

Workshop on Technology Transfer for Sustainable Agriculture

28 April – 2 May 2014, Bogor, Indonesia

Workshop Report



Acknowledgements

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Workshop on Technology Transfer for Sustainable Agriculture

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Executive Summary

The Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA) organized a 'Workshop on Technology Transfer for Sustainable Agriculture' from 28 April – 2 May 2014 in Bogor, Indonesia, in partnership with the Indonesian Agency for Agricultural Research and Development (IAARD), Ministry of Agriculture of Indonesia, and AVRDC – The World Vegetable Center. The training was conducted as part of CAPSA's capacity building programme on sustainable agriculture and complemented outreach activities organized under SATNET Asia, a Knowledge Network facilitated by CAPSA and funded by the European Union.

Twenty seven participants including representatives of the Ministries of Agriculture and related government agencies working in the area of agricultural policy and extension from Indonesia as well as Lao People's Democratic Republic, Myanmar, the Philippines and Timor Leste, took part in the event.

The objective of the workshop was to promote food security by strengthening national capacities for transfer of agricultural technologies that are sustainable, productivity enhancing, suitable for resource poor farmers, and gender sensitive. It was designed in response to a concrete demand expressed by national stakeholders, and addressed technology transfer at both the technical and policy levels. Specifically, the workshop discussed the concept of sustainable agriculture, indicators for measuring the sustainability of agricultural technologies, key approaches in technology transfer, techniques for assessing the adoption and diffusion of technologies, ways to overcome barriers, and technology transfer in particular priority areas. Resource persons comprising of established experts from Indonesia as well as abroad drawn from international organizations, government institutions, private sector and civil society organizations shared their expertise and experience to optimize the learning for participants. Time was allocated for the participants to engage in group work as well as contribute their own examples and perspectives to the discussion. In order to provide practical exposure, a field visit was also conducted to demonstration plots of IAARD showcasing sustainable agricultural technologies and integrated farming systems in peri-urban environments.

In the closing session, the participants thanked the organizers and expressed appreciation for the resource persons of the workshop. They noted the valuable opportunity for interaction with peers from other countries and indicated they had gained useful knowledge from this workshop which they would apply in their work. A training evaluation was also conducted at the end of the event. About 92% of the participants rated the training as 'excellent' or 'good' while 66% indicated that the training met their expectations to a 'very large' or 'large' extent. Some of the suggestions put forth for improvement included discussing more practical cases during the sessions, discussing successes as well as failures, assessing the possibility of arranging simultaneous translation from English to other languages, and inviting NGOs and academia in addition to government representatives.

Workshop on Technology Transfer for Sustainable Agriculture

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Workshop Report

I. Introduction

One of the key challenges facing mankind today is how to meet the increasing demand for food resulting from a rising population, higher incomes levels, and changes in dietary patterns¹. It has been predicted that food production will need to increase by 60-70% by 2050 in order to feed everyone. For developing countries, it is also projected that 80% of the required increase would be from intensification of crop production, particularly higher yields and cropping intensity, and only 20% from increase in arable land² which is constrained by competing land use requirements for urbanization and industrialization. Adding to this challenge is the imperative need for ensuring sustainability of production systems and of adapting to the impacts of climate change which pose a threat to maintaining even existing levels of crop yields.

Technology transfer is critical to addressing all these challenges and for sustainably enhancing incomes of the farming community. The identification, dissemination, adaptation and adoption of appropriate technologies can help farmers bridge the yield gap and/or increase cropping intensity to achieve production growth. Smallholder farmers comprise a large chunk of the farming community in developing countries but often lack the resources to use modern technologies, making technology transfer for them especially important. Moreover, capacity building of relevant national stakeholders is required for ensuring the effectiveness and success of technology transfer initiatives.

In the above context, the objective of this workshop was to promote food security by strengthening national capacities for transfer of agricultural technologies that are sustainable, productivity enhancing, suitable for resource poor farmers, and gender sensitive. It was designed in response to a concrete demand expressed by national stakeholders, and addressed technology transfer at both the technical and policy levels.

II. Programme

The workshop methodology consisted of the following key elements:

- Lectures
- Applications
- Group work and group discussions
- Field visit

The detailed training programme is enclosed in **Annex I**.

