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Sustainable development Smart Agriculture Capacity « SUNSpace »

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Term / Abbreviation	Definition
KEC	Kantipur Engineering College
AEC	Acme Engineering College
KKU	Kohn Kaen University
CMU	Chiang Mai University
RUB	Royal University of Bhutan
ULL	University of Lumiere
UWS	University of the West of Scotland
CUB	Cornivus Univeristy of Budapest
VCDC	Vegetable Crop Development Center
AKC	Agriculture Knowledge Center
NSTB	National Skill Testing Board
CTEVT	Council of Technical Education and Vocational Training
TQPI	Thailand Professional Qualifications Institute
CAC	College Academic Committee
RTCD	Research, Training and Consultancy Division
CNR	College of Natural Resources

Document Progress

Date	Name	Description
2020.05.05	KEC	Initiation of the document and format
2020.09.01	KEC	Input from Partners
2020.09.15	KEC	Updating the documents
2021.01.31	KEC	Updating document
2022.06.22	KEC	Input from Asian and European Partners
2022.06.24	KEC	Updating the document
2022.12.07	KEC	Input for all consortium Partners and update
2023.01.14	KEC	Finalizing the document

1 Introduction

SUNSpAcE Project was developed to upskill farmers in the Asian Countries including Thailand, Nepal and Bhutan to implement smart farming practice in their farms to upgrade their living standard also taking care of the environment, farmers safety and food quality. Under the project the Asian Partners (Chiang Mai University and Kohn Kaen University from Thailand; Kantipur Engineering College and Acme Engineering College from Nepal; and Royal University of Bhutan from Bhutan) were successful in initiating smart farm academy that includes smart farm labs and training center within their premises. The Asian partners with the support of European partners were also successful in training more than 450 farmers, staffs, and technicians during the project duration.

This document focuses on how the Asian partners plan to work for the sustainability of the project even after the project duration.

2 Objective

A sustainability plan is designed towards the designated Asian HEIs of the Partners Countries to ensure the continuation of the key activities beyond the end of the project, with the support of the smart farm labs and the centres of excellence developed in the partner HEIs. The sustainability plan focuses on the following:

- i) Trainings
- ii) Accrediation of the Teaching Learning Materials
- iii) Network Building
- iv) Overall Sustainability Plan

3 Trainings

The Asian HEIs will continue in providing smart farmers trainings even after the duration of the project.

3.1 *Potential stakeholders and users*

G2 and G3 groups including teachers; agricultural students; entrepreneur in agriculture business; farmers capable of using and understanding basic agricultural technology; and agriculture technicians including Technical Assistants, Junior Technical Assistants, Extension Agents, and Agricultural Technicians appointed by the government of the respective countries, etc. can access the teaching materials.

3.2 *Training Modules*

For sustainability of the project, flexible training modules based on the need of the farmers have been designed. Three types of training modules will be implemented in each partner HEIs:

- I. Online Training Module: For many farmers, agricultural students and government employee it might not be possible to visit the smart labs in the designated HEIs as they might need to travel a long distance adding financial burden to them. Mandatory visit to the smart lab for training completion and certification might demotivate the farmers to participate in the training. To help the farmers understand about equipment

installation and use, videos will be made available in the learning platform. In this training module the trainee only uses online teaching & learning materials for training and certification.

- II. Online and Smart Lab Visit Training Module: For farmers, agricultural students and government employee able to visit the smart lab, both Online and Smart Lab Visit Training Module will be offered. In this case, in addition to the online training farmers can also learn the installation and application of real sensors, equipment and technology in the smart labs. In this module face to face interaction between the trainer and trainee is also achieved. This training module is the most effective one and each HEIs shall encourage the interested trainee to join this training module
- III. Smart Lab Visit Training Module: Some farmers might not be interested in enrolling in the full Training sessions, but might be interested to learn about particular equipment or sensor installation to use in their farms. For those farmers only Smart Lab Visit Training Module Training will be provided. This type of farmers is in large numbers in each partners country and including them with the need-based training module is important for the sustainability of the project. Those farmers will be trained as per their interest and requirement.

3.3 Access of Learning Material

The Learning Material can be accessed through (<https://sunspace.farm>) through the project website. In addition the learning materials can be accessed through the website of local HEIs installed in their local server. The materials will be translated to the local language for better reach and effectiveness. Furthermore, KCU has localized the online content and made it available on the KKBSX platform for public learners, making it accessible to a wider audience.

3.4 Schedule for Training

Module I training will be conducted throughout the year and Module II training will be conducted at least once a year by each Asian Partners. Each Asian Partners will organize Module Training II in turns, so at least the Asian Partners will have 5 Trainings throughout the year. The cost of the training will be beared by the host organization. For Module II training, the partner HEIs shall make the training dates available in advance in their institution website or mobile application. Module III training will be conducted during Module II training as well as per the mutual understanding between HEIs and the trainee.

