

Community based Asian Agrifuture: how it can be achieved

Agrifuturo asiático de base comunitária: como pode ser alcançado

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ABSTRACT

Asia is one of the most productive agricultural regions in the world, however the quality control of agricultural food products should be severely and strictly managed from the view point of food security and safety due to the increase of food feeding demand to cover the drastic and rapidly increase of world human population in recent years. We humans are facing two big global issues of energy and environment. Good solution finding is still under the efforts making on building a sustainable society, however no optimal solution has yet been found. Needless to say the special attention should be paid not to jeopardize the natural environment any more for stopping the global warming. Given the world's population, which is growing rapidly by 80 million people annually, it is easy to guess that food issues could become a major issue sooner or later. It is natural for us humans to be ready to prepare and address some message immediately if we know what is coming now around us. In this paper the current status of Asian agriculture in the world is overviewed first, then the Asian agrifuture is discussed and proposed from the community based viewpoint how it should / can be promoted and achieved.

Keywords: Asian agrifuture, Community based agriculture, Asia Food Project, Agri Techno Farm, FFA, Future Farmers of Asia growing programs, ASEAN Economic Community.

RESUMO

A Ásia é uma das regiões agrícolas mais produtivas do mundo, contudo o controlo de qualidade dos produtos alimentares agrícolas deve ser gerido de forma severa e rigorosa do ponto de vista da segurança alimentar, devido ao aumento da procura de alimentação alimentar para cobrir o drástico e rápido aumento da população humana mundial nos últimos anos. Nós, humanos, estamos perante duas grandes questões globais de energia e ambiente. Uma boa solução ainda está sob os esforços de construção de uma sociedade sustentável, contudo ainda não foi encontrada uma solução óptima. Escusado será dizer que deve ser dada uma atenção especial para não pôr mais em risco o ambiente natural para travar o aquecimento global. Dada a população mundial, que está a crescer rapidamente em 80 milhões de pessoas anualmente, é fácil adivinhar que as questões alimentares poderão tornar-se um assunto importante mais cedo ou mais tarde. É natural que nós, humanos, estejamos prontos para nos prepararmos e endereçarmos alguma mensagem imediatamente, se soubermos o que nos rodeia agora. Neste documento, o estado actual da agricultura asiática no mundo é primeiro analisado de forma geral, depois a agrifutura asiática é discutida e proposta do ponto de vista da comunidade como deve / pode ser promovida e alcançada.

Palavras-chave: Agrifutura asiática, Agricultura baseada na comunidade, Projecto Alimentar da Ásia, Agri Techno Farm, FFA, Futuros Agricultores da Ásia programas de cultivo, Comunidade Económica ASEAN

1 INTRODUCTION

Asian agriculture overview

The followings show the summarized overview of Asian agriculture. ASEAN Economic Community was established in December 2015. More than 60 % of world population is in Asia. Rice is cultivated in most of Asian countries. Most of the Asian countries are still relying on the economy from agricultural production more or less. Almost 40 % of wheat is produced in Asia.

The following three tables, and one figure provide the overview the further basic data of the current status of Asian agriculture in the world. It can be obviously found from Table 1 that Asia has a little bit more than 30% of the world cultivated farming area which is one of the reasons why Asia is always listed in the top ranking of agricultural production. Table 2 shows the world cereal production in which only three Asian countries of China, India and Thailand are producing almost equal to the total production of USA and EU even though both of China and India must produce mainly for domestic consumption for feeding their own people not to export. Figure. 1 shows the major cereal products trading percentage of rice, corn, wheat and soybean. Especially for rice, it is produced a little bit less than 500 million tons in the world, however more than 90 % of them are produced in Asia, therefore it can be said that rice is one of the most important staple food crops in Asia. Table 3 shows the farming scale per farmer (one family of farmer) for various countries in the world. It is also very clear to see how Asian farmer is engaged with small scale farming compared to the others such as USA, Australia, Canada, France, England and EU.

