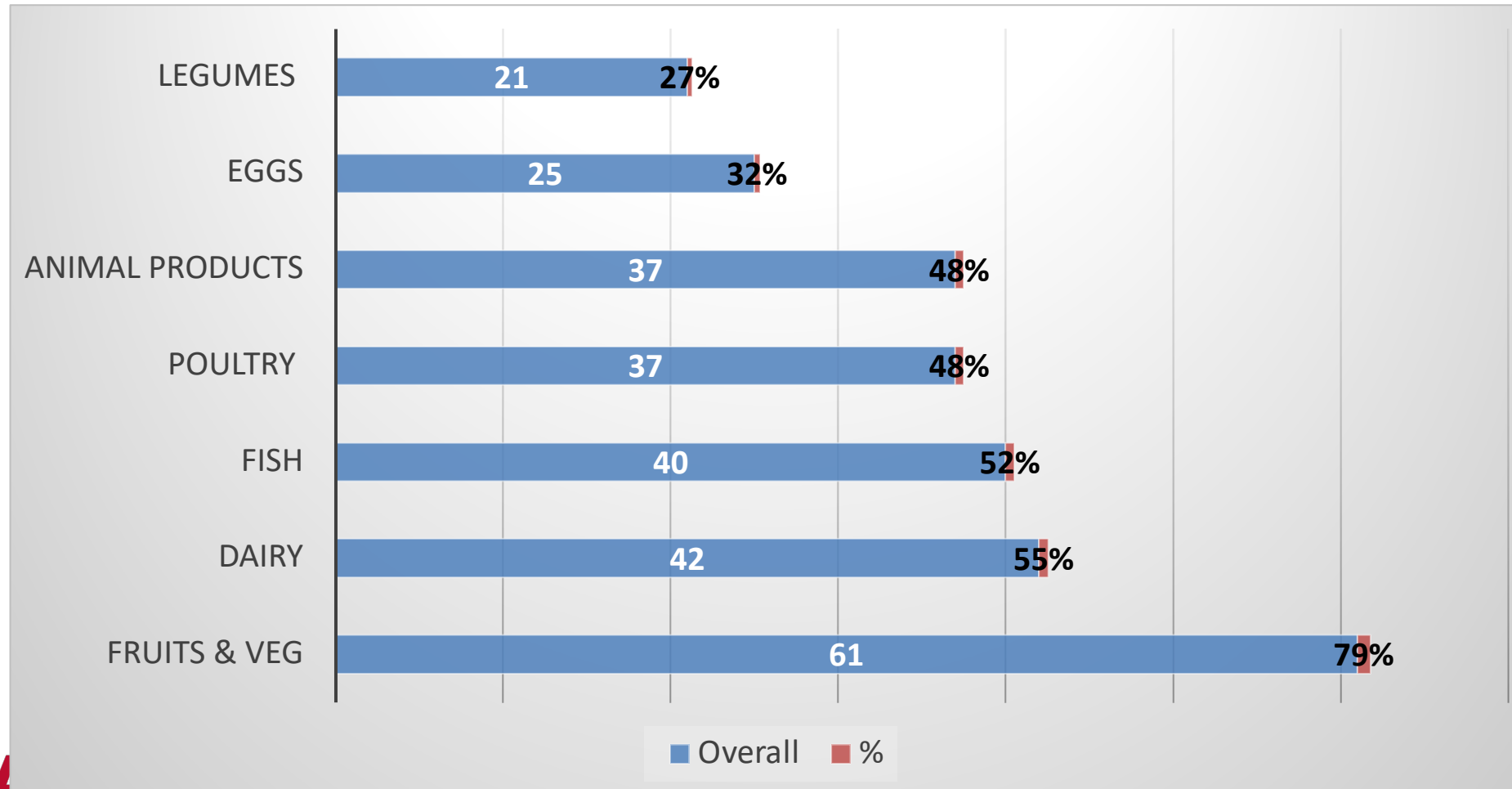


■ Nutrient-dense Food ■ Food Safety

■ Food Loss & Waste



INNOVATIONS AROUND NUTRIENT-RICH FOODS



INNOVATIONS TARGETING FRUITS AND VEGETABLES

Stage of Development	Production, harvest & post-harvest	Post farm-gate Processing & Storage	Infrastructure, Transport, & Markets	Food Environment, Consumer & Retail
Stage 2/3: Proof of Concept/R&D	<ul style="list-style-type: none"> • <i>Cellphone based extension services</i> • <i>Evaporative cooling for horticultural crops</i> 	<ul style="list-style-type: none"> • <i>Evaporative cooling and cool storage for horticultural crops</i> 	<ul style="list-style-type: none"> • <i>Electric bicycles with cooling units</i> • <i>Transport logistics</i> 	<ul style="list-style-type: none"> • <i>Transforming comm. in food industry</i> • <i>Portion sizes in restaurant meals</i>
Stage 4: Transition to Scale	<ul style="list-style-type: none"> • <i>Solar Pumps</i> • <i>Drying Beads</i> • <i>Video Animation for Extension dissemination</i> 		<ul style="list-style-type: none"> • <i>Bioactive Packaging</i> 	<ul style="list-style-type: none"> • <i>Plastic free shopping to reduce waste</i>
Stage 5: Scaling	<ul style="list-style-type: none"> • <i>Trichoderma to manage soil-borne veg disease</i> 	<ul style="list-style-type: none"> • <i>Chimney Solar Dryer</i> • <i>Cold Chain Storage (solar and electrical)</i> 	<ul style="list-style-type: none"> • <i>B2B and B2C platforms</i> • <i>Commercial grade refrigeration</i> • <i>Dynamic retail pricing labels</i> 	<ul style="list-style-type: none"> • <i>Innovative multi-media campaigns to spread knowledge about health, sustainable diet and food waste</i>

