

(1) Final report



Mekong – ROK Cooperation Fund (MKCF) Final Report

A. Brief Project Information

1.1. Project title	Comprehensive Training to Increase Efficiency of Rice Production in the Mekong Sub-region
1.2. Country (ies) / region	Thailand
1.3. Project area	<input type="checkbox"/> Infrastructure <input type="checkbox"/> Information Communication Technology (ICT) <input type="checkbox"/> Green Growth <input type="checkbox"/> Water Resource Development <input checked="" type="checkbox"/> Agriculture and Rural Development <input type="checkbox"/> Human Resource Development
1.4. Implementation start/end date	
Implementation start date	6 February 2017
Implementation end date	28 February 2018
Project lifespan	1 year
1.5. Approved project budget (USD)	163,558.89
1.6. Date of 1 st and 2 nd installments	1 st installment : 20 December 2017 2 nd installment : 00 February 2018
1 st installment	114,491.22 USD (70% of the total budget)
2 nd installment	49,067.67 USD (30% of the total budget)

B. Prepared by

Name:	Ms. Paweena Subhimaros
Title:	Second Secretary
Department:	Department of International Economic Affairs Ministry of Foreign Affairs
Name of the Implementing Agency:	1. Thailand Rice Science Institute, Rice Department, Ministry of Agriculture and Cooperatives
Signature:	2. National Food Institute, Ministry of Industry
Date:	3. Geo-informatics and space technology development agency, Ministry of Science and Technology

C. Project outputs

- Briefly describe the project objective(s) and tangible outputs that were achieved.
- Attach the output document(s) like Program Agenda, Workshop / Meeting Minutes, Questionnaires, List of Participants, Photos etc.
- Attach any other assessment report drafted for the project

Objectives

1. Develop a cooperation network on efficiency rice production, rice production planning between the Mekong countries and ROK.
2. Achieve sustainable a resilient agriculture in Mekong region and improve rural livelihood and poverty

alleviation through dissemination of project output.

3. To build capacity in the systematic use of geospatial technology and products so that the pace, scale and quality of development proceeds in a way which minimizes damaging side effects.

Output

1. Trained personnel with better knowledge and wider experiences. on Increasing rice yields through efficiency production methods.

2. Trained personnel with better knowledge and wider experiences on Green productivity in rice mill factory technology.

3. Trained personnel with better knowledge and wider experiences on Rice crop monitoring using Satellite Remote Sensing.

4. Sharing of best practices among Mekong members and Korea on possibility applied technology in rice mill factory.

5. Creation on rice cooperation between Mekong members and Korea to serve for food security in the region.

Short term outcomes

1. Cooperative network between Mekong countries and the ROK on rice production and food security.

2. Apply knowledge and skills on rice production and food security.

3. Sharing of knowledge and best practices among Mekong countries and the ROK by group work and group presentation.

4. Transfer knowledge for good practice in rice production to their colleagues in country.

5. They have an experience at the real situation in rice production from visiting both of government and private sector and they can exchange the experience with the farmer in that area.

Long term outcomes

1. Sustainable agriculture and food security.

2. Regional competitiveness on rice production and food security.

3. Increase yield and reduce cost of rice production in CLMVT countries.

ATTACHMENT 1 and 2

Participants

There are 17 participants joining our training program. (Out of 20 targeted participants) Most of the participants have their academic background in agricultural science and related field, only one participant from Thailand has background in technical science and participant from Myanmar is lecturer of agricultural field in academic institution.

Cambodia = 4 (4 males)

Laos = 4 (2 males and 2 females)

Myanmar = 4 (2 males and 2 females)

Thailand = 5 (1 male and 4 female)

Vietnam = None

Remark : There is no participant from Vietnam, because during the period of the workshop was Chinese New Year 2017 and they requested to skip the first Module. After consideration, Thailand team project could not accept Vietnam requested to skip and attend only for partial participation which will not complete 3 training modules. Therefore, Thailand had added one more Thai participant to compensate Vietnam targeted number.

ATTACHMENT 3

Measuring Method of the three Modules Training courses will be the questionnaire in line with the program work plan which comprise

- 1) The Pre-Assessment Form was provided for participants prior embarking each three Modules in order to assess the knowledge background and their expectation, and
- 2) The Post-Assessment Form in order to evaluate on site after complete of each training Modules.

Rating scale is 1 – 5 stand for :

- 1 = I do not know anything about this topic
- 2 = I have heard about this topic but do not know enough about how to do/use it
- 3 = I have some knowledge on this topic, but could not do it now without further study
- 4 = I have a good working knowledge and can do routine aspects now
- 5 = I am highly competent and experienced and could teach further

ATTACHMENT 4 and 5

Module 1: Increasing rice yields through efficient production methods

Dated 6 – 18 February 2017 in Suphanburi Province , Thailand

Implementing Agency : Thailand Rice Science Institute , Thailand Rice Department , Ministry of Agriculture and Cooperatives

Mekong region is a strategic location for rice cultivation where The Mekong countries are among top exporters in rice commodity in the world. Rice production does not only create jobs and generate income for Mekong region but also ensure a reliable food supply to the world’ s growing demand for rice consumption. While the agriculture sector remains a major driving force of the Mekong economy, the farmers still face a number of challenges which are needed to be addressed. These are, for example, under productivity, high production costs, damaged harvest due to climate change or pest and incompatible quality with international standards.

The activities in module 1 which is “Increasing rice yields through efficient production methods” corresponds to project objectives are Develop a cooperation network on efficiency rice production, rice production planning between the Mekong countries and ROK , and Achieve sustainable a resilient agriculture in Mekong region and improve rural livelihood and poverty alleviation through dissemination of project output. This purpose of the training course is to conduct a training programs on rice production in the way of reducing cost and being good quality, planning on rice cultivation in order to enhance overall rice-base production system in the Mekong countries.

Contents:

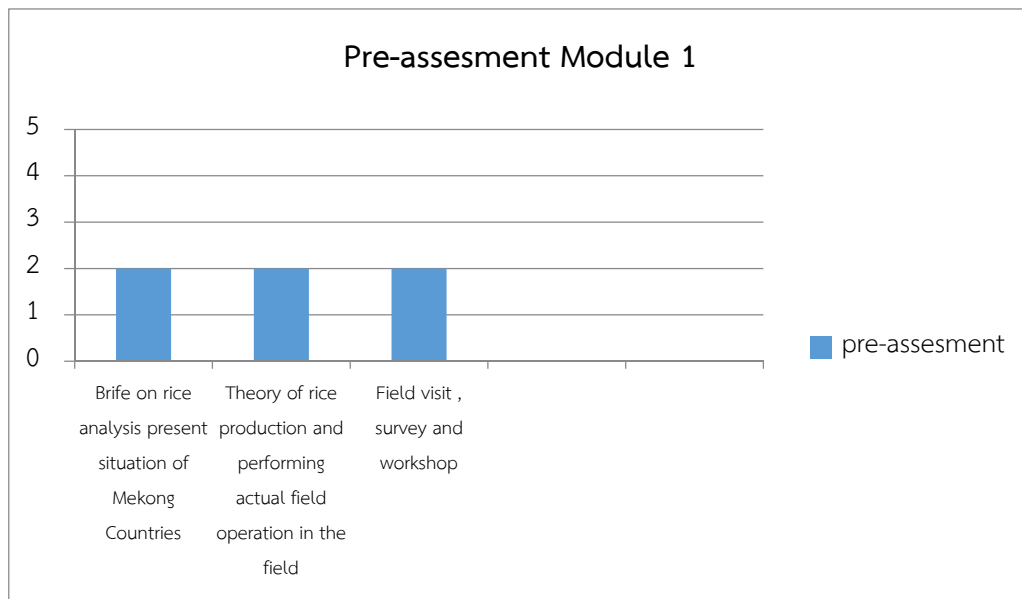
1. Brief on rice production and analysis of present situation of participating countries (Thailand , Cambodia, Laos , Myanmar)
 - Presentation of rice production process and the situation of rice production in each participant countries.
 - Exposure of the Thai culture in Ayutthaya province
2. Theory of rice production and performing actual field operation in the field
 - Rice growing environment
 - Physiology of rice plant and growth stage
 - Land preparation
 - Rice varieties and its characteristics
 - Breeding program
 - Hybrid rice
 - Good quality seed production
 - Fertilization management
 - Pest management in rice
 - Rice disease management
 - Rice planting method

- Rice post harvesting
 - Rice conservation and regeneration
 - Rice quality inspection and certification
 - Thailand good agricultural practice
3. Field visit, survey and workshop
- seed company, rice seed center, paddy field , farmer school and farmer community enterprise

Pre-Assessment for Module 1 :

Increasing rice yields through efficient production methods

Prior embarking the training course, the Pre-Assessment had been done to all 17 participants in order to evaluate the background knowledge and expectation from the course. The overall score rate of Pre-Assessment on Module 1 for total 7 topics is average at rank scale 2 (I have heard about this topic but do not know enough about how to do/use it). Therefore, it is expected that after 2 weeks training, they would gain better knowledge.