Table 1 World cultivated farming area

World Region	Cultivated Farming area (%)
Asia	31 %
N. America	16 %
Africa	14 %
Europe	10 %
L. America	8 %
Oceania	4 %
Others	17 %
Total	100 (%)

Table 2 World cereal crop production (unit:%) (unit: 100million ton)

Nation / Region	Cereal Crop Production
USA	3.50
EU	2.70
RPC (China)	4.50
India	2.40
Thailand	0.30
Total	13.40

Table 3 Farming scale (ha) / farmer

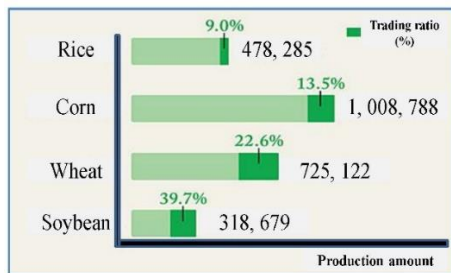


Figure 1 Trading ratio of major agricultural products (unit : 1, 000 t)

COUNTRY	Farmland / one farmer (Average, (ha))	SPECIFIC FARMING SCALE
Japan	2.3 ha	1
South Korea	1.5 ha	0.6
Thailand	3.7 ha	1.6
USA	170.0 ha	73.3
Australia	3024.8 ha	1303.8
Canada	315.0 ha	135.8
France	53.8 ha	23.2
England	84.0 ha	36.2
EU	14.3 ha	6.2

Notice: Above shown three Tables and Figure.1 were proceeded by modifying the original data reported from FAO in 2006

Food production

Asian nations self-sufficiency of cereal food (Rice, Wheat, Corn etc.) which can be defined by the ratio of consumption to the production of food mainly expressed on calorie based. Some of them are shown respectively for Thailand: 166 %, Laos: 122 %, Vietnam: 117 % and Japan 40 %. Thailand and Vietnam are the big agricultural countries producing 30 million tons of cereals per year. Laos is producing 3.81 million tons of cereals enough to feed their people. Among 177 countries in the world, Thailand is ranked in 7th, Laos is ranked in 19th and Vietnam is ranked in 21st respectively in the world. Argentina is ranked at the top in the world for the food self-sufficiency at 306 %.. China is ranked in the top of cereal production and her self sufficiency is 102 %, which means most of them are for domestic consumption to feed their own people. therefore she is ranked in 31st in the world for food self-sufficiency. India is ranked in 29th and food sufficiency is 105 %. Population in India is No.2 next to China. Food sufficiency for South Korea, Malaysia and Japan are almost 25 to 40 % as mentioned above. Food production should be secured from the viewpoints of strengthening agriculture and its competitiveness. It may be achieved by the highly mechanized advanced value adding technology application to the actual farming site for extension. How it can be achieved successfully and completely is the key issue. The method of solving the issue and the process to follow are shown for further discussion of the project concept.

Problems and solutions

Asian agriculture can be characterized as the following problems and the conditions to satisfy for solving them: 1) Small scale, 2) Family labor, 3) Low income, 4) Heavy physical work and 5) Working poor. On the other hand the conditions to satisfy for promoting agriculture are shown below. Agricultural products should be 1) competitive in the world market, 2) High quality control and management of the products should be secured including safety and value adding and 3) Price of the products should be reasonable enough to make it competitive. Food security consists of the following four factors of 2QSL, which means enough 1) Quantity, 2) Quality, 3) Safety and 4) Liability). Let us think what and how we should do for achieving the goal of Asian agrifuture. It must be done not only to improve Asian agriculture, but also to make Asia one of hte the world food pantries.

Method of income increase

One of the methods of income increase can be achieved comparatively easier as it can be seen in Japan's case. That is to provide the additional job to let them be for part-time farmer. The ratio of the part-time farmer to full time farmer is 85 % to 15 % in Japan. Part-time farmer is rich

enough to buy farm machinery individually for promoting the mechanization in addition to take care of family and education of children, therefore the original small scale farmland can be used mainly for domestic family consumption of food, not for earning money from the products selling. Additional merit of shifting small scale farmers to part-time farmers promoted the automation of agricultural machinery because most of them were small scale professional farmers and they needed automated machines more. One time the central government of Japan tried to push the industry to develop simple machines equipped without those automatic control functions, however both of industries and farmers couldn't accept those machines, because part-time farmers are rich enough to buy the automated machines in spite of expensive price. Even for industries they were welcome those part-time farmers if they can buy those expensive ones actively. It means no farmers want to buy such a low functional machine because of cheaper price only. Increasing the number of part-time farmers could solve the farmer's low income problem, however nothing could be done for promoting the agriculture at all.

