

Asia Techno Farm Initiative project

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By

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☉ Background of project planning and application

Asia is one of the largest agricultural regions in the world. Many Asian countries are to some extent dependent on agricultural production for their national economies. Although the production volume of agricultural resources including food is large, it is possible to promote agriculture and the economy by improving quality control from the viewpoint of food safety and distribution (value chain) as products with high added value. In addition, in 2022, the world population will exceed 8 billion in November, so it is inevitable that the demand for increased food production will increase. Agriculture has a high potential to play an important role in the production of food, which is essential for human survival, the production of energy (decarbonized renewable energy) resources necessary for that production, as well as the purification, conservation, and protection of the environment. Asia ranks among the world's top producers of these resources, but food resources, in particular, require further technical support through the application of safety and value-added enhancement technologies as final products. Economic level, industrial technology to support agricultural machinery technology for promoting agriculture, politically relatively stable administration, etc. are all important and indispensable conditions for project promotion.

In 2017, at the request of the Thai government's NSTDA (National Science & Technology Development Agency), we were asked to hold a two-day workshop on precision agriculture (Korat, Nakhon Ratchasima). Precision Agriculture is a part of Smart Agriculture, in which three major Japanese agricultural machinery companies (Siam KUBOTA, YANMAR, ISEKI) and some local Thai companies participated. I believed that the Thai government would support and develop smart agriculture by holding this workshop, but it has not yet been realized due to corporate expectations and the corona disaster. The author hopes that Maejo University, which was established for the purpose of promoting agriculture, will take the lead in Thailand's agriculture from a position of leadership. The author does not understand how many articles (Publications

published in international journals) exist.

Recently, the term "smart agriculture" has spread and seems to be well known to many people. are also very few. As far as the author knows, I sometimes see the name of a teacher who is said to be an expert in smart agriculture at a university in Thailand, but I understand that there is no university that has training and educational facilities of the contents shown in this proposal. . If this project is launched under such circumstances, there is no doubt that the university will be recognized as a leading university in smart agriculture not only in Thailand but also in Asia. The key is whether or not Maejo University has the desire to do so.

In order to improve this situation, the author sent a direct mail to the former Prime Minister, who was unfortunately assassinated, and dispatched experts to let many people know "What is smart agriculture?" The request was realized, but the dispatched experts only visited two universities in Thailand, Kasetsart University and King Mongkut Ladkrabang (KMITL), to give lectures, and the effect was not so great. I'm thinking Also, there was no prior contact with the author. As a result, we never met.

here, the author (proposer) would like to emphasize the following two points.

- 1) How seriously does Maejo University want to make itself a leading university in agriculture?
- 2) Have faculty and researchers at Maejo University published research papers on smart agriculture in international academic journals?

However, even with a small number of research papers, it is possible to demonstrate its capabilities in project planning on smart agriculture. First, it is necessary to confirm to what extent Maejo University can meet the above two conditions.

☛ **Project applicants to consider after the discussion and better understanding**

- 1) TICA (Thai International Cooperation Agency)
- 2) JICA (Japan International Cooperation Agency)
- 3) KOICA (Korean International Cooperation Agency)
- 4) NRCT (National Research Council of Thailand)
- 5) NSF (National Science Fund)
- 6) JSPS (Japan Society for the Promotion of Science)
- 7) Submit applications to multiple funding organizations.

1. Purpose of the project

1) Necessity and background of the project

Considering the rapidly increasing world population, it is inevitable to increase the production of safe food. In addition to the production of food resources, agriculture also plays a large role in the production of energy resources, environmental resources, and material resources. Asia is an agricultural sphere, and it is Asia's role and contribution to the world to develop and promote agriculture, which is originally an important industry, as an even more important industry.

2) Asian characteristics

As mentioned above, Asia is a treasure trove of agricultural resources, and its production volume ranks high in the world. However, although the production volume is large, it is necessary to further improve safety and quality control. Doing so will increase the added value and safety of the final product, which is important and convenient for consumers. It also leads to an increase in the income of producers.

3) Direction for Asia

Considering the abundant agricultural productivity, agriculture will continue to be an important industry in Asia in the future. However, it is necessary to shift from small scale to large scale and promote it to further improve safety, and make agriculture highly efficient, high income, and competitive in the global market.

4) Role of Asia

4.1) Producing and supplying food to the world

Asia's role in the world is food production and supply. It is possible to achieve this goal by transferring technology that can maintain its position as the world's food store and developing human resources who can pass it on.

4.2) Eradication of hunger and poverty

a. Difficulty in maintaining regional peace.

Hunger and poverty are the main causes of regional conflicts. When there is food for everyone and there is less inequality in the distribution of wealth, there are fewer opportunities for regional conflict.

b. Necessity and reason for the project as a community / regional base

It is difficult for a nation to exist alone. It is possible to exist because there is a partner country. However, it is now questionable whether it should be bilateral. In terms of national defense as well, the right of self-defense by a single state is insufficient, and we are entering an era in which even the existence of collective self-defense is difficult without the right of

collective self-defense. The fact that several communities have been formed around the world also speaks to this background.

