Scaling agricultural technologies through market development: examples from the Cereal Systems Initiative for South Asia

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THE IMPACT CHALLENGE: CONTRIBUTING TO DURABLE CHANGE WITH MILLIONS OF SMALL AND MEDIUM-SCALE FARMERS

CSISA's 10-year vision of success aims to significantly increase the incomes and staple crop productivity of 6 million farm families by 2018 through widespread adoption of efficient and productive agronomic practices, marked increases in the cultivation of high-yielding and stress-tolerant cereal cultivars, better access to information, and progressive policies and strengthened markets that stimulate the same with results-oriented public and private investments.

Real development: not demonstrating, piloting, or 'reaching'

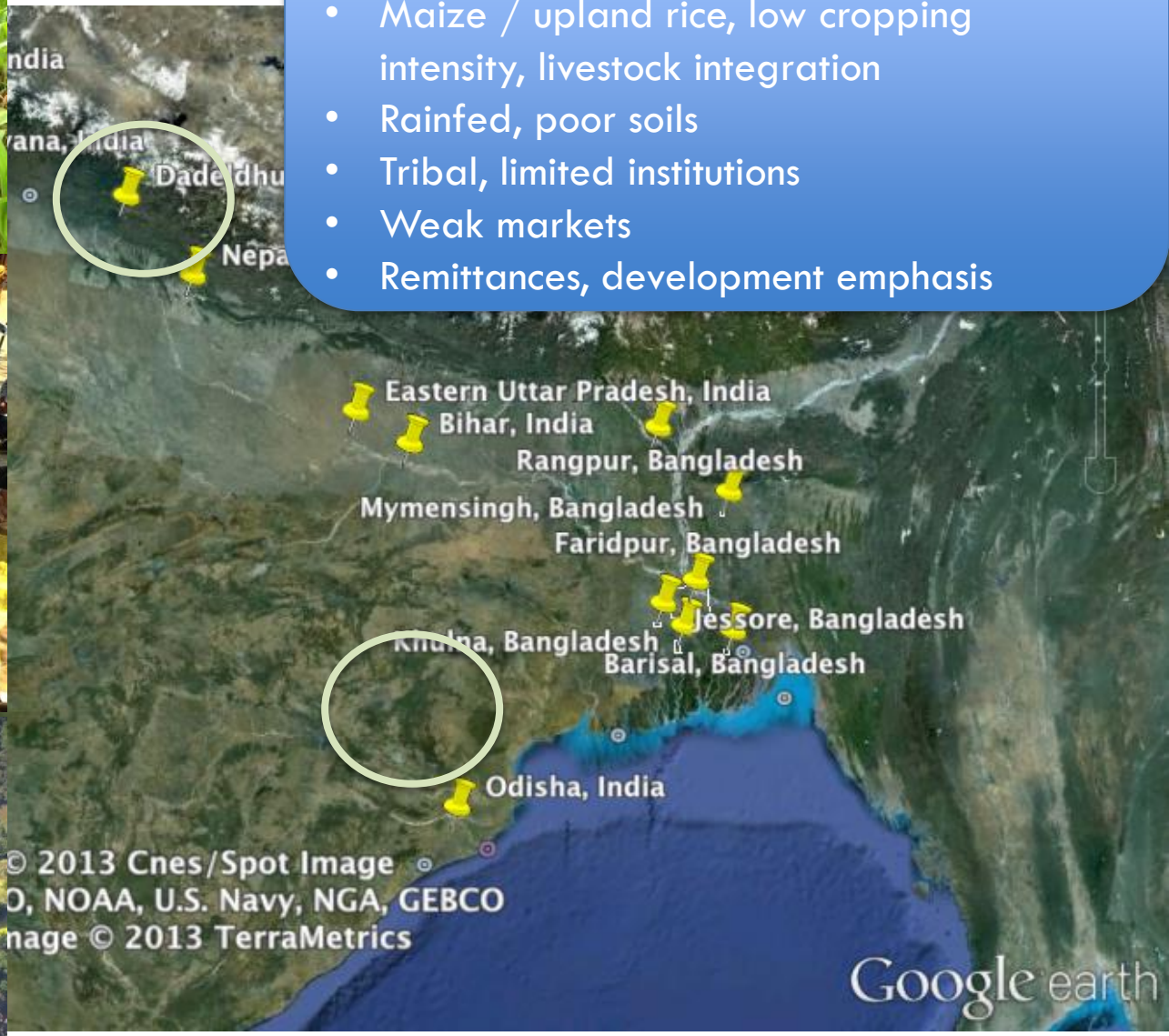
CSISA: A 'BIG TENT' INITIATIVE

CHANGE REQUIRES NOT ONE THING, BUT THE ORCHESTRATION OF MANY

- Participatory development and dissemination of sustainable, productive, and profitable agricultural **technology, support services and knowledge systems via innovation hubs**
- Future-oriented and **process-based research**
- Breeding for high-yielding and stress-tolerant rice and wheat cereal **varieties**
- **Policy analysis** and evidence-based 'road maps'
- Strategic **partnerships** (public + private sectors) to increase the scale and longevity of interventions
- Strengthen **markets and entrepreneurs, especially SMEs**
- Capacity development through **training and mentorship**

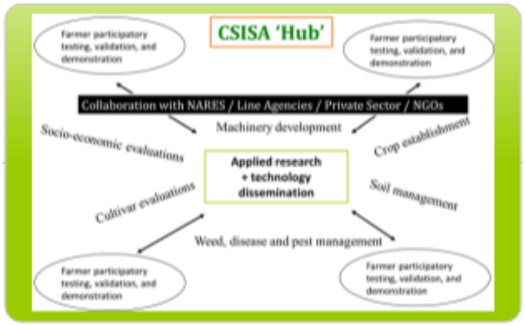
HILL AND PLATEAU ECOLOGIES:

- Endemic poverty / migration
- Maize / upland rice, low cropping intensity, livestock integration
