South Korean Strategy for Agricultural Technology Transfer to Developing Countries
- Case of Rural Development Administration -

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Access to sufficient, safe, and nutritious food is the right of everyone. Korea has always strived for a world free from hunger and poverty, and will participate actively in the global efforts to achieve food security.

As part of this effort, Korea is willing to share its experience in agricultural development with developing countries. One such program is the Korean Green Revolution that aims to help people escape from prolonged hunger and poverty in a short period of time.

Development of infrastructure, agricultural technology, and institutional establishment are major factors to achieve food security in developing countries. However, agricultural technology is critical to agricultural development.

In accordance with the Rome Principle, the Korean agricultural technology transfer to developing countries will support country-led agricultural technology development programmes.

On this basis, the technology development cooperation is focused on improving the national agricultural research and extension system, including capacity building of human resources to develop agricultural technology.

Supporting the Kevin Kelly’s opinion that technology evolves on an accumulated technological basis, we shall focus on the development of appropriate technologies or practices adaptable to the current development level of each country.

On the basis of the assumption that government intention and social agreement are critical to technology development, our cooperation will focus on the institutional capacity building for agricultural technology development and dissemination.

Partnership between domestic, regional, and international stakeholders will be emphasized. We will work together with technology development agencies such as international research institutions, educational institutions, and other international food and agriculture-based institutions. At the partner country level, national research
government, RDA will cooperate with the Ministry of Agriculture, Forestry and Fishery, the Ministry of Planning and Finance, the Ministry of Foreign Affairs and Trade, and the Korea International Cooperation Agency.

RDA will utilize its resources to transfer appropriate agricultural technologies, and practices on food security; research and extension system, and experts’ pool.

On this basis, RDA will implement two programs: the KOPIA (Korea Project on International Agriculture) and the multilateral cooperation initiatives composed of the AFACI (Asia Food and Agriculture Cooperation Initiative) and KAFACI (Korea- Africa Food and Agriculture Cooperation Initiative),

As Korean Green Revolution was evaluated as a successful case of technology transfer from the international society, we also hope to contribute in creating a successful agricultural development case in cooperation with the international society.
1. FOOD SECURITY AND AGRICULTURAL TECHNOLOGY TRANSFER

One billion people are still suffering from hunger and poverty. Considering a world population that will surpass 9 billion by 2050, food security of the world will be threatened more in the future. “This is an unacceptable blight on the lives, livelihoods and dignity of one-sixth of the world’s population” said the World Summit on Food Security in Rome, 2009. Without secured food, any social justices are meaningless. Thus Millennium Development Goal 1, eradicating extreme poverty and hunger, is prerequisite for co-existence of the world.

At the 35th G8 Summit, Korea joined in the common effort towards global food security through the coordinated, comprehensive strategy focused on sustainable agricultural development, while keeping proper emergency food aid. Korea promised to participate in mobilizing $20 billion of the Global Agriculture and Food Security Fund (GAFSF) over three years.

Korea is willing to share its experience in agricultural development with developing countries. One such experience is the Korean Green Revolution that was able to help people escape from prolonged hunger and poverty in a short period of time. Development of infrastructure, agricultural technology, and institutional establishment are major factors to achieve food security in developing countries. However, agricultural technology is critical to agricultural development.

The Rural Development Administration (RDA) is one among several stakeholders concerning the agricultural technology transfer initiative. RDA is a representative

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2 Secretary General of Korea-Africa Food and Agriculture Cooperation Initiative (KAFACI).
government organization that implements agricultural technology development and its dissemination to farmers and other stakeholders.

Since 1960s, RDA has implemented agricultural technical cooperation with international societies, which includes international research institutions, international organizations, research institutions and government agencies of developing and developed counties.

RDA focuses on the technical cooperation of the research projects, expert consultations, and capacity building of technology development agents in the developing countries.

Until the 1980s, RDA shifted its focus from the Technical Cooperation between Developing Countries (TCDC) and learning new technologies from developed countries, to technology transfer to developing countries and collaboration for new technology development with developing countries.

2. HISTORY OF AGRICULTURAL TECHNOLOGY COOPERATION OF RDA

2.1 Agricultural Growth with Support from International Societies
The rapid development in Korean agricultural technologies include areas such as biotechnology, breeding, soil and nutrition management, agricultural mechanization, and post-harvest management. One of the reasons that enable this fast growth is the strong support from international society. These supports include technology transfer, provision of equipment, human capacity development, and improvement of technology development system.

