NATIONAL POLICY OF DIGITAL AGRICULTURE DEVELOPMENT IN INDONESIA

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GLOBAL FOOD SECURITY INDEX (GFSI) 2020 INDONESIA

- **Affordability**: 73.5
- **Availability**: 64.7
- **Quality and Safety**: 49.6
- **Natural Resources & Resilience**: 34.1

**Indonesia scores well for affordability, availability. Meanwhile, for quality & safety, natural resources & resilience, Indonesia's score is still lower than global average.**

**For 2020**, Indonesia's ranking has decreased compared to 2019 (65 out of 113 countries) with a score of 59.5

**Indonesia's challenge is to increase agricultural research and development as well as efforts to increase food diversity.**

**Sumber**: GFSI
**DEMAND SIDE: DEMOGRAPHIC STRUCTURE AND EXPENDITURE PATTERNS**

### Population

- **2010**: 238,5 juta people
- **2045 (SP 2010)**: 318,7 million people
- **2045 (SUPAS 2015)**: 318,9 million people

### Life Expectancy

- 69,8 tahun (2010)
- 72,8 year (2045)

### Jumlah Lansia (65+)

- 11,9 juta people
- 2045 (SUPAS 2015): 44,9 million people

### Urbanization

- 49,9%
- 2010: 69,1%
- 2045: 72,8%

### Food Expenditure Pattern

#### Urban

<table>
<thead>
<tr>
<th>Year</th>
<th>Prepared Food &amp; Beverages</th>
<th>Beverage, Spices, Tobacco, misc</th>
<th>Oil and Fats</th>
<th>Fruits, Vegetables, Nuts</th>
<th>Meat, Fish, Milk, Eggs</th>
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<td>2013</td>
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#### Rural

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Source: BAPPENAS

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Changes in consumption patterns of Indonesian society have occurred. Increased incomes and urbanization lead to increased demand for quality and nutritious processed foods.
CHALLENGES: DECREASING FOOD LOSS AND WASTE

Food Loss by 5 Subsectors

**Agriculture Production** 23,5%
**Storage and Distribution** 24,4%
**Processing and Packaging** 20,3%
**Marketing** 20,3%
**Consumption: Household and “Horeka”** 11,5%

**Direct Causes**
- Abandoned/discarded in the field because quality standards or market prices fall significantly
- Improper storage and transportation facilities and infrastructure (such as refrigerated trucks)
- Inadequate processing capacity in the harvest season
- Varied market demand for perishable products
- Too many date labels on product packaging

**Indirect Causes**
- Selection of the varieties or commodities
- Inappropriate temperature and humidity setting
- Technical problems (incorrect size or damage to packaging)
- Unattractive product display and packaging
- Confusion between the expiration label and the date it is suitable for consumption

- Damage to agricultural machinery, traditional tools
- Longer storage time (due to transportation limitations)
- Processing governance limitations
- Discard products that do not look attractive
- Inappropriate storage or inventory management in the household

- Harvest schedule is not on time
- Logistics management errors (inappropriate handling of perishable products)
- Excessive cutting to achieve an aesthetic shape
- Too much inventory
- Make food with too big portion

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**Subsector with the largest loss compared to domestic supply is horticultural crops (45.9%)**
**Commodity with the largest loss compared to the domestic supply is vegetables (55.9%)**

**Sumber: Dit LH, BAPPENAS**

**Sumber: FAO**
**STRUCTURE OF FARMER IN INDONESIA**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Percentage</th>
<th>Population</th>
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<tbody>
<tr>
<td>≥ 65</td>
<td>13,8%</td>
<td>3,822,995</td>
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<td>55 - 64</td>
<td>22,2%</td>
<td>6,134,987</td>
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<td>45 - 54</td>
<td>28,2%</td>
<td>7,813,407</td>
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<td>35 - 44</td>
<td>24,2%</td>
<td>6,689,635</td>
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<td>25 - 34</td>
<td>10,6%</td>
<td>2,947,254</td>
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<tr>
<td>&lt;25</td>
<td>1,0%</td>
<td>273,839</td>
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**Aging Farmer (BPS)**

- **64,2%** Farmer >45 years old (SUTAS 2018 BPS)

**Population in 2025 (BPS)**

**Dominance of young dan productive people**

**Gratuates in Agriculture (RISTEK DIKTI)**

- Average growth of graduates in food and agriculture until 2030. (Projection, RINDUK Pengembangan SDM sektor Pangan Pertanian)

Digital Agriculture is key factor in enhancing productivity and motivating youth interest in agriculture sector.
TREND OF DIGITALIZATION

The COVID-19 crisis has accelerated the digitization of customer interactions by several years.