- Rainfed, poor soils
- Tribal, limited institutions
- Weak markets
- Remittances, development emphasis



CO-INNOVATION + SCALABLE PRODUCTS + SUPPORT TO CHANGE AGENTS

1. CSISA Innovates



Key activities: participatory research for development ('hub approach') and method up-scaling with public and private partners

2. CSISA Produces

- Adapted technologies
- Decision tools
- Business models
- Training modules
- Technology targeting
- Multi-media outreach materials

Key outputs: actionable products from applied research

3. CSISA Supports

- **Agri-business**
  - Technology targeting
  - Catalyzing contract farming
  - Linkages to NARES and innovative farmers
  - Prototypes for commercialization
- **Govt. extension (e.g. KVKs, DAE, DoA)**
  - Certified crop advisor training
  - Decision tools
- **Innovative farmers**
  - Exposure visits
  - *In situ* technology demonstrations
- **Input dealers**
  - Outreach materials
  - Decision support tools
  - Technical certification
  - Linkages to service providers and agri-business
- **Service providers**
  - Business development services
  - Training in innovative agronomy
  - Linkages to innovative farmers
- **Credit providers**
  - New lending opportunities
  - Risk mitigation strategies
- **Food security initiatives**
  - Training of trainers
  - Technology demonstrations

Sustained and profitable yield intensification for cereals in S. Asia

Key outcomes: strengthened change agents for effective out-scaling

OPERATIONAL MODEL FOR CATALYZING SUSTAINABLE INTENSIFICATION

TECHNOLOGY SCALING AND COMMERCIALIZATION IS MORE THAN JUST AN ENGINEERING PROBLEM…

DESIRABILITY

How to make it desirable for consumers?

