Framework for analysing incentives for private-sector investment in dissemination of technologies

Dominic Smith, University of Queensland

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Framework for analysing incentives for private-sector investment in dissemination of technologies

- Incentives for private-sector involvement and degree of involvement depend on three interrelated characteristics:
  - Inherent characteristics of the **technology**
  - Characteristics of the **production system and farming community**
  - Characteristics of the **value chain,** including ability of agribusiness actors to **capture the benefits** of any investment in technology dissemination

- **Different strategies** for engagement with the private sector must be developed for each combination of technology type, value-chain actor, and production system

(1) Technology characteristics

- ‘Learnability’ of the technology
  - observability
  - technological complexity
  - ease of trialling

- Relative advantage of the technology
  - investment costs
  - profitability
  - ease and convenience
  - risk
  - reversibility

Characteristics of key technologies

TECHNOLOGY	LEARNABILITY	RELATIVE ADVANTAGE
Improved varieties	Easy to trial Low level of complexity Observability good at harvest	Upfront cost low High reversibility Impacts from first year of use Relatively low risk
Fertility management	Moderately easy to trial Moderately complex High observability at harvest	Moderate upfront costs Immediate impact can be high Long-term impact unclear More exposure to risk
Pest and disease management	Difficult to trial due to externalities Complexity can be high Observability may be low	Moderate upfront cost Uncertain private benefits in first year Limited incentive for private sector as benefits can be captured by others High community benefits if community-based implementation

(2) Production system and community characteristics

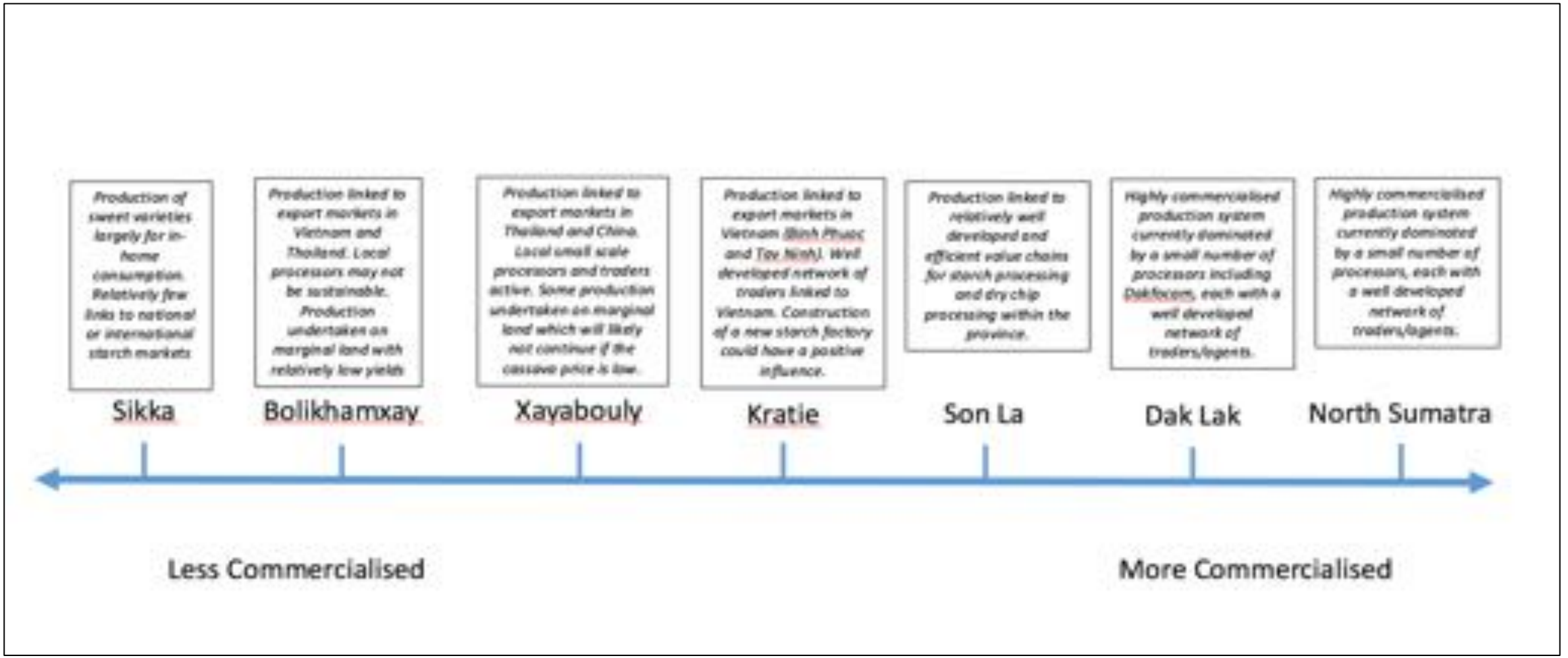
- Agronomic characteristics
- Socio-economic characteristics
- Political characteristics