- c. It is necessary to consider measures to avoid the risk that investments and financial support in bilateral cooperative relationships will sometimes turn into collateral.
- d. Avoid and eradicate causes that create hierarchical relationships between specific nations

1.1 Issues of concern and avoidance

Between two individual nations, there will naturally be a supporter and a supporter. Problems arise when the weaker side must make concessions that forcefully accept the stronger side's case. Also, promises and contracts made at the discretion of the country's leaders return as kickbacks to politicians and some powers. It is necessary to avoid as much as possible the sound that the direction of the nation is determined by gifts to a few powerful people, rather than by the will of the people. To that end, it is important and necessary to make the project as a community like ASEAN. When a project is launched, the participating organizations confirm its purpose, and the spirit of coexistence and co-prosperity based on fair cooperation and competition among the organizations involved in the project is fully confirmed and shared.

1.2 Project structure (framework) Three major institutions (Thailand, project applicant, private company) Role of the university Project applicant country government (Thailand)

- 1) The Thai government will consider this project as a national project and provide the budget.
- 2) Universities in Thailand

Maejo University will start the preparation, operation, management and curriculum implementation for projects whose applications are accepted.

- 3) Cooperating companies (regardless of nationality) related to smart agriculture.

The operation of the project requires the cooperation and support of related companies. The support is the provision of machines used for training, which do not necessarily have to be new. Even used, second-hand machines are very welcome. Furthermore, during the progress of the project, the machines used may break down or be damaged. If the machine is old, it will be difficult to supply parts for repair. As a teaching material, I would like to ask the company to dispatch a mechanic who can be entrusted with the repair and maintenance of the machines used in the detour project. This condition cannot be ignored in order to ensure safety first during project implementation.

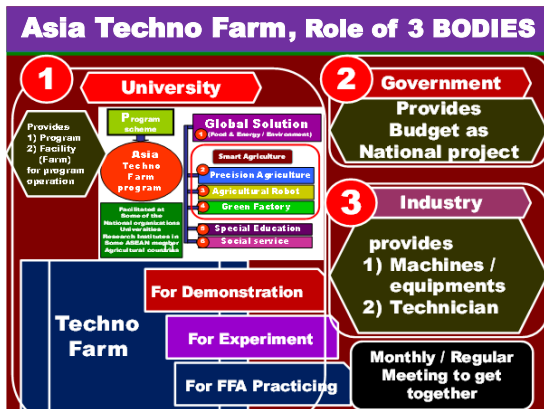


Figure 1 Asia Techno Farm Initiative

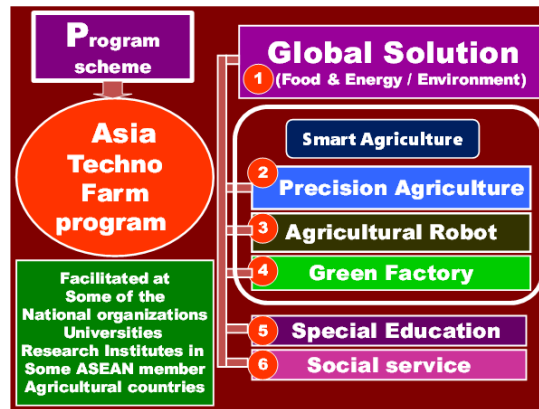


Figure 2 Detailed contents of the program

Figure 1 shows the framework of the Asia Techno Farm Concept. There are three organizations involved in the promotion of the project: the Thai government and the university that applied for project planning.

1) Role of the Thai government

It is to approve the project of the application and provide the budget. In addition, it is to support the MOU conclusion in accepting trainees from ASEAN member countries.

2) Role of project applicant universities

Fully involved in the planning, operation and implementation of the project, he will lead Asian agriculture as a leading university for project promotion and smart agriculture under strong leadership.

3) **The program to be offered** consists of 6 departments, of which the core program is smart agriculture, and consists of 3 departments: precision agriculture, robotics, and plant factories. The Global Solution Department teaches global issues such as population, energy, and the environment, regardless of agriculture. In addition, the Special Education section gives appropriate advice to farmers who are thinking of changing jobs to a different type of industry, as small-scale farming is hard to live on. The Special Service Department introduces farmers who wish to change jobs, provides information, offers advice on the possibilities and necessary knowledge, and also issues letters of introduction and recommendations. However, for the time being, we will start by training human resources as agricultural technology leaders who will shoulder the future of Asian agriculture. Regarding small-scale farmers who wish to change jobs, we will consider them as soon as the need arises, but we will prepare only the situation that can

be accepted at any time. Therefore, for the time being, the curriculum will be centered on smart agriculture, and a system will be prepared to respond flexibly according to the situation. Large-scale farming is inevitable for the promotion of agriculture. Reducing the population of small-scale farmers and expanding the scale of farming per household will increase agricultural income. I am convinced that the reduction of the farming population due to the job change of small-scale farmers is a common problem not only in Thailand but also in agriculture in Asia, so it will be useful as a model. Figure 2 is an enlarged view of the program in 1 in order to make it easier to understand. Figure 3 shows the details of the FFA training program. The curriculum allows trainees to participate in accordance with the Asia Techno Farm Initiative concept. Figure 4 is a group photo of the planning staff at the workshop on precision agriculture held in Nakhon Ratchasima (Korat) on September 19-20, 2017, with the cooperation of the author at the request of NSTDA. In the morning of the first day, three keynote speakers, including the author, gave keynote speeches, and in the afternoon, the event ended with product introductions and demonstrations by three major Japanese companies. Late in the afternoon of the first day, the weather deteriorated, and the event on the second day was canceled due to heavy rain. Unfortunately, although the workshop was a success, there was no progress after that, and the COVID-19 crisis added to the problem, and there has been no progress yet. I don't know why there has been no progress since then, but there is no doubt that the promotion of the Asian agriculture is decelerated behind.