¹ <http://ccafs.cgiar.org/bigfacts/global-food-demand/>

² FAO, How to Feed the World in 2050 (2009),
[http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How to Feed the World in 2050.pdf](http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf)

III. Participants

Twenty seven participants including representatives of the Ministries of Agriculture and related government agencies working in the area of agricultural policy and extension from Indonesia as well as Lao People's Democratic Republic, Myanmar, the Philippines and Timor Leste, took part in the event. Fifteen resource persons from Indonesia as well as abroad and CAPSA/ESCAP staff also participated. The list of participants is enclosed as **Annex II**.

IV. Discussions and key learning outcomes

Theme 1: Sustainable agriculture technologies

The concept of sustainable agriculture: The session provided a brief history and explained the terminology of 'sustainability' and 'sustainable development'. It discussed the background, challenges and issues, and values and goals of sustainable agriculture. Components of a strategy for sustainable agriculture and policy considerations were also discussed.

Indicators of sustainable agricultural technologies: The session elaborated upon why sustainability matters and examined some examples of sustainable agriculture. It discussed ways to measure sustainability, in particular, through Composite Sustainability Indices (CSI). The process for calculation of CSI and the Sustainability Assessment of Food and Agriculture systems (SAFA) framework developed by FAO were explained.

Theme 2: Basic concepts and key approaches in agricultural technology transfer

Technology transfer concept and role of effective research-extension linkages: The concept of technology transfer and its relation to key elements like international/regional best practices and benefits accumulation for all were discussed. A framework for technology transfer and capacity development comprising of policy, institutions and people was presented along with examples and case studies.

Link between technology transfer and sustainable livelihoods: A group exercise was conducted in which participants described cases from their countries where sustainable agriculture technology transfer resulted in positive outcome on livelihoods.

Pathways and key approaches for technology transfer and diffusion: An introduction to the definition and various elements of rural extension and advisory work, underlying theoretical and psychological models (Psychological Field Theory, behavior and change of behavior, perception), and the concept and characteristics of innovations were presented. Examples of the extension approach and characteristics of a good advisor were also discussed.

ASEAN GAP – Current status and key learnings to date: The concept of Good Agricultural Practices (GAP), and the status and global and regional influences on GAP were outlined. GAP adoption in the ASEAN region was discussed in detail including progress in implementation, barriers and strategies to increase adoption. Some learnings from GAP implementation in Vietnam were also presented.

Theme 3: Technology transfer in specific priority areas

Bioindustry approach for sustainable agriculture: The concept and various examples of bioindustrial agriculture and related bioindustrial research for sustainable agriculture were discussed. Biomass utilization, and related bioindustrial trade were also discussed. Examples were used to illustrate the discussions.

Technology transfer in GMO and hybrid seeds: Various dimensions of Genetically Modified Organisms (GMO) and hybrid varieties and technology transfer for them were examined. These included types of hybrid varieties, meaning of GMO, whether these varieties require different strategies for technology transfer, general regulations in case of GMO, their advantages, and specific guidance on how to transfer technology to farmers for hybrid and GMO varieties.

Technology transfer: Vegetable hybrid seeds (private sector perspective): The session covered a background of the vegetable sector in Indonesia and some other Asian countries, how the private sector perceives technology transfer, examples of specific projects, issues and challenges, and suggestions for effective delivery of technology and sustained use by end users.

Agriculture machinery: The session presented an overview of agricultural mechanization including growth trends, productivity gains, current gaps and outlook for the future. A number of approaches to encourage more sustained adoption were outlined. The Asian and Pacific Network for Testing of Agricultural Machinery (ANTAM) launched in 2013 was also briefly discussed.

Field visit

In order to provide practical exposure to the participants, a field visit was conducted on 30th April 2014 to demonstration plots of IAARD showcasing sustainable agricultural technologies and integrated farming systems in peri-urban environments. At the first of the two sites visited, participants interacted with a local champion (lead farmer) to learn about his adoption and advocacy of technologies promoted by one of the Assessment Institutes for Agricultural Technology (AIAT) of the Indonesian Center for Agricultural Technology Assessment and Development (ICATAD) in East Jakarta. These technologies related to preparation of compost, organic farming techniques, use of onion peels coming as waste from community kitchens, vegetable seed nurseries to supply seeds to the community, hydroponics, aquaculture, rabbit farming etc. An interesting part was the integration of the systems where waste from one process was an input for another (eg. rabbit waste being used as manure for the vegetable garden, and vegetable leftovers being used as rabbit feed). The second part of the visit was to the AIAT office, where there was a presentation from the AIAT head and staff to explain about IAARD, ICATAD and the AIAT's work in research and development on sustainable urban agriculture technologies. The participants also visited the AIAT's demonstration plot on campus.

