

Developing value-chain linkages to improve smallholder cassava production in Southeast Asia

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Symposium 4.5 Smallholder participation in global value chains—implications for inclusive and sustainable agricultural development

International Tropical Agriculture Conference
Brisbane, Queensland
20-22 November, 2017



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Cassava production and market conditions

- Cassava ranked 7th food crop globally by area planted, and 3rd in tropics
- Global trade has sharply increased, valued at USD 3.8 billion per year
- SE Asian cassava market heavily influenced by external factors, including agricultural policies for a wide range of commodities
- Vietnam grows 500,000 ha of cassava and exports USD 1 billion per year
- Indonesia grows >1 million ha but is second largest importer of cassava
- Area of cassava in Cambodia has increased by 15 times in last 10 years
- Yields and soil fertility have fallen, leading to decreases in farmer incomes
- Key technologies can improve smallholder incomes but dissemination remains a challenge
- We look at incentives for the private sector to invest in development and dissemination of technologies to smallholders

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

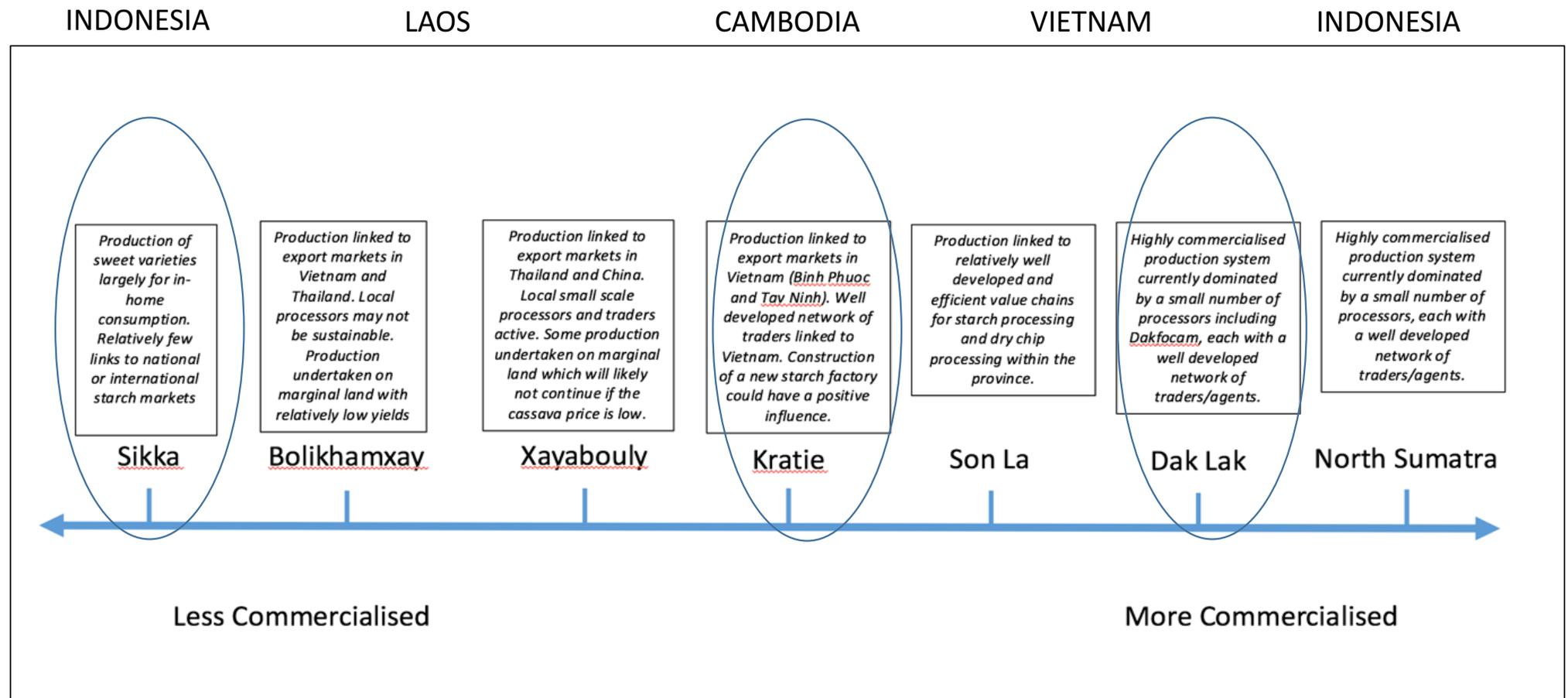
(2) Production system and community characteristics

