Patterns and Determinants of Farmers’ Adoption of Horticultural Crops in Indonesia

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Overview

• Background
• Horticulture in Indonesia
• Objectives
• Data: Farmer Survey
• Findings
• Conclusions
Background

- Agri-food market transformation in Indonesia toward modern **high-value commodities**
  - Indonesian consumers’ diets are becoming **more diversified**, and consumers are demanding **more** livestock products (dairy, eggs and meat) and fruits and vegetables (Reardon et al., 2014)

- **Potential benefits** for farmers to produce (adopt) high-value horticultural crops (e.g. Sahara et al., 2013)
  - Why participation rate **still low**?
Horticulture in Indonesia

• Domestic production capacity is still under domestic demand
  - Top imports: garlic, apples, oranges & mandarines, potatoes, onions & shallots
  - Other commodities:

Source: FAO, 2014
Horticulture in Indonesia

- Domestic production is **mainly concentrated** in Java and Sumatera islands

Source: BPS, 2014
Horticulture in Indonesia

- Number of horticulture farmer households decrease

Note: A farmer households can grow more than one crops
Source: BPS, 2013 Census of Agriculture
Horticulture in Indonesia

Horticulture Development Approach:

• Horticulture Agribusiness Development Area (PKAH)

• Superior Commodities Development (*Pengembangan Komoditas Unggulan*)
  
  - Vegetables: shallot, chilli, potato, indigenous vegetables
  
  - Fruits: durian, mangosteen, mango, citrus, banana, papaya
Objectives

• To understand the problems and opportunities of horticultural crop production in Indonesia
  - To examine patterns of adoption of horticultural crops
  - To analyze the determinants of adoption of horticultural crops
Data: Farmer Survey

- **Sample**
  - 960 farmers in six districts, Java, Indonesia
  - Systematic random sampling technique
Design of Farmer Survey

- Questionnaire
  - 26 page questionnaire
    - HH characteristics
    - Housing and assets
    - Agricultural land
    - Crop production (input use, post-harvest processing) and marketing
    - Production and marketing information
    - Collective action
    - Adoption of crops and farming system
    - On-farm and off-farm income

- Data Collection
  - 18 experienced and trained enumerators in three teams
  - February to March 2013
Findings – Intensity of adoption of any new crops/varieties among Indonesian farmers, 2007-2012
Findings - Adoption rate of horticultural crops in Indonesia

- Relatively low adoption (10.5%)
  - Cucumber, shallot and chilli
  - Melon, tomato and watermelon
Findings: Why farmers adopt?

- To earn **high profit**
- To earn **high yield**
- To have **shorter planting period**
Findings: Reasons for discontinuing to adopt

- **Price** of the crop lower than expected
- **Yield** lower than expected due to **pests**
- **Yield** lower than expected due to **soil/climate**
- **Cost of production** higher than expected
Findings: Sources that gave idea to adopt

- Farmer/Neighbour/Village leader: 68%
- Others: 11%
- Market**: 10%
- Extension officer/Public*: 11%

*Including Dinas officers and universities
**Including trader, input companies and input seller
### Findings: Characteristics of adopters and non-adopters

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non adopters (n=859)</th>
<th>Adopters (n=101)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td><strong>HH characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of head HH (years)</td>
<td>52.1</td>
<td>48.3</td>
<td>***</td>
</tr>
<tr>
<td>Age of spouse (years)</td>
<td>42.2</td>
<td>41.0</td>
<td>n.s</td>
</tr>
<tr>
<td>Education of head HH (years)</td>
<td>7.1</td>
<td>8.1</td>
<td>***</td>
</tr>
<tr>
<td>Education of spouse (years)</td>
<td>6.5</td>
<td>7.6</td>
<td>***</td>
</tr>
<tr>
<td>HH size (persons)</td>
<td>3.7</td>
<td>4.1</td>
<td>**</td>
</tr>
<tr>
<td># Children (persons)</td>
<td>0.6</td>
<td>1.1</td>
<td>***</td>
</tr>
</tbody>
</table>

1Based on t-test: *** significant at the 1% level, ** (5%), * (10%)
Findings: Characteristics of adopters and non-adopters