Theme 4: Techniques for assessing the adoption and diffusion of agricultural technologies

Technology categories and market characteristics: The definition of agricultural innovation and the development of agricultural innovations were discussed. The classification of agricultural innovations based on form, impact on economic agents and markets, and whether they are embodied exogenous innovations or packages of disembodied agronomic and managerial innovations, was presented. The case of rice was taken up as an illustration. A group exercise was also conducted to support the learning.

Methods for analyzing adoption and diffusion patterns: The session elaborated upon the difference between adoption and diffusion. The direction of technology adoption literatures was discussed, encompassing use of econometric and modeling methodologies to understand adoption decisions, examining the process of learning and social networks in adoption decisions, and conducting micro-level studies to collect information on adoption decisions in particular contexts for policy purposes. A case of tomato grafting technique in Vietnam was used for illustration.

Measuring sustainability of an agricultural system at the landscape level: In this session, sustainability as applied to an agricultural system and qualities of a sustainable agricultural system were discussed. Various indicators for measuring agricultural sustainability at the landscape level were presented. An alternative approach based on economists' view was also discussed.

Guide for survey design and Applications: The session covered survey and its variants, methods of collecting survey data, selecting samples (probability and non-probability sampling), steps in questionnaire development, questionnaire design (quantitative and qualitative), data analysis, and steps in planning a survey. A group exercise was conducted which provided participants an opportunity to design a survey.

Theme 5: Overcoming barriers to the transfer and diffusion of technologies

Identification of barriers to technology transfer: A comparative analysis of various models of extension such as Training and Visit, Farmers Field Schools, NGO initiatives, and private-sector led efforts was presented, outlining the strengths and constraints of each. Typical challenges in technology transfer for farmers with respect to production, markets, reaching farmers, enabling environment, and communication and understanding (research-extension gap) were enumerated and discussed.

Measures to overcome barriers (capacity building, business linkages, and research-extension gap): In this session, a private sector perspective on incentives to invest, and the approach to extension including promotion of good practices through key farmers and strengthening business linkages in the value chain, was presented. The mechanism through which inclusion of the private sector improves the sustainability of extension services was also discussed. In the context of knowledge transfer, the significance of the research-extension gap was highlighted and ways to bring researchers and practitioners together were discussed. The role of information and communication technologies in facilitating research-practice linkages was elaborated as well.

Role of public-private partnerships (PPP): The meaning of PPP, their importance for knowledge transfer, and the difficulties and challenges involved were outlined. The general approach and experience of East West Seeds (a private sector company) to PPP in Myanmar was presented. A group exercise was conducted to provide participants new perspectives on establishing PPP.

Introduction to Indonesian South-South Sustainable Tropical Agricultural Research Alliance (ISTARA): In the context of Indonesia's experience in sustainable tropical agriculture, the session presented ISTARA as a south-south cooperation initiative of IAARD to be launched soon. The vision, mission, objectives, planned activities and potential partnerships of ISTARA were outlined.

Platform for co-development and transfer of technology in the framework of International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA): The session provided an introduction to ITPGRFA and discussed the mechanism and various aspects of technology transfer under the Treaty. It also discussed about the Platform for Co-development and Transfer of Technologies and noted examples of its activities.

V. Conclusion

In the closing session, the participants thanked the organizers and expressed appreciation for the resource persons of the workshop. They noted the valuable opportunity for interaction with peers from other countries and indicated they had gained useful knowledge from this workshop which they would apply in their work. A training evaluation was also conducted at the end of the event and the results are presented in **Annex III**. About 92% of the participants rated the training as 'excellent' or 'good' while 66% indicated that the training met their expectations to a 'very large' or 'large' extent. Some of the suggestions put forth for improvement included discussing more practical cases during the sessions, discussing successes as well as failures, assessing the possibility of arranging simultaneous translation from English to other languages, and inviting NGOs and academia in addition to government representatives.