- Agronomic characteristics
- Socio-economic characteristics
- Political characteristics

(3) Value-chain characteristics

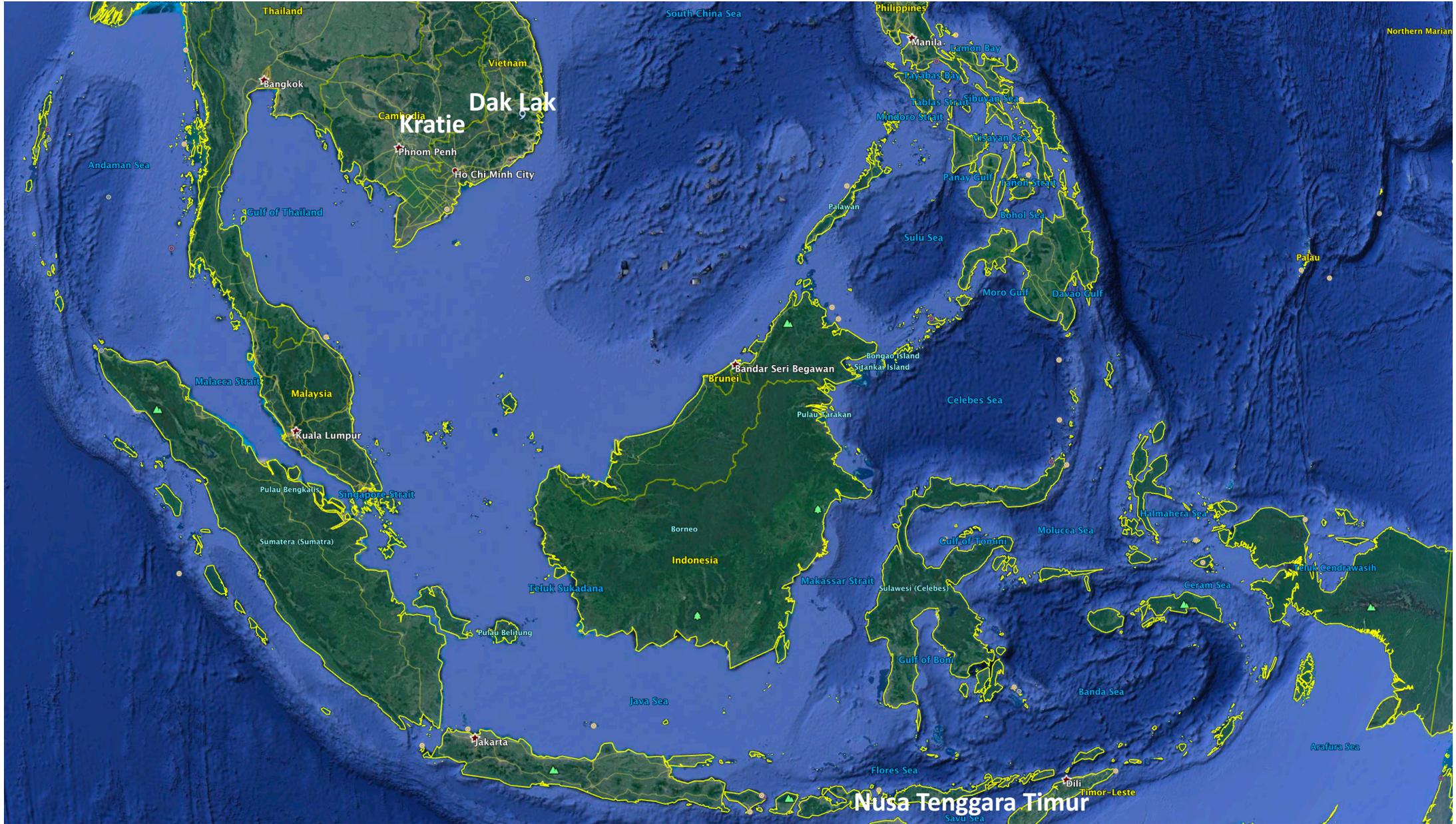
- Chain characteristics
 - linkages between actors
 - external support actors
 - information transmission
 - level of competition
- Actor characteristics
 - ability to capture benefits
 - profit orientation
 - risk orientation
 - enterprise scale
 - management horizon