The impact of Japanese colonization, during 1910-1945 and the Korean War during 1950-1953, destroyed almost all industrial infrastructures, and forced Koreans to start from zero base. Agricultural development was also restrained by the same reason. However, the strong assistance from the international societies including UNDP and FAO, international research institutes, and advanced countries enabled Korea to rapidly develop their agriculture.

One of the most significant assistance from the international societies is the agricultural development system. In 1947, Korea adopted Land Grant College system from USA, which established the National Agricultural Development Institute responsible for agricultural research-extension-education. Though its educational function was transferred to the Ministry of Education in 1949, the strong bond between research and extension resulted in rapid transfer of agricultural technologies to farmers using the extension workers as catalyst. Because of this effective linkage between research and extension, Korea was able to achieve self-sufficiency in rice with its Green Revolution in a short period of time.

Soil and nutrition management system also has been advanced by strong support from international societies. The USA assisted the training program of soil management experts in the late 1950s. UNDP and FAO gave financial assistance for the soil mapping and analysis of arable land in Korea. Today, Korea provides powerful integrated soil management system.
management services to farmers by local extension offices and central research centers thru the internet.

Seed production and supply system was also assisted by IBRD and advanced countries. The existing Korea Seed & Variety Service (KSVP) was established in 1974. The KSVS handles the production, processing and distribution of certified seeds of the national varietal list crops such as rice, barley, soybean, corn and potato. It aims to increase the agricultural productivity and to improve agricultural products’ quality. The process of seed production and supply system is integrated with several institutions of both central and local governments. This public seed management system contributed to stable seed supply and quality maintenance.

Rice breeding technology was also developed with the support and partnership of the International Rice Research Institute (IRRI) and universities of developed countries. IRRI contributed much in achieving rice self-sufficiency known as Korean Green Revolution in 1977. Indeed IRRI has trained more than 1,000 Korean researchers since 1962, and provided materials for rice breeding.

2.2 Technical Cooperation between Developing Countries (TCDC)

Korean agricultural institutes have shared their knowledge with other developing countries. The success of Saemaul Movement and the Green Revolution awakened interests of developing countries. RDA has trained around 3,700 researchers and extension workers in 116 countries since 1972. While the 80 percent of trainees came from Asian countries, 11 percent came from Africa. These trainings were held in the forms of group trainings.

At the early stage of the training program, it was assisted by USAID or international organizations, but from the late 1980s, the Korean governments took all the responsibility through its Ministry of Foreign Affairs. Aside from group training, RDA also offers on-the-job training, post-graduate program, and visiting fellowship in a form of individual training programs; now manage by each RDA institute. RDA also dispatched experts to developing countries since 1975 in the areas of sericulture, rice production, agricultural machinery, horticulture etc. RDA has signed agreements strengthening technology cooperation with the Philippines (1994), China (1994), Uzbekistan (1995), Thailand (1999). They are now implementing these agreements of cooperation through scientist exchanges, and collaboration.

2.3 New Approach to Technology Transfer to Developing Countries

Like other industries of Korea, developing countries may learn some lessons from the agricultural sectors of Korea, specifically from the Green Revolution and Saemaul Movement program. These cases showed distinguished features that are appropriate to adopt in developing countries: political leadership; community participation; institutional building; technology development; strong support of international societies; agricultural infrastructure development; and parallel development of other industries. Above all, technology innovation will be the trigger of agricultural development.
In this context, seven Asian countries launched the alumni association of RDA trainees, and operated pilot projects to introduce new technologies or practices and follow-up trainings since early 2000. Through cooperation with developing countries, RDA learned the ways towards effective technology cooperation.

First, the cooperation between public agricultural research and extension agencies can help expand technology dissemination. The public agricultural development agencies are still the key factor in the national agricultural growth even though the role of private sector is getting more vital.

Second, practical or appropriate technologies adoptable in the fields are more urgent rather than high technologies. Pedal threshing machine may be more effective rather than electric one in countries producing poor electric power. Many training participants from poor African countries found out that the Motjul - a guide line for setting out rows of rice seedlings – could increase rice productivity. In this context, Korean extension agents can facilitate agricultural development of partner countries.