Average share of customer interactions that are digital, %

- **Global**
  - Adoption acceleration 3 years: 20
  - Adoption acceleration 4 years: 36
  - June 2017: 20
  - May 2018: 22
  - June 2019: 19
  - July 2020: 32

- **Asia–Pacific**
  - Adoption acceleration 3 years: 58
  - Adoption acceleration 4 years: 22

- **Europe**
  - Adoption acceleration 3 years: 32
  - Adoption acceleration 4 years: 18

- **North America**
  - Adoption acceleration 3 years: 65
  - Adoption acceleration 4 years: 41

Source: McKinsey and Company

Is Working From Home Here to Stay?

- Work remotely more often: 43%
- Maintain my former schedule: 35%
- Work in the office more often: 12%
- Already worked remotely full-time: 8%

Source: Statistics

Forty-six percent of vulnerable jobs are in food service, customer service, and sales.

Vulnerable jobs, by occupation, millions

- Median annual wage, $:
  - <20,000
  - 20,000–40,000
  - >40,000

Source: McKinsey and Company

How AI could change the job market

Estimated net job creation by industry sector, 2017-2037

Source: PWC
PRESIDENTIAL REGULATION No. 18/2020: THE MEDIUM-TERM NATIONAL DEVELOPMENT PLAN
NATIONAL PRIORITY OF INCREASING AVAILABILITY, ACCESSIBILITY AND QUALITY OF FOOD

1. Increasing quality, safety, fortification and biofortification of food consumption
   - Development of biofortified rice seeds and genetically improved products
   - Local food development
   - Food diversification at the community level
   - Provision and improvement of food quality for school children

2. Increasing availability, price stability and sustainability of food supply, including aquacultural food
   - Facilitating the cultivation of rice, maize, livestock and strategic food commodities
   - Provision of production inputs (including fertilizers)
   - National seed system

3. Increasing productivity and sustainability of agricultural natural resources, including agriculture digitalization
   - Land management (suboptimal land, lowland, upland and dry land)
   - Water efficiency
   - Production road and farm road
   - Digital farming and use of drone technology

4. Improving national food systems and food governance
   - Strengthening the food logistics system
   - Warehouse receipt development
   - Sustainable food systems management
   - Management of urban food systems
   - Food waste management

5. Increasing availability, accessibility and quality of food consumption
   - Development of biofortified rice seeds and genetically improved products
   - Local food development
   - Food diversification at the community level
   - Provision and improvement of food quality for school children

Program Priority
Activity Priority
**Reliable and Sustainable National Food System**

**Global, National, Local Strategic Environment**


- To ensure the availability, accessibility, utilization and stability of food
- Consumer purchasing power
- Food preference
- Agricultural labor

**Farmer corporation and efficiency of food distribution**

**National Food System**

**Local food industrialization**

- Economic stimulus for food. Food industry
- Food market and distribution
- Food processing and manufacturing

**Stability of food access**

- Increasing Profitability and sustainability food production
- Inflation stability
- Food labelling, Food safety

**Food aid for vulnerable households**
FOOD SYSTEMS TRANSFORMATION

National Food Systems Transformation – Archipelago state

Integration of healthy and nutritious food with social safety net system

Promotion of sustainable food consumption and food literacy

Fortification and biofortification technology innovation

Reduction of food loss and waste and promotion of food safety

Promotion of inclusive business and circular economy in food supply chains

Incentives and promotion of local food and food diversification

Promotion of maintenance insurance and disaster risk management to build resilience

Research and development and digital transformation for food production innovation from various sources (land, forest, and ocean)

Policy support for the transition to agroecology and sustainable agriculture

Food system regionalization, fiscal incentives, National Food Agency, national logistics

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DEVELOPMENT OF INTEGRATED UP-TO-DOWN AGRICULTURAL FOOD SECTOR BASED ON DIGITAL AGRICULTURE AND FARMERS CORPORATION

1. Cluster berbasis korporasi petani
2. Supporting system
3. Proses budidaya (Tanaman Pangan, Hortikultura, Perkebunan, Peternakan)
4. Proses hilirisasi (segar dan olahan)
5. Distribusi Logistik

"Farmers and Fishermen Corporations are economic institutions of farmers and fishermen through the consolidation of farming businesses to create optimal added value" (Draft Presidential Regulation of Farmers and Fishermen Corporations)