Activity 1: Overview of the CLMT country report and analysis of rice production in the Mekong Sub-region

Description: Participants presented information about their countries including important agricultural products for exporting and importing and analyzed the problem of rice production in each country.

Result & outcome: The participants learned about the agricultural background and emerging problems in the agricultural sector in each CLMT country. They also shared experience in rice production which allowed them to see the common and different problems in their countries and the whole region.





Activity 2 : Ice breaking Session

Description: Getting to know each other through ice breaking activities.

Result & outcome: Participants got to know each other better despite their different backgrounds, which was helpful for building the network in the future.



Activity 3 : Introducing the Thai culture and tour of cultural sites

Description: Travelling to several landmarks of Thailand to experience the Thai culture, local products and language. Main attractions are at the central part of Thailand where plenty of rice field and production.

Result and outcome: The participants were impressed by the Thai culture, and got a chance to practice some easy Thai words. In addition, those places provinces are the main area for growing rice in Thailand.





Activity 4 : Lectures and workshops on rice production theories

Description: Learning about rice production theories such as rice varieties, pollination, rice physiology, seed production, soil, rice disease and pests.

Result and outcome: The participants learned about advanced techniques in rice production which they aimed to share with officers in their countries.



Activity 5: Applying the knowledge learned in the paddy field

Description: Participants had an opportunity to apply the techniques learned in the paddy field in Supanburi province. Some of them worked in the policy- related agencies and never had the hands on experience in the field before. Therefore, this allowed them to put the theories into practice.

Result and outcome: The participants learned about different methods in rice production.





Activity 6: Site visits at the Rice Seed Production Center, Thai private Sector, Farmer School and Farmers Community Enterprise.

Description: The participants had the chance to learn and discuss experiences and best practices in the rice industry with the stakeholders of rice production from the government and the private sector.

Result and outcome: The participants experienced the real-time rice production process from visiting the government sector, the private sector and local farmers.



Rice Seed Center, Ratchburi Province



The Farmer School, Suphanburi Province





Private Seed Company, Suphanburi Province



Visiting Farmer community Enterprise, Suphanburi Province



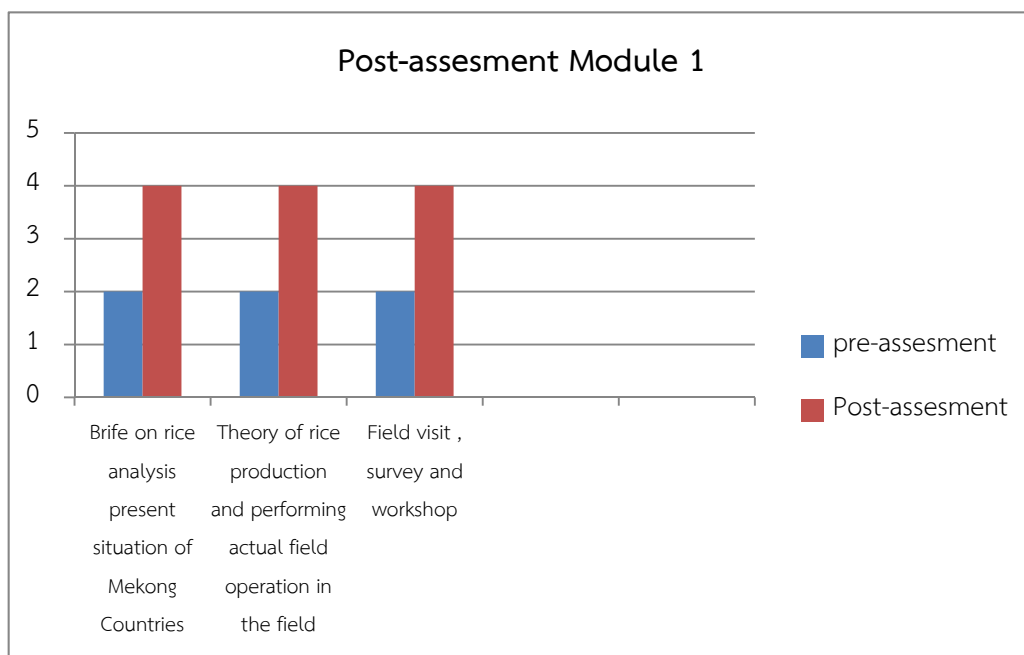
Visiting Post Harvest Laboratory and GENE Bank, Pathumthani Province

Post-Assessment for Module 1 :

Increasing rice yields through efficient production methods

After completed the training course, the Post-Assessment had been done to all 17 participants again in order to evaluate the knowledge and experience they have gained from the course.

The overall score rate of Post-Assessment on Module 1 for total 7 topics is average at high rank scale 4 (I have a good working knowledge and can do routine aspects now). It is shown that most of participants gain better knowledge transfer in 3 main issues namely 1) Brief on rice analysis present situation of Mekong Countries 2) Theory of rice production and performing actual field operation in the field and 3) Experiences on filed visit , survey and workshop.



Module 2: Manufacturing Technology and Green Productivity in Rice Mill

Dated 20 February – 3 March 2017 at Thai Food Heritage Center, Bangkok

Implementing Agency : National Food Institute, Ministry of Industry

Workshop compose of rice mill technology and case study, discussions on environment-friendly rice mill, workshop on waste-to-energy technology, group work on Green productivity practices, site visit to rice mill factory, and presentation.

The purpose of the course is to enhance know-how and experience for government officers from 5 countries; namely, Cambodia, Myanmar, Laos, and Thailand. The module focuses on conducting a training program on rice production in the way of reducing cost and controlling quality, planning on rice cultivation in order to enhance overall rice-base production system in the Mekong countries.

Contents

1. Rice mill Technology and environmental friendly
 - Development of rice mill technology in Thailand
 - Efficiency of milling technology in practices
 - Pollution problems in milling process
 - Environmental control in rice mill factory
 - House keeping in rice mill factory