WHO?
(PEOPLE)

VIABILITY

HOW?
(MARKET)

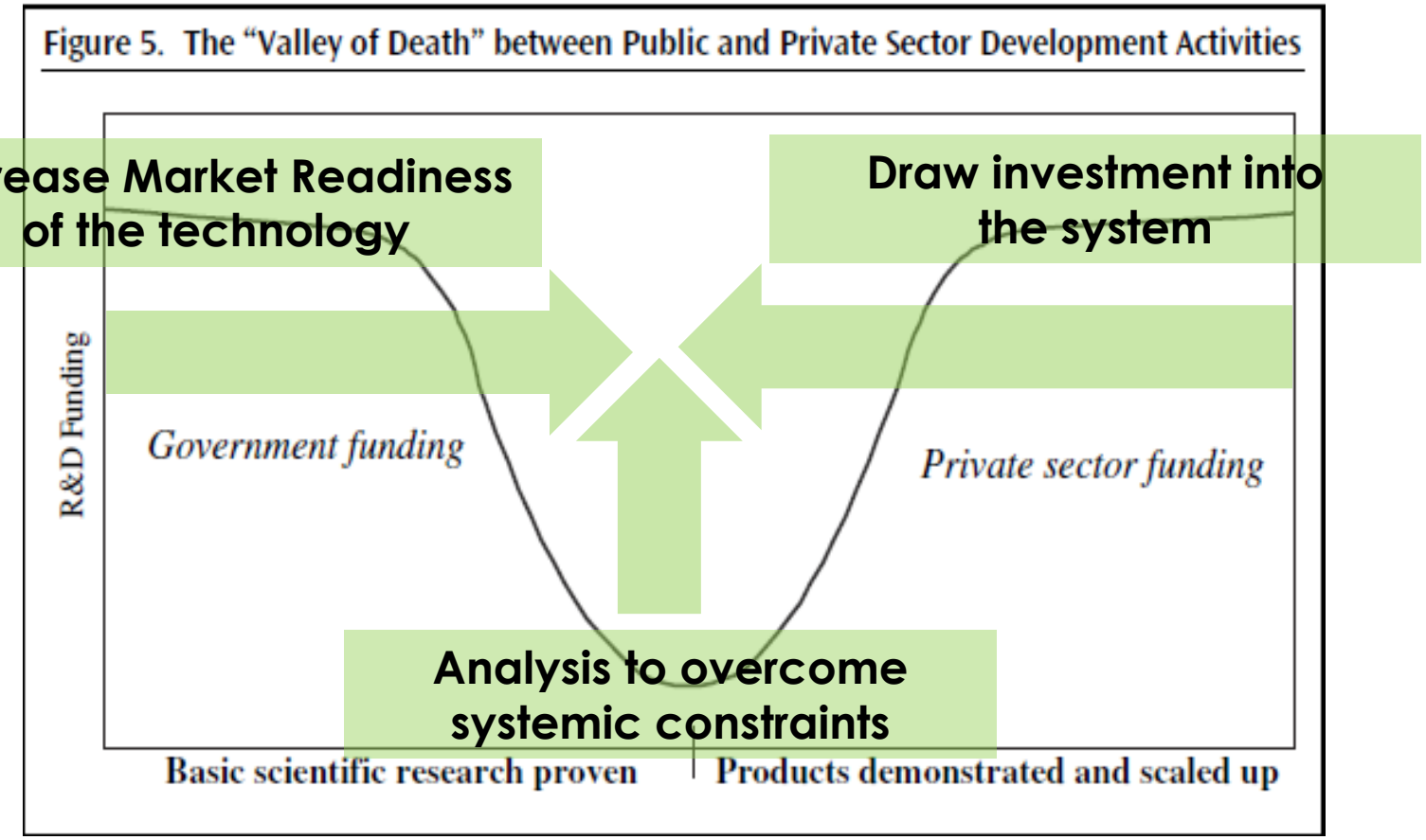
WHAT?
(TECHNOLOGY)

FEASIBILITY

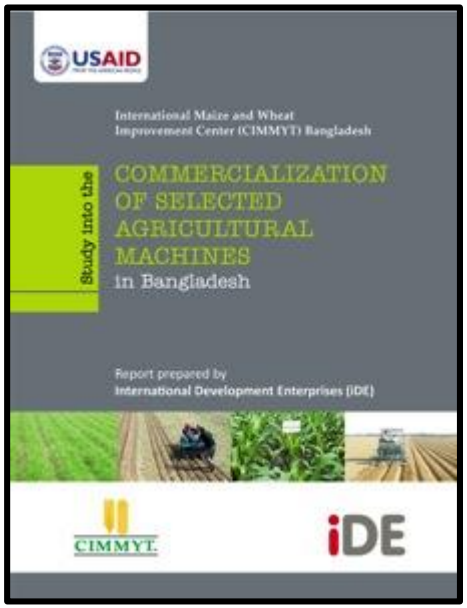
How to make it viable for the market?