Answer for income increase and agriculture promotion issues

The other way is to solve both problems of income increase and promotion of agriculture together is the scale up of farming per one farmer (or one family). The low income is caused by the small scale farming, therefore the farming scale up can improve and solve both problems together, however it looks difficult to do it quickly and takes time even if it could be done. Furthermore the majority of the farmers are too much aged and impossible to accept such a highly innovated smart agriculture due to the lack of knowledge and no next era young generation successor grown up. Referring to Table 3 showing the specific average farming scale ratio compared with the case of Japan is one, owned per one farmer for various countries, it can be found that other countries are extremely higher almost 20 to 1000 times than Asians. Considering the current level of agricultural mechanization, it looks for Asia almost impossible to make Asian agriculture competitive with the other countries. In parallel with the scale up of farming, the new project should be launched together focusing on the next era young generation farmer should be grown up who should be highly educated and qualified enough to understand apply the highly innovated technology even for transferring those technologies to the following next era too. The author named this project as FFA, Future Farmer of Asia growing project, Trainees are accepted based on the application from ASEAN member countries not only from Thailand, but also from the other member countries. Further details of program content is introduced and explained in the section of Asia Food Project and Agri Techno Farm Initiative later.

Additional answer for solving the problems

The conventional and traditional farming is essentially based on the farmland soil, however the green house based farming is now getting popular due to no need of farmland and soil, but hydroponics instead in addition to the merits of clean and automatic full control of environment while growing of target crop. The artificially made crop cultivation program can make it possible to secure the stable yield and multiple cropping per unit period of growing season. Additional merits of type of farming can be found as follows: 1) Anybody can join easily to this farming business even for the handicapped and disabled person, 2) Light labor forces under clean environment, 3) Higher probability of stable yield by artificially prepared cultivation program, 4) Fresh and safe products supply timely on demand etc. One of the problems is the possibility of mass production of main staple food like cereals such as rice, wheat, corn, soybean etc. to cover the rapidly increasing human population. The merit of applying this green factory type of farming can be found in special area such as North Africa and Middle East mostly covered area with desert but without cultivated farmland. They really need fresh, clean and safe food products. What about the possibility of growing main staple food crop in the green factory ? If possible, a short plant rice variety with rice grain only without long length of straw and stem may be developed and experimentally tested for growing.

STRATEGIC POLICY FOR ASIAN AGRIFUTURE

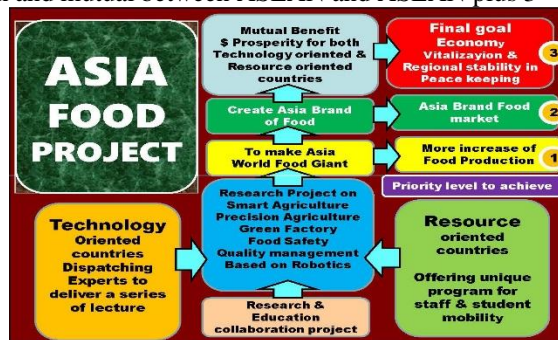
Asian Agriculture Growth Strategy

Figure. 2 shows the growth strategy and the process to follow. As already mentioned above the farming population should be reduced and the small scale farmland should be collected to expand the farming scale. As far as the farmers stay on small scale farming, they can't escape away from working poor under less income and have no hopeful future. The strategic policy should show the direction to go, but not to force the farmers to follow. The final decision must be made depending on the individual farmers which way they want to make choices such as to change the job completely to the other industries, to become a big scale farmer, or to keep staying on farm as small scale farmer as the part-time farmer. Some activity must be done actively for further promotion and improvement of agriculture. Recommendation, suggestion and follow-up support should be prepared and done to the farmers who are wishing to change the current situation. The central government should encourage the young generation to apply actively to be the FFA Future Farmer of Asia program by preparing the training center in which the six programs are offered and installed under the name of Asia Techno Farm Initiative.