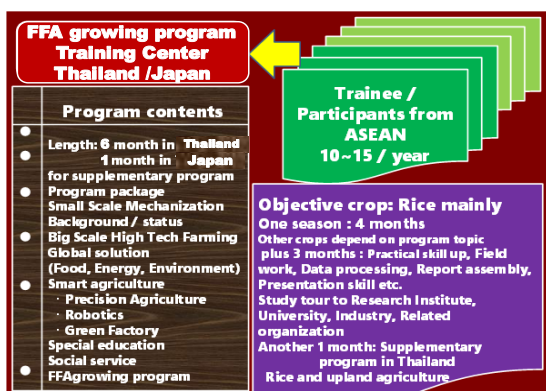


Figure 3 FFA program scheme

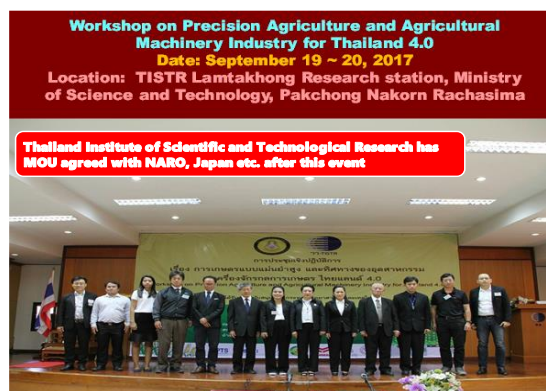


Figure 4 Precision Agriculture workshop



Figure 5 JICA Group training. Practical training participation at the local farmer's farm

The upper two figures in Figure 5 show the situation of JICA group training. Lectures are usually given by invited lecturers at the JICA Tsukuba Training Center. The lower left of Fig. 5 shows the situation at the time of reception at the local government, and the lower right shows the students staying at a Japanese farm for three days and two nights, hulling and packing the harvested rice. indicate the situation. In this application project, a program is being prepared so that individual trainees can actually experience cultivation of target crops for one season.

2. Content of the project

2.1 Outline of contents

1) Various events during project operation

There are several events during the project implementation. An opening ceremony at the start of the project, a closing ceremony at the end, awarding of a certificate of completion, submission of interim and final reports, and presentations in the interim and final reports once a month or once every two weeks. oblige. Confirmation of various strict observances and agreements. Public introductions among participants, etc.

2) Language training and supplementary lessons as needed

Communication in English has increased, and for those who are insufficient, we will provide opportunities to participate in remedial classes in English.

3) Lectures by invited lecturers and one-season cultivation training of target crops

Participants will experience cultivating crops individually or in groups for one season. The project planning side prepares the farmland for that purpose. This has already been mentioned above.

2.2 Obligations of Invited Lecturers

1) Responsible for paying and taking charge of lectures (basically 2 days) related to the lecturer's specialty. In addition, they are obliged to participate in local cultivation, observation of demonstration farms, and discussions. Its purpose and additional advantages are as follows. Objectives: Promotion of friendship and mutual understanding between trainees and invited lecturers, construction of an Asian agricultural network, Promoting the lecturer's own interest in and interest in Asian agriculture, education, and nurturing aspirations for research. Invited lecturers are obliged to accept a one-week stay as a rule. Obligations during the stay due to the invitation.

- a. Lectures: 2 days lecturer in the field of specialization of the invited lecturer, we are obligated to conduct 3 hours in the morning and 3 hours in the afternoon for 2 days.
- b. Actual cultivation test, talks with trainees in demonstration fields: 2 days (or 1 day to visit local related organizations)
- c. Make a round trip by air.
- d. Travel and accommodation expenses will be borne by the inviting party.

3. Specific program content and curriculum

An example of a specific curriculum is shown in Table 2 below.

4. Instructor qualifications and conditions (Eligibility)

The content of the lecture matches the requested area of specialization.

Sufficient ability to communicate in English.

University faculty, researchers, corporate engineers, and others deemed necessary by the project planning side.

Introduced and implemented a registration system for invited lecturers in advance of the implementation of the project.

Must have the ability to exceed a certain level of evaluation in remote classes such as Zoom

Consider preparing an interpreter for someone who is difficult to replace

Nationality of lecturer

Although there are no restrictions, we are considering inviting people from technology-oriented countries, including Europe and the United States.

Of course, Asia is also a target area.

5. Application and eligibility for trainees

Applicants to participate as trainees must meet the following conditions.

- 1) Persons approved by the project planning and management organization
- 2) In principle, we do not accept applications from non-ASEAN member countries, except in special cases.
- 3) Applicants from ASEAN member countries other than Thailand must have an introduction from the government of the host country and attach a letter of recommendation.
- 4) There will be an age limit, but if exceptions are considered, it will be dealt with on a case-by-case basis.

6. Objectives and Implementation Methods of Specific Programs

- 1) Training of High-Tech Agriculture leaders (Trainers)
- 2) Accept trainees from the ASEAN region.
- 3) Training method is group training
- 4) Common language is English
- 5) Training period is 6 months
- 6) The total number of invited lecturers is 50. Half of the participants, 25, were registered as reserves. Or half of them include invited lecturers for distance learning. He is also a substitute invited lecturer in an emergency. Also, even if there are no invitations or dispatches for that fiscal year, there may be cases for the next fiscal year.