Commercialisation levels of selected value chains



Characteristics of key technologies

| TECHNOLOGY | LEARNABILITY | RELATIVE ADVANTAGE |
|------------------------------------|---|--|
| Improved varieties | <u>Easy to trial</u> <u>Low level of complexity</u> Observability good at harvest | Upfront cost low High reversibility Impacts from first year of use Relatively low risk |
| Fertility management | <u>Moderately easy to trial</u> <u>Moderately complex</u> High observability at harvest | Moderate upfront costs Immediate impact can be high Long-term impact unclear More exposure to risk |
| Pest and disease management | <u>Difficult to trial due to externalities</u> <u>Complexity can be high</u> 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 |



Dak Lak

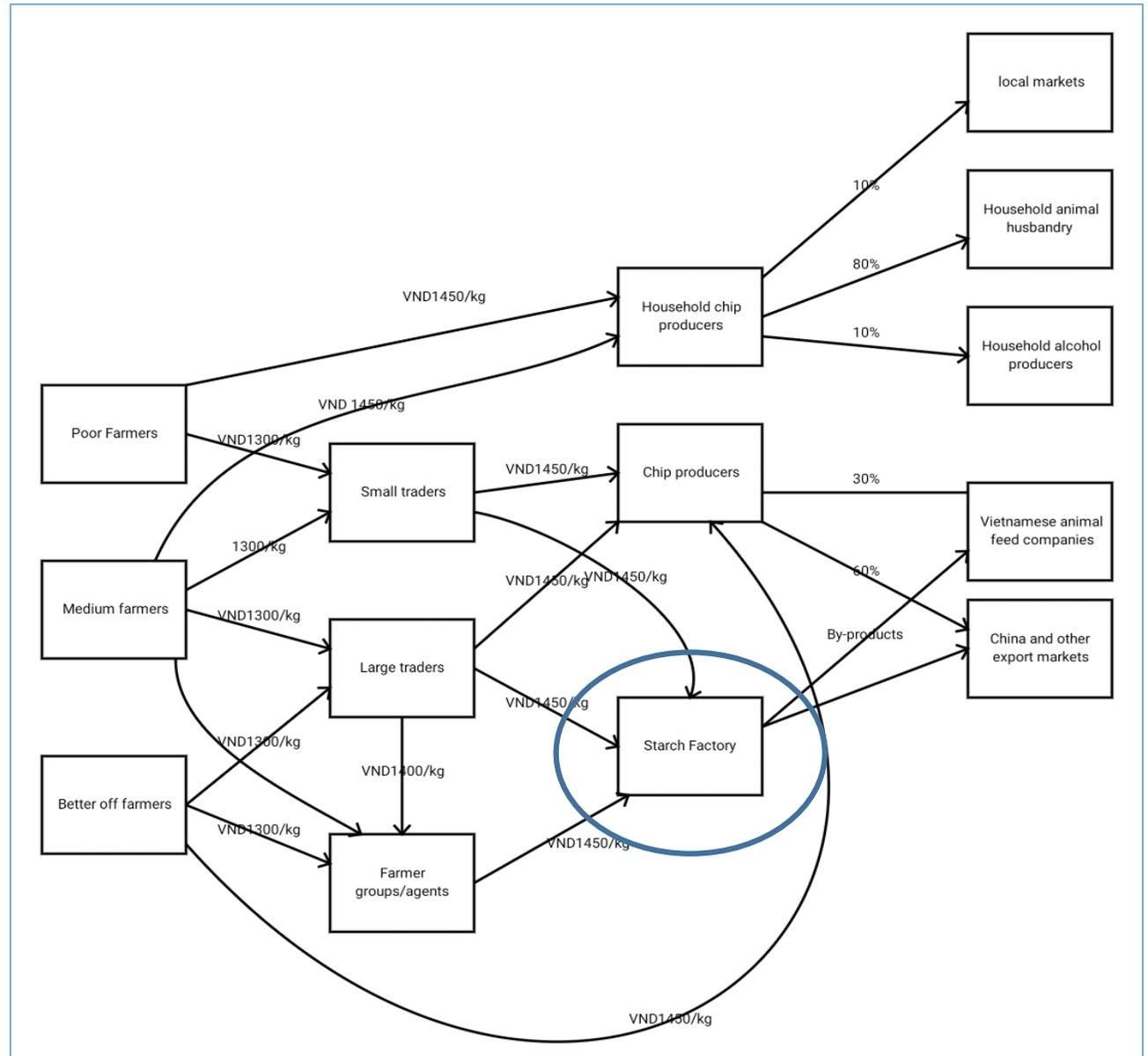
Kratie

Nusa Tenggara Timur

Dak Lak Value Chain

Value chain centred on a large starch processing company with a wide catchment area of smallholder suppliers.

Company captures a large share of total production and has relatively few competitors



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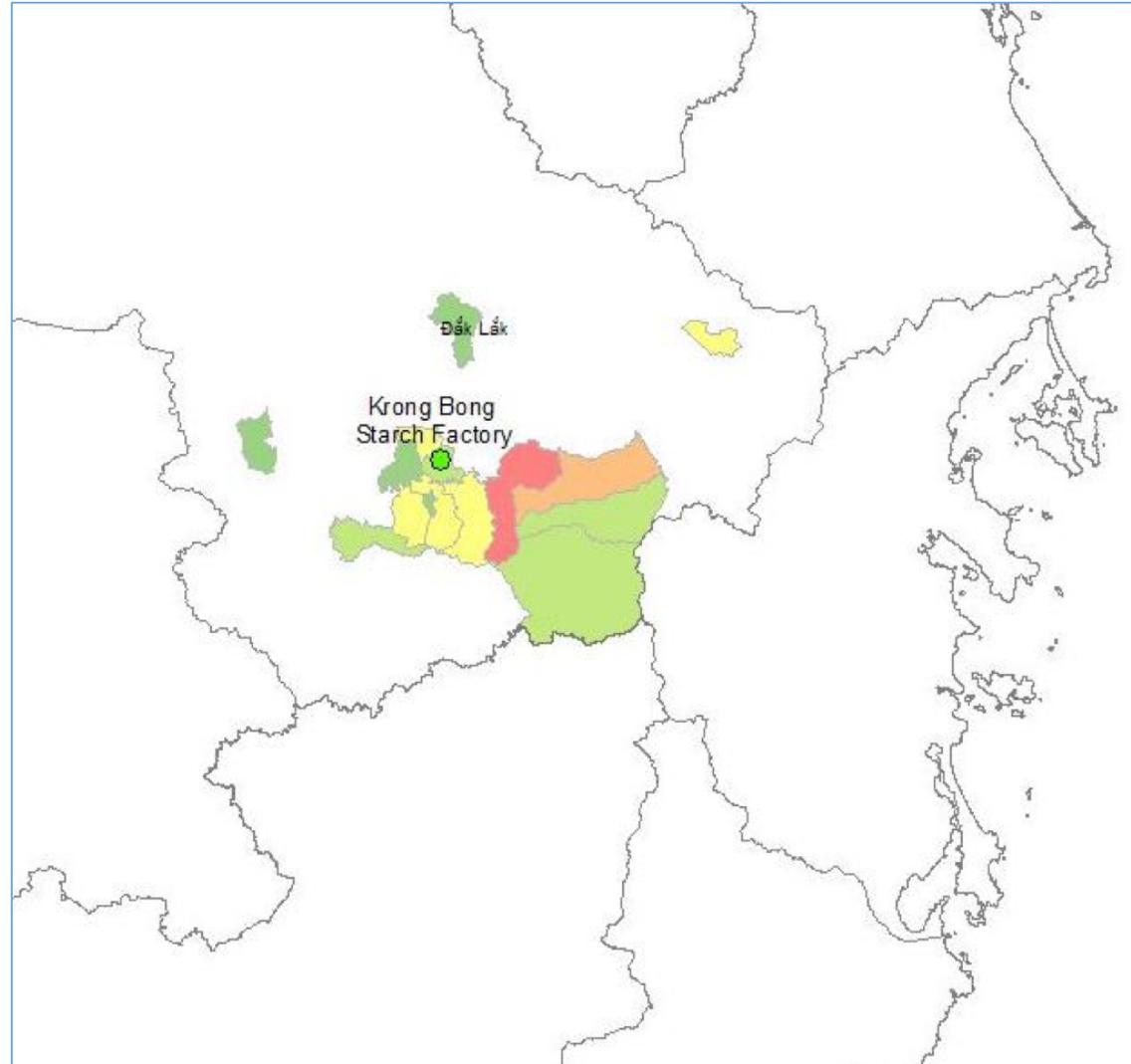
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Dak Lak value chain