BUNDLING INNOVATIONS TO IMPROVE ACCESS TO FRUITS AND VEGETABLES

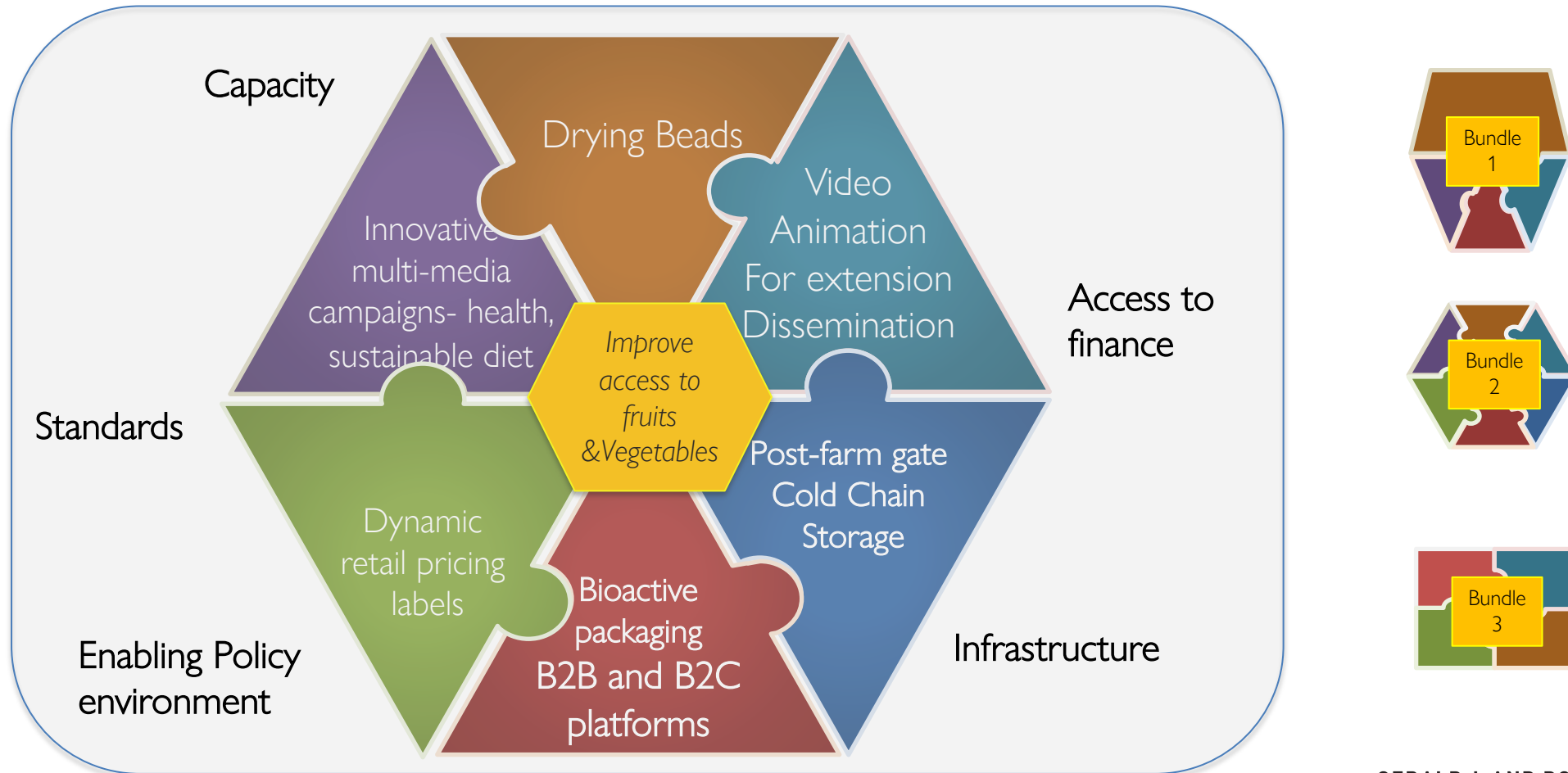
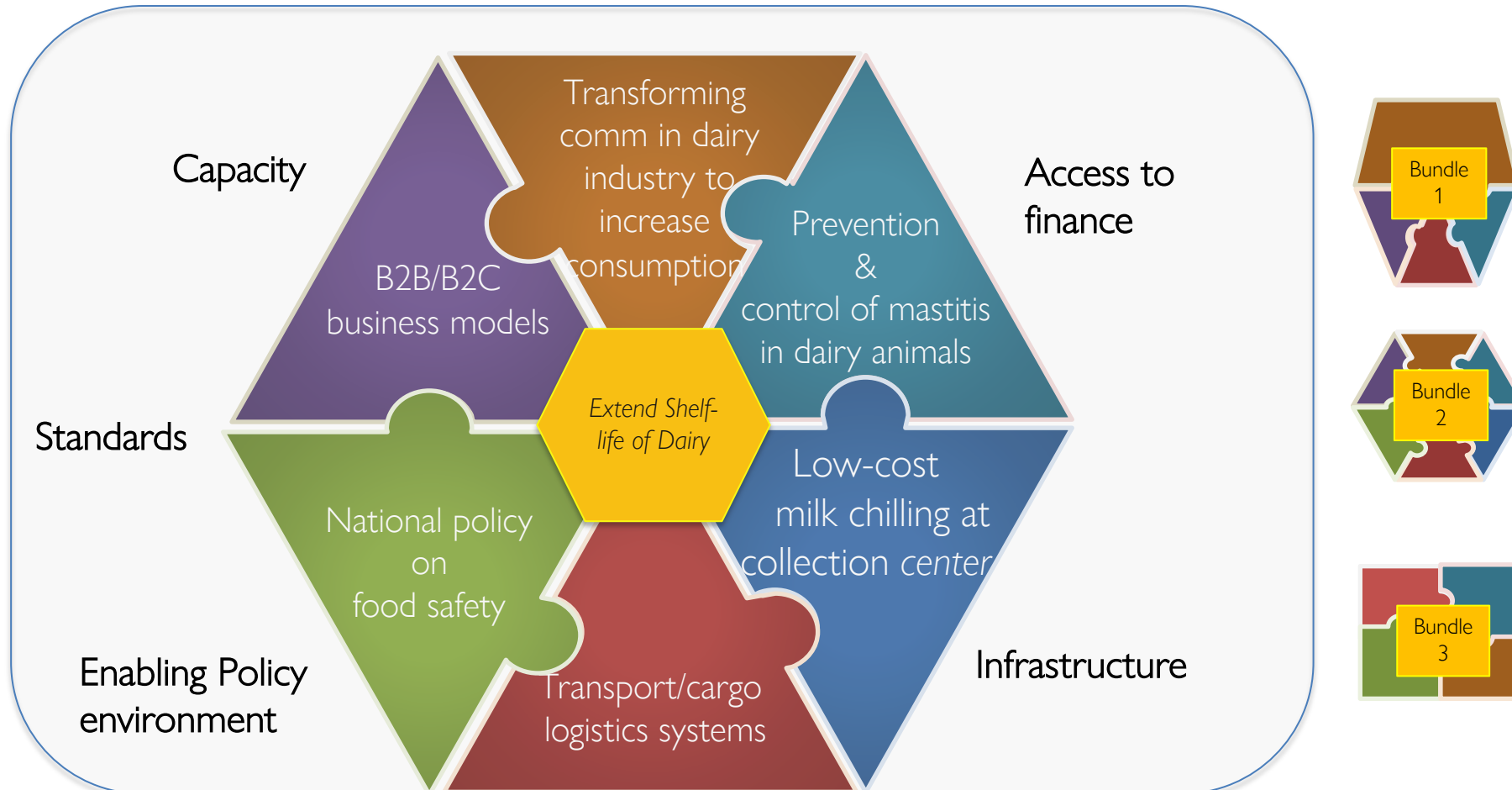