7. Preparation of equipment and facilities

7.1 Training facilities

University accommodation facilities will be used as trainees' dormitories. For example, you can give the dormitory of the School of Renewable Energy. A portion of the university's farm will be used for farmland as well. Somen S root stage requires 5 hectares. (For this

- 1) The total area of farmland used for training is 5 hectares. Details are as follows.
- 2) Provide the farm of the university in charge of the project.
- 3) 1 to 2 hectares (for 15 trainees) as actual cultivation test fields for trainees
- 4) Can be used in groups.
- 5) Demonstration field (Demonstration field) 1 hectare
- 6) Joint research project interim report exhibition announcement field 1 hectare
- 7) FFA (Future Farmers of Asia) trainee farm 1 hectare
- 8) Trainees from ASEAN member countries for 10 actual cultivation test fields of 1 hectare), the number of trainees: Make more adjustments.
- 9) Regarding the machines used in the project, priority is given to new purchases, but if possible, second-hand machines will be provided by participating companies. You can buy new machines like pepper and vinegar, which are very safe, but the reason why we dare to request second-hand machines is to show the trainees knowledge about the structure and function of the machine, and as knowledge, trouble shooting and repair skills. The purpose is to provide opportunities to learn
- 10) Dispatch mechanics and technicians from companies to request training on provision and transfer of knowledge on such failures, repairs and maintenance.

8. Project implementation period

By continuing the project itself for 10, 20, and 30 years, full-fledged results can be expected and demonstrated, but the first three years are a preparation period to make the project sustainable. In other words, it will be an organization that implements the initial plan, finds problems and points that need to be improved, and quickly finds solutions to problems. For example, feedback from the prefectures of trainees who participated in the project, cooperating companies, and organizations related to cooperation and support can be used to quickly implement measures for the next fiscal year. After three years of preparation and trials, this project will continue to be implemented. From this point of view, the three years of application for this project will be a period of preparation, problems, and points to be improved.

8.1 Reasons for Implementing Projects in Thailand

In Japan, rice can be cultivated only once a year, but in Thailand it is possible to cultivate rice at least twice a year, or even three times depending on the location. It is positioned as a long-term training project, but for the first three years, it will be implemented based on the plan." Problems and four points to be improved will be gradually improved, and after three years, a full-fledged project will be launched. From this point of view, it is planned to be implemented for three years. Japan also has JICA group training, and

I have been involved in it for over 20 years. However, in Japan, rice is planted and cultivated once a year, so frequent data collection is not possible. again

Agricultural conditions are also very different from those in Asia. It is thought that it will be easy for trainees from ASEAN member countries to acquire knowledge because the agricultural situation is similar to that in Thailand and there is no big difference. Invited lecturers will also be able to build human networks in the Asian region by increasing their interest in Asian agriculture.

9. Advantages and Expected Effects of Project Implementation

The human population will exceed 8 billion in November 2022. Unless there is a regional conflict, a natural disaster, or a major war like World War 3, the population will decline significantly even if its growth stagnate for a while, unless mankind is extremely stupid. presumably not. Therefore, it is natural to think that there will be an increase but not a decrease. Food is then essential to survival and a daily necessity. It is well known that agriculture greatly contributes not only to the production of food resources but also to the cultivation and production of other resources such as energy resources and environmental resources. Therefore, even if there is an increase in production, there should be no policy to reduce it. If you have a product, you can use it, but if you don't have it, there is no way to use it. Economic promotion will not go well if the administration does not give priority to production. This is because the economy consists of a mechanism that earns income according to the production volume of the production department Tsun.

Agriculture in Asia consists of groups of small farmers. Large-scale farms in Europe, America, and South America are dozens to hundreds of times larger than those in Asia, and it is natural to infer the difference in yields that can be obtained from the scale of management. The yields of agricultural products in Asia are among the highest in the world, but most of the farmers producing them are small-scale farmers of 2 to 3 hectares. Unless they grow in size sooner or later, they will not be able to beat the large-scale farmers in Europe, America and South America. High-tech farming with innovative technology alone cannot beat large-scale farmers. While respecting free will, it is necessary to implement measures to reduce the agricultural population through guidance, including job changes for small-scale farmers, and achieve sustainable economic promotion by maintaining stable production and supply of food. . Although it is necessary to subsidize and support individual small-scale farmers, in the long term, it is difficult for countries in the Asian region to follow the path of large-scale farming, reduction of agricultural producers, and large-scale agricultural mechanization. I think that it should be selected as an appropriate policy.

The final goal of the project is coexistence and co-prosperity through cooperation and competition, but

individual support for small-scale farmers cannot be expected to be very effective because of small-scale farming. In a country with large-scale farming, the number of people actually working is about two people, the farmer and his son, and housewives do not participate in farm work. However, in Asia, it is a family business that even children help, and it is hard work. Even so, their income from farming is small and they are always working poor. It will take a long time to change this situation.

Various industries, including agriculture, without exception, base their income on the production of their target products. The relevant factors are determined by the type of planted crop, its unit price, production volume, and planted cultivation area. Prioritize economic thinking and ignore the will of industrial workers. lead to the decline of the industry itself.

