South Korea Case Study:
Digital Agriculture and Its Practice
Joint Technical Assistance on ICT with International Organization and Digital Agriculture Projects

Presenter: Sanghun Lee,
External Specialist, Department of Global ICT Consulting Team, National Information Society Agency (NIA)
Joint Technical Assistance on ICT with International Organization and Digital Agriculture Projects

Presenter: Sanghun Lee, External Specialist, Department of Global ICT Consulting Team, National Information Society Agency (NIA)

CONTENTS

1. Introduction of NIA’S joint TA on ICT
2. Why is the Smart Farm needed in LDCs?
3. Achievement of recent Smart Farm TAs
4. Brief on Smart Farm TA with WB in Myanmar
5. Case Study of Smart Farm in Philippines
CONTENTS

1. Introduction of NIA and Its joint TA on ICT
2. Why is the Smart Farm needed in LDCs?
3. Achievement of recent Smart Farm TAs
4. Brief on Smart Farm TA with WB in Myanmar
5. Case Study of Smart Farm in Philippines
Introduction of NIA’s Joint TA on ICT

Joint Technical Assistance on ICT with International Organization

is a series of projects in which Korea joins hands with major international organizations to share its experiences and expertise in Digital Transformation through technical assistance programs for assisting partner countries.

ACHIEVEMENT
Since 2009, we have carried out 47 TA projects with 12 intl. organizations & 40 countries.

SERVICE TYPES
ICT Consulting, Joint-study, Capacity Building

Focus AREA
- Informatization Policy
- Environment
- Education
- Agro-livestock

Technology
- Data
- Information System
- IoT
- AI
- Cloud
- Network

Partner International Organizations and 30 Partner Countries

<table>
<thead>
<tr>
<th>WB</th>
<th>UNESCO</th>
<th>FAO</th>
<th>APT</th>
<th>AfDB</th>
<th>ADB</th>
<th>WeGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>IFAD</td>
<td>UNPOG</td>
<td>CABEI</td>
<td>UNFPA</td>
<td>APT</td>
<td>IDB</td>
<td>ITU</td>
</tr>
</tbody>
</table>
Introduction of NIA’s Joint TA on ICT: How It Works

**PROCESS**
Joint Technical Assistance on ICT with International Organization

1. **TA Request to NIA/Needs Assessment**
   - check the needs of the major international organizations and partner countries in the initial dialogs, with the letter of interest, and so on

2. **TA Team Organization**
   - organizes a consulting team considering expertise and experience, based on TA requirements from major international organizations and partner countries,

3. **Execution/Implementation**
   - provides the ‘Customized’ TA considering demand and environment of partner countries

4. **Result Sharing**

5. **Follow-up Project Planning**

*TA: Technical Assistance*
CONTENTS

1. Introduction of NIA and Its joint TA on ICT
2. Why is the Smart Farm needed in LDCs?
3. Achievement of recent Smart Farm TAs
4. Brief on Smart Farm TA with WB in Myanmar
5. Case Study of Smart Farm in Philippines
Why is the Smart Farm needed in LDCs?

Features in developing country

**Difficulties**

- **Natural Disasters and Environment Pollution**
  - Vulnerable to flood and drought due to climate change
  - Collateral damage on agricultural products and environmental pollution *due to indiscreet use of agricultural chemicals*

- **Small Size of Production and Low-value Crops**
  - Small size of farm land and small *arable land*
  - Concentrated in low value crops

- **Poverty on Most Agricultural Workers**
  - *High ratio of small sized farm*, focused on individual production and low market accessibility
  - *Low income compared to urban area*

**Directions**

- **Modernization**

- **Climate Controlled Agriculture**

- **High-value Commodity**
  - (tomato, strawberry, paprika, etc.)

**Solution**

- Adopting Smart Farm Technology in Developing Countries
Why is the Smart Farm needed in LDCs?