(3) Value-chain characteristics

- Chain characteristics
  - linkages between actors
  - external support actors
  - information transmission
  - level of competition

- Actor characteristics
  - ability to capture benefits
  - profit orientation
  - risk orientation
  - enterprise scale
  - management horizon

Characteristics of selected value chains



Kratie Value Chain

Cross-border value chain linking smallholders in Kratie Province, Cambodia, to starch factories in Vietnam

Tay Ninh is the main destination for roots from Kratie, but Tay Ninh sources roots from Vietnam and other provinces in Cambodia as well as Kratie.

Key feature is the “break” at the border. Traders only operate within a single country, not across the border.

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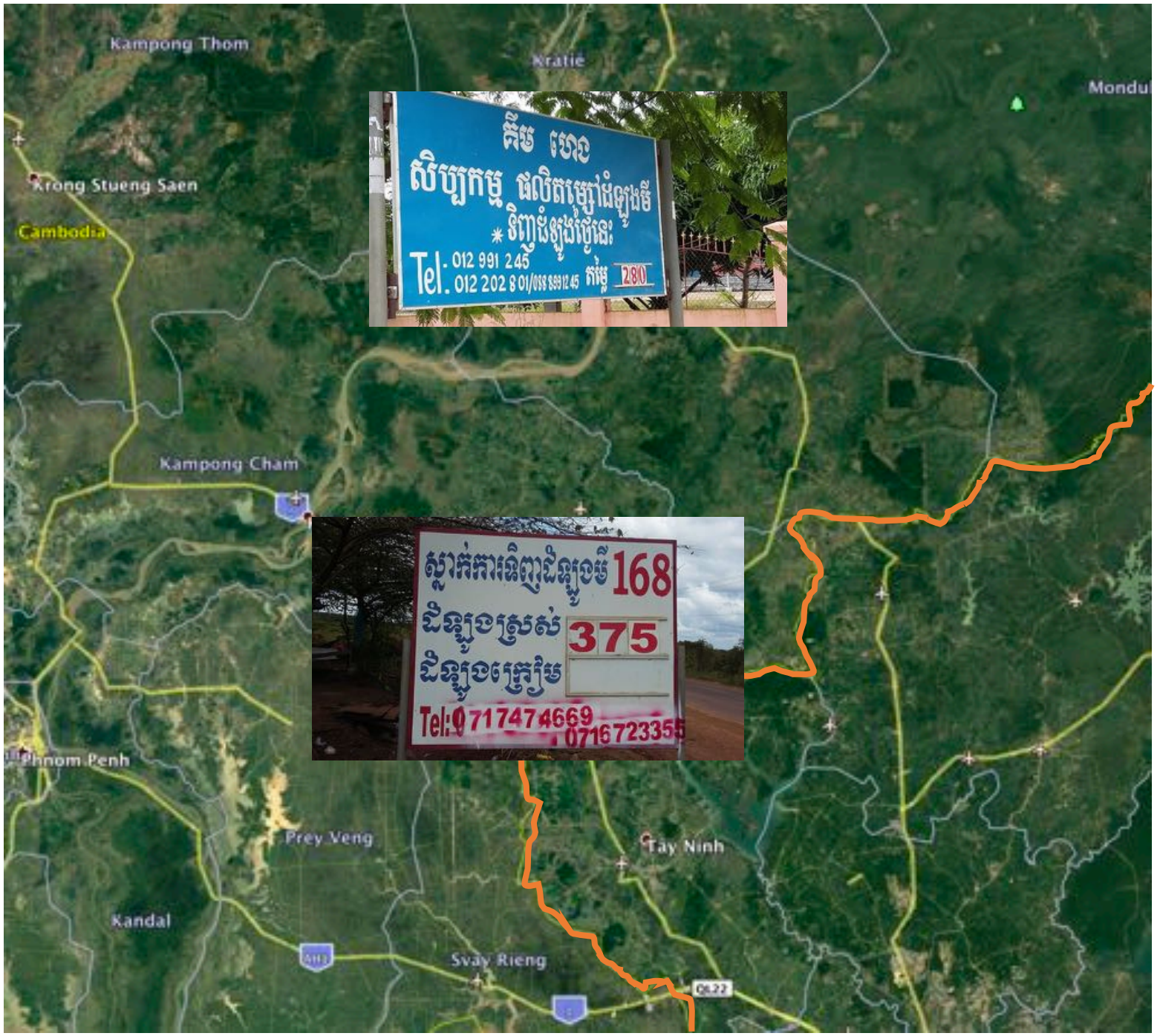