In the past, Japan had implemented rice production adjustment measures for half a century to protect farmers. The results are as follows.

as the final goal of the project.

- 1) The international competitiveness of rice has declined significantly.
- 2) Farmers' motivation to work in agriculture has been lost or decreased.
- 3) The image of the industry called agriculture has deteriorated.
- 4) The next-generation successor was not brought up.
- 5) The policy of unnecessarily protecting farmers with subsidies goes against the movement of the world toward free trade.
- 6) Eventually, the farmers became too old to go out and work in the fields physically and mentally.
- 7) It is unfair from the viewpoint of workers in other industries that they receive income from subsidies without producing.
- 8) The willingness to work has declined and the amount of abandoned farmland has increased.

is as follows. In other words, although a temporary drop in production is unavoidable in order to adjust production, if possible, it is common sense to develop new markets and expand consumption during that time. It is impossible for a general company to carry out production adjustments over a long period of time because the funds do not last long. The administration has a large amount of funds (funds) called taxes from taxpayers, so there is never a problem. But politicians should not consider such policies. Such a level of response by an administration that cares about the nation's citizens will only give hopelessness, with no prospects for development, not only in agriculture.

10. Expenses

Below is a rough estimate of overhead costs.

10.1 Labor costs

Irrespective of the training program, staff hired exclusively for the project are required for maintenance of facilities and equipment.

There is also a need for support staff during training programs. The staff involved in the project are as follows.

- 1) Planning Committee Chairperson: 1 person,
- 2) 2 vice-chairpersons,
- 3) Treasurer: 2 people,
- 4) General affairs 3 people,
- 5) Audit 2 people
- 6) Evaluation: 5 people
- 7) 3 advisors
- 8) Corporate dispatch mechanic 2 people from industry (participatory company)

10.2 Invited Lecturer Expenses

- 1) Total number of registered lecturers: 50
- 2) Invited and dispatched lecturers 25 people US\$2,000/capita x 25 lecturers = US\$50,000
- 3) The remaining half (distance lecturers, alternatives in case of emergency) 25 people US \$1,000 x 25 = US\$25,000 will be paid and provided according to the results of participating in the actual project.

10.3 Training Field Management Fee

- 1) Field management costs for a total area of 5 hectares
- 2) Agricultural materials
 - Fertilizer
 - Pesticides
 - Herbicide
 - Insecticide

11. Project implementation plan for the next three years

Table 1 Program content for next 3 years

Month	Year 1	Year 2	Year 3
January	Happy New Year and Preparation starts	Happy New Year and Preparation starts	Happy New Year and Preparation starts
February	Contact, request & confirm	Contact, request &	Contact, request &

	the convenience of individual Lecturer to be invited	confirm the convenience of individual Lecturer to be invited	confirm the convenience of individual Lecturer to be invited
March	Invitation Letter sending	Invitation Letter sending	Invitation Letter sending
April	Final preparation for trainee acceptance	Final preparation for trainee acceptance	Final preparation for trainee acceptance
May	Orientation, Opening ceremony, Lecture starts by 2 lecturers	Orientation, Opening ceremony, Lecture starts by 2 lecturers	Orientation, Opening ceremony, Lecture starts by 2 lecturers
June	Lecture by 4 lecturers	Lecture by 4 lecturers	Lecture by 4 lecturers
July	Lecture by 4 lecturers	Lecture by 4 lecturers	Lecture by 4 lecturers
August	Lecture by 4 lecturers	Lecture by 4 lecturers	Lecture by 4 lecturers
September	Lecture by 4 lecturers	Lecture by 4 lecturers	Lecture by 4 lecturers
October	Lecture by 2 lecturers Final presentation & report submission, Certificate grant Closing ceremony	Lecture by 2 lecturers Final presentation & report submission, Certificate grant Closing ceremony	Lecture by 2 lecturers Final presentation & report submission, Certificate grant Closing ceremony
November	Check & confirm the tools, equipment, machines,	Check & confirm the tools, equipment, machines,	Check & confirm the tools, equipment, machines,
December	Evaluation meeting for further improvement, Final report submission to Thai Government	Evaluation meeting for further improvement, Final report submission to Thai Government	Evaluation meeting for further improvement, Final report submission to Thai Government
Remarks	During the project going, 1) On-site visit to Industry & related organization will be scheduled (2 to 3 times) 2) Progress report	During the project going, 1) On-site visit to Industry & related organization will be scheduled (2 to 3 times)	During the project going, 1) On-site visit to Industry & related organization will be scheduled (2 to 3

	<p>submission and presentation are requested to all trainees</p> <p>3) Due to any convenience, the schedule may be changed properly by the replacement Zoom lecture</p> <p>Evaluation meeting is planned at the end of the program completion inviting the related organization people / members</p> <p>Budget: 15 million THB</p>	<p>2) Progress report submission and presentation are requested to all trainees</p> <p>3) Due to any convenience, the schedule may be changed properly by the replacement Zoom lecture</p> <p>Evaluation meeting is planned at the end of the program completion</p> <p>Budget: 10 million THB</p>	<p>times)</p> <p>2) Progress report submission and presentation are requested to all trainees</p> <p>3) Due to any convenience, the schedule may be changed properly by the replacement Zoom lecture.</p> <p>Evaluation meeting is planned at the end of the program completion</p> <p>Budget: 6 million THB</p>
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Notice: Special award may be prepared for the trainee who contributed excellently

Total budget required for materializing this project is shown as mentioned above.