Local Produce in LDCs

Smart Farm Produce

- High Yields (10 months)
- Uniformed Size
- Good Agriculture Practice (GAP)
- High Sugar Content (Different Variety)
- Longer Shelf Life
Why is the Smart Farm needed in LDCs?

Doesn’t necessary to be a high-tech only

Soil-less Production

Soil Production
Why is the Smart Farm needed in LDCs?

Should be a fully value-chain approach

- Co-operatives: Farmers education
- Production Modernization: Smart greenhouse
- Distribution Improvement: Linked to local distribution, Co-branding, Cooperative Shipping
- Consumption: Local market, Franchise
- Diffusion: Farmers cooperatives, Government fund, Joint venture

- Work-visa
- Local Smart Farm
- Smart Farm Diffusion (by Cooperatives)
- Farmers Training in Korea
Why is the Smart Farm needed in LDCs?

Can produce high-value crops by controlling climate conditions

Cherry tomatoes

Pepper type paprika

Four season strawberry

Summer season strawberry

Ordinary type paprika

Melon

Cucumber

Salad tomatoes

Pepper
CONTENTS

1. Introduction of NIA and Its joint TA on ICT
2. Why is the Smart Farm needed in LDCs?
3. Achievement of recent Smart Farm TAs
4. Brief on Smart Farm TA with WB in Myanmar
5. Case Study of Smart Farm in Philippines
**Achievement of recent Smart Farm TAs**

- **IFAD-MASL-NIA Cooperative Project (a Pre-Feasibility Study in Sri Lanka)**

| Background | To cooperate among IFAD, MASL and NIA to pioneer the chance to adopt smart technology in Sri Lanka for smallholder agribusiness and youth farmers.  
(MASL requested the pre-F/S to NIA in 2018)  
* IFAD SAPP : IFAD Smallholder Agribusiness Partnerships Program  
* MASL : Mahaweli Authority of Sri Lanka |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F/S Title</td>
<td>Producing high quality tomatoes through smart farm in Sri Lanka</td>
</tr>
</tbody>
</table>
| Support | Provision of experts for the smart farm FS  
※ Supporting technical experts for pre-FS |
| Duration | July ~ November, 2018 (5 months) |
| Components | 1) Feasibility analysis of smart farm in Sri Lanka  
2) Applicable smart farm model in Sri Lanka  
3) Implementation plan for establishing model smart farm |
Achievement of recent Smart Farm TAs

- Sri Lanka

### Feasibility Study Report

Producing high quality tomato through smart farm in Sri Lanka

December, 2018
Smart Farm F/S Consultant Group

<table>
<thead>
<tr>
<th>Category</th>
<th>Content</th>
<th>July</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st local F/S</td>
<td>Start report, situation analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st study report</td>
<td>local study result (1st)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd local F/S preparation</td>
<td>Cooperation network and financing plan analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd local F/S</td>
<td>Potential project site visit and cooperation network</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F/S final report</td>
<td>local study result (2nd) F/S final report</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Achievement of recent Smart Farm TAs

- Sri Lanka

1. Feasibility Study (TA, 2019)
   - “Establishing Smart Model Farm and Agri Technology Park in Sri Lanka”
3. MOA signing & Supply Contract (Jan, 2020) with JAGRO group
4. Materials Delivered to Kothamale, Sri Lanka (May, 2020)
Achievement of recent Smart Farm TAs

- Sri Lanka

Co-Investment (25%)

Shinhan A-tec

- Smart Farm Establishment

MASL

Supervision

Jagro Ltd.

