



**Asia-Pacific  
Economic Cooperation**



# **Situation, policy and innovations on reducing post- harvest loss in Vietnam**

**Dang Kim Khoi**

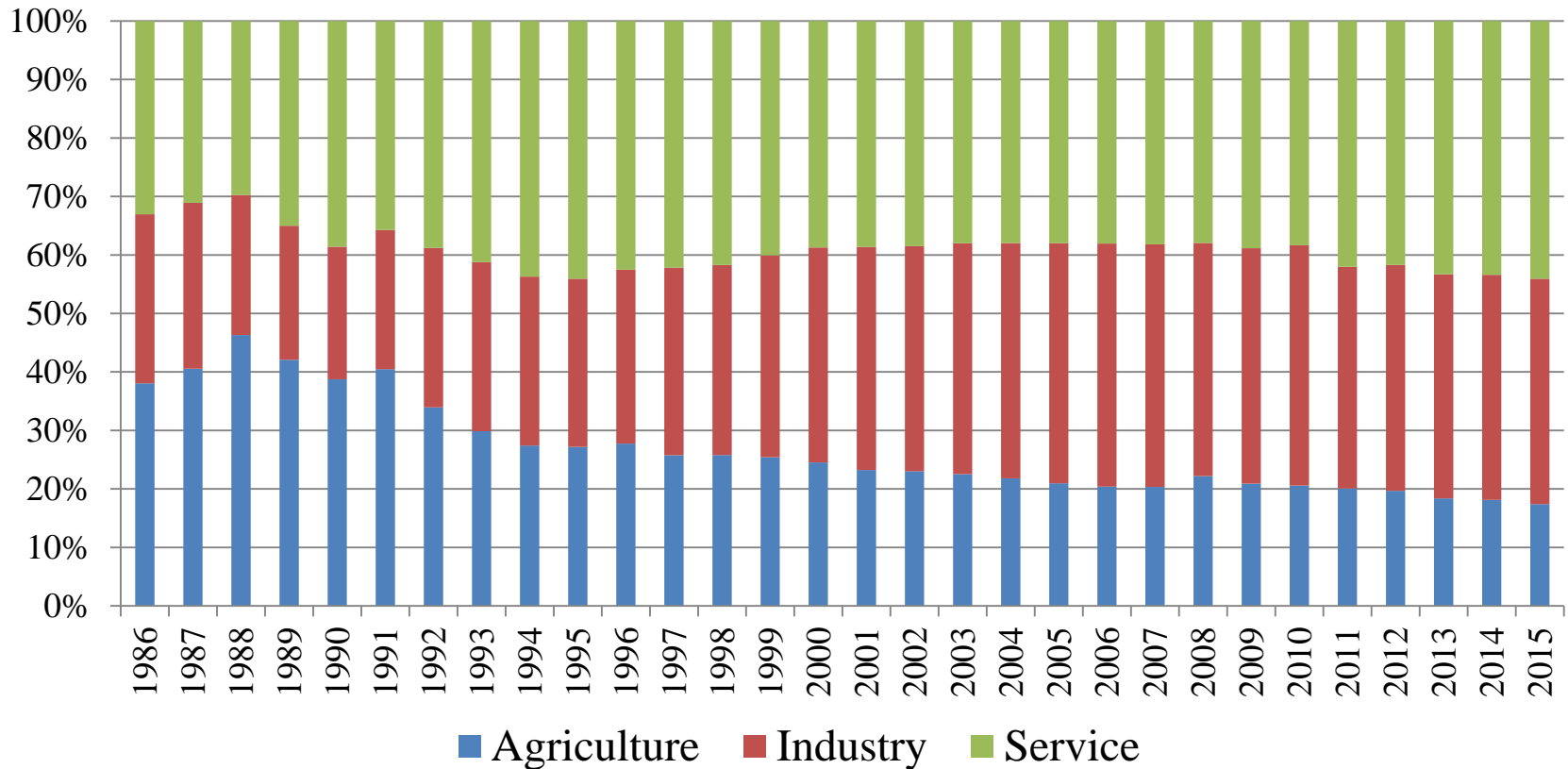
**2017 APEC Expert Consultation on Food Losses and Waste Reduction  
June 12-13, 2017 Taipei City**

# Content

- Overview Vietnam's Agriculture
- Food loss and waste in agriculture and post-harvest loss in rice sector in Vietnam
- Post harvest loss institution, policy and implementation in Vietnam
- Innovation in Vietnam
- Possible approaches to reduce post harvest loss/waste

