ROLE OF TECHNOLOGICAL INNOVATION FOR PROMOTING SUSTAINABLE AGRICULTURE

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Outline:

- Introduction
- Research and Development Policy Direction 2015-2019
- Strategy Policy to Develop Innovative-Adaptive Technology
- Technological Innovations in Sustainable Agriculture

IAARD- MINISTRY OF AGRICULTURE OF THE REPUBLIC OF INDONESIA
INTRODUCTION
The strategic role of the agricultural sector

- Provide food and industrial raw materials
- Contribute to the national GDP
- Earn foreign exchange
- Become the major sources of rural income earning and employments
- Provide feed and materials for bioenergy
- Preserve the sustainability utilization of natural resources and environments

IAARD- MINISTRY OF AGRICULTURE OF THE REPUBLIC OF INDONESIA
Global issues faced by every country in the future are food, energy and water problems due to the persistent problems of agricultural land conversion to non-agriculture activities and uncertainty of climate change.

In the future, agriculture should be able to produce more food and energy for population, while conserving the environment for a sustainable food production.

The role of Technological Innovation is important.
The Distribution of the Population Across the Archipelago is Highly Asymmetric

Java represents only 7% of the total land area but hosts 57% of the population. Density 1,000 person/km²

Papua occupies 22% of the land area but is habited by less than 2% of the total population. Density 7 person/km²

National average population density is 124 persons/km²
## Land-People Ratio for Food Crops in Some Countries

<table>
<thead>
<tr>
<th>No.</th>
<th>Countries</th>
<th>Total Land (000 ha)</th>
<th>Number of People (000)</th>
<th>Land per capita (m²/person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Indonesia: Paddy Land</td>
<td>7.886</td>
<td>240.000</td>
<td>329</td>
</tr>
<tr>
<td></td>
<td>Paddy land and Dry land</td>
<td>13.386</td>
<td>240.000</td>
<td>558</td>
</tr>
<tr>
<td>2.</td>
<td>Vietnam</td>
<td>7.500</td>
<td>78.137</td>
<td>960</td>
</tr>
<tr>
<td>3.</td>
<td>Thailand</td>
<td>31.839</td>
<td>60.925</td>
<td>5.230</td>
</tr>
<tr>
<td>4.</td>
<td>India</td>
<td>161.750</td>
<td>1.016.938</td>
<td>1.290</td>
</tr>
<tr>
<td>5.</td>
<td>China</td>
<td>143.625</td>
<td>1.282.172</td>
<td>1.120</td>
</tr>
<tr>
<td>6.</td>
<td>Bangladesh</td>
<td>8.085</td>
<td>123.406</td>
<td>655</td>
</tr>
<tr>
<td>7.</td>
<td>Australia</td>
<td>50.304</td>
<td>19.153</td>
<td>26.100</td>
</tr>
<tr>
<td>8.</td>
<td>Brazilia</td>
<td>58.865</td>
<td>171.796</td>
<td>3.430</td>
</tr>
</tbody>
</table>

Source: Sumarno, 2012
Young Generation Participation in Agricultural Sector Tends to Decrease

The Composition of Farmers by Age, 2003 and 2013

Agricultural Census 2003
- Age >= 55 years: 23%
- Age 35-54 years: 51%
- Age < 35 years: 26%

Agricultural Census 2013
- Age >= 55 years: 27%
- Age < 35 years: 11%
- Age 35-54 years: 62%
2 Research and Development Policy Direction 2015-2019
1. Creating innovative technology: good quality seed, new superior variety, fertilizer and agricultural machines,
2. Creating innovative technology for land usage, mitigate and adaptive to climate change,
3. Developing institution model and policy development,
4. Technology transfer to increase products competitiveness in domestic and international market,
5. Creating innovative technology of bio-energy based on renewable local resources,
6. Creating innovative technology for food diversification based on local resources advantages
7. Empowering innovative technology and institution for development of agriculture industry.
3 Strategy Policy to Develop Innovative-Adaptive Technology
STRA?'EY TO DEVELOP INNOVATIVE-ADAPTIVE TECHNOLOGY

Exploration, utilization of genetic resource engineering \(\rightarrow\) ADAPTIVE SUPERIOR VARIETIES

Optimization and efficiency of land-water resources \(\rightarrow\) technology of LAND AND WATER MANAGEMENT, FERTILIZATION, CONSERVATION

Optimalization of biomass/ORGANIC WASTE \(\rightarrow\) "zero waste" approach

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Technological Innovations In Sustainable Agriculture
CLIMATE SMART AGRICULTURE (CSA)

ACHIEVING OF NATIONAL FOOD SECURITY AND ECONOMIC GROWTH
Integrated Crop Management (ICM)

Dynamics
(improved technologies)

Participatory
(Based on farmer needs & supported by extension workers)

Integrated
(IPM)

Synergism
(Technologies & Resources)

Goals

1. Resources efficiency
2. Increasing yield, production and profit
3. Sustainable
**FOOD SMART VILLAGE** is a rural livelihood that pursue food self-sufficiency by applying innovative agriculture on the marginal land.

Land and water resources optimization through surface and ground water management, soil fertility enhancement, and micro-climate modification.

**Foods diversification**
Expanding food crops options based on agro ecological zone through development variety of food product

**Integrated Crop-Livestock system**;
Livestock feeds come from agriculture residues, and animal provide energy and manure for the crops. Animal waste be input in biogas as high quality fertilizer
Food Smart Village
Desa Oebola, Kupang NTT

- Climate Change Adaptation
- Zero waste
- Conservation agriculture
- Land and water resources optimization
- Foods diversification
- Integrated Crop-Livestock system

FOOD SMART VILLAGE
Integrated Planting Calendar

SISTEM INFORMASI KALENDER TANAM TERPADU MEMUAT INFORMASI:
- Estimasi waktu dan luas tanam padi dan palawija
- Estimasi wilayah rawan banjir, kekeringan dan serangan OPT
- Rekomendasi varietas dan kebutuhan benih
- Rekomendasi pupuk
- Rekomendasi mekanisasi pertanian
- Info tanam - BPP
- Kalender Tanam Rawa
- Monitoring online kondisi tanaman pangan menggunakan CCTV
- Standing Crop Padi Sawah Pulau Jawa, Bali, Sumatera, dan Sulawesi

INFORMASI TERSEDIA UNTUK LAHAN SAWAH IRIGASI DAN LAHAN RAWA
PADA LEVEL KECAMATAN SELURUH INDONESIA

SCIENCE. INNOVATION. NETWORKS
Modern Agricultural

**INDO JARWO TRANSPLANTER**
- Reduce labor use (20 persons/day),
- Reduce planting Cost (35%)
- Reduce planting time to be 6 hours/ha

**INDO COMBINE HARVESTER**
- Reduce yield loss from 12.2% to 2.2%
- Reduce labor use (40 persons/ha)
- Reduce Harvesting time to be 4–6 hours/ha
- Reduce harvesting cost (30%)

Mechanization implementation reduces production cost ±30%, and yield loss 10%, as well as increase farmers’ profit 80%.

Reduce labor use from 20 persons to 3 persons/ha, and reduce land preparation cost 28%.
Thank You