Annex I: Workshop Programme

Monday, 28 April 2014

- 08:30 – 09:00 Registration
- 09:00 – 09:30 Inaugural session
IAARD representative
Dr. K. Weinberger, CAPSA-UNESCAP
- Photo session
- 09:30 – 09:45 Refreshments

Introduction

- 09:45 – 10:30 Course introduction and getting-acquainted with each other
Mr. Anshuman Varma, Knowledge Management Coordinator, CAPSA, and
Ms. Martina Spisiakova, Knowledge Management Officer, CAPSA

Theme 1: Sustainable agriculture technologies

- 10:30 – 11:30 The concept of sustainable agriculture
Dr. Katinka Weinberger, Director, CAPSA, Indonesia
- 11:30 – 12:30 Indicators of sustainable agricultural technologies
Dr. Simone Kathrin Kriesemer, Research Fellow, Food Security Center, University of
Hohenheim, Germany (currently based in India)
- 12:30 – 13:30 Lunch
- 13:30 – 15:00 Indicators of sustainable agricultural technologies (contd)
Dr. Simone Kathrin Kriesemer
- 15:00 – 15:30 Refreshments

Theme 2: Basic concepts and key approaches in agricultural technology transfer

- 15:30 – 17:30 Technology transfer concept and role of effective research-extension linkages
Dr. Kevin Gallagher, Agriculture Research, Extension and Education Officer, FAO Regional
Office for Asia and the Pacific (FAO-RAP), Thailand

Tuesday, 29 April 2014

Theme 2: Basic concepts and key approaches in agricultural technology transfer

- 08:30 – 09:45 Link between technology transfer and sustainable livelihoods
Dr. Kevin Gallagher
- 09:45 – 10:00 Refreshments
- 10:00 – 11:30 Pathways and key approaches for technology transfer and diffusion
Dr. Simone Kathrin Kriesemer

11:30 – 12:30 ASEAN GAP – Current status and key learnings to date
Mr. Clive Murray, Regional Project Manager in Asia, Syngenta Foundation for Sustainable Agriculture, Australia

12:30 – 13:30 Lunch

Theme 3: Technology transfer in specific priority areas

13:30 – 14:30 Bioindustry approach for sustainable agriculture
Prof. Dr. Bambang Prastowo, Agricultural Engineering, Indonesian Center for Estate Crops Research and Development (ICECRD), Indonesian Agency for Agricultural Research and Development (IAARD), Ministry of Agriculture, Indonesia

14.30 – 15.15 Technology transfer in GMO and hybrid seeds
Prof. Dr. Sumarno, Plant Breeding and Genetics, Indonesian Center for Food Crops Research and Development (ICFORD), IAARD, Indonesia

15:15 – 15:45 Refreshments

15:45 – 16:30 Technology transfer: Vegetable hybrid seeds (private sector perspective)
Dr. Edwin Saragih, Technology Transfer Manager, PT East West Seed, Indonesia

16:30 – 17:30 Agriculture machinery
Mr. Bing Zhao, Director, Centre for Sustainable Agriculture Machinery (CSAM-ESCAP)

Wednesday, 30 April 2014

Full day Field visit

Thursday, 1 May 2014

Theme 4: Techniques for assessing the adoption and diffusion of agricultural technologies

08:30 – 09:45 Technology categories and market characteristics
Mr. Christian Genova II, Consultant, ICF-GHK International, Philippines

09:45 – 10:00 Refreshments

10:00 – 12:30 Methods for analyzing adoption and diffusion patterns
Mr. Christian Genova

12:30 – 13:30 Lunch

13:30 – 15:00 Measuring sustainability of an agricultural system at the landscape level
Dr. Upali Wickramasinghe, Regional Adviser on Poverty Reduction, CAPSA

15:00 – 15:30 Refreshments

15:30 – 16:30 Guide for survey design
Mr. Christian Genova

16:30 – 17:30 Applications
Mr. Christian Genova

Friday, 2 May 2014

Theme 5: Overcoming barriers to the transfer and diffusion of technologies

- 08:30 – 10:00 Identification of barriers to technology transfer
Mr. Stuart Morris, Extension Manager, East West Seeds International, Myanmar
and Ms. Martina Spisiakova
- 10:00 – 10:15 Refreshments
- 10:15 – 12:00 Measures to overcome barriers (capacity building, business linkages, and research-extension
gap)
Mr. Stuart Morris and Ms. Martina Spisiakova
- 12:00 – 13:30 Lunch
- 13:30 – 14:30 Role of public-private partnerships
Mr. Stuart Morris
- 14:30 – 15:00 Introduction to Indonesian South-South Sustainable Tropical Agricultural Research Alliance
(ISTARA)
Mrs. Seta R. Agustina, Assistant Deputy Director for Collaboration, Indonesian Agency for
Agricultural Research and Development Secretariat (Secretariat of IAARD), Indonesia
- 15:00 – 15:30 Platform for co-development and transfer of technology in the framework of International
Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)
Dr. M. Sabran, National Commission on Genetic Resources, Indonesian Center for
Agricultural Biotechnology and Genetic Resources Research (ICABIOGRD), IAARD,
Indonesia
- 15:30 – 16:00 Refreshments
- 16:00 – 17:30 Evaluation, closing and distribution of certificates