| TECHNOLOGY | VALUE CHAIN CHARACTERISTICS | IMPLICATIONS FOR PRIVATE SECTOR ENGAGEMENT IN DISSEMINATION |
|----------------------|--|---|
| Improved varieties | Limited competition for fresh roots gives incentive for factory to invest in variety dissemination as higher yields will lead to more throughput | Make use of existing linkages of factory with traders and farmer groups and with farmers taking credit |
| Fertility management | <p>Incentive for fertiliser companies to promote adoption of cassava fertiliser as most producers use inadequate fertiliser</p> <p>Linkages of fertiliser companies to farmers are strong through input supply shops</p> | <p>Main entry will be fertiliser production companies.</p> <p>Project can share research results to develop more balanced fertiliser formulations</p> |

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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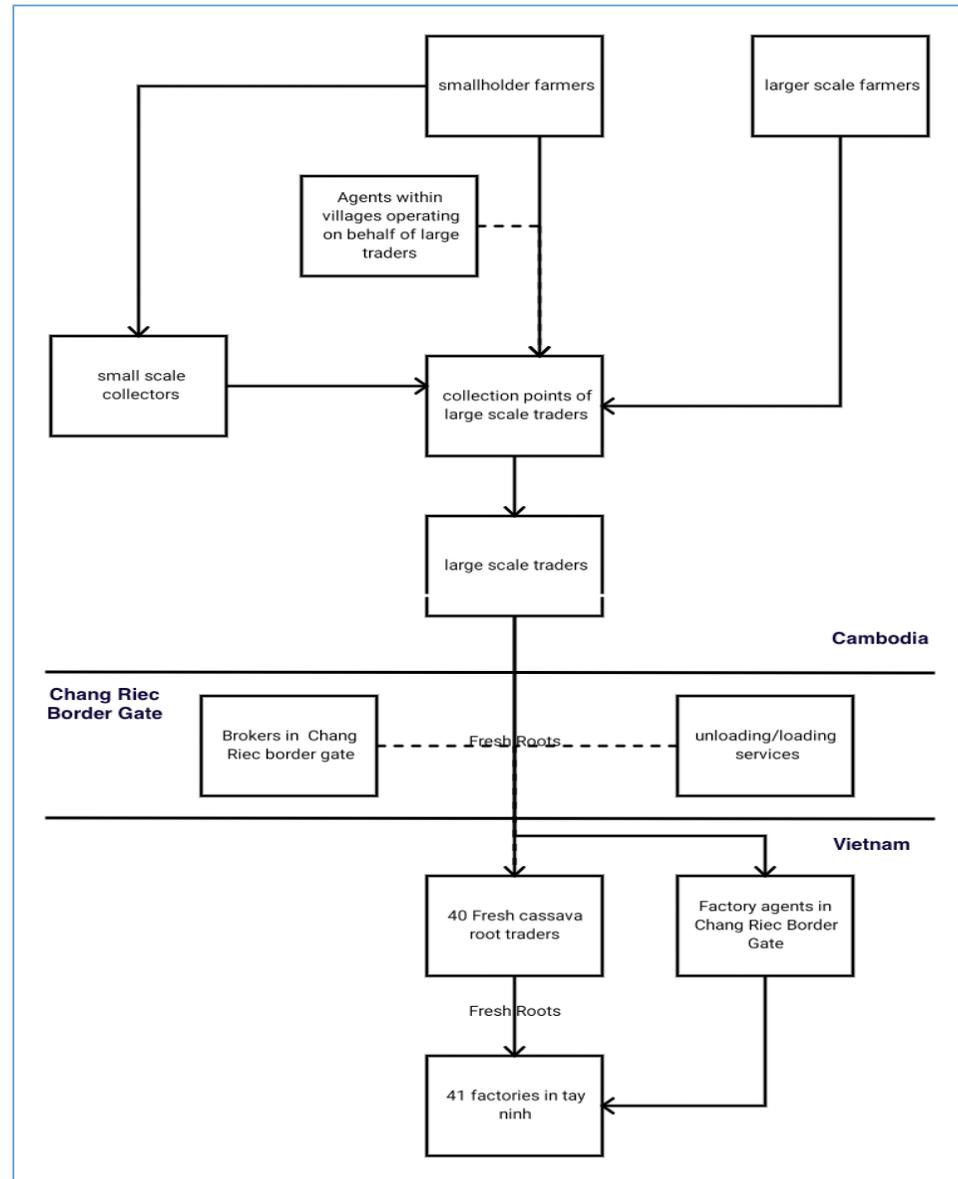


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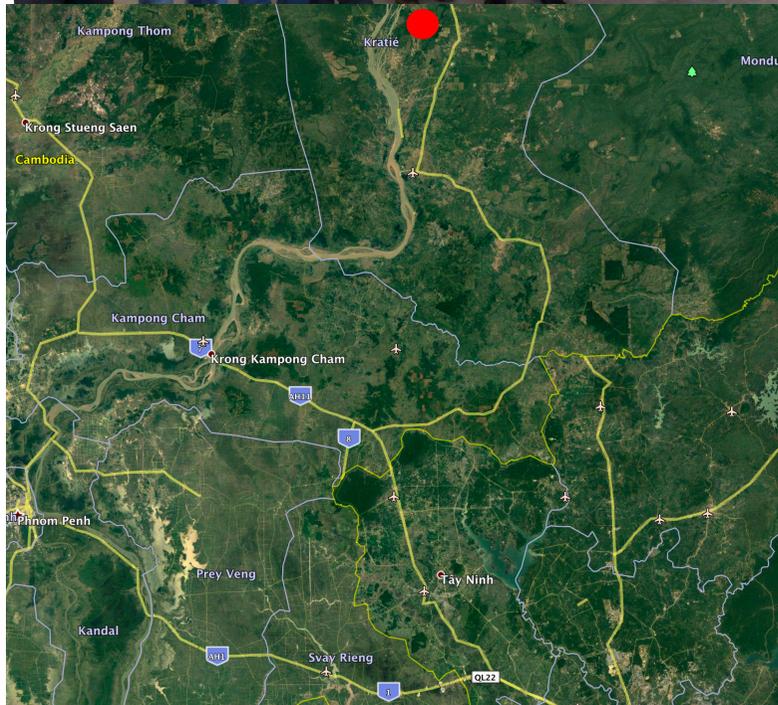