Module I: Around the year

Module II: At least once a year, the dates will be made available in advance in the institution website

Module III: Mutual understanding between the HEIs and trainee

4 Accrediation of the Teaching Learning Materials

Each partner HEIs shall get the training accredited or certified or endorsed by the government of professional body existing in the country. In Nepal the training will be endorsed by Agriculture Knowledge Centre, government organization working for agriculture in Nepal. Research, Training and Consultancy Division of Kantipur Engineering College will issue certificates for the trainee trained through KEC. KEC and AEC will work with the National Skill Testing Board (NSTB) under the Council of Technical Education and Vocational Training

(CTEVT) to accredit the teaching and learning materials developed by the SUNSpAcE Consortium.

In Thailand, Thailand Professional Qualifications Institute (TPQI), a public organization under the supervision of the Prime Minister, established by Royal Decree in 2011 will accredit and endorse the training. In Thailand, CMU will launch Master degree in Digital Technology Management (DTM) by the end of 2024, Lifelong Education to begin Reskill/Upskill short course for smart farmer which can be accumulated in the CMU’s credit bank. The mobile smart lab is setup for smart agriculture using equipment from the project. One spin-off start-up has been setup to support the farmers to transform their farms by using the smart controlled system.

In Bhutan, the College Academic Committee (CAC) based in the College of Natural Resources of the Royal University of Bhutan will accredit and endorse the training. The Department of Agriculture in CNR has plans to include digital agriculture and smart farming modules from the online platform (MOOC) in Bachelor of Science in Agriculture curriculum and offer the course by July 2024 after seeking approval from the accreditation body (Academic Planning and Resource Committee (APRC) and Programme Quality Control (PQC) based at the Office of Vice Chancellor (OVC)). The Fab lab at CNR and smart lab in the agriculture farm will support facilities for students to explore and develop skills and knowledge in smart farming through practical, research, and innovation. The Fab lab was set up in CNR from the beginning of the year 2022.

5 Network Building

5.1 National Network

For making the project sustainable an effective national network among the farmers, government and non-government body or agencies and HEIs has been established. The HEIs in each partner countries will work to link the farmers with Agro-Centers, government and non-government organizations working in the field of agriculture and the smart labs for gaining and sharing knowledge.



In Nepal, both community and individual farmers have been approached for the training. For this, HEIs in Nepal will work in coordination with the Agriculture Section of the Local Government and organizations like Vegetable Crop Development Centre and Agriculture Knowledge Centre for obtaining information of the farmers as well as to inform the farmers about the scope and objectives of the training the HEIs offer. Youths returning from abroad including Israel and Gulf countries and willing to adopt farming as their profession will be involved in the training because most of them are willing to adapt smart farming practices in their farm. In Nepal AEC and KEC will work with Thoplo Machines Pvt. Ltd. to develop smart farming startups. The startups will be able to install, manage and maintain smart farm devices in the farms. This will help to minimize the running cost of smart farms. Nepalese partners will also work with agriculture based colleges for training students and joint research. AEC plans to work with experts from fishery to carry research on specific fishes using Bio-floc technology. The smart green house at KEC and AEC will be used to produce seedlings and saplings of vegetables and high valued crop for generating finance.

AEC and KEC are also coordinating with the local government and the Ministry of Agriculture and Livestock and provide training to the extension agents and local farmers for whom local government shall pay the training cost. KEC and KKU have signed MOU and will focus on collaboration in joint webinar, trainings and research.

In Bhutan, College of Natural Resources will link the farmers with the smartlabs in Bhutan for training and certification. The officials of Ministry of Agriculture and Forest (MoAF) at the district level, The District Agriculture officers and the agriculture extension agents at the blocks in District level will be contacted to link the interested farmers. The training will focus on off seasonal vegetable in green house with the use of smart technology. The incubation center of RUB shall also help link farmers to smart farm technology. The Agro-Biotechnology incubation centre at CNR offers tailored made course to youths on crop and livestock farming and business management for a duration of three months. The module on smart farming can be included and used in training of these youths. The facilities at the Fab lab and smart lab will be used as the practical/hands-on training for the trainees. In Bhutan, RUB worked with the researchers from the Agriculture Research and Development centre (ARDC), Wengkhari to train in smart farming for the agriculture extension agents of Punakha and Wangdue Districts and researchers of ARDC, Bardo. The Royal Chimipang project collaborated in designing smart lab for RUB.