Annex II: List of Participants

Country	Name / Current position	Address	Contact
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1. Lao PDR	Ms. Bounthanom Bouahom Head of Sustainable Agriculture Development Policy Research Unit National Agriculture and Forestry Research Insitute	Nongviengkham Village, Dongdok Campas, Saythan district, Vientiane, Lao PDR	P: +856 21 770 078 F: +856 21 770 047 M: +856 20 5562 2678 E: bounthanom.b@gmail.com
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Annex III: Workshop Evaluation

Introduction

Twenty seven officials from Lao People’s Democratic Republic, Indonesia, Myanmar, the Philippines and Timor Leste representing their Ministry of Agriculture and related government agencies working in agricultural policy and extension, gathered in Bogor, Indonesia, from 28 April – 2 May, 2014 to participate in a workshop on technology transfer for sustainable agriculture. The workshop aimed to strengthen national capacities for transfer of agricultural technologies that are sustainable, productivity-enhancing, gender sensitive, and suitable for resource poor farmers, thereby promoting improved food security.

The workshop was jointly organized by the Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA), a subsidiary of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), the Indonesian Agency for Agricultural Research and Development (IAARD), Ministry of Agriculture, Indonesia, and AVRDC – The World Vegetable Center.

General evaluation

Twenty seven participants (trainees) took part in the training from the following countries of Southeast Asia: Lao People’s Democratic Republic (PDR), Myanmar, Indonesia, Philippines, and Timor Leste. All trainees were government staff working in the agriculture sector. The table below shows the numbers of trainees from the above-mentioned countries. Fifteen resource persons and CAPSA/ESCAP staff also took part.

Lao PDR	Myanmar	Indonesia	Philippines	Timor Leste
2	2	19	2	2

Out of the participants, 26 filled out the workshop evaluations. Twelve of them did not indicate the country they are from. Forty-six per cent of respondents were women and 54 per cent were men.

Usefulness of the training content, and the quality of processes and logistics

In terms of content, the session on ‘sustainable agriculture’ received the highest average ranking (3.3). It was followed by sessions on ‘basic concepts and key approaches in agricultural technology transfer’ and ‘barriers to the transfer and diffusion of technologies and how to overcome them’, each receiving an average of 3.2. All these sessions were therefore perceived between good to excellent. The table below provides details.

		Excellent (4)	Good (3)	Average (2)	Poor (1)	Session Average
Content	Sustainable agriculture technologies	8 (31%)	17 (65%)	1 (4%)		3.3
	Basic concepts and key approaches in agricultural technology transfer	7 (27%)	16 (62%)	3 (11 %)		3.2
	Techniques for assessing the adoption and diffusion of agricultural technologies	6 (23%)	15 (58%)	5 (19%)		3
	Barriers to the transfer and diffusion of technologies and how to overcome them	9 (35%)	13 (50%)	4 (15%)		3.2
	Role of PPP in technology transfer	7 (29%)	14 (58%)	3 (13%)		2.9
Process	Agenda and flow	7 (28%)	14 (56%)	4 (16%)		3
	Knowledge-sharing processes (e.g. group work, role playing, storytelling, exercises, etc.)	5 (19%)	16 (62%)	5 (19%)		3
	Facilitation and feedback	5 (19%)	15 (58%)	6 (23%)		3
Logistics	Pre-training communication	7 (27%)	13 (50%)	6 (23%)		3
	Meeting facilities	5 (19%)	16 (62%)	5 (19%)		3
	Accommodation	6 (26%)	13 (57%)	4 (17%)		2.7
	Food	4 (16%)	16 (64%)	4 (16%)	1 (4%)	2.8

Overall ranking of the meeting

The majority of participants (68%) ranked the meeting as ‘good’ while 24% ranked it as ‘excellent’ and 8% average. Nobody ranked it as poor.