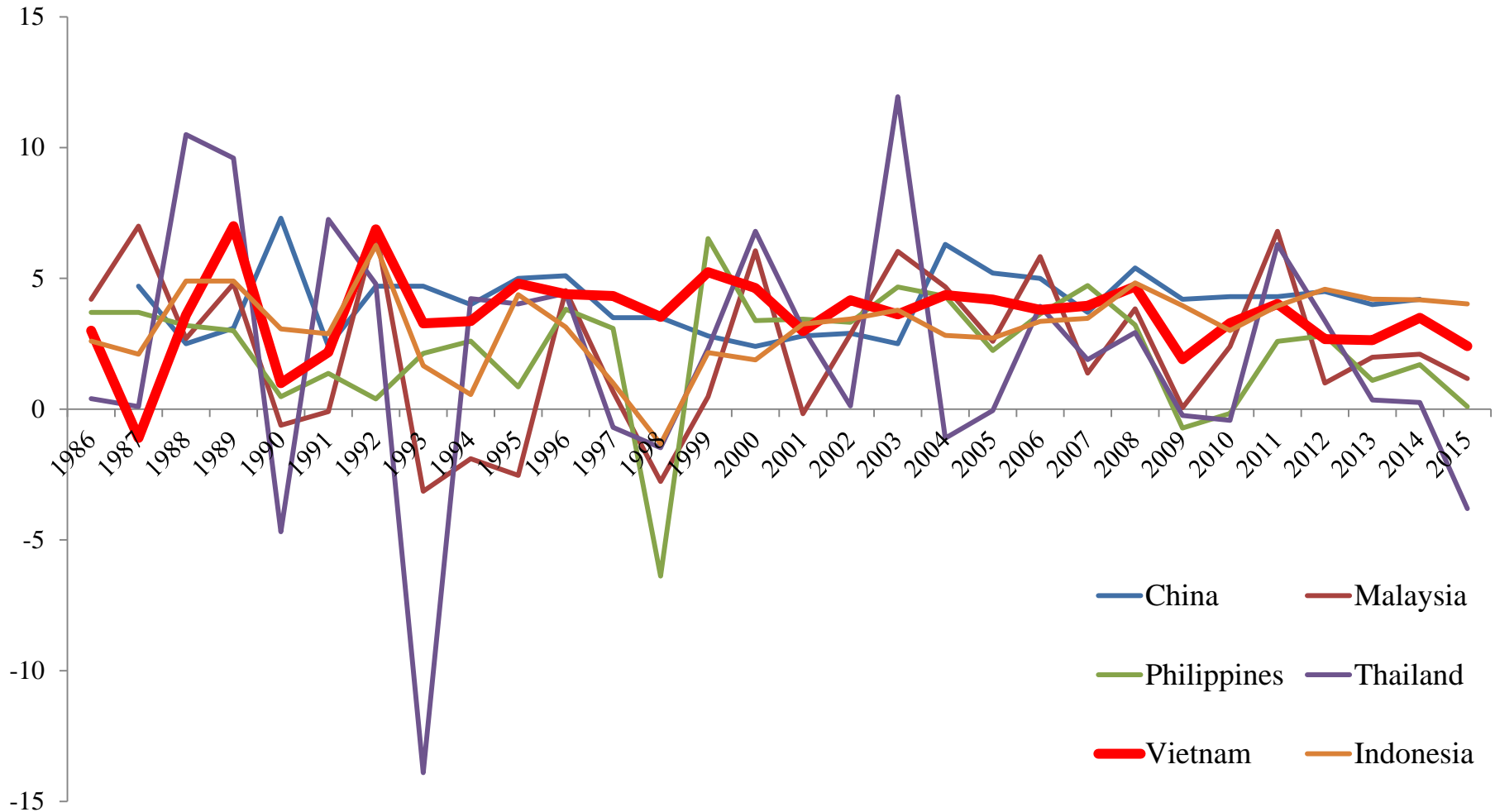
# Share of Agriculture GDP

Share of GDP by main sectors, current price

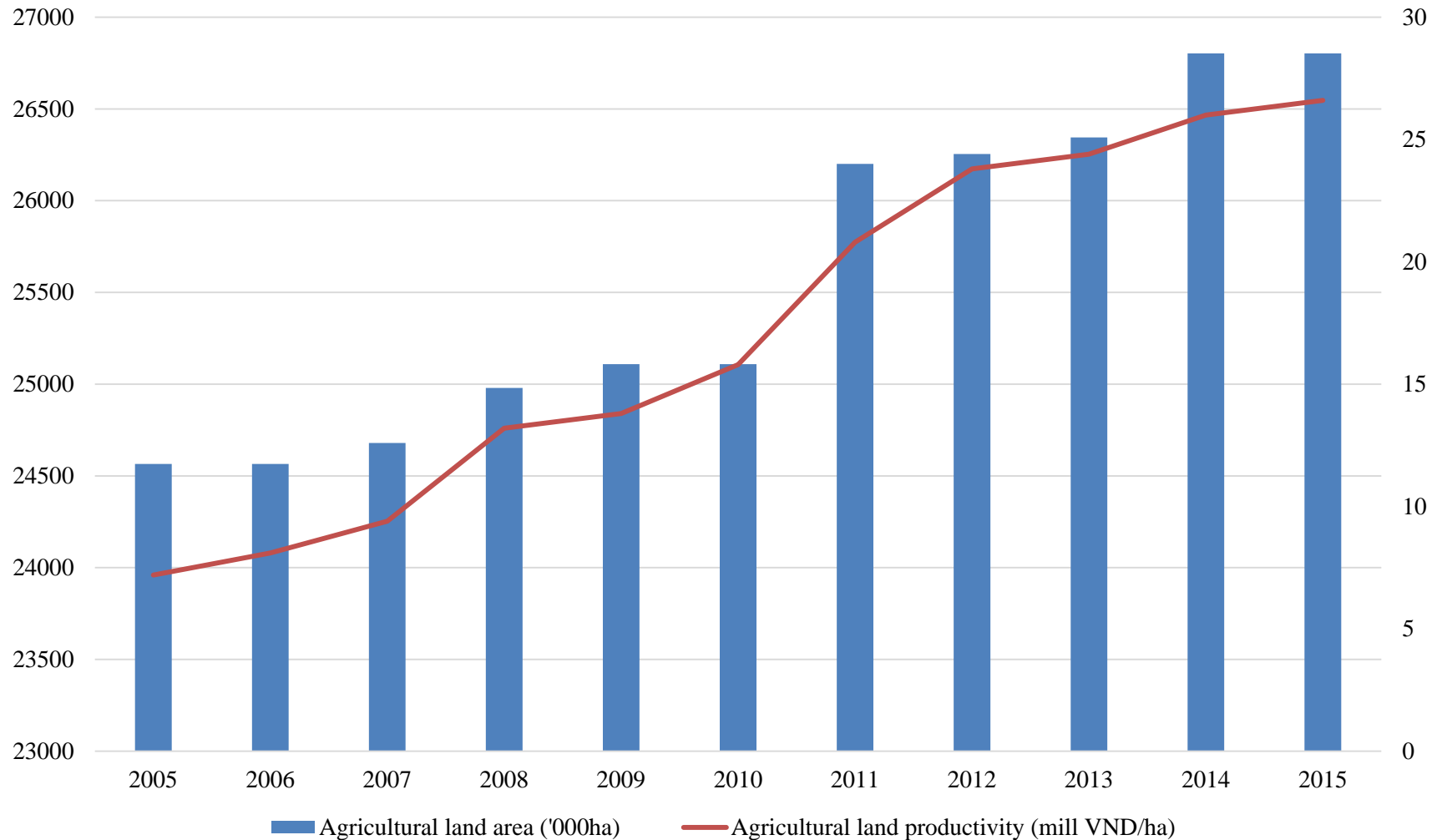


Nguồn: GSO, 2016

# Agricultural growth rate of Vietnam and other countries

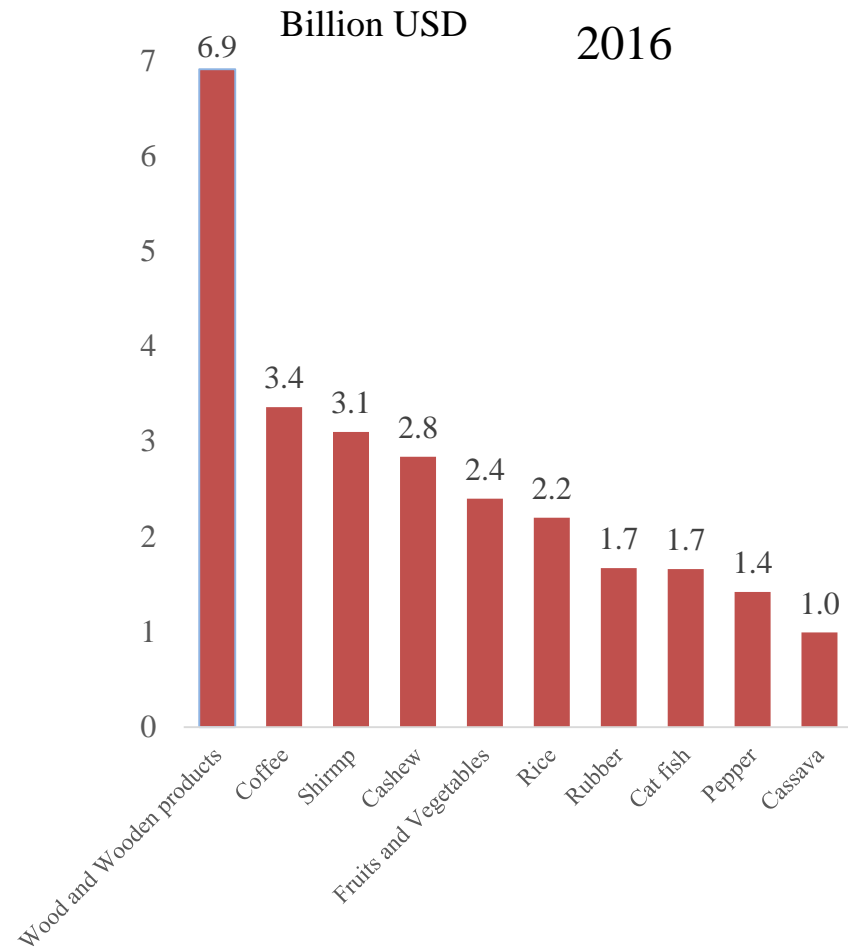


# Agricultural land area and productivity

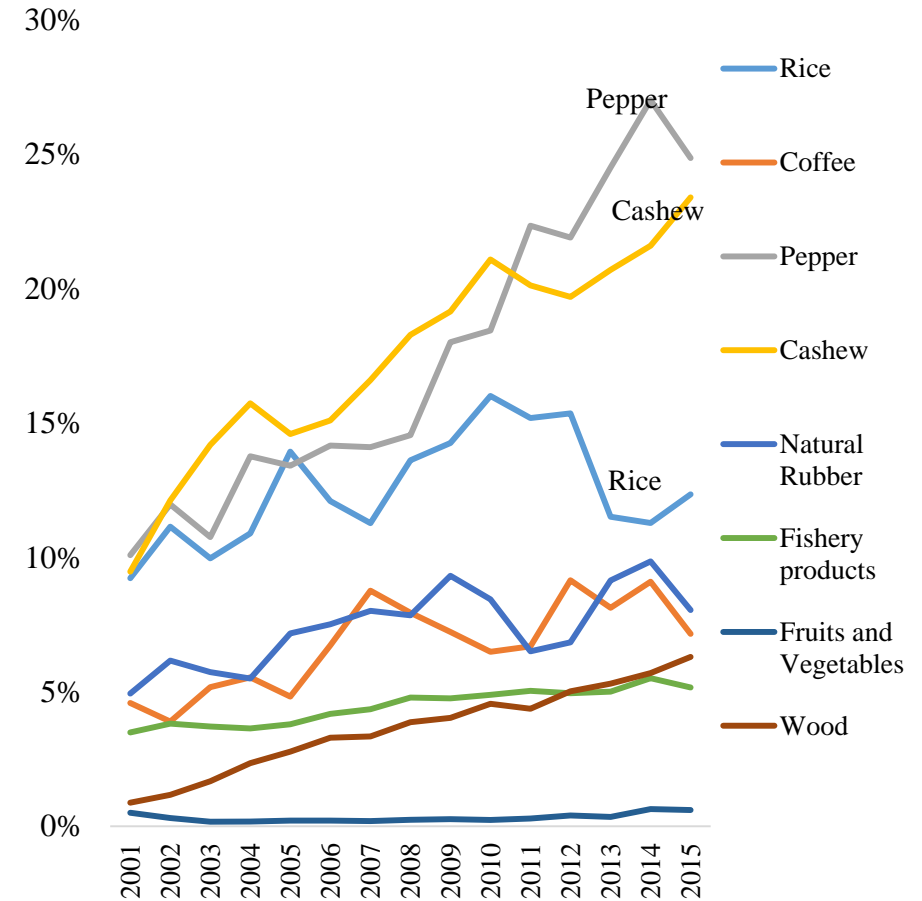


Source: GSO (2017)

# Agricultural exports



Source: *MARD (2017)*



Source: *Trademap (2016)*

# Challenges for food sector in Vietnam

- **Population:** Providing food and nutrition to 91.713 million people now and 104.699 million people by 2050
- **Natural resources** (land, water, forest, fisheries): Depleting
- **Agricultural land productivity:** Reaching the ceiling
- **Climate Risks:** Vietnam is very disaster prone, among the countries worse affected by climate change. Long coast, low land, complex geography. Yearly huge lost due to disasters
- **Urbanization:** rate 3.4%/year, fastest among Southeast Asia
- **Food safety:** 2016: Meat infected Salbutamol 6/345 (0.44%); Fruits, Vegetables and Meat is in excess of antibiotic residues – 11/1345 (0.82%); Fruits and Vegetables is in excess of plant protection products – 4.1%; Aquaculture products – 91/2472 (3.68%)
- **Food security:** Undernourishment - 11% of population (2015); children are stunted due to malnutrition – 23% (2015)

# Food loss and waste – Definition

## **FAO definition:**

- Food loss: the decrease in edible food mass available for human consumption throughout the different segments of the supply chain.
- Food waste: food losses resulting from decisions to discard food that still has value.