2. Green Productivity

- Concept of Green Productivity and methodology
- Case study of Good Practice

3. Energy saving technology in rice mill factory

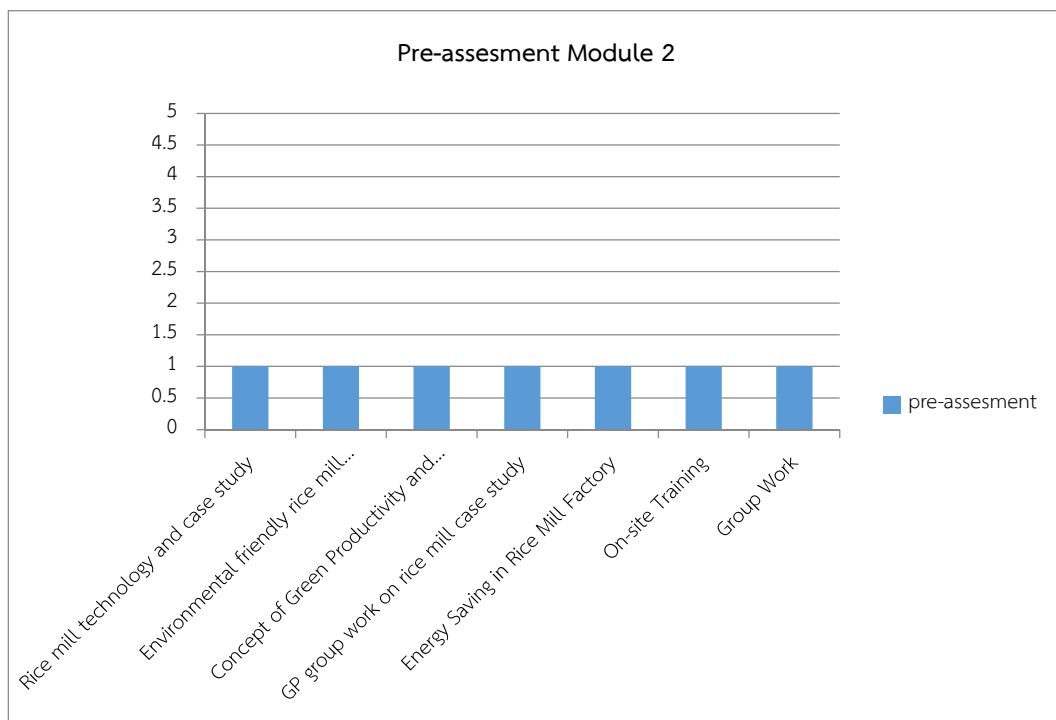
- Process optimization
- Thermal energy saving
- Power fuel from rice waste
- Solid fuel from rice waste

Pre-Assessment for Module 2 :

Manufacturing Technology and Green Productivity in Rice Mill

Prior embarking the training course, the Pre-Assessment had been done to all 17 participants in order to evaluate the background knowledge and expectation from the course.

The overall score rate of Pre-Assessment on Module 2 for total 7 topics is average at rank scale 1 (I do not know anything about this topic). Therefore, it is expected that after 2 weeks training, they would gain better knowledge.



Activities

The training module 2 was designed as a hand-on training program. The program was planned using Project Case Work Concept which could be divided as follow :

- 30% of lectures in the theory of green productivity, rice mill manufacturing processes, pollution problems from rice mills and its prevention, and resources used in rice mills activities.
- 30% of lecture was assigned to factories' visits.
- 40% was assigned to the participants to work on project case. The participants were given the case studies of real factories to evaluate and analyze the situation. starting from the beginning in obtaining information, analyzing the obtained information, identifying the factory problems and their causes, generating options to solve the factory's problems. At the end of the workshop, the participants presented the outcome of their works to the class.

Activity 1 : Lecture on Rice mill Technology, Environmental Friendly Rice Mill Technology and Green Productivity Concept and Tool

- Development of rice mill technology in Thailand
- Efficiency of milling technology in practices
- Pollution problems in milling process
- Environmental control in rice mill factory
- House keeping in rice mill factory



Activity 2 : Lecture development of rice mill technology in Thailand and rice mill productivity and rice mill process rice milling practice and demonstration.

Also lecture on Green Productivity and energy saving technology in rice mill factory

- Concept of Green Productivity and methodology
- Case study of Good Practice
- Process optimization
- Thermal energy saving
- Power fuel from rice waste
- Solid fuel from rice waste



Activity 3: Project Case Work of rice mill

Project Case Work was designed using an actual rice mill in Nakornphathom as a case study. We gave real data in the case, the participants used data, together with information from site visit and interviewing with the owner in analyzing using Green Productivity Concept step by step. The participants learn the about the rice mill situation gradually as they moved along the step of Green Productivity Methodology. At the end of the implementation of GP methodology, the participants would fully understand about rice mill process, resources used and how to optimize them.

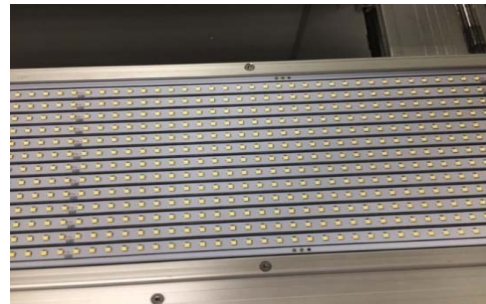


Activity 4 : Field visits

There were 3 field visits on this training module.

- Field visit to Lianghuak Inter rice mill factory in Ayuthaya Province , in which the participants had a chance to observe a large, advanced milling factory dedicated to exportation.
- Field visit to rice mill factory in Nakornprathom: The factory is a medium scale factory that was used as model to project case work. The participants used this factory as a case to learn how to apply Green Productivity Program in solving the problems of this factory.
- Field visit to L & E LED manufacturing factory, where energy-saving LED bulbs are produced.





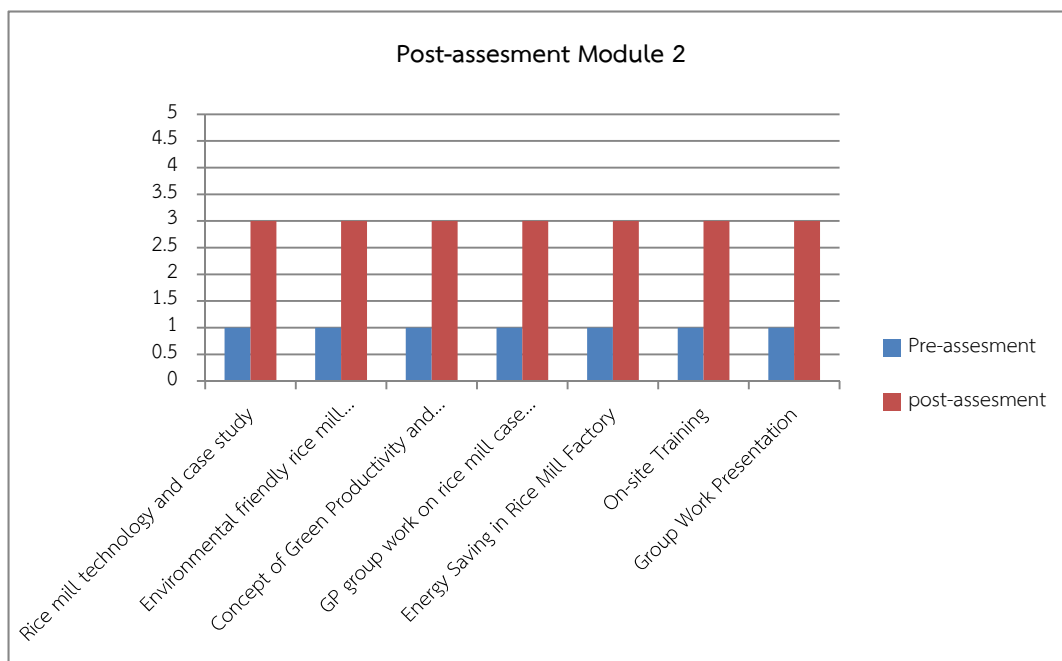
Result & outcome :

Post-Assessment for Module 2 :

Manufacturing Technology and Green Productivity in Rice Mill

After completed the training course, the Post-Assessment had been done to all 17 participants again in order to evaluate the knowledge and experience they have gained from the course.

The overall score rate of Post-Assessment on Module 2 for total 7 topics is average at rank scale 3 (I have some knowledge on this topic but could not do it now without further study). Those issues that participants gain more knowledge comprise 7 topics namely 1) rice mill technology and case study 2) Environmental friendly rice mill technology at present and case study 3) Concept of green productivity and methodology 4) GP group work on rice mill case study 5) Energy saving in rice mill factory 6) On site training and 7) Group work presentation.



There are some observations that the participants were quite new to the designed subjects of training module 2, it was quite difficult in the beginning in tuning up especially to the concept of Green Productivity. Besides, rice mill productivity, processes and practices were related to the participants' background and were easily taken in by the participants especially when used demonstration milling equipment for all participants to try out.

For Site visits of rice mills factory was very good and necessary for project case work. Another visit the plants, most participants understood the milling processes and their potential practical problems. It was very useful in technical discussion during group work. As for site visit to L&E LED manufacturing factory, it was very useful

in looking into a potential energy saving methods in the case. Group work in the project case work created a very strong working environment among participants. They were divided into 4 groups. Each group contained each country representative. They could work very well together and they shared their experiences from their countries.