Total budget may be around 31 million THB for 3 years.

12. Project training content

12.1 Example of syllabus and lecture content

Table 2 shows one of the examples of the class lectures syllabus consisting of mainly smart agriculture and the peripheral advanced technologies related to the basic highly advanced technological innovations.

Table 2 One of the examples of class lecture subject syllabus

No.	Lecture content
1	<p>1. Global tetralemma</p> <p>1.1 Population: Increasing rate: 80 million / year, 1.4 hundred million newly born and 0.6 hundred million dying</p> <p>1.2 Food: Required amounts of food : 400 kg/capita/year</p> <p>1.3 Energy: Natural & Renewable Energy kinds & characteristic feature)- Solar (Photovoltaic, Thermal), Wind, Hydro), Geothermal, Biomass, Biogas), Others: Nuclear fusion, Shale oil, Shale gas), Methane hydrate, Automobile (Gasoline, Diesel, Alternative, Hybrid, Electric, Fuel cell, Hydrogen)</p> <p>1.4 Environment: Carbon neutral, Carbon footprint, LCA (Life Cycle Assessment) Decarbonized society</p>
2	<p>2. Asian agricultural mechanization: Characteristic; Small scale, Low income, Family labor</p> <p>2.1 Rice cultivation (Wetland agriculture), More than 90% of the world production in Asia</p> <p>2.2 Upland agriculture Food &Energy resources: Sugarcane, Soybean, Cassava, Corn (Maize), Sweet potato, Fruits & Vegetables, Longan, Orange, Pineapple, Papaya, Mango, Banana</p> <p>2.3 Historical development of farm machinery: Man power, Animal power, Mechanical power, Automation, Robotization, Hyper low-cost rice mechanization, Direct sowing of rice: Coated seeds with CaO₂, Fe₂O₃, Direct de-husking of high moistened rough rice</p>
3	<p>3. Organic faming</p> <p>3.1 Definition of organic farming, Safety based Value-added agriculture</p>
4	<p>4. ASEAN Economic Community</p> <p>4.1 ASEAN University consortium, Community based Asian agrifuture, Policy & strategy based on future vision and aspect, Collaboration between Resource-oriented and Technology oriented countries, Make Asia World Food Pantry, Promote economy by future development / creation of Asian Food Brand and maintain the regional peace keeping, Eliminate Poverty & Hunger, Establish Future Farmers of Asia growing program</p>
5	<p>5. Smart agriculture</p> <p>5.1 Precision agriculture (Feld robotics) GPS: Global Positioning System, GIS: Geographical Information System Mobile vehicle: Tractor, Combine, Farm vehicles, Sensors (Yield sensor, Nutrition sensing) Obstacle avoiding sensor, Variable rate control</p> <p>5.2 Robotics: Agricultural Robot & Industrial robot, Various harvesting robots, Fruit harvesting</p>

	<p>robots, Vegetable harvesting robots,</p> <p>5.3 Green (Plant) Factory: Various type of Green Factory, Solar powered & Closed type Green Factory, Strawberry, Lettuce</p> <p>5.4 Field server</p> <p>5.5 Remote Sensing: NDVI (Normalized Difference Vegetation Index), Continuous monitoring of crop while growing, Judgement and decision making to apply something or not for maximizing value added product production with minimum loss for ensuring higher stable yield</p>
6	6. Image processing: Quality control of products, Maturity, outlooking damage. injury and injury, AI application to agriculture; decision making for harvesting timing
7	7. Nano Technology: Various type of Nano Bubble water application in primary industry Disinfection cleaning and Sterilization of agricultural products
8	8. Plasma Technology Waste treatment, Waste to energy
9	9. Bio-resources for energy production Biomass, Biogas, Biofuel for direct use for alternative energy, Hydrogen production & electric generation, Euglena mass culture production for multi-purpose use such as food, Supplement for human health, animal feed, fertilize etc., and bio-jet plane fuel, Contribution to de-carbonized society
10	10. Food Supply chain: Agricultural policy - Production control, Increase of demand & consumption, New market development, Value added technology application
11	11. Traceability (Food safety & Liability): 2QSL - Quantity, Quality, Safety, Liability between producer & consumer), Product recognition and identification: Barcode & QR code application
12	12. Global environment: Climate change, Global warming, Carbon Foot print, Haze issue: PM 2.5, PM 10, De-carbonized society building
13	13. Application of Drone: Information gathering of growing crop, Environment monitoring Safety and cost down, Application: Regulation & International law and standard
14	14. SDGs: Sustainable Development Goals, 17 targets for achievement, Virtual water, Food mileage, COP. IPCC, Paris agreement, Disaster (natural & artificial) & infectious disease pandemic
15	15. International law and standard: International organization: (NPO, NGO, WHO, WTO, FAO, WFP, IPO, ISO 9000, 14000, International qualification and approval (FE, PE) , JABEE: Japan Accreditation Board for Engineering Education

13. ADDITIONAL BENEFITS OF THE PROGRAM

By giving undergraduate and graduate students the opportunity to participate in and listen to the contents of this project, the following merits can be expected.