1. Production

2. Handling and Storage

3. Processing

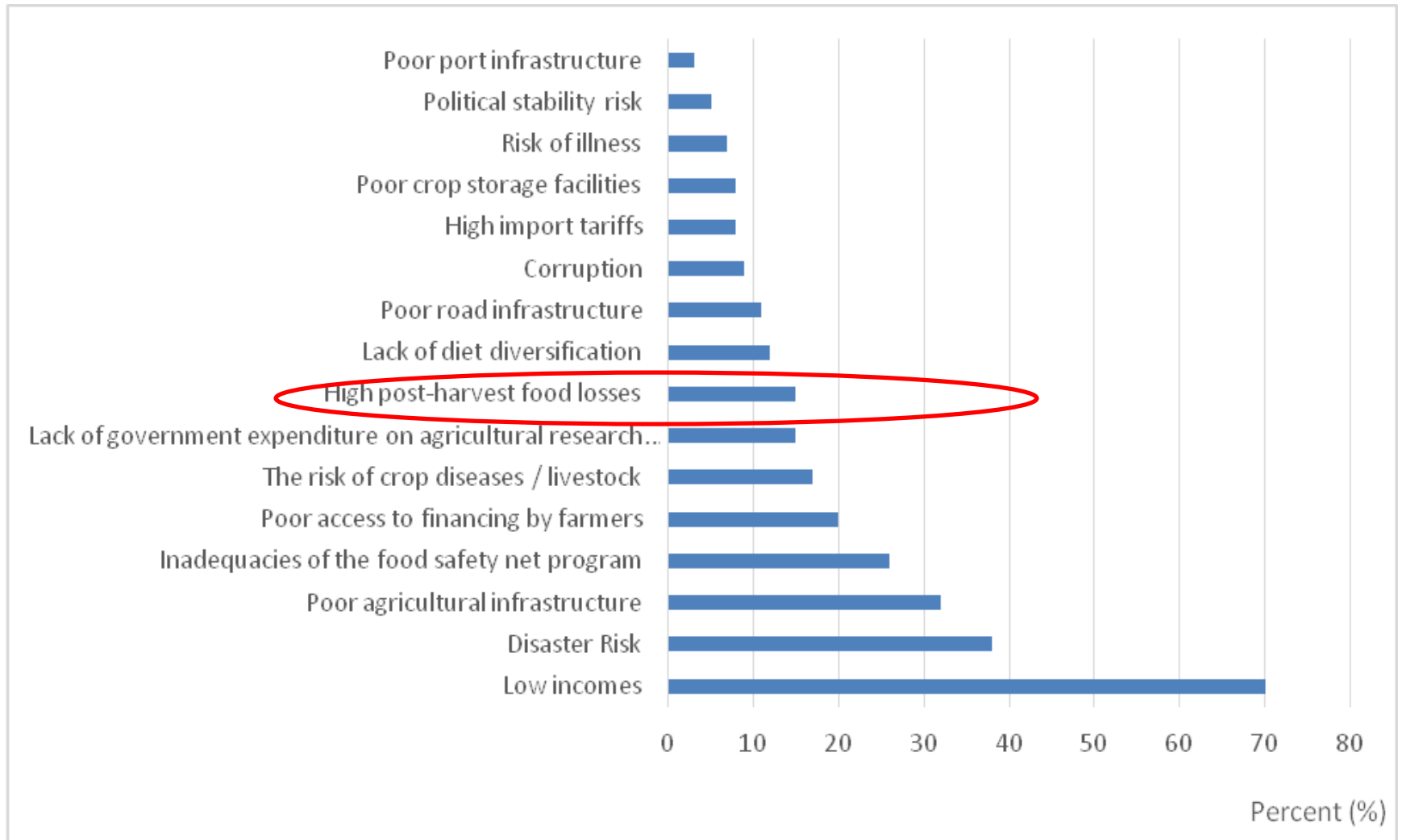
4. Distribution and Market

5. Consumption

Post-harvested  
Loss

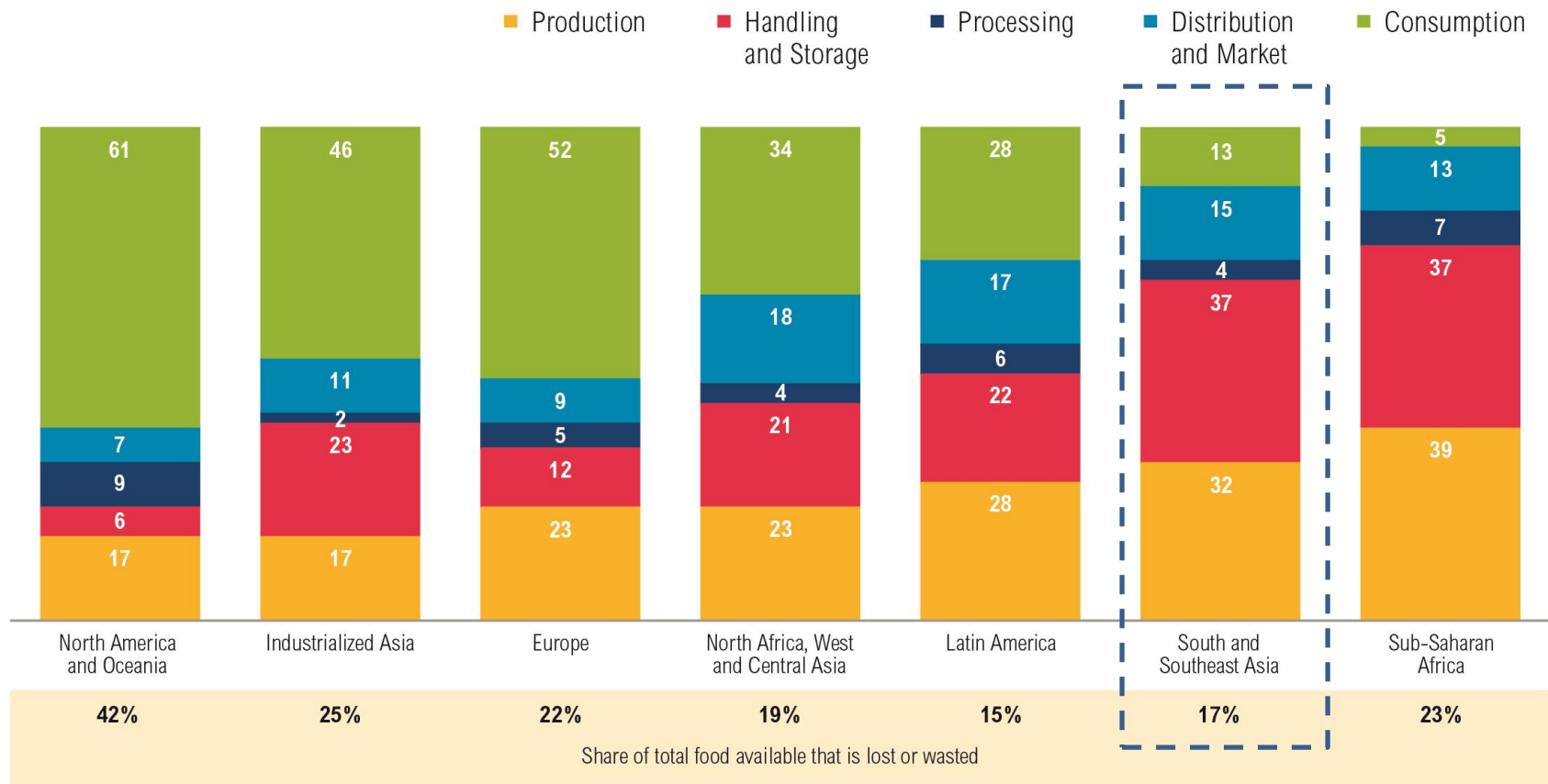


# Perceptions of the major food security issues in Vietnam



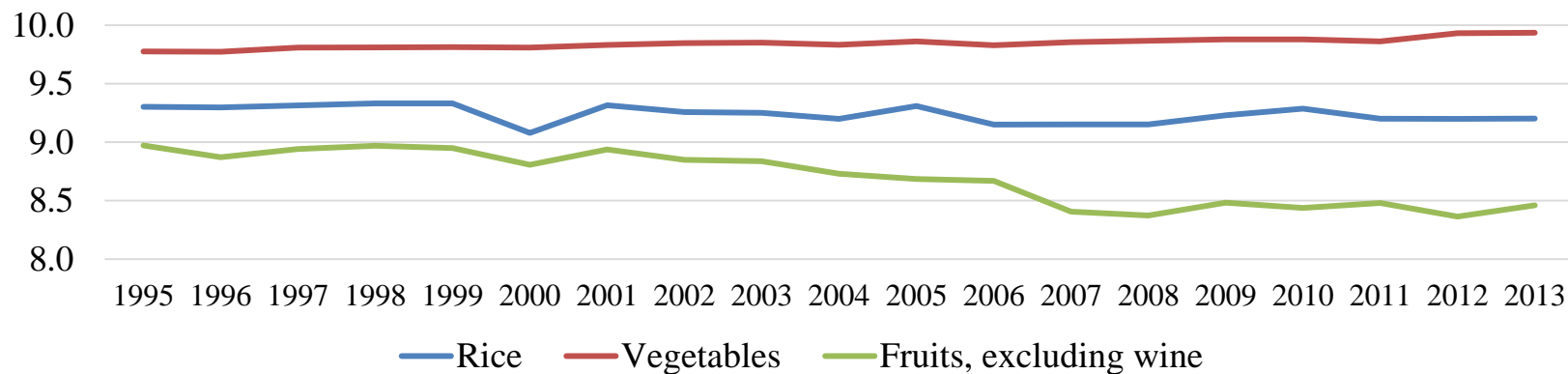