The overall result from our training program is very satisfactory. The participants learn a lot about the rice mill activities, processes and its practices. They know how to use Green Productivity Concept in identifying the factory problems and analyze the causes of the problems and identify options to solve the problems. However, the participants should use the knowledge they learn here in their countries and get more training course may be needed in their countries with demonstration project in each country should be encouraged.

There are some feedbacks from participants after finished Module 2 and how to apply knowledge to their work or countries.

- Had got many knowledge about rice mill technology and environmental friendly rice mill technology. This course is very good.
- This course is short time and I can't get the knowledge. Because I don't know basic of this course and thank you very much for your support and cooperation.
- Get a new lesson and I get a lot of knowledge about rice mill and processing.
- Want to training course next time.
- This training provides me a lot of information on GP rice milling. So, got new knowledge and experience.
- Got a lot of knowledge about rice mill and rice processing. We have no knowledge before or we have just a little knowledge. So, this topic is very useful for our knowledge to improve and this training program is very effective.
- Visiting more rice mill to be able to compare them and see the process of milling rice more clearly.
- Don't have more black ground or information about manufacturing technology and green productivity in rice mill. But after learned from this course ,it can be improved and development to my work that sometimes I work relate about rice processing after production (after get rice yield). I think can bring all of knowledge to share for the farmer to produce and processing their product for the future.
- It's good knowledge for improve rice milling

Module 3: Rice Crop monitoring using Satellite Remote Sensing

Dated 6 – 12 March 2017 at Geo-Informatics and Space Technology Development Agency, Chonburi province

Implementing Agency : Geo-Informatics and Space Technology Development Agency, Ministry of Science and Technology

This module 3 aimed to provided knowledge and skills on building resilient capacity in rice production by introducing the systematic use of geospatial technology and products so that the pace, scale and quality of development proceeds in a way which minimizes damaging side effects and developing a cooperative network of efficiency rice production planning between the Mekong countries and the ROK.

Contents

1. Introduction to Geo-Informatics Technology and Remote Sensing

- Overview of Geo-informatics Technology
- Basic of remote sensing technology and agricultural application
- Geo-informatics Technology, Best practices for rice monitoring
- Thailand experiences in rice mapping and monitoring

2. Lab

- Basic Image processing
- Lab : color composite, image, enhancement, mosaicking, sub setting
- Image classification , visual interpretation
- Lab : Visual classification

3. Introduction to GPS

- Image classification : rice monitoring and production forecasting using satellite data
- Lab : Image classification : rice monitoring and production forecasting using satellite data
- Rice area estimation and accuracy assessment
- Group work rice monitoring by countries
- Technical filed of ground receiving station

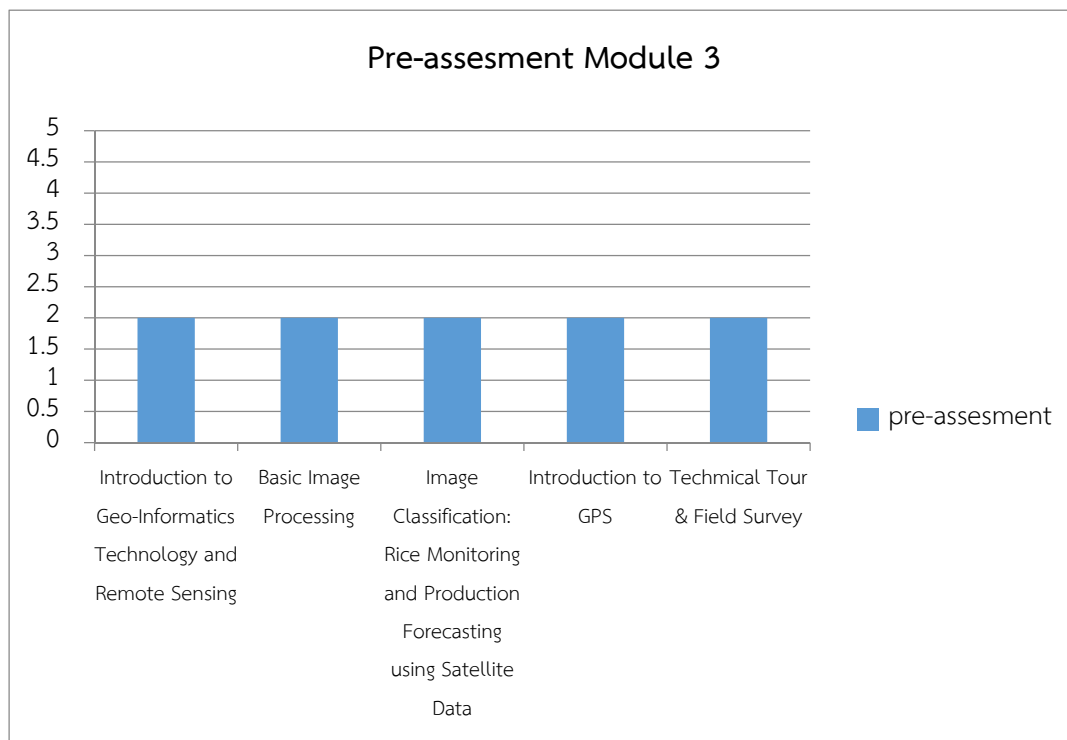
- Technical field of space inspirium
- Introduction to Global Navigation Satellite System (GNSS) and its application
- Lab :GNSS practices
- Basic of Geographic Information System and Agricultural Applications
- GIS database and data input basic spatial analysis / geographic visualization

Pre-Assessment for Module 3 :

Rice Crop monitoring using Satellite Remote Sensing

Prior embarking the training course, the Pre-Assessment had been done to all 17 participants in order to evaluate the background knowledge and expectation from the course.

The overall score rate of Pre-Assessment on Module 3 for total 5 topics is at rank no.2 (I have heard about this topic but do not know enough about how to do/ use it). Therefore, it is expected that after one week training, they would gain better knowledge.



Activities

Refer to overall activities, the training course started at “Basic of Remote Sensing Technology and Agricultural Applications” and “Introduction to Satellite Data” session. All participants were trained to know the main concept of Geo-informatics technology. This module prepared them for next session.

Then, all participants practiced the laboratory of color composite images and visual interpretation to understand the benefits of satellite images for rice monitoring. Moreover, they learned the satellite image classification for rice field areas and location and production forecasting using satellite data though the case study of Thailand experiences.

To strengthen resilient capacity building in rice production, all participant were assigned to have the group work on rice monitoring by countries and group discussion on future plan of ASEAN rice monitoring system to realize the current situation, problem and appropriate and sustainable solution for their countries.



Activity 1: Overview of Geo-Informatics and Remote sensing Technology

Participants were introduced to principles, concepts and applications of Geo-Informatics and Remote Sensing Technology. This section deals with spatial data to gain skill in the use of basic geospatial tools, a decision support tool for planners and managers of spatial information.



Activity 2: Geo-Informatics and Remote Sensing Technology for Rice Monitoring and Thai experiences in Rice Mapping and Monitoring using Satellite remote sensing as well as how to apply GIS, GPS and RS in assessment of rice crop area extent and hands-on practical exercises to processing, downloading, and visualizing large volume of geospatial and remote sensing data.



Activity 3: Rice Field Survey

After participants gained knowledge from hands-on project, we conducted the Rice Field survey to obtain reference data to test the accuracy of resulting maps.



Activity 4: Technical Visit at GISTDA Ground Receiving Station and Space Inspirium

Participants visited Thailand Ground Receiving Station which receives, processes and archives more than 30 satellites, with some 4 million scenes of satellite data. They learned about how to operate the big-diameter antenna as well as the corresponding data receiving, recording and transmitting facilities. For Space Inspirium, it is the first and only space learning center in Thailand that inspire visitors lead to imagination and curiosity in the space system. It has a two story building with 13 zones that have a different appeal. Zone 1-7 describes the origin of the universe through a video presentation on the hologram screen. This give an answer to why the world is a creature. What are the factors that make life on earth possible? Then why do not we float from the world?