Kratie value chain

| TECHNOLOGY | VALUE CHAIN CHARACTERISTICS | IMPLICATIONS FOR PRIVATE-SECTOR ENGAGEMENT IN DISSEMINATION |
|----------------------|---|--|
| Improved varieties | <p>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</p> | <p>Medium-scale traders who collect most cassava roots have incentive to disseminate high-yield varieties.</p> <p>New starch factory in Kratie has incentive to disseminate varieties if it can manage competition</p> |
| Fertility management | <p>Incentive for fertiliser companies to promote use of fertiliser as current use inadequate</p> <p>Linkages to farmers are strong through input supply shops</p> | <p>Main entry fertiliser companies</p> <p>Project can share research results to develop balanced fertiliser formulations</p> |



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





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

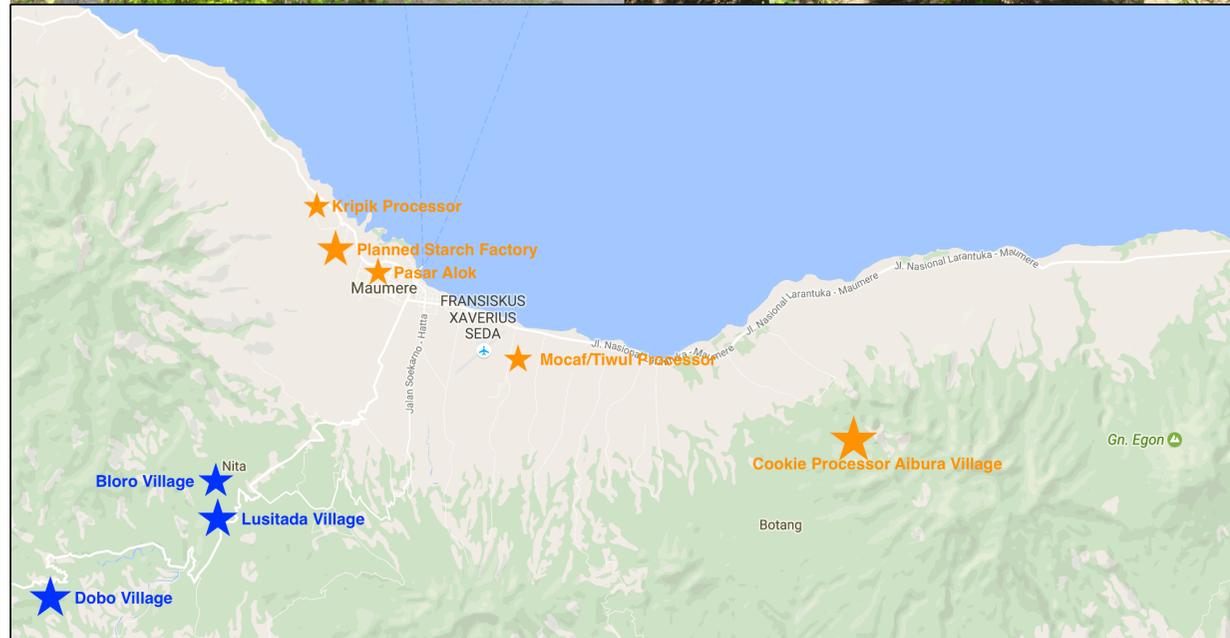
Nusa Tenggara Timur Value Chain

Local value chain for sweet cassava as a food crop in Nusa Tenggara Timur Province