	Excellent	Good	Average	Poor
No. of participants	6	17	2	0
%	24%	68%	8%	0%

Expectations

Most participants (58%) indicated that the workshop met their expectations to a large extent. For 34% and 8% of respondents, their expectations from the meeting were met to a moderate and very large extent, respectively.

	Very large	Large	Moderate	Small
No. of participants	2	14	8	0
%	8%	58%	34%	0%

Aspects to be improved in future

This section indicates key areas that will be taken into consideration in the organization of similar events by CAPSA and its partners in the future. These areas are based on suggestions that participants expressed during the evaluation and relate to time management, content, logistics, participants and processes.

Logistics: Four participants were missing internet access in the meeting room. According to one of them, if a trainee cannot pick up some words spoken by the facilitator, he/she can easily look them up on the Internet. Two participants suggested that meeting facilities should improve or future workshops should be held in a hotel. One participant suggested that AC should not be placed behind the participants because it affects their health. Fruit served during lunch should be local (originally from Indonesia, not imported and with low quality). Snacks should be made from cassava, rice flour or corn, without using excessive wheat flour. There was also a comment that power cuts make participants sleepy, therefore, any power back up would be welcome in the future. One person also commented that some free time during workshop should be provided for foreign participants for sightseeing around Bogor. Other suggestions included improved communication and early provision of workshop material.

Content: Ten participants commented on the workshop content. Six participants felt that there is a need for more case studies and examples to be presented and discussed. These cases should come from other countries in Asia, America, Australia, and Africa for better clarification of the topic. Success and failures of technology transfer based on experiences of participating countries could be more explored to enrich participants' understanding. Two participants suggested that the workshop should add more focus on analyzing and discussing concrete examples and applicable issues in sustainable agriculture rather than theories and philosophies. Another two felt that content, especially on sustainable agricultural technologies, overcoming barriers to the transfer and diffusion of technologies, methods for assessing adoption and adoption of technologies, needed to improve in general. Since the focus was on bringing technology innovations from public and private sectors to farmers, communication aspects and methodologies for technology transfer need to be discussed in more depth, according to one participant.

More group work and exercises: Three participants suggested that in the future, there should be more group work and exercises. It was also mentioned that it would be useful if the workshop could generate a case study report by the participants. For instance, the participants are given lectures for few days and then visit the field to see good (and/or bad) practices. In a group work, the participants could identify key factors of success and/or failure of the project and make a comprehensive report.

Coordination of sessions: One participant suggested that coordination among resource persons on related topics needs to improve. It seems that some materials had overlaps and could be avoided in the future. House rules at the beginning of the workshop would have helped, including some expectation setting right at the beginning.

Experience sharing: Two participants felt that there should be more experience sharing with feedback from resource people. It is considered very important for people from various countries with different agricultural development. Two other participants pointed out the need for more knowledge-sharing processes to discuss different topics in more interactive ways.

Participants: Two participants suggested inviting people from other countries as well as from NGOs and universities to learn and share more knowledge.

Language: The way language barriers are managed should improve. For example (as suggested by two participants), English-speaking participants should be considered for future training and an interpreter should be provided during the field trip.

Additional comments

- “I like the moderate size of the workshop and interested participants,” Anonymous.
- “I like class interaction,” Anonymous.
- “Overall, workshop is very excellent but the material which is very interesting for me is identification barriers,” Maria Fransisca Belo de Assis.
- “The way the lectures were delivered and followed by exercises made the training content understandable,” Anonymous.
- “Very well done,” Bachtar Bakrie.
- “I like the agenda but dislike the depth of material,” Suci Wulandari.
- “Some subject was out of date,” Anonymous.
- “I think the overall workshop is good in providing more information about sustainable agricultural technologies from other countries, so I can find and compare new concepts for the future,” Yuniawan.
- “This workshop should be held at least once a year,” Harwanto.
- “Sustainable agriculture will be an important part of future communities,” Thura Soe.
- “The duration of the workshop was too short,” Sengchanh Phetkhounluang.

Knowledge, attitude, practice

This section is a basis for evaluating changes in knowledge, attitude and practice of trainees over time. Another such evaluation is planned to be conducted after six to twelve months following the meeting.

Meeting relevance

Twenty-five participants responded that the meeting equipped them with the right knowledge to improve the way they work. One person skipped this question.

New knowledge

Most participants rated their knowledge after the workshop as ‘good’ in relation to all key topics. The average score is ‘3’ or ‘good’ for all topics covered in the workshop. The table below provides details.