It describes the evolution of space exploration. It explains the factors that must be taken into consideration when going to outer space and how the body reacts when out of the world. Zone 8-13 have introduced a remote sensing system and Satellite navigation system.

The exhibition also show Application of remote sensing systems in areas such as natural and agricultural, urban planning and protection.

The visiting Space Inspirium as Thailand space museum could exhibits an overview of space exploration and the benefits derived from Earth observation satellites. The tour offered to participants with an impressive experience learning about the development of Thailand Satellites and their operational technique and advances, especially in the field of agriculture.



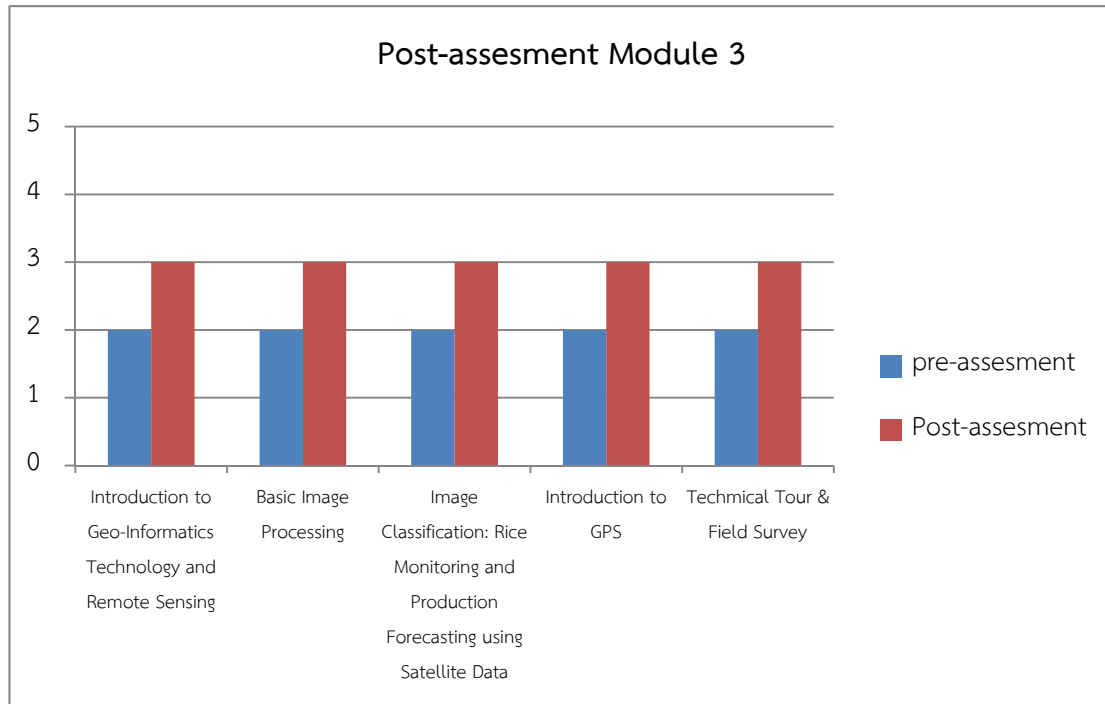
Result & outcome :

Post-Assessment for Module 3 :

Rice Crop monitoring using Satellite Remote Sensing

After completed the training course, the Post-Assessment had been done to all 17 participants again in order to evaluate the knowledge and experience they have gained from the course.

The overall score rate of Post-Assessment on Module 3 for total 5 topics is at rank no.3 (I have some knowledge on this topic but could not do it now without further study). Therefore, this show that the training should allow more durations (may be 7-10 days) for the participants to gain new knowledge because this is new and advance topic especially in Basic Image Processing that should be more concentrated as the basic fundamental for explaining the forecasts by using the Satellite.



Furthermore, the lecturer and organizers found that this activity contributed the understanding of introduction of Geo-informatics, rice monitoring and production forecasting using satellite data including lab exercise and field survey to Mekong countries.

The lecturers and organizers also suggested that the duration of the course should be longer than 5 days to train all participants intensively. The participants need “on the job training” in order to improve capacity of all participants for ensuring the potential in rice monitoring and applying for their work tangibly. Several sample sites are needed to verify and validate the results of image classification to improve accuracy and precision of a rice monitoring and rice production forecasting model.

Evaluating the success of this module 3 should be considered and assessed for a long-term monitoring by observing and follow up the results of the project and submitting the report of rice yield measurement in a given time frame.

Field Trip in the Republic of Korea

Dated 13-17 March 2017

The field trip to Korea provided for all participants and Thailand team project with the aim to learn the experiences and learning advance technology from Korea to be apply with their skills and expertise. The institutions in field trip are in accordance with three training module.

The visit included Rural Development Administration (RDA), INNOPOLIS Foundation, and Korea Aerospace Research Institute (KARI). Additionally, the visitation to Korea International Cooperation Agency (KOICA), and Royal Thai Embassy also have been included in order to exchange views and comments to improve the development cooperation between Thailand with Korea and support to Mekong countries.

Rural Development Administration (RDA) [in accordance with Module 1]

The Rural Development Administration is the Korea central government organization responsible for extensive agricultural field in terms of research, development, support, and service in Korea. Its founded in 1962 after the end of the Korean War in order to develop and provide rice and vegetable production for domestic consumption sufficiently due to the crop season in Korea is very limited especially in the winter. Its goal to achieve self-sufficiency in rice and other staple food through dissemination and promotion of high-yielding cultivars and improved cropping technologies, and made a remarkable progress in fresh vegetable

production by introducing year-round cropping systems in greenhouses.

The main mission of RDA aim to improve technology for crop for high yielding. RDA also contributed greatly to the improvement of the rural environment and nurturing new farmers. However, after joining in the international trade, agricultural pattern in Korea has been changed. As a result, RDA need to seek for cooperation for further support with changing of agricultural patterns in Korea. In this connection and would complement to Mekong cooperation project, RDA and the Department of Agriculture of Thailand have established the center of “Korea Project on International Agriculture: KOPIA” in Thailand in order to exchange agricultural techniques and experiences and also capacity building for researchers through training course and field visit.

Throughout the field trip at RDA and Korea experiences in rice production, participants can gain good experiential learning combine with direct experience which is meaningful with guidance reflection and analysis in rice production and rural development.



INNOPOLIS Foundation [in accordance with Module 2]

The INNOPOLIS Foundation is a prototype organization in Korea that transform research study and development policy recommendation to the manufacturing sector. Through this visit, participants would be inspired to apply their own creative thinking knowledge and gained innovation and technology to improve the rice industry and also create value added in food industry, agriculture, biotechnology, and related services in their Mekong countries. At present, in close cooperation between two countries the INNOPOLIS Foundation of Korea has signed the memorandum of understanding (MOU) with the Ministry of Science and Technology of Thailand for a joint management in Science and food Innopolis Park which include exchange information and experiences, technology transfer, consultation, and entrepreneur training course provided.

The participants also learned the history of Korean industrial development as well as the initiation of the Special Research and Development Zones. Moreover, participants were introduced to the model of Special Research and Development Zones and its management of which are very useful for the future industrial development in their Mekong countries.



Korea Aerospace Research Institute (KARI) [in accordance with Module 3]

The Korea Aerospace Research Institute (KARI) was established in 10 October 1989 located in Daejeon , the city of science and technology in the central part of Korea. The participants visited to the space test center and be exposed to the actual site of space development. It's facilities are for analyzing and testing the final assembly, alignment, heat/vacuum properties and electromagnetic wave properties of systems such as satellites and launch vehicles that require a high degree of reliability. The participants also visit National Satellite Operation & Application Center which dedicated to the operation of government satellites and the systematic and efficient utilization of satellite data. It is developing an integrated database and platform to integrate the government's satellite data and increase its added value by establishing a user-friendly data distribution function to contribute to national economic development.