Largely self-sufficient production

Very limited small-scale processing

Major problems with pests and diseases



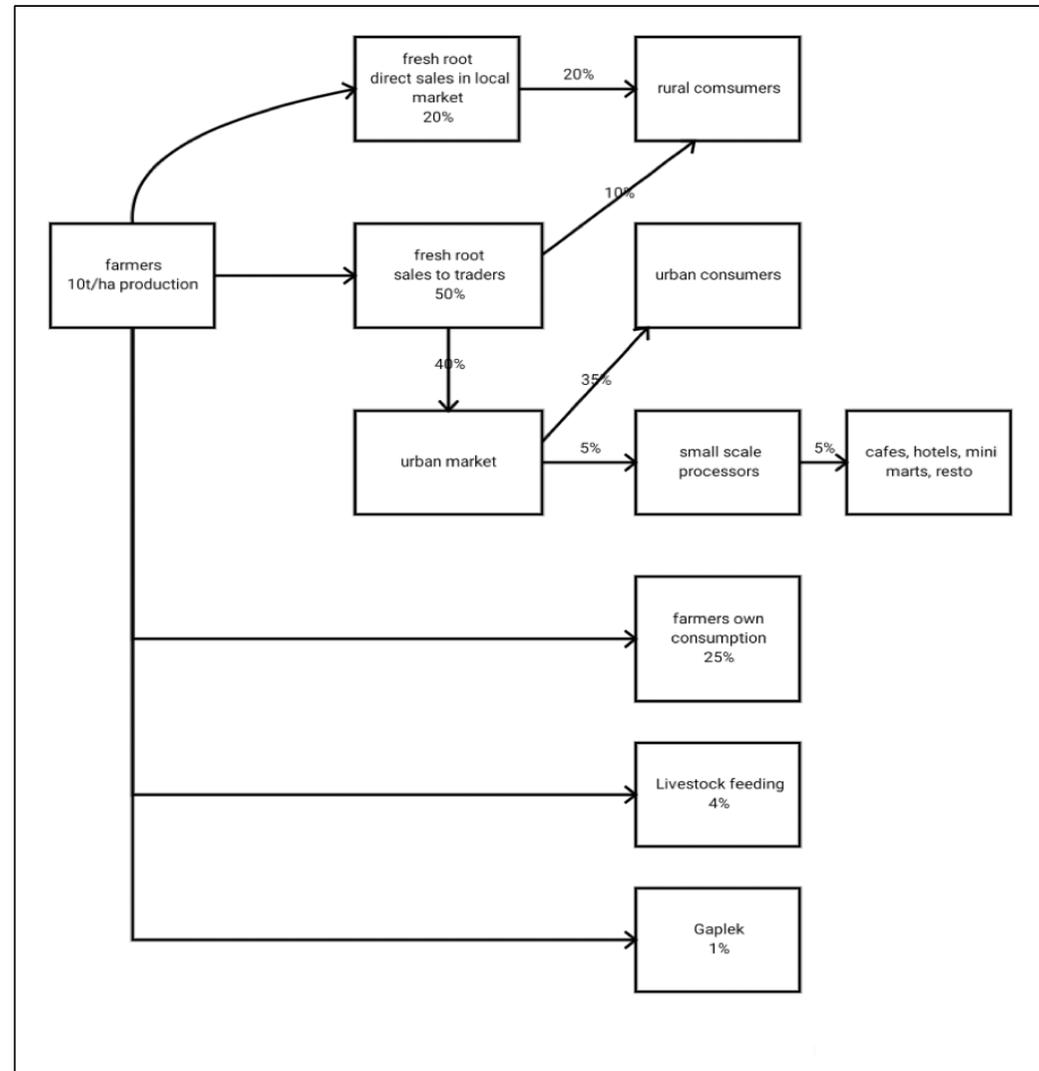
Nusa Tenggara Timur (NTT) value chain

Local value chain for sweet cassava as a food crop in Sikka Regency, NTT Province

Upland farmers largely self-sufficient in production

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|--------------------------|---|--|
| Improved varieties | Introduction of high-yield sweet varieties positive for smallholder livelihoods, but little incentive for private sector to get involved | Local and international NGOs have incentive to promote high-yield sweet varieties as key component of rural livelihoods and food security in uplands |
| Pest and disease control | <p>Mealybug can devastate cassava crop and have serious impact on livelihoods</p> <p>Private incentive to control mealybug low due to externalities</p> | A case for involvement of local government and NGOs who have incentive to control pests and disease to safeguard smallholder livelihoods and food security |

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)

Thank You



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