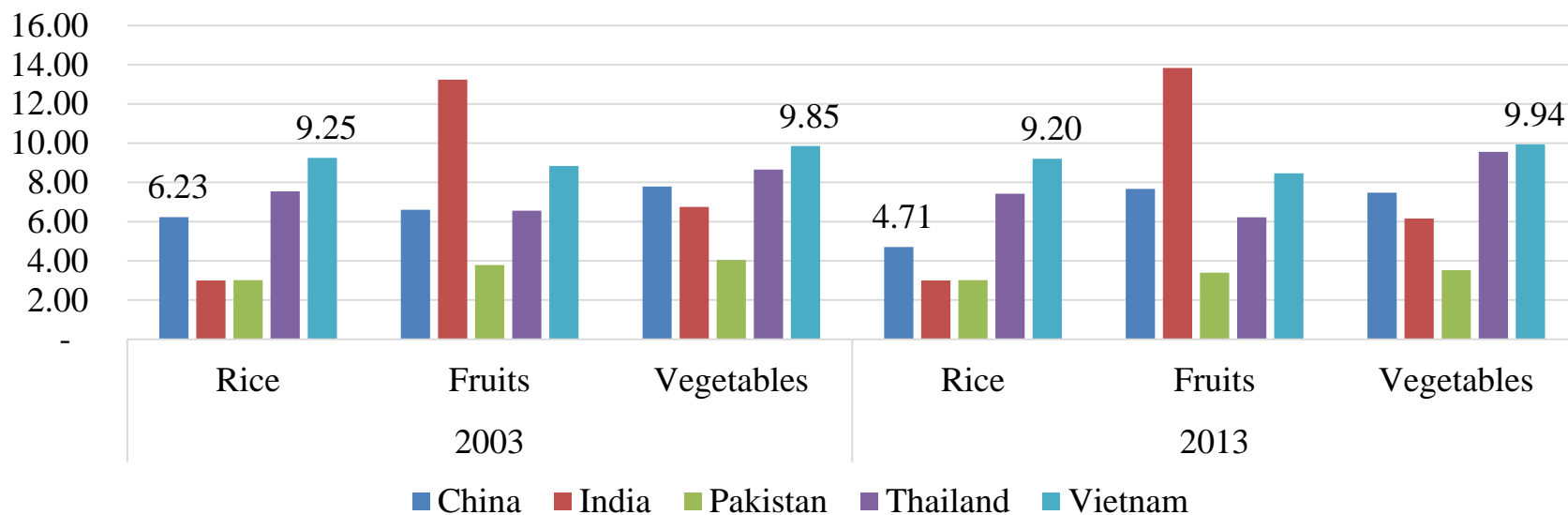
Source: Project ADP/2015/01, ACIAR

# Comparison of total kcal lost and wasted between different regions, 2009



Source: WRI analysis based on FAO (2011)

# Food loss and waste in Vietnam



Source: FAOSTAT (2015)