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<tr>
<td></td>
<td>Mean</td>
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<tr>
<td><strong>HH and farm assets (in 2012)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owns mobile phone (unit)</td>
<td>1.79</td>
<td>2.24</td>
<td>***</td>
</tr>
<tr>
<td>Access to internet (1/0)</td>
<td>0.27</td>
<td>0.45</td>
<td>***</td>
</tr>
<tr>
<td>Farm size (ha)</td>
<td>0.76</td>
<td>0.82</td>
<td>n.s</td>
</tr>
<tr>
<td>% of rented land</td>
<td>12.38</td>
<td>22.97</td>
<td>***</td>
</tr>
<tr>
<td>% of irrigated land</td>
<td>56.92</td>
<td>50.71</td>
<td>*</td>
</tr>
<tr>
<td>Transportation asset (million Rp)</td>
<td>8.61</td>
<td>6.81</td>
<td>n.S</td>
</tr>
<tr>
<td>Production asset (million Rp)</td>
<td>1.44</td>
<td>1.95</td>
<td>n.s</td>
</tr>
<tr>
<td>Storage asset (million Rp)</td>
<td>1.46</td>
<td>7.08</td>
<td>***</td>
</tr>
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## Findings: Characteristics of adopters and non-adopters

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<tr>
<td><strong>Production &amp; marketing characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsidy availability from government (1/0)</td>
<td>0.64</td>
<td>0.58</td>
<td>n.s</td>
</tr>
<tr>
<td>Credit availability (1/0)</td>
<td>0.11</td>
<td>0.11</td>
<td>n.s</td>
</tr>
<tr>
<td>Cooperative/Farmer group involvement (1/0)</td>
<td>0.81</td>
<td>0.92</td>
<td>***</td>
</tr>
<tr>
<td>Women farmer group involvement (1/0)</td>
<td>0.04</td>
<td>0.10</td>
<td>***</td>
</tr>
<tr>
<td>Participated in FFS for horticultural crops (1/0)</td>
<td>0.08</td>
<td>0.16</td>
<td>**</td>
</tr>
<tr>
<td>Extension services (1/0)</td>
<td>0.16</td>
<td>0.43</td>
<td>***</td>
</tr>
</tbody>
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# Findings: Characteristics of adopters and non-adopters

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<tr>
<td><strong>Income Activities &amp; Location</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net income (million Rp)</td>
<td>42.7</td>
<td>39.5</td>
<td>n.s</td>
</tr>
<tr>
<td>% of off-farm income</td>
<td>42.8</td>
<td>44.3</td>
<td>n.s</td>
</tr>
<tr>
<td>Horticultural income (million Rp)</td>
<td>2.2</td>
<td>6.7</td>
<td>***</td>
</tr>
<tr>
<td>Remittance income (million Rp)</td>
<td>1.4</td>
<td>0.6</td>
<td>n.s</td>
</tr>
<tr>
<td>Altitude (m)</td>
<td>185.5</td>
<td>293.0</td>
<td>***</td>
</tr>
<tr>
<td>Distance to nearest urban market (km)</td>
<td>20.2</td>
<td>23.3</td>
<td>**</td>
</tr>
</tbody>
</table>

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Findings: Determinants of Adoption

Logit Regression:

\[ Adoption (1/0) = f (HH \text{ Characteristics}, Farm \text{ Characteristics}, HH \text{ and Farm Assets}, Institutional \text{ Factors}, Information \text{ and Location}) \]

The effect of [...] on horticulture crop adoption

- Extension services on horticulture (+)
- Collective action (producer organizations) (+)
- Farmer Field School GAP for horticulture crops (+)
- Farmer Field School ICM for food crops (-)
- Age of HH (-)

Other significant variables: transportation asset, production asset, storage asset, altitude, share of rented land
Summary and Policy Implications

• The opportunities to improve smallholder farmers’ participation on horticultural crop production are relatively high.

• Understanding patterns and determinants of adoption are important as it sheds light on what constraints for farmers to adopt a new (horticulture) crop.

• Who are the adopters?
  - more involved in cooperative/farmer group and Farmer Field School
  - more exposure to the extension services
  - younger and more educated
Summary and Policy Implications (2)

- Including and encouraging smallholder farmers in horticulture production will be critical to assure high value products’ supply and offer potential income.

- Implications
  - How to make “adopted-farmers” more productive?
  - More targeted policy and development programs.
Acknowledgements

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Thank you!

Questions?

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