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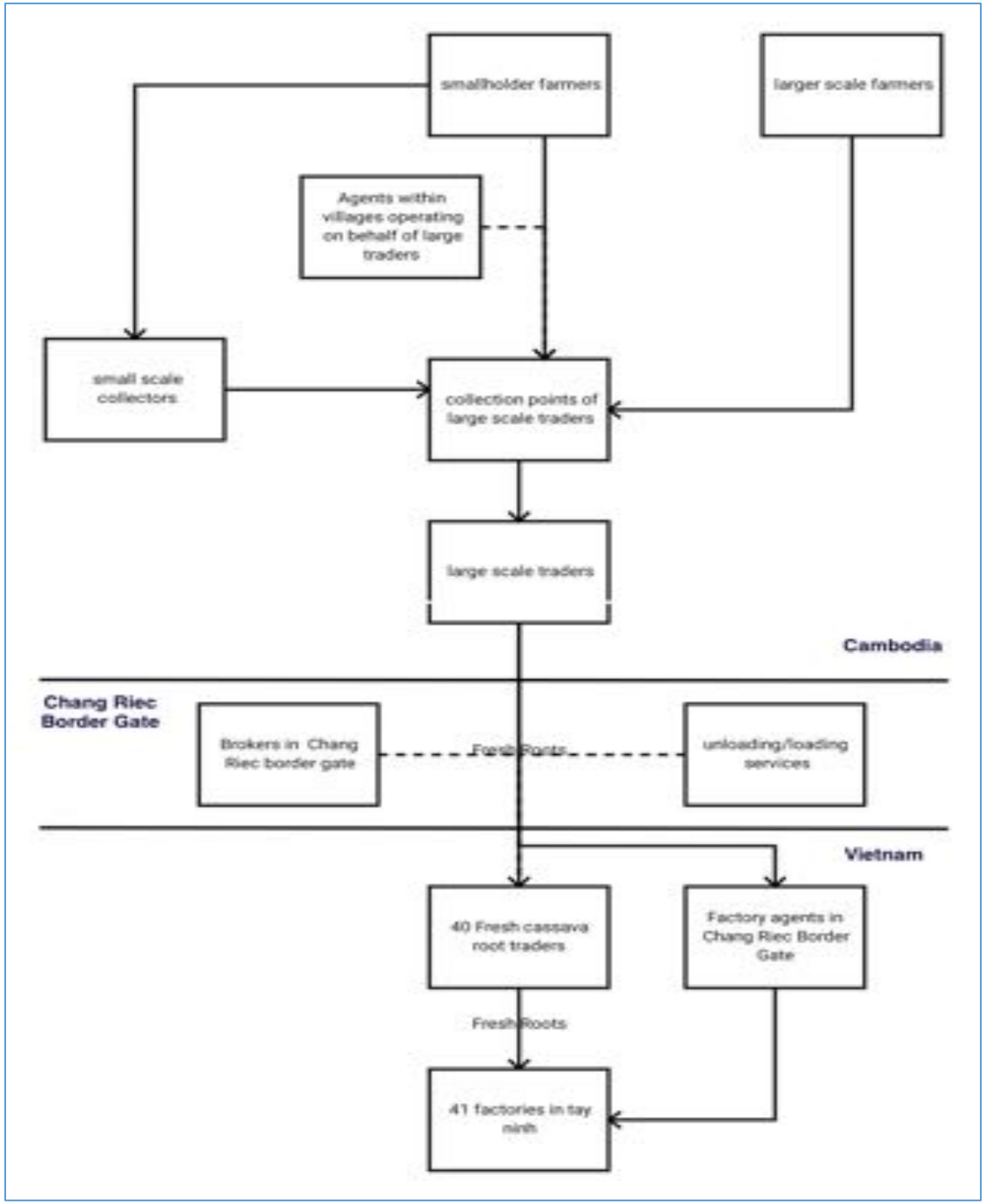