In Thailand, SBIC in KKU will work to strengthen the community enterprise for cultivating organic vegetables and handling livestock (cattle). KKU will also work with IoT Applications and Innovation Center of Faculty of Engineering, KKU; Japan International Research Center for Agricultural Science; Lao National Chamber of Commerce and Industry. SBIC in KKU will also work in the incubation of new products to aid in the business model of the project. KKU has collaborated with Kasetsart University, Hakhodo Bangkok, The Halal Science Center, German Agriculture Society, and Agricultural Engineering Research Institute (AERI) in dissemination of project.

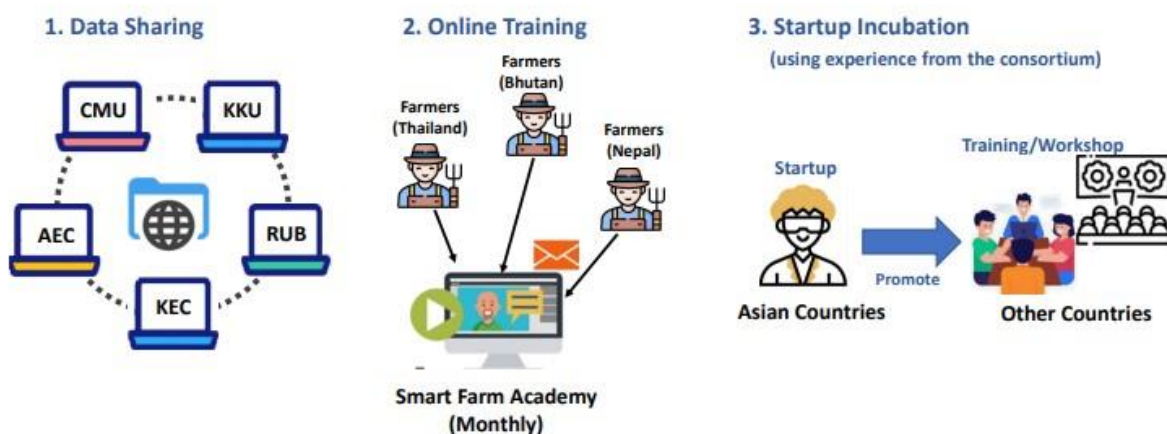
Similarly, CMU will work together with Oon Valley and Innovative village for helping the farmers in introducing smart technology in organic vegetable cultivation for sustainable

agriculture taking in care the health of both consumer and producer. CMU will work in Agritech Startup Incubation and help to develop local experts for installing, managing and maintaining smart farming devices in the community. CMU will also work in the incubation of organic product and help smart farm upscaling to help the farmers achieve their service and business development process.

The HEIs will work as a training centre with the facility of virtual class room from where farmers can attend the online training sessions, scheduled by the HEIs, from the experts in the field of agriculture and technology.

5.2 Consortium Network

HEIs will work in data sharing that include of weather station, soil parameters, indoor air parameters, etc for join reseach and publications. The HEIs will coordinate and organize monthly trainings among the Asian Partners in periodic basis. The partner HEIs shall create a common online forum of the farmers who have completed the smart farmers training. Through this forum, the farmers can share their experiences and technology among themselves. The smart lab of each partner HEIs shall be linked and made accessible to the trainee. This way farmers will also be able to learn the technology used in smart labs of other HEIs. The HEIs will also work in Startups development/incubation through trainings and workshops. The startup development/incubation can be done jointly between the Asian HEIs or Partners of HEIs in the local level. KEC and KCU among the Asian partners have already signed MOU to work in joint research, support in trainings, student and faculty exchange, conference participation to boost the cooperation. Similarly, MOUs among other Asian partners are in pipeline. The consortium partners will regularly participate in Conferences organized by each other and also participate in SKIMA 2023 in a special session dedicated to Sustainability of SUNSpAcE Project.



6 Overall Sustainability Plan

Dissemination of the training Information

The information of trainings and its schedule will be posted in HEIs website, project website and project Facebook page and youtube channel. The government and non-government

bodies linked with farmers will be contacted through emails, phones and official letters to disseminate the information regarding training to the farmers linked with those organizations.

Community linkage

The community network of farmers within and among the partner country will be established. The farmers can communicate through the smart labs and training centers of the partner countries. Social media like Facebook will be used to share information and knowledge within the farmers. The community will be regularly updated with the latest innovation and technology in farming.

Financial sustainability

To sustain the program financially after the project duration, a nominal training fee will be taken from the farmers. Alternative funding source from sponsors (government/non governmental organizations) will help to reduce the training fee. CMU and KKU have already started to work with the government to train farmers. The training will be funded by the government aiding to the sustainability to the smart farm academy developed in the HEIs. In Thailand, CMU will launch Master degree in Digital Technology Management (DTM) by the end of 2024, Lifelong Education to begin Reskill/Upskill short course for smart farmer which can be accumulated in the CMU's credit bank.