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The mission is set to experience the research and develop space technology and also as rocket and space launcher area in Korea. There are three satellites that have already launched into the space namely KOMPSAT1, KOMPSAT2, and KOMPSAT3. The participants have learned and shared about space and spatial data while discovered that in Korea the data from satellites would be applied for agricultural survey and study as well as to forecast yield crops. This visit is in accordance with the project that would encourage the Mekong participants to learn the application of geo-informatics technology in order to plan the rice farming by learning from Thailand to apply in their Mekong region due to Thailand contains readiness in satellite surveying as well as Korea.



Korea International Cooperation Agency (KOICA)

Participants were introduced to the KOICA organizational functions and its cooperation with the Mekong countries. Dr. Minho Lee, Agriculture Specialist gave his insightful presentation on the topic of *KOICA's Experience and Strategy for Rice Production in Developing Country*, which explained about KOICA's goal for SDGs, KOICA's Experience on Rice Production, KOICA's Strategy (2016-2020) for Agricultural and Rural Development, KOICA's New Projects for Rice and its future tasks. Afterwards there was an exchange of views and knowledge between participants and the representative from KOICA on the situation of rice production and their involvement in several development projects in the Mekong countries. Dr. Lee also informed the participants that there are KOICA offices available in the Mekong countries, which provided them greater opportunity to enhance their cooperation with KOICA.



Royal Thai Embassy in the Republic of Korea

Participants were welcomed to the Royal Thai Embassy in the Republic of Korea . Discussion and exchange views on how to enhance more collaborative cooperation under Mekong Korea Cooperation.



Evaluation and Monitoring

Later 5 months after finished the training course in Thailand and Field visit to Korea , on 22 August 2017, the Division of Economic Relations and Cooperation, Department of *International Economic Affairs*, Ministry of Foreign Affairs the focal point of Thailand team project followed up all 17 participants by emailing the training evaluation questionnaire. The purpose to follow the objectives of the project to evaluate and assess how the participants gain better knowledge and apply in practice in their duty or responsibility in the local areas.

Rating scale compose of 5 levels of satisfaction :

5 = Strongly Agree

4 = Agree

3 = Neutral

2 = Disagree

1 = Strongly Disagree

ATTACHMENT 6

However, there are only 5/17 participants reply back in response to the evaluation 4/4 from Cambodia and 1/5 from Thailand. The result of evaluation as follow :

Participants agree that the objectives of the project was clear defined and the topic covered those relevant to their function in home countries. Module 1 on increasing rice yield through efficient production methods is the most useful , follow by Module 3 on rice crop monitoring using satellite remote sensing but the training should extend more time due to this topic is very new with hi technology. Module 2 on green productivity in rice mill factory technology also useful for planning the production of rice supply chain from up stream to middle stream

and extended to down stream. Workshop case study with experiment in the fields are very useful tools for the training program. At this moment, the cooperation among Mekong countries is need for fundamental extend to build up the cooperation with Korea.

Since the evaluation method by emailing is only few response, therefore, the monitoring visit to participants is needed in order to follow up the results they have gained from the training course.

In addition to the evaluation, during that period the team project also visited selected participants (based on budget availability) to follow up and in-depth interview on how those participants utilize the knowledge and apply into there duty.

The activities has been done as following

One Thai participant in Northeast of Thailand on September 2017

Two Laos Participants in Vientian, Laos PDR on September 2017

Four Cambodian participants in Phnom Phen, Cambodia on November 2017

Two Myanmar participants in Naypitaw, Myanmar on February 2018

Result & outcome :

THAILAND

Participant:Ms .Sakonwan Aranyanak (5 September 2017)
Position:Agricultural Research Officer, Kalasin Rice Seed Center,
Rice Seed Division, Department of Rice ,
Ministry of Agriculture and Cooperatives , Thailand

- Participant has learned issues of rice production theories which include rice varieties, pollination, rice physiology, seed production, soil, rice disease, and pests .The contents from training course are relevant and very useful to her duty .She has shared experiences obtained from the training course among MKCF participants which allowed them to find the common and different problems in rice production and management in each Mekong countries .
- She has the opportunity to learn and discuss best practices in rice industry with the stockholders of rice production from relevant government and private sector . In her views, the exercises and workshop simulation are the most effective tools to gain better understanding in the subjects of the training program especially the post-harvest handling of rice grains. Besides, She has learned the advanced techniques in rice production so that she can apply the knowledge from the training course and contributes to the achievement of the organization's mission .
- Regarding the module of Geo- Informatics and Remote Sensing Technology took place at Geo-informatics and space technology development agency : GISTDA, this is one of the most useful in her practical duty especially the issue of remote sensing-based methods for forecasting rice production .This knowledge could contribute to government, organizations, planners, and decision makers to formulate appropriate policies in rice crop management . However this training module should be conducted in longer period in order to learn the rice field survey compliant with workshop in order to obtain reference data to test the accuracy of resulting maps accordingly. She has applied GISTDA 's data from website gisagro2.gistda.or.th to study and monitor rice production. GPS tracking devices have been used to collect all ground control points in field survey for image validation. In addition , the participants brings knowledge and experiences from the training course to establish a research project on paddy flood monitoring which are used to assess and observe rice growth stage for three years. A project on flood monitoring and waring system for paddy fields is also launched. She will propose their project proposal for financial support to her organization and request GISTDA to be an advisor for the projects.
- To sum up, she acquired knowledge and skill in rice production and willing to share her excellent knowledge to colleagues and rice farmers in the target community in order to improve rice productivity in Kalasin province . She also initiates study research project of rice crop by the application of remote sensing sensors, this project is in the process of seeking funding support .



LAOS PDR

Participant: Mrs. Sengsathith Phalakhong (6 September 2017)

Position: Head of Weed Science Unit, Plant Protection Center,
Vientiane Laos PDR

- Participant has learned new techniques in Good Agricultural Practices for Rice GAP, rice production systems and the post-harvest handling of rice grains. Besides, the agricultural background and emerging problems in the agricultural sector among Mekong member countries also have been discussed.
- Rice and Sticky Rice are the staple food grain produced in Laos PDR, with greater than 70 percent of all agricultural land devoted to its cultivation. However, Laos PDR has serious limits to its ability to expand the production due to flooding, climate change and increased pest outbreaks. Therefore, the lesson learned of advanced techniques in rice production are very useful in her practical duty in order to increase in the growth rate of rice yield.
- She discloses widely and shares knowledge among colleagues and farmers on various issues related to paddy farming activities such as Good Agricultural Practices (GAP) and post-harvest handling of rice grains in order to develop local rice seeds especially “Khao Kai Noy and Khao Tadokkham 8-11 (TDK8–TDK11)” (which are the most popular rice in Laos PDR).
- Due to Thailand having the best practice while Laos PDR having lower potential in technical expertise, in her view the module of Manufacturing Technology and Green Productivity in Rice Mill taking place at the National Food Institute (NFI) (should extend more theories of post-harvest system and advanced techniques in rice mill factory).
- The experience learned in rice mapping and monitoring using satellite remote sensing are very useful for her professional career. She tries to apply available data sources from GIS, GPS and RS in assessment and management of rice crop area from GISTDA website. The suggestion is to provide in English version. It is represented that participant has applied knowledge of satellite images for processing the analysis of rice suitable area in Laos PDR by using QGIS software, while some software that learned from the training course such as ENVI and ArcGIS are limited to a copy right. However, she always states that satellite image application for crop monitoring could reduce the time and cost. She prefers to attend GISTDA training course to enhance her knowledge in using technology for her duty especially to study outbreak monitoring and analysis in paddy field by using remote sensing techniques due to it is the main problem of rice plantation in Laos PDR. Therefore, collaborative project between GISTDA and Laos PDR on pest outbreaks monitoring for paddy field is needed.
- This training course highlights rice production in Laos, Cambodia, Myanmar, and Thailand – countries that share the international Mekong River. Therefore, it is the great opportunity to enhance regional cooperation frameworks such as the Lower Mekong Initiative and the Mekong Rice Seed Quality Improvement for promoting sustainable rice production to ensure a robust outcome that would benefit the people in this region.



Participant :Mr .Konekham Syvantha (7 September 2017)
 Position: Vice-Director, Naxaythong Agriculture and Forestry Office,
 Laos PDR.