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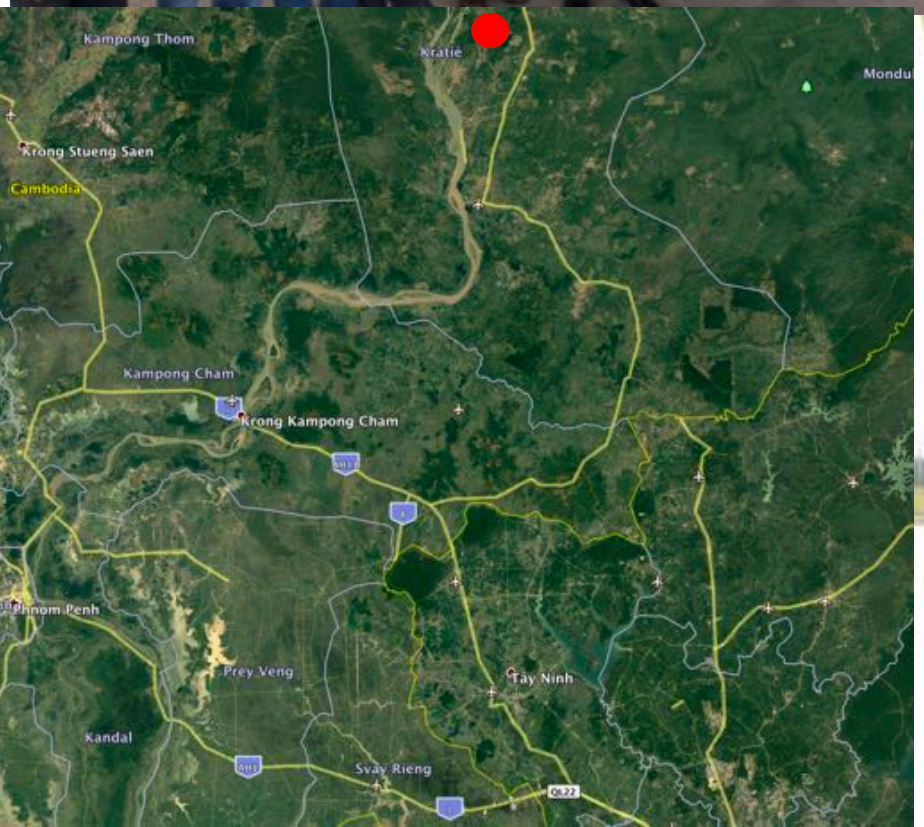
Kratie value chain

TECHNOLOGY	VALUE CHAIN CHARACTERISTICS	IMPLICATIONS FOR PRIVATE-SECTOR ENGAGEMENT IN DISSEMINATION
Improved varieties	Starch factories in Vietnam have no incentive to support dissemination of high-yield varieties in Cambodia as no direct links to producers and any benefits easily captured by competitors	Medium-scale traders who collect most cassava roots have incentive to disseminate high-yield varieties. New starch factory in Kratie has incentive to disseminate varieties if it can manage competition
Fertility management	Incentive for fertiliser companies to promote use of fertiliser as current use inadequate Linkages to farmers are strong through input supply shops	Main entry fertiliser companies Project can share research results to develop balanced fertiliser formulations
Pest and disease control	Cassava Mosaic Virus, Witches Broom and Mealybug can devastate cassava crop and have serious impact on livelihoods Private incentive to control disease is low due to externalities	A case for involvement of local government and NGOs who have incentive to control pests and disease to safeguard smallholder livelihoods and food security

Opening of new starch factory in Kratie Province 16-11-2017



Cambodian Fertiliser Company promoting fertiliser formulations for cassava in Tboung Khmum Province

Implications

- Engagement of private sector in diffusion of cassava technologies depends on complex interrelationship between (1) technology characteristics, (2) production system characteristics, and (3) value chain characteristics
- Situations where **some** private value-chain actors (e.g., fertiliser suppliers, starch factories) have incentive to partner with researchers to disseminate **some** technologies (e.g., varieties, fertilisers) to smallholders
- “One size fits all” is not a useful strategy to link with private sector in research for development
- Other situations where technology, production system, and value chain characteristics combine to make private sector a less likely partner for technology diffusion (e.g., pest/disease control)