Figure 2. Asian Agriculture Growth Strategy Project and prosperity countries



Figure 3. Schematic view of Asia Food and main concept and process to follow achieve the final goal of community based Agro-economic promotion and mutual between ASEAN and ASEAN plus 3



Asia Food Project

There can be seen two kinds of countries in Asia, named ASEAN Economic Community consisting of ten member countries and ASEAN plus 3 countries such as China, Japan and South Korea. ASEAN Community consists of agricultural countries relying on a huge amount of agricultural production more or less, therefore they can be categorized as the resource oriented countries. On the other hand ASEAN plus three are categorized as the technology oriented ones due to less amount of resources production. The main concept of Asia Food Project is to promote and make Asian economy sustainable based on the joint collaboration between the resource oriented and the technology oriented countries. They need resources and technologies mutually for further development and promotion of Asian economy in addition to the regional peace keeping. The process to the final goal should be followed and achieved along the priority number from one to three in order as shown in Figure 3. They are 1) To make Asia a world food pantry by more increase of quality controlled safe food production and supply, 2) To develop and create an original Asia brand food (product) market and 3) To achieve and maintain the Asian economic promotion stably and vitalization enough to contribute to the regional peace keeping. The mutual transfer relationship between the resources oriented and technology oriented countries can be sustainable for ASEAN Economic Community development.

Asia Techno Farm Initiative

Figure 4 shows the whole concept and its schematic diagram of Asia Techno Farm program consisting of mainly three organizations of 1) University as program organizer, 2) Government as budget provider for supporting and promoting the national project and 3) Industry closely related to the project and program. University offers the program content consisting of six divisions such as

- 1) Global solutions: Global issues related to Food, Energy and Environment should be discussed and found the solution. Update information and knowledge can be taught.
- 2) Smart agriculture: Precision agriculture: Agricultural mobile robot and related control and management technology are taught including sensor, actuator and peripheral control devices etc.
- 3) Smart agriculture: Robotics in agriculture use: Basic knowledge and skill related to robotic machine control are taught including sensor, actuator and peripheral control devices etc
- 4) Smart agriculture: Green factory: Environment control, image processing, sensing, data acquisition skill etc. are taught
- 5) Special education: Special skill and knowledge necessary to provide opportunity and give advices to the farmers wishing to change the job.
- 6) Social service: Recommendation / Introduction letter and Official documents such as certificate, diploma and approval can be issued in addition to the negotiation to the different organization and industry for the surplus farmer wishing to change the job.

Related industries to join the program or project are requested to provide the machines for educational material and send one technician with free of charge for taking care of the maintenance and repair of the machines provided in case of the trouble. Some lecture delivery related to the machine maintenance and spare parts supply may be possibly requested especially for the old model secondhand machines if necessary.

Figure 4. Whole schematic diagram of Asia Techno Farm Initiative

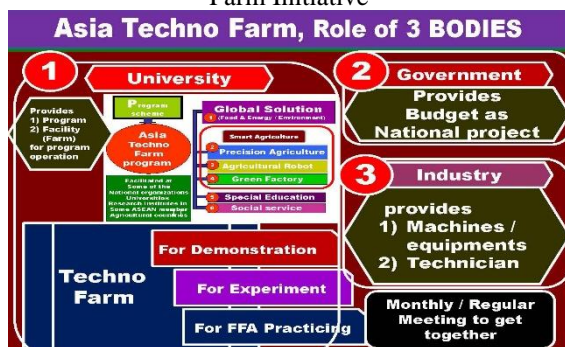
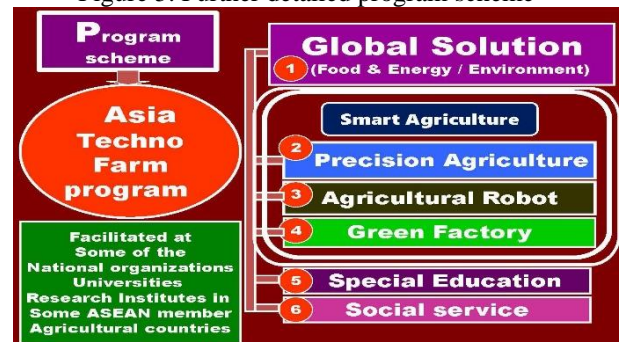


Figure 5. Further detailed program scheme



Asia Techno Farm Initiative program accepts trainee participants from ASEAN member countries. Applicants should be qualified enough to communicate in English. Academic background should be higher than undergraduate program level. The main major of the trainee participants which division he or she makes a choice depends on the individual expertise and career to be considered in case by case. The program can be operated for almost six months equal to one season of crop cultivation. The participants should be involved in the actual farming at least one season for practical experience. Three farms are prepared for the newly developed technology demonstration, experimental farm and FFA trainee participants crop cultivation practice. The industry participation and its support and cooperation to program operation can be highly considered. The strong recommendation can be made to the trainee participants if they want to buy the related machines from industry participated to the program after the successful completion of the program.