- 1) It is possible to spread knowledge about smart agriculture by opening the official curriculum to undergraduate and graduate students of remote classes by zoom.
- 2) You can deepen your understanding by communicating directly or indirectly with experts in smart agriculture.
- 3) Since lecturers are invited from participating companies, it is possible to experience deep lectures that cannot normally be heard in university classes.
- 4) In particular, shading can be tackled as a research theme for obtaining a degree. Another human resource development program in this project.
- 5) By getting to know lecturers invited from overseas, you can acquire higher level of specialized knowledge along with internationalization.
- 6) It will be an opportunity to nurture next-generation agricultural successors who wish to work in agriculture.
- 7) Become a human resource who contributes to the development of next-generation human resources as an agricultural engineer even after obtaining a degree.
- 8) It is possible to develop human resources who can support Asian agriculture.

From the author's point of view, the important objectives of this project planning are as follows. Those that show how are things that the author has always emphasized as a university professor for a long time.

The Thai government created industrial parks, invited many foreign companies, and chose the path of industrialization for economic development. However, although economic development has certainly been achieved to a certain level, it is regrettable that no 'Thai original' technology has been created. Opportunities for learning and acquiring knowledge have increased, but there are almost no products that incorporate more original technology. Simply put, there is a need not only in Thailand but also in Asia to develop human resources who can conduct product development research that incorporates unique technology beyond the realm of learning and studying. What is most needed in Asia now is the development and training of followers who can imagine Asian original or Thai original brand products. To meet this demand, we are considering the necessity of preparing such a path for undergraduate and graduate students in this project as well.

14. Research achievements related to this project proposal application

The author's research achievements related to this application project (papers presented and published in international academic journals, presentation materials) are shown below. It is recommended that each co-researcher participating in the project should write at least 3 to 5 papers.

- 1) The total number of participating researchers is about 10, and they must be able to give lectures on smart agriculture in English. 3-5 research papers on smart agriculture.
- 2) 15 assistants or technicians for maintenance, inspection, and repair of machinery (drilling, welding (gas, electric), brazing, soldering, press working) what you can do.

Publication list related to the project proposal. (just only Ito's ones)

- 1) Nobutaka Ito (2017) Asia Techno Farm, The International Conference of Building of Food Sovereignty through a Sustainable Agriculture: Challenge of Climate Change and Global Economic Community, University of Jember (UNEJ), East Java, Indonesia, August 1st ~ 3rd, 2017
- 2) Nobutaka Ito (2017) Asia Techno Farm Initiative, Thai Society of Agricultural Engineering, Impact Arena, September 9 ~ 10, 2017
- 3) Nobutaka Ito (2017) Haze issues in Northern Thailand, Thai Society of Agricultural Engineering, Impact Arena, September 9 ~ 10, 2017
- 4) Nobutaka Ito (2017) Asia Techno Farm Initiative for Promoting Asia Food Project, Workshop on Precision Agriculture and Agricultural Machinery Industry for Thailand 4.0, TISTR Lamtakhong Research station, Ministry of Science and Technology, Pakchong Nakorn Rachasima, Thailand
- 5) Nobutaka Ito (2017) Haze Free Forest Farm, Regional Haze and Climate Change Management (Keynote speech), Proceeding Book of conference RHCCM2017
.. https://drive.google.com/open?id=1sgd5TmyY5Oy96gyNSU_tFT04VtsI8v74rF89g-meauc
Kanthary Hotel Chiang Mai, Thailand
- 6) Nobutaka Ito (2017) Technology for Multi-purpose use Rice Mechanization, Proceedings of MIER Joint symposium on Mechanical Engineering - Industrial Engineering & Robotics, between Muroran Institute of Technology & Chiang Mai University, UNISERV, CMU, November 16 ~ 18, 2017
- 7) Nobutaka Ito (2017) How Asian agriculture should be changed and promoted for Regional Community Development, (Keynote speech), The International Conference on Agricultural and Bio-system Engineering, Nong Lam University, Vietnam, December 19 ~20, 2017
- 8) Sermkiat, Nobutaka Ito (2018) Forest farm for Haze Free, Proceedings of The 11th TSAE International Conference, 26~27 April, Chulaborn International Convention Center (Wora

- Wara Hua Hin Hotel & Convention) Hua Hin, Prachuap Khin Khon, Thailand
- 9) Nobutaka Ito (2018) FFA (Future Farmers of Asia) growing program, Proceedings of The 11th TSAE International Conference, 26~27 April, Chulaborn International Convention Center (Wora Wara Hua Hin Hotel & Convention) Hua Hin, Prachuap Khin Khon, Thailand
 - 10) Nobutaka Ito (2018) Food and Energy Farm, 7th CMU-KU Joint Symposium 2018, August 27 -29, 2018, Chiang Mai University, Thailand
 - 11) Nobutaka Ito (2018) Which is which, Biomass or solar for food and energy? SAFE NETWORK International workshop, October 18 - 21, I'M Hotel, Manila, Philippines
 - 12) Nobutaka Ito (2018) Technology and Culture, International Seminar on Millennial and Tomorrow's world, Warmadewa University, Bali, Indonesia, November 24, 2018.
 - 13) Sermkiat Jomjunyong, Nobutaka Ito (2018) Modeling for estimating Energy loss and CO2 emission from forest burning, Program & Book of abstracts, F-07, P. 92, SEE 2018 Proceedings of The 7th of International Conference on Sustainable Energy and Environment: Technology and Innovation for Global Energy Revolution, P. 105 - P. 109, November 28 -30, 2018, Chatrium Hotel Riverside, Bangkok, Thailand
 - 14) **Nobutaka Ito (2018) Technologies for agrimation and agro-industry, ISHS Acta Horticulturae 1213**