Land Provision

Private Financial Investment (75%, USD 341,000)

NIA & EBC-K

Budget: 60,000 USD

- Co-branding, Marketing

- Establishing Smart Farm in Kothmale, Sri Lanka (1,000m²)

- Farmers Training: 90 farmers per year
  48 youths for long-term
  42 farmers for short-term
Achievement of recent Smart Farm TAs

- Sri Lanka

**Completed**
- 1st Step: Feasibility Study (Action Plan)
- TA (NIA)

**On-going**
- 2nd Step: Model Farm
- Private-Public Partnership (MASL)

**Tentative**
- 3rd Step: Agro Technology Park
- ODA Project (KOICA)
- EDCF Project (EXIM Bank)

Whole chain approach for Sri Lanka to adopt smart farm technology
1. Introduction of NIA and Its joint TA on ICT
2. Why is the Smart Farm needed in LDCs?
3. Achievement of recent Smart Farm TAs
4. Brief on Smart Farm TA with WB in Myanmar
5. Case Study of Smart Farm in Philippines
Brief on Smart Farm TA with WB in Myanmar

### WBG-DAR-NIA Cooperative Project (a Pre-Feasibility Study)

| Background | To cooperate between WBG and NIA to develop the component 1 (Agriculture Productivity Enhancement and Diversification) of WB’s NFASP (Myanmar National Food and Agriculture System Project) with the smart farm technology  
|            | (NIA initially offered WBG to cooperate in the field of ICT & Smart farm in early 2020) |
| F/S Title  | Enhancing Productivity and Producing High Value Crops through Smart Farm Technologies in Myanmar |
| Support    | Provision of experts for the smart farm FS  
|            | ※ Supporting technical experts for pre-FS |
| Duration   | July ~ December 2020 (6 months) |
| Components | 1) Government policies and market analysis, and demand forecast study  
|            | 2) Feasibility analysis on the application of smart farm technology in Myanmar  
|            | 3) Suggesting an conceptual implementation plan |
Brief on Smart Farm TA with WB in Myanmar

- **WBG-DAR-NIA Cooperative Project (a Pre-Feasibility Study)**

  **First Survey (Aug-Sep)**

<table>
<thead>
<tr>
<th>Region/State</th>
<th>Temperature and humidity</th>
<th>Crops</th>
<th>Expected Crops</th>
<th>F/S team's Crops</th>
<th>Discussion Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Openland crops</td>
<td>Greenhouse Crop production (Tons)</td>
<td>DAR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Rice</td>
<td>Strawberry</td>
<td>0</td>
<td>Mango</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Pulas</td>
<td>Tomato</td>
<td>9109</td>
<td>Divin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Maize</td>
<td>Paprika</td>
<td>no data record</td>
<td>Grapes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Potato</td>
<td>Cucumber</td>
<td>no data record</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Onions</td>
<td>Mango</td>
<td>10175</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Melon</td>
<td>2444</td>
<td>no data record</td>
<td></td>
</tr>
</tbody>
</table>

  **Site 1 NPT (Yezin)**

  | Temperature | Maximum 34.3°C | Minimum 22.3°C | Humidity | Maximum 88.70% | Minimum 43% | Water Quality PH | 8.3 |

  **Site 2 Pampi**

  | Temperature | Maximum 33.7°C | Minimum 23.9°C | Humidity | Maximum | Minimum | Water Quality PH | 7.4 |

  **Site 3 5.5hah (Ta/Yaw)**

  | Temperature | Maximum 26.60°C | Minimum 16.79°C | Humidity | Maximum | Minimum | Water Quality PH | 6.19 |

  **Second Survey (Oct-Nov)**

<table>
<thead>
<tr>
<th>Region/State</th>
<th>Temperature and humidity</th>
<th>Crops</th>
<th>Expected Crops</th>
<th>F/S team's Crops</th>
<th>Discussion Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1. Rice</td>
<td>Strawberry</td>
<td>9</td>
<td>Strawberry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Pulas</td>
<td>Tomato</td>
<td>8240</td>
<td>Paprika</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Maize</td>
<td>Paprika</td>
<td>no data record</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Onions</td>
<td>Cucumber</td>
<td>no data record</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Potato</td>
<td>Mango</td>
<td>11296</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water Melon</td>
<td>83357</td>
<td>no data record</td>
<td></td>
</tr>
</tbody>
</table>