FFA (Future Farmers of Asia) growing program

FFA Smart Agriculture Training program should be implemented at farm prepared by the university appointed as the project organizer. The program is roughly shown as below (See Figure 5)

Length of program operation : 6 month

Contents of the program involves the following six divisions

Smart agriculture includes the following three divisions. They are Precision Agriculture, Robotics and Green Factory. Emerging Technology lectures available for agriculture should be offered and provided. Data acquisition and processing can be taught such as ,Sensing, Monitoring, Data Gathering, Processing For practical skill up, the practice of one season target crop cultivation is requested for experience and practical skill up learning. The official qualification of the program participation can be made based on the final report submission & presentation in addition to the certificate issue & its grant.FFA program participants can be accepted almost 10 = 15 per one time program operation. They can be accepted mainly from ASEAN countries. The invited lecturers are requested to stay at least one week per one time visit and deliver a series of lecture for 4 days. In addition the other 2 days should be spent for the visit on site What is the reason why this is requested for the invited lecturer to follow ? The main reason is to know more 1) Asian Agriculture, 2) To have more communication with trainees and 3) Further improvement of English communication for promoting mutual friendship between lecturers and trainees.

After the successful completion of program, 2 weeks study tour may be offered and scheduled for the trainees to visit the invited lecturer's laboratory

Figure. 6 Group training program offered to JICA and accepted by NPO



Figure. 7 The first workshop on precisionagriculture organized by Ministry of Science and Technology, Thailand



Technology to be transferred from “Supply” side should be “Appropriate Technology” which can be defined to satisfy the following conditions and it should be enough to cover a huge scale farming__mainly based on precision agriculture in smart agriculture

- 1) Technologically feasible
- 2) Socially acceptable

Class lecture content (syllabus) example of Introduction to Smart Agriculture

The Asia Techno Farm Initiative project aims to promote community-based agriculture centered on smart agriculture that basically uses highly developed information and communication innovation technology. Many people know the term Smart Agriculture, but few people understand what kind of agriculture it is. As already mentioned in this paper, the characteristics of Asian agriculture are characterized and represented by small-scale farming, low income, family labor, heavy physical labor, and the working poor. Agricultural income can be increased by taking part-time jobs, but as long as such measures are continued, it will not lead to technological innovation or promotion of agriculture itself, and it is clear that it will not be possible to compete with products obtained from large-scale mechanized agriculture in the global market. It is also important, necessary, and wise to produce large amounts of safe and secure food and prepare for food crises due to rapidly increase of world human population that may come in the near future. Due to the above-mentioned characteristics of small-scale farming, succession training has not progressed, and many young people come to gather in cities in search of occupations other than agriculture. Rural areas are then aging, and the average age of farmers is 65 in Japan. Farming in other Asian countries is also unattractive due to the lack of strategic policy and many young people want to pursue non-agricultural careers. It is difficult for aging farmers to operate machines mounted with high-tech equipment, so expectations are high for the younger generation, who are accustomed to taking

advantage of the crisis of information technology on a daily basis, to play an active role in the primary industry sector and field.

Smart agriculture mainly consists of three fields such as 1) Precision agriculture, 2) Robotics, 3) Green (Plant) factory. In any of the above fields, the use of information and communication technology is fundamentally essential, and unless a system configuration using them is established, it cannot be called smart agriculture. As mentioned above, these high-tech core information technologies are difficult for aging farmers, and even though many people know the term smart agriculture, they do not have a clear understanding of what kind of agriculture it is specifically, creating a situation where there are few people who can explain. It is necessary to create an environment in which young people who are interested in agriculture and who are familiar with information and communication technology and how to operate equipment will be attracted to the promotion of future agriculture.