How to make the technology feasible?

AVOIDING THE 'VALLEY OF DEATH' BETWEEN INNOVATION AND COMMERCIALIZATION



ASSESSING THE MARKET FOR AGRO-MACHINERIES IN BANGLADESH: IDENTIFYING OPPORTUNITIES AND SYSTEMIC CONSTRAINTS



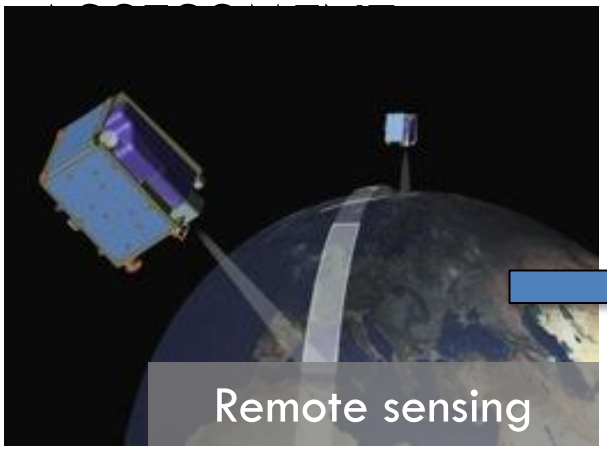
Improved Seeder-Fertilizer Attachments for Two-Wheeled Tractors

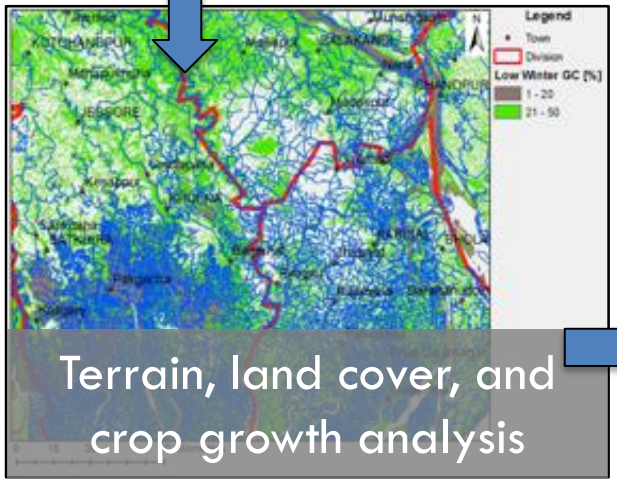
- Lack of **support services** including mechanics, finance, spare parts.
- Market volume currently low at $250k/year in imports – mainly projects. **Potential of $105m market in CSISA areas.** >$ 20m potential value to be captured by LSPs.

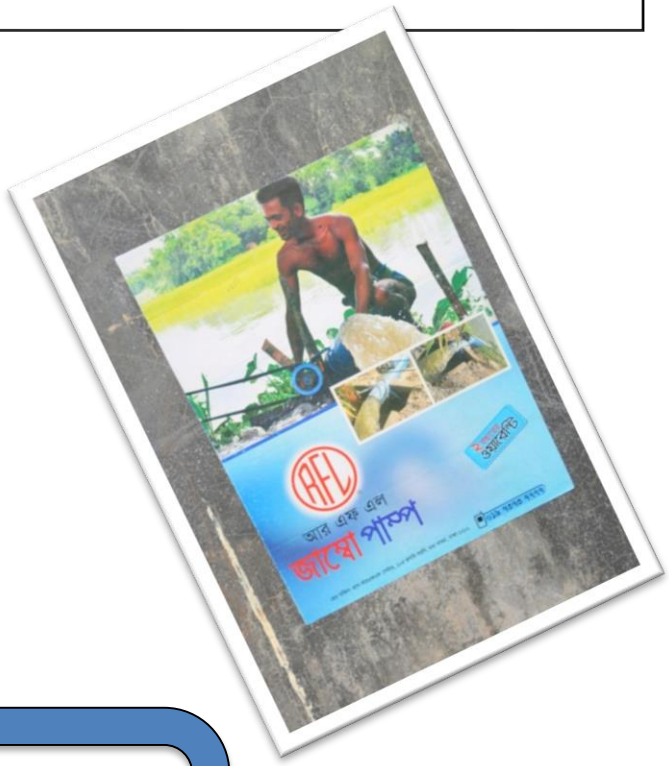
Table 12: Market size of seeder attachments