In Nepal both KEC and AEC are coordinating with the local government to train the agriculture officers and their farmers. In this case, the local government will pay for the training cost. KEC and AEC will use the smart labs for producing saplings and seedlings which can be sold for some profit. The fund generated will be used for farmers training purpose. The finance generated during the development of smart farming start up will also add in financial prosperity.

In Bhutan, the training at the incubation centre will be funded by Ministry of Labour and Human Resources, The Royal Government of Bhutan. The college can continue as well as explore other funding sources.

Post training follow-up

The post training follow-up will be carried out through a survey (online and field visit) to know the effectiveness of the training and its impact produced in the farms and the life standard of farmers. The outcomes and impact of the training will be continuously updated in the home page of the project website. The Kirkpatrick model will be used to assess the effectiveness of the training and its impact in farms.

Updating training materials as per the feedback of the trainee

For the sustainability of the project, the training materials will be updated after every 3 years as per the need and feedback from the farmers. Failing to do so, the contents developed might be outdated and produce no impact to the farmers. For feedback, questionnaire will be provided to the farmers after completion of their training.

Commitment for Sustainability

The partners of the project are committed to the continuity of the functioning of the smart labs and academy through the common MOU.

MOU with Asian and European Partners

For the continuity of the project even after the project duration, the HEIs of Asian and European Partners will sign a common MOU to commit working in the development of smart farmers in their respective countries and help other partner countries during trainings with the available resources.

The sample of MOU is attached here with.



MEMORANDUM OF UNDERSTANDING (MoU)

Among

“SUNSpAcE” Partners

- 1. University of Lumeire (ULL)**
Lyon 2, France
- 2. University of the West of Scotland (UWS)**
Paisley, UK
- 3. Corvinus University of Budapest (CUB)**
Budapest, Hungary
- 4. Acme Engineering College (AEC)**
Kathmandu, Nepal
- 5. Chiang Mai University (CMU)**
Chiang Mai, Thailand
- 6. Kantipur Engineering College (KEC)**
Lalitpur, Nepal
- 7. Koen Kaen University (KKU)**
Koen Kaen, Thailand

8. Royal University of Bhutan (RUB)

Bhutan

1. Purpose

The purpose of this MoU is to make sure the continuity of the “SUNSpAcE” project activities even beyond the project duration. Both European Partners (ULL, UWS, and CUB) and Asian Partners (AEC, CMU, KEC, KKU and RUB) ensure the promotion and continuation of the project activities with the teaching and learning materials, equipment and expertise developed or purchased through the project.

2. Responsibilities of the Partners

For convenience, the responsibilities among the partners are split into two categories as following:

A) Responsibilities of the European Partners: (ULL, UWS, CUB)

Provide technical and expert assistance to the Asian Partners for:

- i. training
- ii. virtual meetings, seminars and workshops
- iii. joint publications
- iv. training certifications
- v. teaching and learning materials update

However, the Asian Partner or Partners shall be financially liable to pay the European Partner or Partners for the service requested on mutual agreement.

B) Responsibilities of the Asian Partners: (AEC, CMU, KEC, KKU, RUB)

- i. conduct trainings and workshop regularly using the materials and equipment developed and or installed through the project
- ii. maintain and update the equipment of smart labs even after the project duration
- iii. develop strong network between the smart farmers among the Asian partner countries
- iv. develop strong network between the smart labs among the Asian partners
- v. work for joint research and publications among the Asian partners institutions sharing the outcomes from the smart labs
- vi. get the teaching and learning materials developed by the project endorsed or verified in the national level by governmental or non-governmental organizations of the related Asian country



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3. Financial Arrangements

All Parties understand that all financial arrangements between any Partners or among the Partners have to be further negotiated and mutually agreed depending on the availability of funds.

4. Liability

Except for loss or damages caused through gross negligence or intent, the Partners shall have no liability to each other hereunder.

5. Legal Relationship

This MoU shall be construed as a statement of purpose to promote a genuine and mutually beneficial collaboration among the Partners. Nothing in this MoU shall create any legal relationship between the Parties.

6. Commencement and Renewal

This MoU will be effective from the date of the termination of the project and will remain in force for a time period of five (5) years, with a possibility for renewal at the end of the five-year-period, subject to the Parties' written agreement.

Authorized person to sign on behalf of ULL

Name: _____

Designation: _____

Signature: _____

Date of signature: _____

Stamp:

Authorized person to sign on behalf of UWS

Name: _____

Designation: _____

Signature: _____

Date of signature: _____

Stamp:

Authorized person to sign on behalf of CUB

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Authorized person to sign on behalf of AEC

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Authorized person to sign on behalf of CMU

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Authorized person to sign on behalf of KEC

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Authorized person to sign on behalf of KKU

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Stamp:

Authorized person to sign on behalf of RUB

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