	Excellent (4)	Good (3)	Average (2)	Weak (1)	Score
Sustainable agricultural technologies	5 (20%)	16 (64%)	4 (16%)	0	3
Basic concepts and key approaches in agricultural technology transfer	4 (15%)	18 (69%)	3 (12%)	1 (4%)	3
Techniques for assessing the adoption and diffusion of agricultural technologies	5 (19%)	17 (65%)	3 (12%)	1 (4%)	3
Barriers to the transfer and diffusion of technologies and how to overcome them	6 (23%)	16 (62%)	4 (15%)	0	3
Role of public-private-partnerships in technology transfer	6 (23%)	15 (58%)	5 (19%)	0	3

Understanding the meeting content

Twenty-one participants (81%) fully understood the workshop content. Five participants did not understand well the following: measuring sustainability of agriculture systems (especially at the landscape level) (2); techniques for assessing technologies and their diffusion; agriculture machinery; and GMOs.

Areas that the meeting did not cover

Nine participants indicated that there were some areas they expected the meeting to cover, however, they were excluded. These areas are as follows:

- Pathways and key approaches for technology transfer and diffusion. This should be added with the communication topic because it largely communication that makes technology transfer effective.
- Cultural aspects.
- Policies that would attract governments to adopt and execute them.
- Measures to stakeholder analysis.
- Soft system methodologies and models in technology transfer.
- Success stories in technology transfer for sustainable agriculture.
- Sharing experiences from other countries about how to overcome barriers in technology transfer.
- Specify farmers' behavior.
- The presentation of Professor Sumarno was interesting but no insight was given on the strategies they used in technology transfer.

Key learning being taken away from the meeting

Most participants indicated more than one learning aspects. However, the key areas about which participants felt that they learned most include the following:

- Concept of sustainable agricultural technologies (12 participants).
- Concepts and approaches in technology transfer (9 participants).
- Approaches in and methods of analysing adoption and diffusion of technologies (9 participants).
- Barriers to technology transfer as a shared concern in all countries – identification and solutions (7 participants).
- Measuring sustainability – sustainability indicator (6 participants).
- Research-extension gaps linkages (5 participants).
- Survey design – sampling population and methods (4 participants).
- Technology categories and market characteristics (3 participants).
- Technology transfer of GMOs and hybrid seeds (3 participants).
- Link between technology transfer and sustainable livelihood (ASEAN gap) (3 participants).
- Social factor – changes in behavior, people and institutions (3 participants).
- PPP (3 participants).
- Urban agriculture (2 participants).
- Other country experience (2 participants).
- All lectures from Mr Genova.
- Bio-industry approach for sustainable agriculture.
- Agricultural evaluation system.
- Translational development.

- The importance of market information that should be considered by researchers in order to generate technologies that suit market demand.
- Enabling environments that are required for ensuring the sustainability of an agricultural technology transfer.
- Other institution's experiences.
- The role of effective communication in sustainable agriculture.

Some specific participants' quotes on their key learning are included below:

- "Sustainability in agriculture is not easy but attainable with more concentrated efforts from all stakeholders and sectors," Anonymous.
- "Sustainable agriculture is a must. R&D agriculture system and practices should be more developed and bring the results of R&D and technological innovation to the farmers who are the applicants of these innovations. It is a hard task and should be done properly," Anonymous.
- "Before we change behaviour, we have to change perception. The social factor is one of the most important before we adopt the technical factor and bring the message to the farmers," Yuniawan.
- "Technology transfer as giving away technology(ies) in a form of total package not through piece by piece approach to make it sustainable," Anonymous.

Planned changes

Participants indicated some planned changes or improvements that they are willing to make in their work as a result of the training. Below are participants' statements on envisioned changes:

- "I think the results of this workshop will not change my daily work too much. However, the concept of sustainable agriculture should be better understood by each staff and the importance of and the needed efforts for technology transfer for sustainable agriculture should be emphasized," Anonymous.
- "I will keep in mind the important things in achievement of technology transfer," Anonymous.
- "Nothing. All presentations affirmed that we are doing the right approach, programmes, projects, and plans. Hence, we should continue and intensify our efforts e.g. in terms of scaling up, convergence and institutions," Anonymous.
- "Try to implement sustainable agriculture in my proposal and research," Anonymous.
- "Based on the results of this workshop, we will plan a programme for human resource development on policy for rural agriculture extension workers to enable them to better understand the importance of transferring agricultural technologies to farmers in order to improve agricultural production," Ms. Natalia M. de Aranja and Ms Maria Fransisca Belo de Assis.
- "Yes, probably I will use some of the techniques to make questions and conduct survey as a research tool," Anonymous.
- "My perceptions on cooperation with private companies," Anonymous.
- "When developing technology or innovation, we will consider the presented aspects in technology transfer process in order to get successful adoption by users," Anonymous.
- "Putting more effort into development of market-driven research to enhance opportunities for technologies generated by research centers to be adopted by end users," Anonymous.
- "Keep in mind the concept of sustainable agriculture and to ensure that I will apply all lesson learned in my daily work, especially for key approaches for technology transfer and linkages between technology transfer and livelihoods," Anonymous.
- "I will try to apply the concept of modification in the method of technology transfer," Bachtar Bakrie.

- “As a long-term plan, we need to change the use of fertilizer pesticides, we should use organic fertilizer in our daily work and we need to transfer this technology to farmers,” Khin Myo Win.
- “Improve research methodology for analysing adoption of introduced technologies,” Nurindah.
- “For my work plan I can adopt sustainable food reserved garden (STRO). This project is a good idea and I can collaborate with a renewable energy (biogas) station,” Yuniawan.
- “I got new knowledge from this workshop and I am going to make changes in my job step by step,” Sengchanh Phetkhounluang.
- “Conduct an assessment on agricultural sustainability,” Victor Siagian.
- “Communication,” Andi Abdurahim.
- “As a long term plan, we are trying to succeed in the implementation of sustainable agriculture system,” Thura Soe.
- “Design and plan training of users in research results,” Harwanto.
- “In transferring new technologies be sure to know your environment first and learn from it. Through this knowledge, specific technologies will be easily presented to farmers or communities – know your target client and his problems first,” Anonymous.
- “I work in a research institute that has little contact with farmers and end users. There is no department in our institute that is responsible for assessing adoption of technologies we developed and disseminated. Our task is mainly doing basic research. I will use the knowledge for my own research activity,” Anonymous.

Ability to use new knowledge and skills

When asked how much of what the participants learned in the workshop they will be able to use in their work (all, most of it, about half, a little and nothing), they provided the feedback below. More than half participants (54%) indicated they will be able to use about half of the new knowledge and skills, 38% will be able to use most of it and 8% will be able to use all.

	All	Most of it	About half
Number of participants	2	10	14
% of total	8%	38%	54%

New practices and skills planned to be applied in practice

Twenty-four participants indicated that they will be able to use some of the new practices and skills they acquired during the workshop in their work. Below is a summary of specific skills they plan to apply in practice:

- PPP, including design of PPP and patience in pursuing PPP (5 participants).
- Methods and techniques in technology transfer to farmers/end users (3 participants).
- Begin to identify applied agricultural technologies that have no negative environmental impact. Thus, we will be able to implement a sustainable agriculture programmes that could benefit from socioeconomic and environment terms (2 participants).
- Study and identify barriers to technology transfer, including social, economic, cultural and environmental (e.g. capacity building, business linkages and research-extension gap) and try to find solutions (2 participants).
- Design and use sampling method and surveys, questionnaires (2 participants).
- Share knowledge of sustainable agricultural technologies with our colleagues (2 participants).

- Networking.
- Method for analyzing adoption.
- Enhance technology transfer and links between research and extension.
- Sustainable food-reserved garden (SFRG) as it is very important for developing household food security. This can be combined with renewable energy (biogas) station so not only for food security but also for renewable energy security.
- Transfer technologies to farmers.
- Communication and organization.
- Identification and choosing of technology for adoption and implementation by farmers.
- Monitoring technology adoption by farmers.
- Analyse adoption, outcomes and impact.

Training others

Eighteen participants (69%) indicated that they will train others following the workshop. In particular, the following people are planned to be trained:

- Researchers/scientists (8 participants).
- Colleagues (7 participants).
- Extension workers (7 participants).
- Local farmers (6 participants).
- Government/provincial officials (2 participants).
- Agro-business students.
- Whole country.

Key indicated training areas:

- Identification and overcoming of barriers to technology transfer (2 participants).
- Concept of sustainable agriculture and sustainable technologies (2 participants).
- Technology categories and market characteristics.
- PPP.
- Case studies presented in the workshop.