Value Chain Location	Interventions	Entry points	Incentives
Son La	Evaluation, introduction and dissemination of improved varieties	FOCOCEV/Mai Son Starch Factory in conjunction with larger Traders (including Nguyen Thi Ha in Thuan Chau)	Increased coordination and information sharing leading to more efficient use of factory capacity Potential increased quantity of inputs to factory in order to utilise increased capacity since the takeover by FOCOCEV. Larger traders have good upstream linkages through the value chain but not high incentive for disseminating varieties.
	Introduction of improved cultivation practices including more effective fertiliser treatments.	Fertiliser company and input suppliers	Fertiliser companies have incentive to develop fertiliser blends suitable for cassava production if there is demonstrated demand from farmers.
Dak Lak	Introduction of improved cultivation practices including more effective fertiliser treatments.	Fertiliser company and input suppliers	Fertiliser companies have incentive to develop fertiliser blends suitable for cassava production if there is demonstrated demand from farmers.
	Introduction of improved varieties (higher yielding, different harvesting times)	DAKFOCAM – in Krong Bong through network of farmers with credit, in Ea Kar through small trader/farmer group network	Potential increased quantity of inputs to factory. Building stronger linkages with farmer groups Increased coordination and information sharing leading to more efficient use of factory capacity
Xayabouly	Evaluation, introduction and dissemination of improved varieties	Khampai Chip factory Meuang Mor Mailivanh Chip factory, Meuang Kao Luon Chip factory, Kenethao town	Incentives for the root traders/ chip processors to support the introduction of improved varieties with better quality and for increased information flows and coordination in order to avoid periods of over- and under-supply.
Bolikhamxay	Introduction of improved dried chip processing technology for smallholders	Bolikhan district: Vasana trading company (Paksan)	Vasana can secure larger quantities of chips for export and balance periods of over and under supply.
	Introduction of more effective fertiliser treatments	Vienthong district: starch factory Bolikhan district: TTL starch factory	Starch factories have incentive to increase supply of raw material inputs and build stronger relationships with farmers.

Value Chain Location	Interventions	Entry points	Incentives
Sikka	Pest and disease control	DINAS, NGOs	DINAS have strong incentive to control mealybug in order to ensure sustainability of cassava production in Sikka.
	Introduction of higher yielding sweet cassava varieties for the uplands	NGOs (upland livelihood support)	NGO have strong incentive to promote higher yielding sweet varieties of cassava as it is a key component of smallholder livelihoods and food security in the uplands of Sikka
	Introduction of higher yielding bitter varieties for the flatlands	Farmer/processor group near airport led by Pak Ikang (MOCAF/tiwul production) Pak Tommy (MOCAF production/future tiwul or mocaf production)	Small scale processor group has incentive to secure reliable supply of inputs for MOCAF and tiwul production
	Introduction of improved cultivation practices including more effective fertiliser treatments.	Farmer/processor group near airport led by Pak Ikang (MOCAF/tiwul production) Pak Tommy (MOCAF production/future tiwul or mocaf production)	Small scale processor groups and medium scale enterprise have incentive to develop fertiliser blends suitable for cassava production.
North Sumatra	Evaluation, introduction and dissemination of improved varieties	Bumisari starch company through their agents and the network of large traders associated with the agents	Bumi Sari and agents have incentive to increase supply of raw material inputs. Traders could be incentivised through taking on the role of multiplying planting material for sale to farmers.
	Introduction of improved cultivation practices including more effective fertiliser treatments.	Fertiliser company and input suppliers	Fertiliser companies have incentive to develop fertiliser blends suitable for cassava production if there is demonstrated demand from farmers.
Kratie	Evaluation, introduction and dissemination of improved varieties	New starch factory near Kratie town (if opened) and network of supplier traders	Aid in developing relationships to secure supply of input material for new starch factory under competition from traders exporting to Vietnam.
	Pest and disease control/introduction of disease resistant varieties	NGO/UNDP/CAVA/GIZ	NGOs and development agencies have strong incentive to control pests and diseases in order to ensure sustainability of cassava production in Kratie.
	Introduction of improved cultivation practices including more effective fertiliser treatments.	Fertiliser company and input suppliers	Fertiliser companies have incentive to develop fertiliser blends suitable for cassava production if there is demonstrated demand from farmers.

Thank You

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