The Asia Techno Farm Initiative has the role of a training institution for high-tech agricultural leaders, making it possible to transfer and hand down such technology. It is a high-tech agricultural leader training institution enough to take care of Asian agrifuture for the regional community. Participating trainees are not limited to only one country, but also qualified applicants from member countries targeting the ASEAN Economic Community. A training center will be prepared for this purpose and the official language at the training center will be English, and efforts will be made to foster a sense of unity by expanding the human resources network within the ASEAN region. One training program operation period is about 6 months, and the training period consists of lectures by specialized instructors and actual cultivation drawing assignments that the trainees individually or in groups are in charge of. This concept is linked with FFA, Future Farmers of Asia and the participation of trainees from ASEAN member countries. If there are any applicants from those countries, it will be implemented with the same program in parallel with FFA. Or alternatively, by adopting a group training format that accepts a certain number of trainees from ASEAN member countries annually, the effects of this project will be greatly reflected in the development of Asian agriculture.

Specialized lecturers in charge of lecture delivery will be invited from a wide range of countries in the world, but the selection will take into consideration factors such as matching with the specialty, ability to communicate in English, overseas experience, and career etc. The selection of invited lecturer may be followed on the registration. Some necessary documents are requested to submit for lecturer registration. Online lecture delivery will be requested to the lecturer candidates registered in advance to find and check the lecture content, and the performance level of communication in English. the invitation will be decided after evaluating the English proficiency of

the invited lecturer and matching with the specialty. Specialized lecturers will be invited through a registration system, and will be invited as necessary. The content of the lectures during the training program per one time operation period covers a wide range of topics such as agriculture, engineering, especially data acquisition, information processing, communication, and various global standards in use. Here shows an example. In general, one lecture is 1.5 hours, twice a week is 3.0 hours, and if one program operation term is six months, the total number of hours is about 45 hours, and two other subjects are prepared in parallel. Invited lecturers are required to stay for 4 to 6 days per invitation. Of these, 2 days will be spent traveling and returning, 2 days out of the remaining 4 days will be lectures, and the remaining 2 days will be for observation and discussion at the experimental cultivation fields of the trainees. Needless to say further discussion should be made in detail for project implementation. Mutual site visit may be considered from the viewpoints of deepening the understanding and providing the valuable opportunity to obtain the new knowledge. Even for the invited lecturer, it will be a great benefit in knowing and getting familiar with Asian agriculture in addition to the human networking

Table 1 Class lecture subject syllabus

No.	Lecture content
1	<p>1. Global tetralemma</p> <p>1.1 Population Increasing rate: 80 million / year 1.4 hundred million newly born 0.6 hundred million dying</p> <p>1.2 Food Required amount of food / capita: 400 kg</p> <p>1.3 Energy Natural & Renewable Energy (kinds & characteristic feature) Solar (Photovoltaic, Thermal), Wind, Hydro), Geothermal, Biomass, Biogas), Others Nuclear fusion Shale oil, Shale gas), Methane hydrate Automobile (Gasoline, Diesel, Alternative, Hybrid, Electric, Fuel cell, Hydrogen)</p> <p>1.4 Environment Carbon neutral, Carbon footprint LCA (Life Cycle Assessment) Decarbonized society</p>
2	<p>2. Asian agricultural mechanization Characteristic; Small scale, Low income, Family labor</p> <p>2,1 Rice cultivation (Wetland agriculture) More than 90% of the world production in Asia</p> <p>2.2 Upland agriculture Food & Energy resources: Sugarcane, Soybean, Cassava, Corn (Maize), Sweet potato Fruits & Vegetables Longan, Orange, Pineapple, Papaya, Mango, Banana</p> <p>2.3 Historical development of farm machinery Man power, Animal power, Mechanical power, Automation, Robotization</p>