Figure adapted from: C.B. Barrett et. al., Socio-Technical Innovation Bundles for Agri-Food Systems Transformation, Sustainable Development Goals Series'

INNOVATIONS TARGETING DAIRY

Stage of Development	Production, harvest & post-harvest	Post farm-gate Processing & Storage	Infrastructure, Transport, & Markets	Food Environment, Consumer & Retail
Stage 2/3: Proof of Concept/R&D			<ul style="list-style-type: none"> • <i>Transport/cargo logistics systems</i> 	<ul style="list-style-type: none"> • <i>Learning to increase consumption</i> • <i>Transforming comm. in the food industry</i>
Stage 4: Transition to Scale	<ul style="list-style-type: none"> • <i>Prevention and control of mastitis in dairy animals</i> • <i>Index insurance</i> 			<ul style="list-style-type: none"> • <i>Using heat retention bags</i>
Stage 5: Scaling	<ul style="list-style-type: none"> • <i>Low-cost milk chilling at collection center</i> 	<ul style="list-style-type: none"> • <i>Solar powered cold storage units</i> • <i>Motorized vans with cooling units</i> • <i>B2B/B2C business models</i> 	<ul style="list-style-type: none"> • <i>National policies on food safety</i> 	<ul style="list-style-type: none"> • <i>Innovative multi-media campaigns to spread knowledge about healthy, sustainable diets and food waste</i>

BUNDLING INNOVATIONS TO EXTEND SHELF-LIFE OF DAIRY



KEY TAKE-AWAYS

Within agri-food systems literature: Social and technical bundling links technologies, products, processes to an enabling environment

Our bundling exercises are showing that its most likely that multiple innovations are required in one or more parts of the value chain

Enabling Policy instruments, standards, infrastructure, access to finance will need due consideration

Caveat: Not all innovations are at the same stage of development

Bundling innovations for better outcomes, and likely facilitate scaling and sustainability of one or more innovations



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



Government of Nepal
National Planning Commission

COLLABORATORS