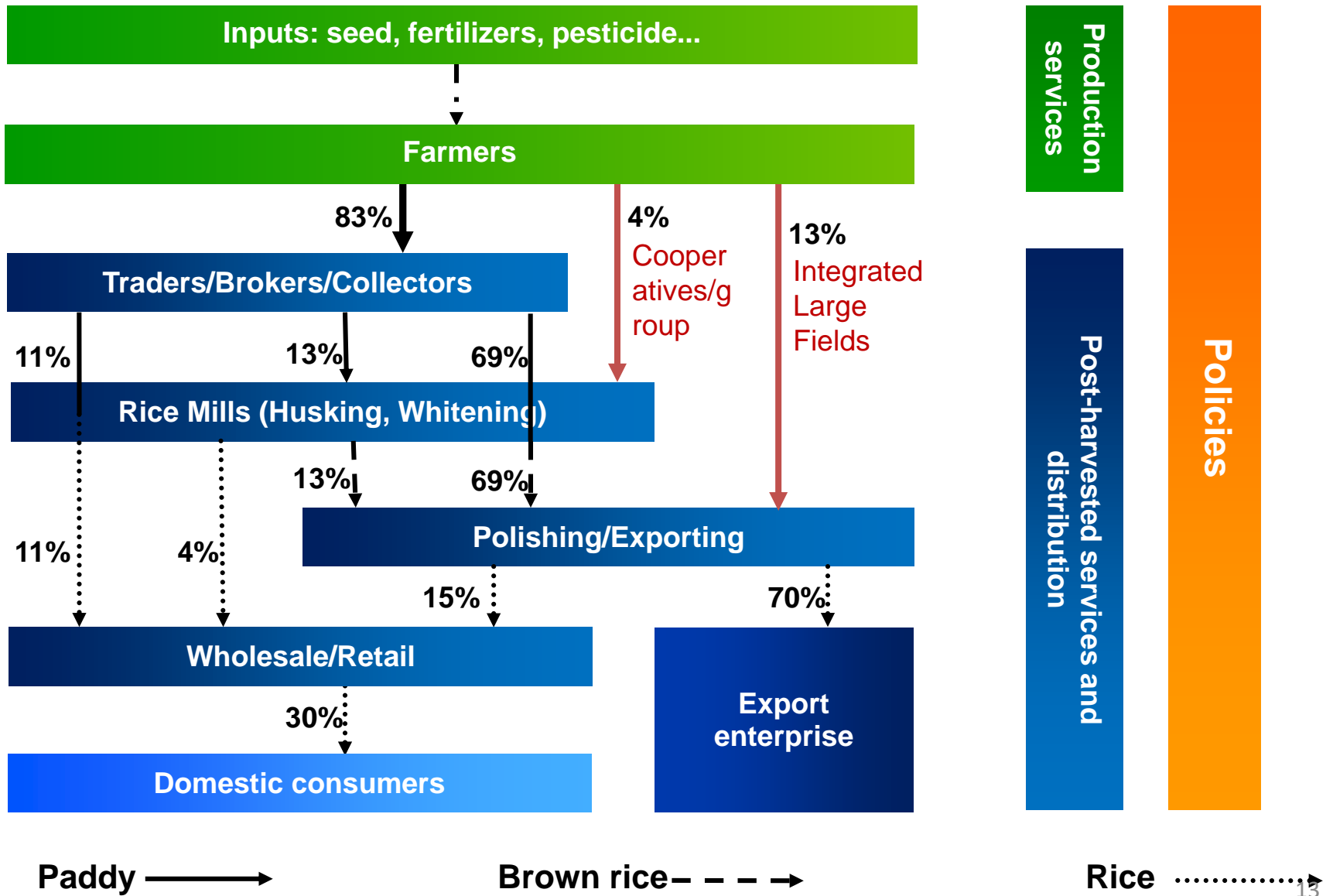
# Comparison post-harvest loss in rice between Vietnam and Thailand

Stage	Vietnam (MRD)	Thailand
Harvesting	2-3%	2%
Distribution	0,9%	0,4%
Drying	4,2%	1,7%
Storage	2,6%	1,2%
Milling	3%	2,3%
Total	13,7%	7,6%

*Source: VIAEP (2016), VIAEP&FAO (2014)*

**Annual post-harvest loss of rice in MRD: ~ USD 150 - 300 million**

# Rice value chain in MRD



# Harvesting technologies



Hand/Manual



Reaper



Small combine harvester



Large and modern combine harvester



China



Thailand






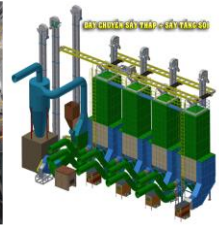



Vietnam



## Harvested by machines

- MRD has **11.000** harvesters, in which **6.000** combine harvesters.
- Share of total area using harvesters: RRD 30%, MRD 76%.
- Using harvester reduce loss by approximately 3-4%

# Drying and Storing technologies

							
	Sun	Fixed Bed Batch Dryer	Re-circulating Batch Dryer	Continuous Flow Dryer	Open bag	Inside Storage	Silo
Vietnam	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Thailand	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Japan	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>



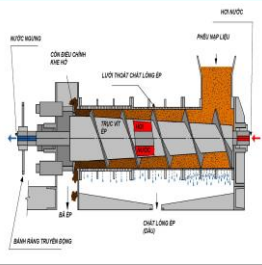



## Drying by machines

- RRD 5%
- MRD: 46% (Fixed Bed Bath Dryer 90%, Re-circulating Batch Dryer 10%)
- Using Dryers reduce loss in MRD, keep loss rate of this stage at 3%.
- Inside Storage: only 6 mill tons (24%).

(<20% HHs with good storage facilities)

Source: MARD (2016)

# Processing Technologies

	 <p><b>Steel plate milling machine</b></p>	 <p><b>Rulo rubber milling machine</b></p>	 <p><b>Vertical shaft tapering machine</b></p>	 <p><b>Horizontal shaft tapering polisher (Stone and rubber disk)</b></p>	 <p><b>Vibratory Sieve separator</b></p>	 <p><b>Laser stacking machine</b></p>
<b>Vietnam</b>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Thailand</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Japan</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

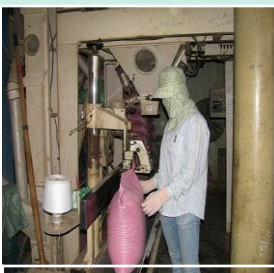
- ❖ Only whitening husking: >70%
- ❖ Combine stacking, whitening husking and polishing : <30%
- ❖ Separating: 90%