  **Final Result (Dec)**
Brief on Smart Farm TA with WB in Myanmar

- Structure of Myanmar Greenhouses by Sites (Front View)
Brief on Smart Farm TA with WB in Myanmar

- Myanmar Smart Agriculture Vision

<table>
<thead>
<tr>
<th>Vision</th>
<th>Higher Farmers’ Income and Rural Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal</td>
<td>Improving the productivity of high-income crops by High-Tech Farming</td>
</tr>
</tbody>
</table>

**Application & Diffusion (2022~)
- Pilot Application (High Technology): World Bank, Year 2022
- Pilot Application (Mid-lower Technology): EPIS (Korea), Year 2022
- Smart Farm Diffusion: EXIM Bank, Year 2023

**Model Development (2020/2021)
- NIA (National Information Academy), Feasibility Study

**THE WORLD BANK**
IBRD · IDA
Brief on Smart Farm TA with WB in Myanmar

Confirmed Projects

- Pre F/S - TA -
- NIA (Korea)
- Model Farm Project (Mid-high Technology) - LOAN -
- World Bank
- Model Farm Project (Appropriate Tech.) - ODA -
- EPIS (Korea)
- Smart Farm Diffusion - LOAN -
- Co-Financing (tbd.)
- Year 2020 (Completed)
- Year 2021 (On-going)
- Year 2022 (Planning)
- Year 2023 (Tentative)

Cooperative Project

Upgrading Myanmar’s Agriculture by Applying Smart Farm Technologies
### Brief on Smart Farm TA with WB in Myanmar

**Outcome: MAFRA (EPIS) Project Outline**

This MAFRA ODA project was designed and proposed timely with the result of NIA’s TA.

<table>
<thead>
<tr>
<th>Country</th>
<th>Myanmar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td>Establishment of High Value-Added Crop Production System with Smart Farm Technology in Myanmar</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td>The overall objective is to enable farmers to increase their income through production and exports of higher value added crops by introducing and activating the use of smart farm technologies to the farmers in Myanmar</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>1. Nay Pyi Taw (DAR)</td>
</tr>
<tr>
<td></td>
<td>2. Shan (Taryaw)</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>48 months (4 years)</td>
</tr>
<tr>
<td><strong>Budget</strong></td>
<td>4,386,649 USD (approx.)</td>
</tr>
<tr>
<td><strong>Beneficiary</strong></td>
<td>Farmers, MOALI’s researchers, and local extension workers</td>
</tr>
<tr>
<td><strong>Implementing Organization</strong></td>
<td>DAR (Department of Agricultural Research), MOALI</td>
</tr>
</tbody>
</table>
Brief on Smart Farm TA with WB in Myanmar

- Outcome: MAFRA (EPIS) Project Outline

Smart Farm for Vegetable

Smart Mango Orchard

Smart Farm for Vege-fruits
1. Introduction of NIA and Its joint TA on ICT
2. Why is the Smart Farm needed in LDCs?
3. Achievement of recent Smart Farm TAs
4. Brief on Smart Farm TA with WB in Myanmar
5. Case Study of Smart Farm in Philippines
## Case Study of Smart Farm in Philippines

**Public-Private Partnership (PPP) ODA of KOICA, EPIS and private investment to enhance productivity and quality of the Tomato in the Philippines (on-going, ODA)**

<table>
<thead>
<tr>
<th><strong>Background</strong></th>
<th>Initiated by Korean agency (EPIS) and Korea’s smart farm related companies to introduce smart farm technologies to developing countries through PPP type ODA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td>Enhancing Productivity and Producing High Quality Tomato through Smart Greenhouse in the Philippines</td>
</tr>
</tbody>
</table>
| **Budget**    | USD 2.43 million *(KOICA 70%, Private Investment 30%)*  
  ※ Public partner (EPIS)  
  Private Investment (3 Korean private companies) |
| **Duration**  | 2018. 1 ~ 2021. 12 (4 years) |
| **Components**| 1) Establishing Smart Greenhouse and Operating System  
  2) Enhancing Distribution System and Value-added Branding  
  3) Farmers Capacity Development on Greenhouse Operation |
Case Study of Smart Farm in Philippines