Hub	Number of small farmers	Number of seeders	Value for importers/manufacturers		Value for Service Providers	Additional Income to farmers
			Seeder	Diesel Engine[35]		
Barisal	916,934	23,563	1,201,695,830	848,255,880	401,452,467	5,516,484,652
Faridpur	790,503	13,246	675,530,974	476,845,393	225,675,723	4,755,846,840
Khulna	995,100	11,069	564,521,470	398,485,744	188,590,599	3,986,749,185
Jessore	545,251	25,771	1,314,320,634	927,755,742	439,077,217	3,280,354,718
Dinajpur	746,105	23,776	1,212,575,558	855,935,688	405,087,075	4,488,738,318
Total (Taka)	**3,993,893**	**97,424**	**4,968,644,466**	**3,507,278,446**	**1,659,883,080**	**24,028,173,713**
Total (US$)			**62,109,000**	**43,841,000**	**20,749,000**	**300,353,000**

TARGETING: UNDERSTANDING LANDSCAPES FOR EFFICIENT TECHNOLOGY DEPLOYMENT AND LATENT MARKET

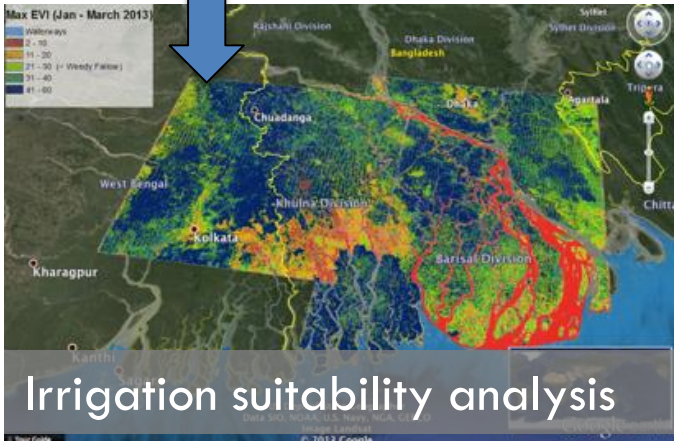






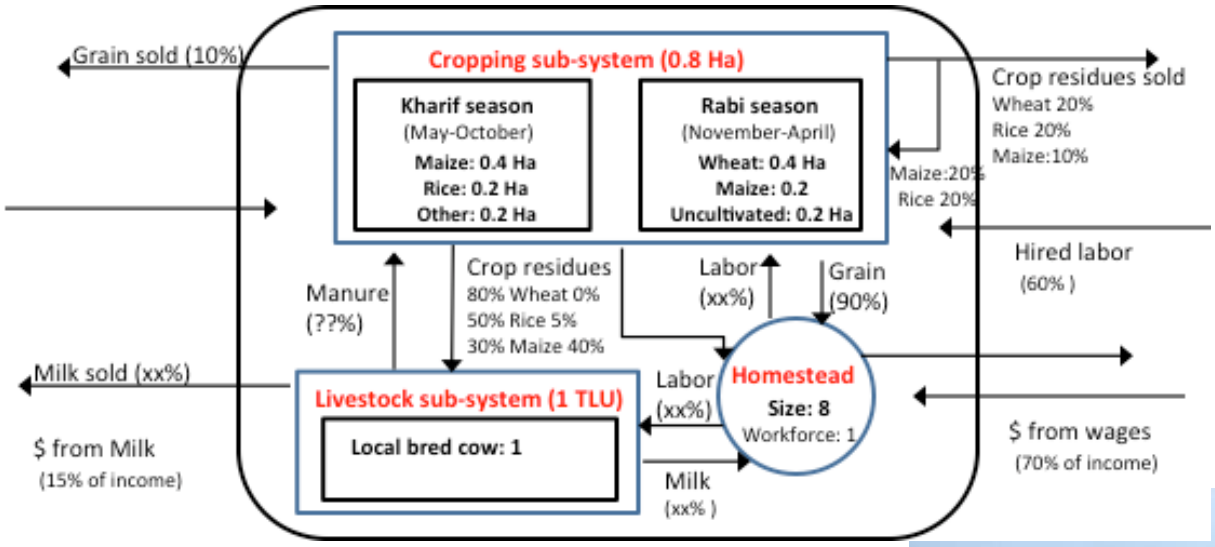
Joint with STARS / IrMaSAT

With intelligence-led approaches, technologies 'work' and markets develop



WHO ARE THE CLIENTS FOR DIFFERENT TECHNOLOGIES?

SEGMENTING MARKETS FOR INNOVATION



FUNCTIONAL TYPOLOGIES

through 'games' to guide interventions

WAGENINGEN UR
For quality of life

LABOR SCARCITY + FEMINIZATION = NEW ENTERPRISE OPPORTUNITIES

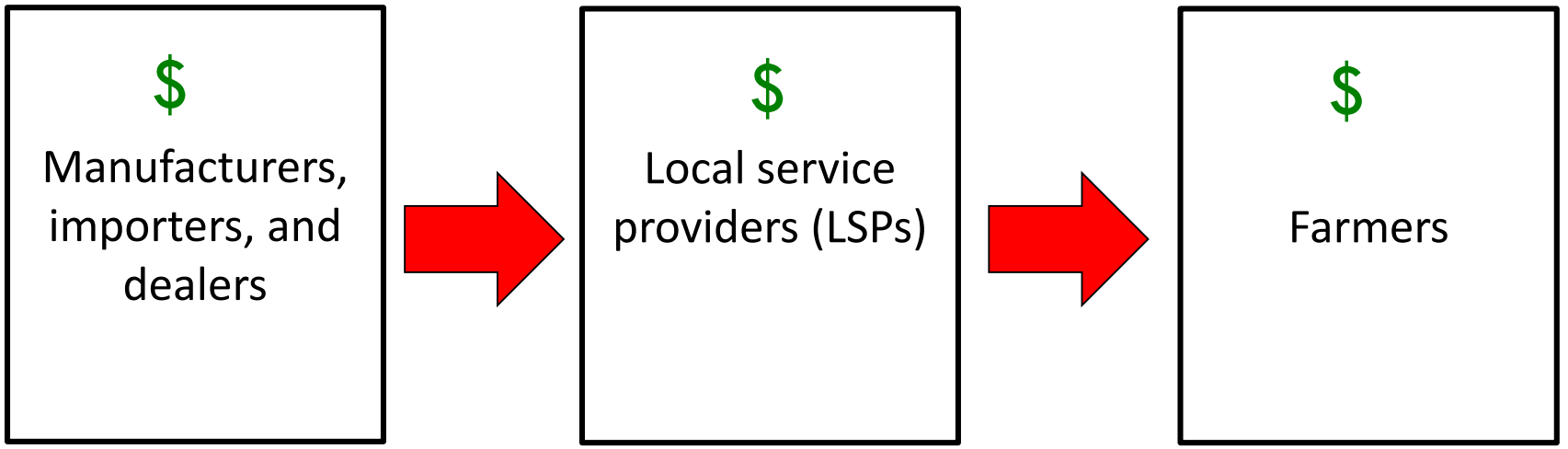
10 – 20% increase in AEN and yield

BUT THE SOCIAL CONTEXT FOR INNOVATION VARIES WIDELY

BUILDING THE 'BUSINESS CASE'