# Packing Technologies



**Had Sack Sewing**



**Sack Packing Line**



**Closed Bag Sealing Machine**



**Closed Bag Sealing Line**



**Vacuum Absorption Machine**



**Packing and vacuum absorption line**

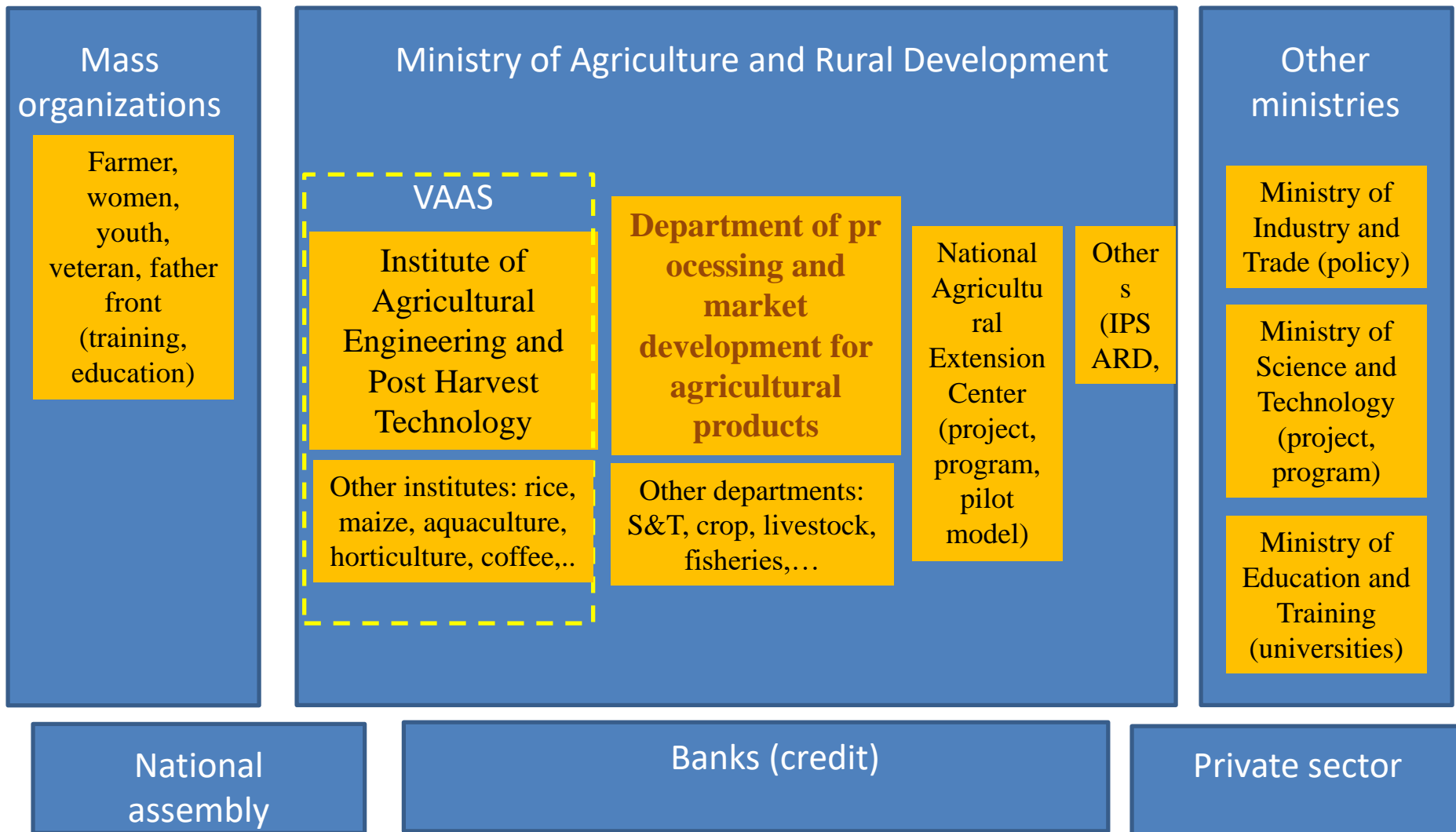
	Had Sack Sewing	Sack Packing Line	Closed Bag Sealing Machine	Closed Bag Sealing Line	Vacuum Absorption Machine	Packing and vacuum absorption line
<b>Vietnam</b>						
<b>Thailand</b>						
<b>Japan</b>						

- Handing Sack Sewing: 65%,
- Closed Bag Sealing Line: 20%
- Closed Bag Sealing Machine: 15%
- Vacuum Absorption Machine: 5%

# Distribution/ Transportation/Market



# Stakeholders relateds to food loss management in Vietnam



# Policy on reducing post-harvest loss in Vietnam

2007

- The Master Plan on development of the agro-forest product-processing industry in agricultural and rural industrialization and modernization up to 2010 and orientations towards 2020

2009

- Resolution No. 48/NQ-CP providing mechanisms and policies to reduce post-harvest losses in agricultural and fishery products

2010

- Decision No. 63/2010/QĐ-TTg on policy on subsidies to reduce post-harvest losses in agriculture and aquaculture
- Decision No. 65/2011/QĐ-TTg amending Decision No. 63/2010/QĐ-TTg on policy on subsidies to reduce post-harvest losses in agriculture and aquaculture

2013

- Decision No. 68/2013/QĐ-TTg providing support policies to reduce losses in agriculture, and implement respective measures for each commodity value chain (substituted for Decision 63 and 65 above)

2014

- The Scheme on improving added value in the processing of agro-forestry and fishery products and reducing post-harvest losses

# Policy implementation results

- Total lending capital in financial support program on reducing agricultural post harvested had reached 4,470 billion VND with outstanding loans of 2,440 billion VND (30 July 2016).
- 11,732 customer turns were accessed to this financial support scheme
- Total agricultural machines increased
  - Tractor: increased by 1.6 times compare to 2006
  - Dryer: decreased by 8% but drying capacity increased by 20%
  - Harvester: increased by 25.6 times (MRD 75% of total harvester of VN)
- The mechanization of rice, sugarcane and maize work increased rapidly:
  - Land preparation: 92% (rice), doubled to 2000
  - Sowing and Transplanting: 30% (rice and sugarcane); 70% (rubber)
  - Spraying and Caring: 60% (rice), 70% (tea and sugarcane)
  - Harvesting (rice): 42% (5% in 2000); RRD 20% and MRD 76%; 20% (tea)

# Challenges in reducing post harvest loss

- Small and fragmented land
- Lack of financial access and high interest rate
- Inadequate farmer knowledge and skills in post harvest loss reduction
- Technology and research capacity
- Environment and climate change
- Infrastructure and Market system

# Innovations

## **Technology application:**

- 2007-2015: 150 inventions (Vietnam society of agricultural engineering)
- 2011-2015: 147 mechanization model in rice production help increasing labor productivity 10-30 times and reduce 20-25% of total production cost (Extension program)

## **Agricultural mechanic industry:**

- Tractor producing capacity: Vietnam can produce diesel machine of 30 HP; 40,000 machines/year (30% of total domestic market share)
- Combine harvester: Vietnam has 15 factories but only 3 factories with capacity 1,000 machines/year
- Threshing machine: 3 factories with capacity 6,000 machine/year (in the North)
- Rice milling machine and Dryer: >90% of total market share produced domestically (Bui Van Ngo company, SINCO, LAMICO, etc with the capacity 4 – 48 tons/hour; Dryer with capacity 30 – 200 tons/turn and exported to other countries.