At present, the current situation and outlook of rice production in Naxaythong District, Vientiane Capital require greater irrigation system .The paddy cultivation pilot scheme has been selected in this area due to suitable conditions for rice cultivation.

- The training course provides Mekong participants with practical learning experience through interaction with farmers who serve as facilitators of learning in rice farming activities .The participants acquire practical knowledge and skills through a structured training program that complement to the farmer learning process .In his view, all the activities are most effective in helping him to apply on his duty which include 1 (organizing local community in organic crops, rice, animal feeding which is in line with the theory of Sufficient Economy of Thailand .2 (Technology in rice production and rice mill management .3(Climate risk assessment by satellite remote sensing.
- The experiences in both rice production theories, fertilization and pests-management from the training course are very meaningful and useful .He expressed his willingness to apply the technologies learned as well as to share the experience among farmers in target communities.
- Rice farmers in Naxaythong District are not only extensively widely using pesticides, but they also using higher seed and fertilize .Therefore, participants have set up the rice farmer model projects in order to develop rice cultivation into organic farming .He tries to motivate farmers to use alternative pest control management to reduce the environmental impacts and health effects.
- In addition, He explores the potential utility of integrating Geo- Informatics and Remote Sensing Technology in monitoring stages of rice and compare the rice productivities .At the moment, Regional cooperation has been developed between the Geo- Informatics and Space Technology Development Agency or)GISTDA (of Thailand and the Agriculture and Forestry Office of Laos PDR in terms of supporting the new knowledge of Remote Sensing Technology in agricultural sector in Laos PDR.



CAMBODIA

Participant: Mr. Marinat Ngoun (28-29 November 2017)

Position: Technical Officer, Department of Rice Crop, General Directorate of Agriculture, Cambodia

- A famous Cambodian rice, *Phka Rumduol*, was chosen as the “World’s Best Rice” for three consecutive years (2012 – 2014). Rice in Cambodia is mainly produced during the wet season, which accounts for more than 75% of total paddy output per year. However, the rice has a wide array of ‘enemies’ in the field which include rodents, harmful insects, viruses, diseases, and weeds. Understanding the interactions among pests, natural enemies, host plants, other organisms, and the environment would allow farmers to determine how to deal with pest management if necessary. Therefore, the lessons of advanced techniques in rice production are very useful in his practical duty in order to increase in the growth rate of rice yields.
- Participant has learned new techniques in rice production system such as rice breeding, rice seed production, post-harvest technology and green rice mill concept. The contents of the rice mill best practices of in Thailand would encourage participants to apply the knowledge of rice mill factory on his duty.
- He shares knowledge among colleagues and farmers on various issues related to paddy farming activities and also applied knowledge and experience learned from training program into his research project about rice seed production.
- The resilience of rice production systems to climate changes can be enhanced by improving more understanding impacts and responses of rice to changing climates. Several countries in Asia are at the risk of losing potential rice production as a result of climate change factor, particularly increasing temperatures and prolonged dry periods. In his view, the module of rice breeding method and rice quality seed production should extend more time referred to theories of rice variety improvement.
- In addition, he explores the potential utility of Geo-Informatics, Remote Sensing Technology and Image Classification in identifying, characterizing, and monitoring stage of rice and mapping rice production areas in Phnom Penh.



Participant: Mr. Sovann Nget (28-29 November 2017)

Position: Technical Officer, Department of Rice Crop, General Directorate of Agriculture, Cambodia

- Even though the food habits of the people of Cambodia changed over the last few decades, but rice still continues to be their staple food. However, the yield and quality of rice has been reduced due to seed degeneration, if seed is used repeatedly. In his view, the module of increasing rice yields through efficient production methods and the module of Green productivity in rice mill factory technology are most effective modules in helping him to apply on his duty in order to increased rice yield in Cambodia.
- Using good quality seed is important to maintain the yield and quality of the variety. It is also important to avoid seed-borne diseases. Therefore, participant would like to learn more about rice classification and specific crop classification (Product type, Crop genus and species) in order to develop local rice seeds.

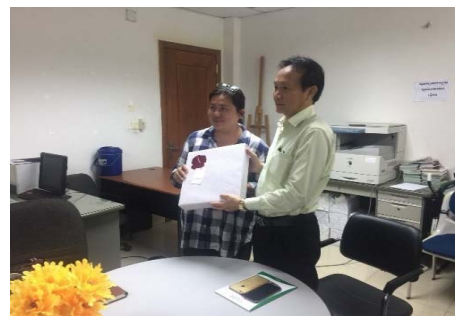
- It is widely recognized that the timely and effective transfer of technologies and knowledge from Thai researchers to farmer fields remains one of the greatest challenges in developing Thailand agriculture. Therefore, participant would like to learn more knowledge from Thailand in term of coaching in order to transfer expertise and all knowledge from the training program to farmer in Cambodia.
- In his view all the 3 modules are really useful and module 3 (Geo-Informatics and Remote Sensing Technology) is the most useful. This course relates to his duty as a technical officer in the Department of Rice Crop, so there should be extension to conduct.



Participants: Mr. Chaya Vaesna (28-29 November 2017)

Position: Technical Officer, Department of Agriculture Land Resource Management, General Directorate of Agriculture, Cambodia

- Rice production situation in Cambodia this year is somewhat problematic due to several storms in Monsoon season. The overall production possibly reduces from 1 million tons to 0.6 million tons. However, the aromatic rice (i.e. Phka Rumduol) situation is still quite stable. The main support markets consist of China, Europe, and Malaysia.
- Technology is important to enhance the rice production especially by applying the satellite to survey the farming area (Geo-Informative). In the course, he has the opportunity to learn about the importance of this new method by GISTDA. He gains more knowledge of the system to monitor the rice production area comparing with the targeted production.
- In his view, this course project is very useful to enhance the rice production support to agricultural sector in Cambodia. Additionally, he suggests to extend some activities or contents which including efficient land use, new rice production technic, and other specific crops





Additional Activities Benefit to the Project

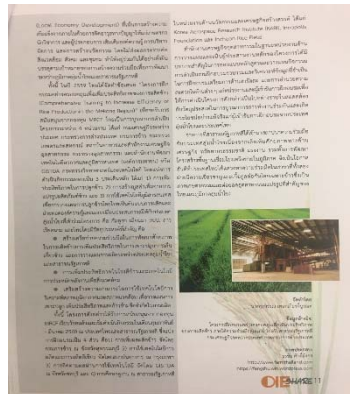
1. Development Cooperation between GISTDA and Lao PDR in satellite image utilization for rice monitoring and yield forecasting system.

Geo-Informatics and Space Technology Development Agency (GISTDA), Minister of Science and Technology of Thailand (one of Thailand team project of Module 3) in cooperation with Department of Technology and Innovation, Minister of Science and Technology of Lao PDR have joint developed the cooperation in satellite image utilization for rice monitoring and yield forecasting system in Laos PRD since 2015. The development cooperation aims to support Lao PDR to learn the efficiency utilization on the management of agricultural cultivation areas due to space technology and geographic information system are key instruments to manage large crop areas. Rice is the major crop in Lao PDR therefore, utilization of satellite image to monitor rice cultivation area and yield forecast would bring the benefits to Lao PDR from local to national level. With the reasons that Lao PDR does not contain sufficient technology, hence GISTDA has offered instrument development, operational and technical consultation, human resource development, and promotional utilization. The cooperation development also in accordance with sustainable rice cultivation management in Lao PDR and SDGs development goal.



2. Dissemination of Mekong-Republic of Korea Cooperation.

2.1 Office of Industrial Economics (OIE), Ministry of Industry , Thailand one of the project facilitator has disseminated the scoop in OIE Share monthly journal on February 2017. There were the introduction of the sub regional cooperation of Mekong-Republic of Korea Cooperation and the support of Mekong-Republic of Korea Cooperation Fund : MRCF) to Thailand project of “Comprehensive Training to Increase Efficiency of Rice Production in the Mekong Region).