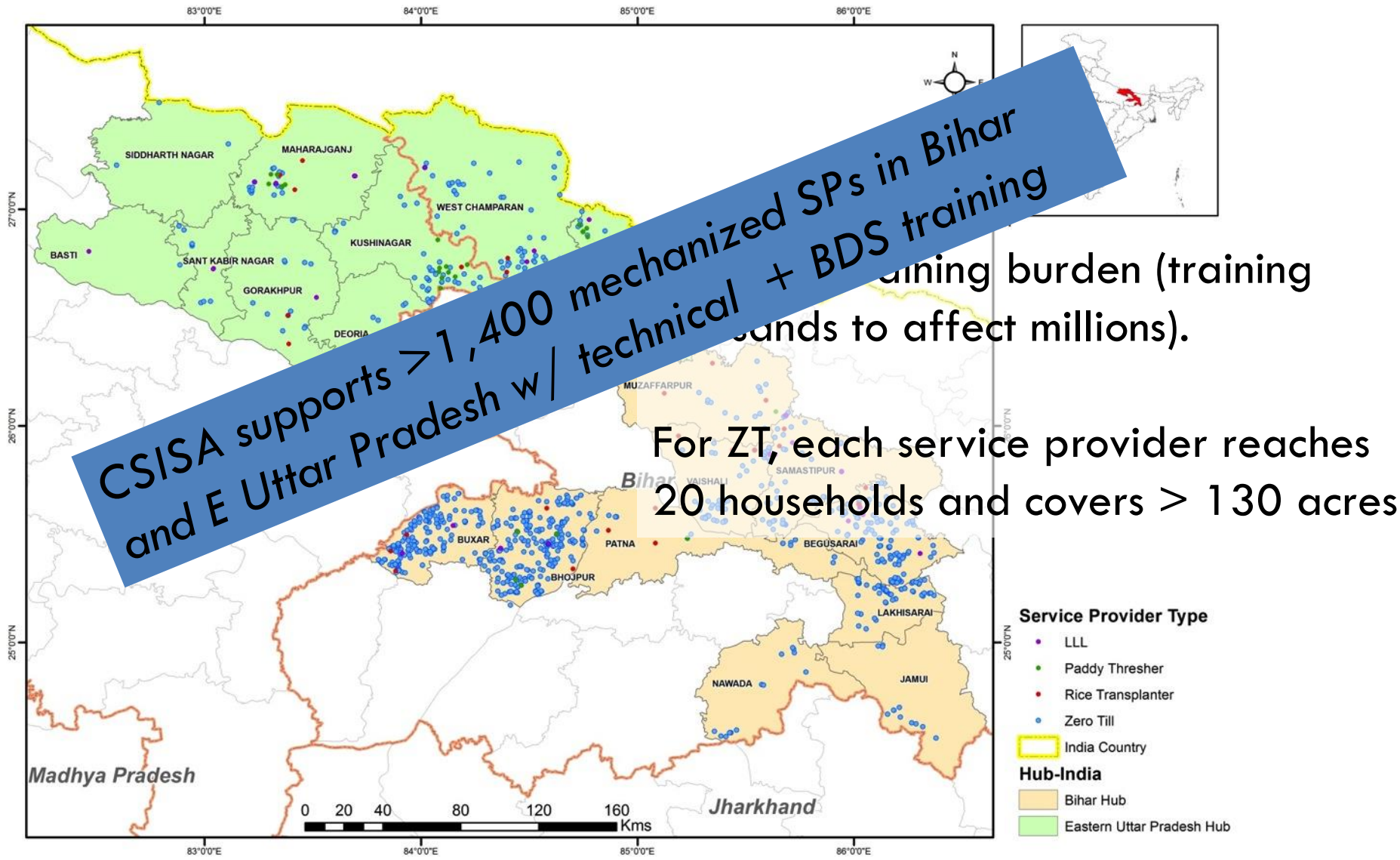
FOR CSISA TECHNOLOGIES

- Assessing incentives for all actors in the value chain



- Working example: Seeder-fertilizer drill

SCALING CAPITAL-INTENSIVE SI TECHNOLOGIES WITH DIVERSIFIED **SERVICE PROVISION MODELS**



...aining burden (training ...sands to affect millions).