# Bui Van Ngo Industrial & Agricultural Machinery Co. Ltd

- 75% of agricultural machinery market share in MRD and export to many countries (Thailand, Philippines, Malaysia, Brazil,...)



Milling Chain



Dryer



CB-1C

Polishing machine



# Loc Troi Group

- Leading seed trader in Vietnam
- Own and operate their own science research center
- Invest and apply modern technologies and machines
- Establish the Together-three agricultural engineers\* (2006)
- Develop the “Together with Farmers to the Field” Progame (2006)
- Sign directly contracts with 40.000 farmers
- Develop sustainable agricultural value chain



Science research



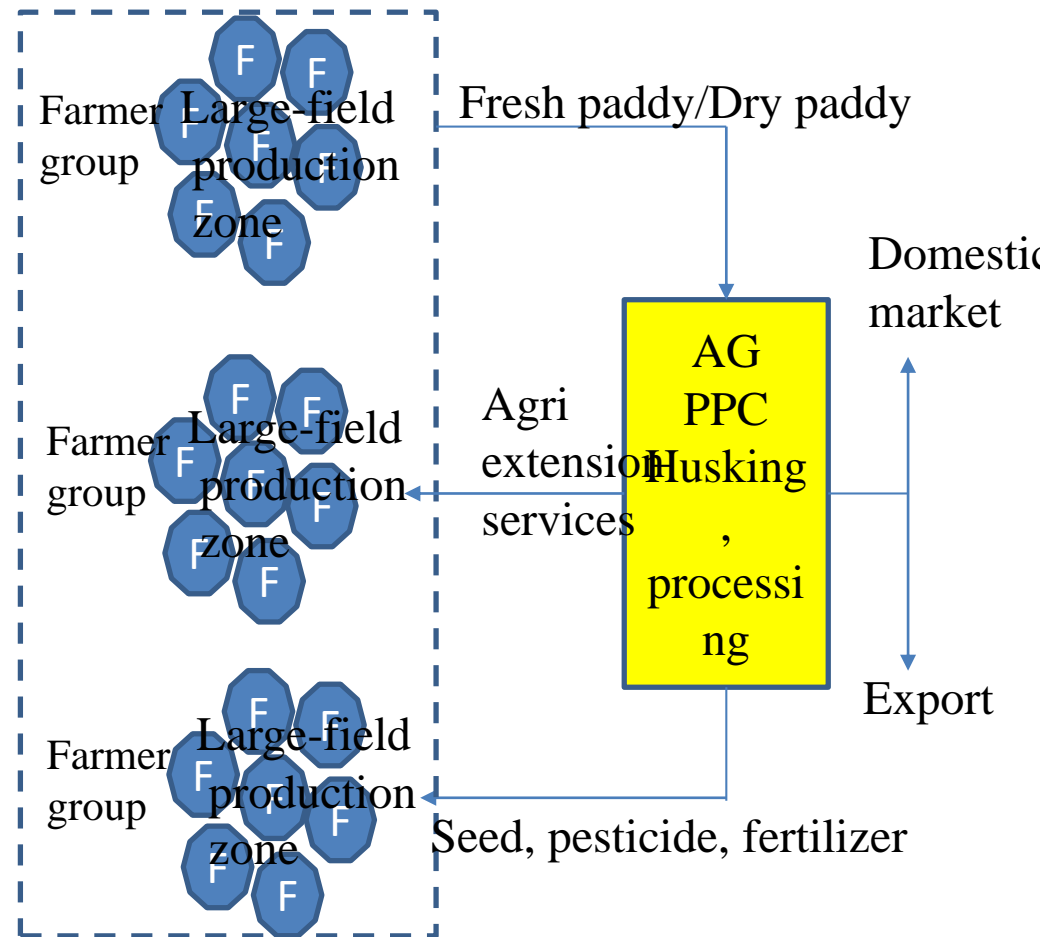
Toge-three engineer



Rice Mills

# Business model of Loc troi group

- Rice production area: 2012 19,500 ha (6,500 smallholders), 2013 61,600ha (20,500 smallholders)
- Export: 2013, 300 tons to Japan (closed since 2008 due to high pesticide residue of VN)
- 4 factories (380,000 tons)
- Sell stocks for 6,000 smallholders
- Economic profits: smallholders who have contracts with Loc Troi have \$US550/ha/year higher than others (Nghia 2012)



Source: Nghia (2012)

# Rice processing technologies of Loc Troi



**Material**



**Primary Refinement**



**Drying Tower**



**Storage**



**Brow rice**



**Paddy Separator**



**Sorter**



**Hulling machine**



**Stone Refinement**



**Whitening Machine**



**Polishers**



**Grain Separator**



**Color Separator**



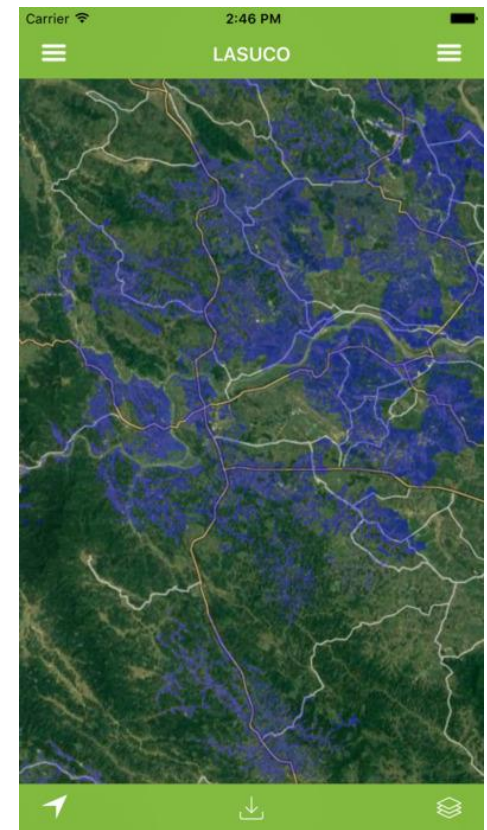
**White Rice**



**Packing**

# Lasuco – Lam Son sugar company

- Apply GIS, big data, machine learning to manage the raw material zone of company (contract farming, harvest, transportation, processing) → reduce post-harvest loss



# Summary

- Vietnam has achieved significant results in agricultural productivity
- Food loss in Vietnam is still high compared to other countries
- Food loss and waste are still new concept to Vietnamese people
- The institutional and policy framework for post-harvest loss is still incomplete
- The impact of these policies is still low
- However, there are some innovations that work in reality (shorten the value chain, farmer-enterprise linkage, industrial 4.0)