Third, it may be more effective to identify and solve problems at the actual research and extension fields of partner countries together. Partner countries can learn not only technological knowledge but also practical and effective ways to increase their development capacities thru the co-works. In facts, many partner agencies are sending their staff to Korea not only for the technical aspects but also institutional establishment and capacity building. For example, the Ethiopian government newly established Agricultural Transformation Agency (ATA) was developed with the Korean Economy Planning Board as model. The ATA aims to plan and coordinate comprehensive national agricultural development programs.

RDA has introduced new approaches to facilitate technology transfer to the partner developing countries through both bilateral and multilateral cooperation: KOPIA (Korea Project of International Agriculture), AFACI (Asian Food and Agriculture Cooperation Initiative), and KAFACI (Korea-Africa Food and Agriculture Cooperation Initiative).

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**Rising Korea’s Role in Growth of Developing Countries**

After Korea joined the OECD membership in 2000s, many developing countries wanted to learn the development experience of Korea. They wanted to do bench marking from Korea to explore the possibilities of learning from Korean achievements. There are some similarities between many developing countries and Korea. These are as follows:

First, Korea started the national development from zero-base after the colonial age on 1910-1945 and Korean War on 1950-1953. The colonial age restrained industrial growth and accumulation of technologies and national wealth. Likewise, the Civil War devastated the country. Like Korea, many developing countries have experienced colonial days and civil wars or disputes. Examples include, Cambodia (1975-1979, Nepal 1996-2006), Vietnam (1955-1975) and Sri Lanka (1983-2009) in Asia, and Burundi.
(1959-1996), Mozambique (1976-1994), Liberia (1989-2003), Niger (1980-1996), Lesotho (1970-1998) in Africa. Even today, there are 45 conflicts in Africa and 21 in Asia (KIDA, 2011). The Korean experience of reconstruction of devastated country encourages the countries having similar experience. They have same issues: how to catch up with the advanced countries. It may not be the same path for developing countries to achieve their growth, however, Korea can be a good case of bench marking.

Second, many countries are making an effort to find solutions to achieve political and economic development. Korea achieved both political and economic growth. Some wants to believe that political development can be separated from economic development.

Last, Korea started her development without industrial basis such as infrastructures, technology, and human capacity. Korea has very limited natural resources and little accumulated national wealth. She has only human resources as a tool to develop the country; nevertheless she has overcome poverty and hunger and built a wealthy society. Koreans created their wealth not by the heritage of their ancestors or abundant national resources but by their own efforts - by building human capacities. This is an amazing thing to many developing countries, even those that have abundant natural resources. Many developing countries wanted to gain knowledge to create everything from nothing like Korea.

3. APPROACH TO TECHNOLOGY TRANSFER

3.1 Is Leapfrogging Possible in Developing Countries?
Alvin Toffler claimed in his book *The Third Wave*, that Agricultural Society settled in the First Wave can transition into the Information Age (referred to as “The Third Wave”) without going through the Industrial Age Society. In other words, agriculture-oriented society can be introduced to the structure of the Third Wave by leapfrogging the classic industrialization process.

His opinion that Agricultural Society can be transformed into the Information Age without industrialization has overlooked the fact that Information Age, known as “Post-Industrial Society”, is based on the foundation of industrial society.

However, it is not easy for agricultural societies to introduce high technologies. In *What technology wants*, Kevin Kelly was quoted as follows:

“You can’t do digital infra-structure unless you do industrial. For example, a recent high-profile effort to computerize every hospital in Ethiopia was abandoned because the hospitals did not have reliable electricity. According to a study by the World Bank, a fancy technology introduced in developing countries typically reaches only 5 percent penetration before it stalls. It doesn’t disseminate further until older foundational technologies catch up. Wisely, low-income countries are still rapidly inhaling industrial technologies. Big budget
infrastructures such as roads, waterworks, airports, machine factories, electrical systems, and power plants are needed to make high-tech stuff works. In a report on technological leapfrogging the Economist concluded: “Countries that failed to adopt old technologies are at a disadvantage when it comes to new ones.”

He insists that technologies are like organisms that require a sequence of developments to reach a particular stage.