	<p>Hyper low-cost rice mechanization Direct sowing: Coated seeds with CaO₂, Fe₂O₃ Direct de-husking of high moistened rough rice</p>
3	<p>3. Organic farming Definition of organic farming Safety based Value-added agriculture</p>
4	<p>4. ASEAN Economic Community ASEAN University consortium Community based Asian agrifuture Policy & strategy based on future vision and aspect Collaboration between Resource-oriented and Technology oriented countries Make Asia World Food Pantry Promote economy by future development / creation of Asian Food Brand and maintain the regional peace keeping Eliminate Poverty & Hunger Establish Future Farmers of Asia growing program</p>
5	<p>5. Smart agriculture 5.1 Precision agriculture (Feld robotics) GPS: Global Positioning System GIS: Geographical Information System Mobile vehicle: Tractor, Combine, Farm vehicles Sensors (Yield sensor, Nutrition sensing) Obstacle avoiding sensor Variable rate control 5.2 Robotics Agricultural Robot & Industrial robot Various harvesting robot Fruit harvesting robot Vegetable harvesting robot 5.3 Green (Plant) Factory Various type of Green Factory Solar powered & Closed type Green Factory Strawberry, Lettuce 5.4 Field server 5.5 Remote Sensing NDVI: Normalized Difference Vegetation Index Continuous monitoring of crop while growing Judgement and decision making to apply something or not for maximizing value added product production with minimum loss for ensuring higher stable yield</p>
6	<p>6. Image processing Quality control of products AI application to agriculture; decision making for harvest timing</p>
7	<p>7. Nano Technology Various type of Nano Bubble water application in primary industry Disinfection cleaning and Sterilization of agricultural products</p>
8	<p>8. Plasma Technology Waste treatment Waste to energy</p>
9	<p>9. Bio-resources for energy production Biomass, Biogas, Bio-fuel for direct use for alternative energy Hydrogen production & electric generation Euglena mass culture production for multi-purpose use such as food, Supplement for human health, animal feed, fertilize etc., and bio-jet plane fuel Contribution to de-carbonized society</p>
10	<p>10. Food Supply chain Agricultural policy Production control</p>

	<p>Increase of demand & consumption New market development</p>
11	<p>11.Traceability (Food safety & Liability) 2QSL: Quantity, Quality, Safety, Liability between producer & consumer) Product recognition and identification: barcode & QR code application</p>
12	<p>12. Global environment Climate change, Global warming Carbon Foot print Haze issue: PM 2.5, PM 10 De-carbonized society building</p>
13	<p>13. Application of Drone Information gathering of growing crop Environment monitoring Safety and cost down Application Regulation & International law.</p>
14	<p>14. SDGs SDGs: Sustainable Development Goals 17 targets for achievement Virtual water Food mileage COP. IPCC, Paris agreement Disaster (natural & artificial) & infectious disease pandemic</p>
15	<p>15.International law and standard International organization (NPO, NGO, WHO, WTO, FAO, WFP, IPO, ISO 9000, 14000) International qualification and approval (FE, PE) JABEE: Japan Accreditation Board for Engineering Education</p>

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It has already been mentioned that smart agriculture relies on knowledge in several academic and academic fields. Observation of target fields and crops, monitoring of growing conditions, gathering, transmission and processing of various data. Alternatively, detailed explanations of international standards, international organizations, etc. that must be strictly adhered to in developing smart agriculture businesses are related to the topic of the lecture, and more detailed lectures are added each time depending on the topics, so that the entire lecture content can be fully covered.

2 CONCLUSIONS

Many factors must be considered in the promotion of Asian agriculture, however looking at the current status of agricultural mechanization in Asia, the implementation of agricultural reforms at the community-based level is more important and meaningful than supporting individual farmers. At present, it looks difficult for the farmers to accept high-tech represented by precision

agriculture for example. The first priority is to create the demands and needs of the customers (farmers) who can accept such high-tech machines and equipment. FFA (Future Farmers of Asia) growing program should be highly considered as the first priority issue. The market should be developed actively for those trainees to work with joy

The following is the summarized conclusion derived from the discussion development in this paper.

- 1) ICT & IOT based Smart Agriculture are paving the way for high-tech agricultural mechanization, however the speed of technology development and innovation are evolving day by day.
- 2) These technologies are still under developing and innovating, but constantly and stably day by day.

However.....

- 3) To whom and How do we transfer those technologies?
- 4) There are many small scale farmers in Asia, but “None of them” can understand and accept those hightech mechanization now due to the lack of knowledge and economic power, aging and no Young successor wishing to be a farmer.
- 5) The right answer is the strong suggestion to "Make customers first” for agri-business promotion of The situation of Asian agriculture can be neither improved nor changed unless no action could be started and taken immediately not to be too late.

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Notice: Papers listed above were presented by the author or published in recent years in the Proceeding of the International Conference / Symposium / Workshop related to Asian agriculture and its promotion based on the proposal how the technology transfer and human resources development should be made to achieve the final goal of Win - Win relationship between both of the resource oriented ASEAN and technology oriented ASEAN plus 3 countries.