For ZT, each service provider reaches 20 households and covers > 130 acres

STRENGTHENING **EXISTING MARKET NETWORKS**

(AND MAINSTREAM SUPPORT WITH NARES PARTNERS)

Table 14. Sources of information on new wheat and rice varieties, differentiated by district (Percentage of households, values >= 10 in bold)

Districts	Vaishali		Begu-sarai		Lakhi-sarai		Ara		Buxar		Samasti-pur		Overall	
Rice/Wheat	R	W	R	W	R	W	R	W	R	W	R	W	R	W
No. of households	32	49	18	27	4	53	31	37	155	200	12	17	252	383
Govt. extension	**13**	**20**	0	2	3	0	2	2	0	0	0			
KVK	**16**	8	0	0	0	0	1	4	0	0	0			
CSISA	3	8	0	2	0	0	0	0	0	0	0			
Agr. university	0	0	0	0	0	0	0	0	0	0	0			
Seed dealer /seed co.	**19**	**22**	**50**	6	3	5	**14**	**13**	8	**12**	**17**	**2**		
Service provider	0	0	0	0	3	0	8	10	0	0	0			
Fellow farmer/Relat.	**47**	**39**	**50**	**89**	**90**	**95**	**72**	**66**	**75**	**71**	**72**	**59**	**71**	**68**
Radio	0	0	0	0	0	0	0							
Own initiative	3	2	0	2	0	0	3							

R stands for Rice and W stands for Wheat.

UPL Limited

Input companies and formal extension band together with CSISA to increase the capacity of agro-dealers with knowledge and new products.

Strategically intervening in the supply chain (TOC) to facilitate technology adoption

Interventions to drive technology (supply)

Joint-venture agreements for:
- *Consumer promotion: 'discount model'*
- *Rural marketing and promotion (demos)*
- *Commission based sales team*
- *After sales service*

CSISA

Interventions to develop LSP businesses (demand)
- *Building market access to farmers' groups*
- *LSP capacity development (through ToT)*
- *Creation of FBAs to sustain access to market*

Interventions to strengthen LSP support services (supporting services)

Access to services for improved machinery operations

Import

Existing demand

SOURCE → **RFL** → **DEALER** → **SALES OFFICER** → **LSP** → **FARMER**

Manufacture from 2015

Customer for the technology

Customer for the service

Achieving critical mass while building market fundamentals

15% Critical mass	Seeder-fertilizer drill threshold	Axial flow pump threshold	Non-cumulative total threshold
Machines	750	975	1,725
Hectares	4,500	9,750	14,250
Farmers	11,250	24,375	35,625

Where markets are weak

- **Mobilize** big, well-capitalized players, based on latent market characterization (e.g. Kellogg's, Bayer Crop Science, etc.)
  - the mixed blessing of CSR support – does the business side take it seriously?
- **Foster** entrepreneurship with BDS (financial literacy, business planning, marketing, etc.)
- **De-risk** innovation through contact / contract farming or semi-assured output market channels
- **Ensure** that projects do not undermine long-term success (limit 'giveaways', move away from central brokering role with time)
- **Value-driven partnerships (public, private, and dev. orgs)**

VISIT US @ CSISA.ORG

MARKET DEVELOPMENT IS ESSENTIAL, BUT BRINGS A DIFFERENT SET OF RISKS

Description: Maize (corn), U.S. No.2 Yellow, FOB Gulf of Mexico, U.S. price, US Dollars per Metric Ton

International prices for maize have ranged from more than $300/t to less than $190/t during the last five years.

Gross margin for maize can be double that of rice or wheat (e.g. > $1,000 ha), however:

- **No public procurement** in SA (unlike rice or wheat in India), so famers thrive or fail depending on market dynamics → new maize areas dominantly for income generation rather than direct food security
- Considerable **market price volatility** due to factors such as bird flu (see inset)
- Market access governs **farmgate prices,** with many areas disconnected to existing value chains which poses a challenge to area expansion.