We had seen such problem exposed on a project that aims to introduce agricultural mechanization at a swampy area of Indonesia. In one agricultural development project between Korea and Indonesia, agricultural machines were introduced at a place with no industrial infrastructure; several problems in terms of utilizing the agricultural machine emerge. For instance, base infrastructures namely road, farm road, compartmentalization of farm land, procurement of components, and provision of proper fuel are necessary requirements in the use of agricultural machines. Mechanization of the area did not reach its goal.

Some African countries do not show its will to industrialize their country. An African government official in an interview with Korean experts on the field survey was asked why they do not desire to industrialize. The official answered that their government prohibits the building of factories because it would make it difficult for them to get grant-type aid once industrialization got started. This interview implies that development aid is perceived in the wrong way.

Because of the reason mentioned above, we need to look into the details of technology level of the target country to be able to transfer advanced technology. If Kevin Kelly is right, different types of technology should be adapted into the next developmental stage depending on the current development stage. So does agriculture.

It is not true that advanced technology adapted by advanced country could instantly solve the food security problem. The technology that can be added into a developmental stage of the target country should be socially adaptable and are considered the best technology.

After having experienced many success as well as failures in technology adoption, we now realize that providing appropriate and socially adaptable technology is the most important task.

3.2 Who facilitate technology transfer?

It is not easy to discover appropriate technology for each developmental stage of the developing country. There are few experts with wealth of experience and knowledge who can confirm which stage the country is currently settled and suggest them appropriate technology. We are an exception however.

Korea has experienced rapid change and development in the agricultural sector as well as economic growth spurt from 1960s. We have disseminated appropriate technologies and solved the post-dissemination problems when base agricultural infrastructure was not
completely ready.

Around 10,000 extension workers and researchers have played the role so far across the country. They do have wealth of experience and expertise as extension workers no matter if he is a retiree or a current post holder. At that period of time when food crops were extremely low and food self sufficiency was the first priority of our nation, they spread out appropriate technologies and completed the mission. The next step to food self sufficiency is the increase in farmer’s income. There are many options for small holder farmers that possess only small scale farm, nevertheless; vinyl greenhouse and livestock production were considered the most important sector. In the next stage, technology dissemination for safe agricultural product became the core value.

To realize technology transfer in the developing countries, re-utilization of these extension workers would have a positive effect. However, they will need to develop some qualities such as language skill, background knowledge of the target country, its culture and its agriculture related know-how.

3.3 What are the technologies to be transferred?

In accordance with the Rome Principle, Korean agricultural technology transfer to developing countries will support country-led agricultural technology development programs.

New technologies, can contributes greatly in solving food security problems. In Green Revolution, there is a saying, “A seed saved 100 million people”, with this as our guide, Korea will focus on cooperation for the development and transfer of safe, productive, and sustainable agricultural technology through cooperation with related research and development agencies and partner countries.

Nonetheless, all technologies or practices to be transferred are not necessarily high technology. Adaptable techniques that are useful at the current level of the targeted country are sufficient enough. Who are the experts that will transfer such technologies? The most suitable ones are the extension workers and agricultural researchers. The RDA will play its role in providing these professional human resources. On the basis of the demands of partner countries and self assessment, the list of possible areas of technology transfer to developing countries is shown in table 1.

<table>
<thead>
<tr>
<th>Sort</th>
<th>Field</th>
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<tbody>
<tr>
<td>Crop Technology</td>
<td>Rice, Maize, Wheat, Potato, Livestock, Horticulture</td>
</tr>
<tr>
<td></td>
<td>Breeding, Cultivation, Agricultural Machine, Soil Management, Crop Protection, Water Management, Nutrition, Post Harvest Management, Bio-Technology</td>
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Countries suffering from extreme poverty would need technologies to increase production of food crops, while countries that have already accomplished food self-sufficiency but
still desire to eradicate poverty would need support for agricultural technologies in increasing its income. It is also possible to combine both options from time to time.

Increased income through agricultural development can help public health, medical treatment, education, and environment issues. Millennium Village Project (MVP) for example has been recognized as a successful case that improved children’s health and education at the same time through augmentation of crop production income.

Our efforts on technology development also include agricultural technology transfer system like research-extension linkages system and seed dissemination system and so on.

3.4 Partnership
Partnership is sharing resources together under the same purpose. When limited resources that governmental offices and private sector possess are jointly utilized, we will be able to create synergy effect.