ATTACHEMENT 7

2.2 Office of Industrial Economics (OIE), Ministry of Industry , Thailand one of the project facilitator has disseminated the scoop in OIE Share monthly journal on December 2017. There was the report of Thailand project “Comprehensive Training to Increase Efficiency of Rice Production in the Mekong Region”. This is

the showcase of the sub regional cooperation of Mekong-Republic of Korea Cooperation with the great support from Mekong-Republic of Korea Cooperation Fund : MRCF).



Sharing
การนำนวัตกรรมเทคโนโลยีการรีไซเคิลพลาสติก (Mekong - Republic of Korea Cooperation) ตอนที่ 2 นวัตกรรม การรีไซเคิล ไข่มุกแห่งประสาทรักพัฒนาการเกษตรอย่างยั่งยืน

กิจกรรมที่ 200 ของโครงการ MRCF...
 กิจกรรมที่ 200 ของโครงการ MRCF...
 กิจกรรมที่ 200 ของโครงการ MRCF...



Rural Development Administrative (RDA) ...
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Korea Aerospace Research Institute (KARI) ...
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ATTACHMENT 8

2.3 Mr.Chalee Khansiri , Senior Plan and Policy Analyst , Office of Industrial Economics (OIE), Ministry of Industry , Thailand one of the project facilitator had done research study at the training course of executive level. He studied the topic “The Application of Sufficiency Economy Philosophy of King Bhumipol Rama IX in Comprehensive Training to Increase Efficiency of Rice Production in the Mekong Region”.

He had applied the content of Module 2 “Manufacturing Technology and Green Productivity in Rice Mill” by showing the case study of rice mill factory at Nakhon Pathom Province and how to apply with Sufficiency Economy Philosophy. The study found that five aspects of Sufficiency Economy can lead the production process in rice mill factory become more productivity and reach to green development.



นักบริหารระดับกลาง รุ่นที่ 33-34
กระทรวงอุตสาหกรรม กลุ่มที่ 2

การศึกษานำหลักปรัชญาเศรษฐกิจพอเพียง มาประยุกต์ใช้ในโครงการฝึกอบรมอย่างครอบคลุม เพื่อเพิ่มประสิทธิภาพการผลิตข้าว ให้กับประเทศผู้นำเข้าน





ATTACHMENT 9

Problems Encountered / Deviations

1. Participants came from different background knowledge and ages. There is a knowledge gap among them.
Possible Solution: Small group activities were very helpful in facilitating the peer assistance among the participant, contributing to fulfilling the existing knowledge gap.

2. Participants after finished training course and back to their home countries may not convenience to response evaluation and feedback.

Possible Solution: *-To be completed-*

3. The budget transferred to each organization was delayed because the process of the government regulations and the different internal management in each organization.

Possible Solution: If possible, the implementing agency could should advance its own budget before the process is approved.

4. The project implement by several organizations, therefore the communication and the status of implementing from each team project may not be updated.

Possible Solution: Intersessional discussion among team project of each organization should meet regularly.

5. Changing and moving of officers and people of each Module in Thailand team project may lead to delay of country report submission.

Possible Solution: Focal point of each organization should communicate among team project.

	Indicator	Achieved	Remarks
Project output 1.	Trained personnel with better knowledge and wider experiences on Increasing rice yields through efficiency production methods.	Achieved Pre Assessment score rank no.2 : have heard this topic but do not know enough about how to do/use it Post Assessment score rank no.4 : have a good working knowledge and can do routine aspects now	- Quantitative result Pre / Post Assessment Form : Module 1 (on site) from 17 participants
Project output 2.	Trained personnel with better knowledge and wider experiences on Green productivity in rice	Achieved Pre Assessment score rank no.1 : do not know anything about this topic Post Assessment score rank no.3 : have some	- Quantitative result Pre / Post Assessment Form : Module 2 (on site) from 17 participants

	mill factory technology.	knowledge this topic but could not do it now without further study	
Project output 3.	Trained personnel with better knowledge and wider experiences on Rice crop monitoring using Satellite Remote Sensing.	Achieved Pre Assessment score rank no.2 : have heard this topic but do not know enough about how to do/use it Post Assessment score rank no.3 : have some knowledge this topic but could not do it now without further study	- Quantitative result Pre / Post Assessment Form : Module 3 (on site) from 17 participants
Project output 4.	Sharing of best practices among Mekong members and Korea on possibility applied technology in rice mill factory.	Achieved Participants among Mekong countries share their own knowledge and experiences on rice production. However they have not yet shared with Korea due to the project was introduced only in the initiatives stage.	- Quantitative result - Qualitative from study visit in Korea - Monitoring CLMT
Project output 5.	Creation on rice cooperation between Mekong members and Korea to serve for food security in the region.	Not Achieved yet , however Mekong participants of each countries create its community to communicate among them and among all participants. Therefore MRKC should continue develop cooperation program in order to create more opportunities in food security and extend to various aspects.	- Qualitative from study visit in Korea - Monitoring CLMT

D. Project outcomes

- Briefly describe the project outcomes that were achieved.

Thailand project provided for Mekong countries achieved successful outcome for agriculture and rural development. Most of the participants gain more knowledge and wider experiences on Module 1 increasing rice yields through efficiency production methods. They also get better knowledge and wider experiences on rice crop monitoring by using Satellite Remote Sensing that should extend more time to study. Additionally, they get better knowledge and wider experiences on Green productivity in rice mill factory technology to support the supply chain of rice production. However, learning of best practice and hi technology from Korea need to be extended such as joint research project, joint workshop and exchange of visit.

-To be completed-

	Indicator	Achieved	Remarks
Project outcome 1.	Cooperative network between Mekong countries and the ROK on rice production and	Not Achieved yet , however MRKC should continue develop cooperation program in order to create more	- Monitoring CLMT

	food security.	opportunities on rice production and food security and extend to various aspects.	
Project outcome 2.	Apply knowledge and skills on rice production and food security.	Achieved Participants among Mekong countries apply knowledge and experiences of rice production learned from the project into their function at home countries in order to serve for food security in the future.	- Monitoring CLMT
Project outcome 3.	Sharing of knowledge and best practices among Mekong countries and the ROK by group work and group presentation.	Achieved Participants among Mekong countries sharing knowledge and best practice during training program by group work and group presentation. However, sharing with ROK have not been done yet. The project only introduced Korea organization that related to each Module. The continues support would be need in order to strengthening the cooperation.	- Monitoring CLMT
Project outcome 4.	Transfer knowledge for good practice in rice production to their colleagues in country.	Achieved All participants do transfer knowledge for good practice in rice production to their colleagues and community in their home countries.	- Monitoring CLMT
Project outcome 5.	They have an experience at the real situation in rice production from visiting both government and private sector and they can exchange the experience with the farmer in that area.	Achieved Most of participants have experience at the real situation in rice production by visiting both government and private sector and they exchange experience with the farmer in that area.	- Monitoring CLMT
Long Term outcome 1.	Sustainable agriculture and food security.	Achieved for initial stage and need to continue further development	
Long Term outcome 2.	Regional competitiveness on rice production and food security.	Achieved for initial stage and need to continue further development	
Long Term outcome 3.	Increase yield and reduce cost of rice production in	Achieved. Theories provided by Thailand team in three Modules are	

	CLMVT countries.	realistic to implement and could support to increase yield and reduce cost of rice production.	
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E. Contribution towards developing the Mekong Countries and deepening the Mekong-ROK cooperation

-To be completed-

F. Overall Project Assessment

- Outline two or three key findings or lessons learned arising from the implementation of the project.

- If applicable, provide explanation for any adjustments made for project implementation

1. Plantation of rice field and land mapping plan with the application of hi tech technology are vital key factors for increasing efficiency of rice yield production.

2. Systematic manufacturing to control productivity in rice mill factory with the application of sufficiency theory is also key factor to improve rice production.

3. Research and development is the core function in order to extended development of value added of rice from downstream to upstream supply chain.

- Provide guidance to the design and implementation of future or related projects.

The workshop provided by Mekong Institute for Mekong-Korea countries is needed in order to understand and proper preparation on how to draft the project proposal and activities in order to response the objectives of the development project.

G. Financial Analysis

-To be completed-

H. Project Completion Check List

I. By Mekong Institute

Name
Title
TIF
Mekong Institute
Signature
Date