III Asia Pacific Symposium on Postharvest Research, Education and Extension: APS2014
October 5, 2018, <https://www.actahort.org/books/1213/>
 - 15) Nobutaka Ito (2018) Does EV make Renewable Energy useless?, Keynote lecture, 2nd Maejo-Engineo International Conference on Renewable Energy, The wisdom of Agriculture and Renewable Energy, Proceedings of MEICRE 2018 December 14-15, 2018 at International Education and Training Center, Maejo University, page 4, Chiang Mai, Thailand
 - 16) Nobutaka Ito (2019) Where does Electric Vehicle drive renewable energy?, Proceeding of The 12th TSAE International Conference 14-15 March 2019, Hard Rock Hotel, Pattaya, Thailand (Keynote speech as Invited Guest speaker)
 - 17) Nobutaka Ito (2018) Asian Agriculture Growth Strategy, International Conference on Material, Machines and Methods for Sustainable Development, published in the Journal of Applied Mechanics and Materials (ISSN print 1660-9336 and ISSN web 1662-7482) published from Trans tech Publisher. (<https://www.scientific.net/AMM>) (Book)
 - 18) Nobutaka Ito (2019) "**Technologies for agrimation and agro-industry**" **Nobutaka Ito (2018) Technologies for agrimation and agro-industry, ISHS Acta Horticulturae 1213**

III Asia Pacific Symposium on Postharvest Research, Education and Extension: APS2014

October 5, 2018, <https://www.actahort.org/books/1213/> (Book)

- 19) Nobutaka Ito (2019) Urban Farming and Research Innovation, Mini- symposium on Urban Farming and Research Innovation, Andalas University, Padang, Indonesia (Keynote Presentation as Invited Guest speaker), April 26 - 30, 2019.
- 20) Nobutaka Ito (2019) SAFE NETWORK, Summer course, Indonesia Towards Leading Agro-industry in Local Wisdom- based Food and Bio-energy Sovereignty, "How Agriculture can achieve the Goal for Food and Energy Sovereignty", Bandung, Indonesia, July 29 & 30, 2019.
- 21) Nobutaka Ito (2019) FFAAGPI, Future Farmers of Asia Growing Program Initiative, Invited speech, Green Agri - Food Energy Production for a better world in a changing climate, Conference Program & Paper abstract, Phuket, Thailand, October 18 - 21, 2019
- 22) Nobutaka Ito (2019) How the Asian Agrifuture can be achieved, Agrifuture Conference & Exhibition 2019, The True Digital Park, Bangkok, December 2-3, 2019 (as invited speaker)
- 23) Sermkiat Jomjunyong, Nobutaka Ito (2020) Haze Free Forest Farm in Thailand, The conference of Industrial Engineering Network (IE NETWORK 2020) May 7, 2020
- 24) Nobutaka Ito (2020) **Community based ASIAN AGRIFUTURE: How it can be achieved** (Page #06) *AGRI MECH* magazine, July 2020. [The digital edition of AGRI MECH \(July 2020\)](#) *AGRI MECH* presents its latest online edition of **July 2020**,
- 25) Nobutaka Ito (2020) University goods manufacturing program combined with engineering education, Maejo International Journal of Energy and Environmental Communication
<http://www.mijeec.mju.ac.th/Upload/Journal/21959ea8-aada-49e1-9163-b3b68d84be4e.pdf> It was published on Issue 2, volume 1, year 2019 of Maejo International Journal of Energy and Environmental Communication journal.
- 26) Nobutaka Ito (2020) Asian Agrifuture: How the Asian Agriculture can be achieved, The 7th International Conference of TSAE, Thai Society of Agricultural Engineering,, July30, 2020, Suranaree University of Technology, Korat, Thailand
- 27) Nobutaka Ito (2021) Hyper Low-Cost Rice Mechanization System, The14th of te

TSAE International Conference and the 22nd TSAE National Conference, Paper Code No. 10, May 12 - 13, 2021 organized and hosted by Khon Kaen University, Khon Kaen, (Awarded for good presentation award by TSAE organizing committee)

28) Nobutaka Ito (2021) Technology for overcoming the global tetralemma, Contribution Number 60011, SIGNAL 2021. The Sixth International Conference on Advances in Signal, Image and Video Processing SIGNAL 2021, May 30, 2021, to June 03, 2021, - Valencia, Spain (Keynote lecture)

IMPORTANT NOTICE

Other things to add for the official project proposal documents and keep in mind.

- 1) Please have a look carefully his proposal draft and philosophy
- 2) Add more researchers and university faculties and their publication.
- 3) Estimate and calculate the fee payable for the people involved in the project.
- 4) Same thing should be done for the materials, facility, machines and equipments to be used for the project.

Considerations for Large Project Budget Requests

In case of applying for a large project, related parties gather on a regular basis for discussions, and most of the related parties fully understand the purpose, content, necessity, social contribution, and benefits of the project. The matter is well known.

If possible, it should be submitted as a joint research project at the university, undergraduate, or research institute level, as the application amount will be less for a personal proposal. In order to do so, there must be a researcher involved in the application project and a paper published in 3 to 5 international journals as an expert by the researcher. If not, it is necessary to add a researcher with such achievements to the members.