**FIRST YEAR : Baguio (owned by DA-BPI)**
- **FEATURES:** altitude 1,600 m
  - Establishing smart greenhouse in Bangui-BPI: 3,360m² (1 Research, 8 Training greenhouses)
  - Easy to access and approach to Baguio city

**SECOND YEAR : Rizal-Tanay (owned by DA-RAREZ)**
- **FEATURES:** altitude 300 m
  - Establishing smart greenhouse in Tanay, Rizal: 4,200m² (10 greenhouses)
  - Close to Manila (1.5hrs)
Case Study of Smart Farm in Philippines

Facility Construction

- Foundation Work
- Building Structure
- Internal Installation
- Bird’s-Eye View
Case Study of Smart Farm in Philippines

Facility Information System
- Climate info
- Sales info
- Plant growth info

Smart Farm System (Main Board)

Smart Farm System (Monitoring)

Production Management System (Farm Diary)

Production Management System (Analysis)
Case Study of Smart Farm in Philippines

Short-term Training (for 1 – 2 weeks)

Theory Training

Hands-on Training

Nutrient System Operation

Automatic Control System
Case Study of Smart Farm in Philippines

Long-term Training (for 6 – 12 months)

Seeding and Seedling

Transplaning

Wiring

Cultivating
Case Study of Smart Farm in Philippines

High Quality Tomato Production

High Quality Paprika Production
Case Study of Smart Farm in Philippines

Process of High-quality Tomato Production and Branding

Culturing

Selection and Packaging

Brand Re-design (Highlighting Korea/Sweet)
Case Study of Smart Farm in Philippines

3 times more than traditional farming
Year 2020

Baguio BPI site (3,360 m²)

Yield increased

Open Farm: 3 kg/m²
Smart Farm: 10 kg/m²

Sales increased

2019 (Trial) 2020 1st quarter
20,000 USD 40,000 USD

40,000 USD Sales only up to 1st quarter of 2020 (due to COVID-19)

Otherwise expected sales was Over 100,000 USD In 2020
Case Study of Smart Farm in Philippines

**[ Diffused Project (Planning) ]**
Public-Private Partnership (PPP) Project with BSU

<table>
<thead>
<tr>
<th>Background</th>
<th>To provide co-investment opportunity to adopt smart farm to Phil farmers who were trained in the model farms together with Korean private investors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>Farm Modernization by Smart Technology through Private-Public Partnership at Banguet State University (BSU) in La Trinidad</td>
</tr>
<tr>
<td>Budget</td>
<td>USD 500,000 (Korean Private Investment 50%, Phil Farmers 50%) ※ 1 Korean Partner(private company) and 10 Phil farmers(or cooperatives) ※ Farmers will be selected from DA-BPI program participants and BSU farmers</td>
</tr>
<tr>
<td>Duration</td>
<td>2020.3 ~ 2029.3 (9 years)</td>
</tr>
<tr>
<td>Components</td>
<td>1) Establishing Smart Greenhouses for Tomato (11 units, 8m x 80m) 2) Establishing Smart Greenhouses for Research (with BSU) (1 unit, 6m x 60m)</td>
</tr>
</tbody>
</table>
Another site-visit was performed by Korean experts and investors for another BSU land behind the campus. (July 28, 2019)
About 1 ha land is needed to establish 11 greenhouses. (8m x 80m)
THANK YOU

Presenter: Sanghun Lee,
External Specialist, Department of Global ICT Consulting Team, National Information Society Agency (NIA)