- Upstream-downstream connectivity
- Strengthening the role of farmers in the food supply chain and reducing the role of middlemen
- Cost efficiency in the food supply chain
- Product traceability through transparency and data integration
- Provide alternative capital for farmers in down streaming and marketing
PRECISION AGRICULTURAL ECOSYSTEMS

**Challenges**: Soil quality, emissions, land use and quality, water use efficiency, energy, food quality, biodiversity

**Physical**: Seeds, fertilizer, water, disease control.
**Information**: precision farming (Input requirement mapping, automatic sensors, diagnostics)

**Production marketing**

**Food, Feed, Fiber, Fuel**

**Input Technology**

**Food Processing**

**Food, feed, fiber, fuel**

**Production**

**Processing**: carbohydrates, oil, protein, fiber, meat-milk-eggs, food and feed safety, logistics, bioenergy, biomaterials

**Livestock and aquaculture**: genetics, proper feeding, nutrition, health care, animal health, diagnostics, drug administration
ROLE OF DIGITAL AGRICULTURE

Cost Savings
Efficiency & Productivity Gains
A Driver of Innovation and Product Development

Boost Customer Acquisition and Retention
Understand the Market Conditions
PF/PP Infrastructure Layer

**Data**
- Farmer registries
- Weather Data
- Surveillance data (e.g., pest, crop, livestock)
- Transaction data
- Market information (e.g., prices, volumes)
- Soil data
- Agronomic content
- Agronomy field data
- Land data
- Crop data

**Software**
- Machine learning
- Blockchain
- Artificial intelligence (e.g., CRM, ERP)
- Other

**Hardware**
- Drones
- In-situ sensors
- Diagnostics equipment
- Other (e.g., Weather stations)

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- Diagnostic equipment
- Other (e.g., Weather stations)

*PF/PP: Precision Farming/Pertanian Presisi*
STAGES OF PRECISION/DIGITAL FARMING

Stage 1: Device introduction and installation

Stage 2: Upstream-downstream cultivation equipment installed

Stage 3: Application of economies of scale

Stage 4: Precision farming environment has been established (digitization and automation well)

Data Driven
ICT-based
Precision-based
Multi-disciplinary
Transformative & Inclusive
Business Paradigm
Big Data Development
Robotic
Artificial intelligence
Internet Network
Sensor
Instrumented Agrosystem

Achievement Level

Integrated Agrosystem
Automated Agrosystem
Smart Agrosystem
NANOTECHNOLOGY IN FOOD AND AGRICULTURAL DEVELOPMENT

**BIOINDUSTRY AGRICULTURE**

**AGRICULTURE**

**BIOINDUSTRY**

**CONSUMPTION**

**NANOTECHNOLOGY**

**CULTIVATION**
- Nanoagrokimia
- Nanopembenah tanah
- Nanosensor

**PROCESSING**
- Nanovitamin
- Nanobioaktif
- Nanoantimikroba

**PACKAGING**
- Nanokemasan modifikasi
- Nanokemasan aktif
- Nanokemasan pintar

**DISTRIBUTION**
- Nanosensor
- Nanobarcode

**CONSUMPTION**

**POTENTIAL BENEFITS**
- Increase efficiency
  - Detection of fertility status and soil physiology
  - Improve soil characteristics
  - Reduce pollution
- Improve taste, fat reduction, preservative reduction
- Improve mechanical properties, physical properties, gas transport, easy weathering, extend product shelf life
- Makes it easier to detect contaminants and spoilage
  - Make it easier to trace the expiration date
CHAPTER III INDONESIAN ONE DATA OPERATOR

- Article 12. Minister of National Development Planning/Head of Bappenas as chairman of the Steering Committee.
- Article 16. Bappenas coordinates the Central Level Indonesian One Data Forum.

CHAPTER IV IMPLEMENTATION OF ONE DATA INDONESIA

- Article 25. The implementation of One Indonesia Data consists of: planning, collecting, checking, and disseminating data.
FOOD SYSTEMS FRAMEWORK: GEOSPATIAL DATA

Food Production
- Increase agricultural productivity and incomes of small-scale food producers
- Sustainable food production systems and implementation of sustainable agricultural practices

Distribution & Aggregation
- Improve the efficiency of delivery and quality of food marketed

Marketing & Purchasing
- Support positive economic links between farmers and consumers and access to markets

Geospatial data acquisition
- Land suitability, water resources, monitoring of crop areas, etc.
- Logistics, transport, infrastructure, storage, etc.
- Markets, mapping consumption and consumer preferences, etc.
THANK YOU