RDA has explored the feasibility of forming a partnership with domestic and international stakeholders for the agricultural and rural development of developing countries thru the technology cooperation.

The government partners among domestic partners are the Ministry of Foreign Affairs and Trade (MOFAT) and the Korea International Cooperation Agency (KOICA), Ministry of Strategy and Finance (MOSF) and the Ministry for Food, Agriculture, Forestry and Fisheries (MIFAFF). RDA takes part in the Knowledge Sharing Program (KSP) of the MOST through development of module for Green Revolution and Community Development Program of KOICA by providing experts, and managing its agricultural development projects. For example, RDA recently carried out the Seed Potato Production Project in Algeria; Rice Processing Complex projects in the Philippines and Nigeria; and Sericulture Projects in Tunisia and so on. RDA also in particular, takes part in the agricultural development cooperation programs of MIFAFF for the developing countries thru technological assistance and experts dispatch.

RDA is also expanding partnership with private or non-government organizations like Canaan Farmers School, Saemaul Movement Central Training Institute, and Good Neighbors. Such organizations require assistance of agricultural technologies and expert consultations for encompassing their development goals. RDA also needs their cooperation for the comprehensive development approaches.

RDA also works with agricultural colleges in the KOPIA projects. Agricultural colleges provide expert consultation and dispatch their students to the KOPIA centers as research interns.

In order to assist developing countries, RDA works with international research institutes. RDA and the International Livestock Research Institute (ILRI) together disseminate technologies for the artificial insemination and embryo transfer in cattle for the African countries. RDA also transfers the rice production technologies to the Asian countries with the International Rice Research Institutes (IRRI).
Besides, RDA tries to approach poverty issue through partnership with international NGO/NPOs. RDA agreed in partnership with the Alliance for Green Revolution in Africa (AGRA) to share the experience and knowledge of Green Revolution and cooperate to achieve food self-sufficiency in Africa.

### Table 2 - RDA Technical Cooperation Partners

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<tr>
<th>Institute</th>
<th>Cooperative sector</th>
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<tbody>
<tr>
<td>Korea International Cooperation Agency (KOICA)</td>
<td>Community development program</td>
</tr>
<tr>
<td>Saemaul Movement Central Training Institute</td>
<td>Agricultural technology training and Saemaul Movement program</td>
</tr>
<tr>
<td>Canaan Farmers School</td>
<td>Agricultural technology transfer</td>
</tr>
<tr>
<td>Alliance for a Green Revolution in Africa (AGRA)</td>
<td>Green Revolution related technologies</td>
</tr>
<tr>
<td>International Rice Research Institute (IRRI)</td>
<td>Rice production technology transfer to Asian countries</td>
</tr>
<tr>
<td>International Livestock Research Institute (ILRI)</td>
<td>Artificial insemination and embryo transfer to African countries</td>
</tr>
<tr>
<td>Centro international de la papa (CIP)</td>
<td>Potato</td>
</tr>
<tr>
<td>International institute of tropical agriculture (IITA)</td>
<td>Tropical crops (cassava, rice)</td>
</tr>
<tr>
<td>Centro in de Mejoramiento de Maiz Trigo (CIMMYT)</td>
<td>Maize, wheat</td>
</tr>
<tr>
<td>International Crops Research Institute for the Semi-Arid Tropical Crops (ICRISAT)</td>
<td>Legume</td>
</tr>
<tr>
<td>Domestic universities</td>
<td>KOPIA projects (Expert consultation, research interns)</td>
</tr>
</tbody>
</table>

RDA is actively partnering with universities for manpower utilization. Through this network, college and graduate students get involved in overseas agricultural technology transfer.

### 3.5 Whom to transfer?

**Target countries**

The target country is chosen with consideration to national policy. Such consideration is based on criteria set by governmental offices such as the Ministry of Foreign Affairs, Ministry of Strategy and Finance. The criteria for choosing the Target County that RDA has considered for KOPIA, AFACI and KAFACI are as follows:

- Developing countries and least developed countries defined by the UN
- focus countries of related government offices
### Target institutions

Related governmental organization that can directly transfer technology or hand it over to small holder farmers can be our partners. For RDA, to pass on its technology to small holder farmers directly would be very difficult indeed. Accordingly the first priority of technology transfer is the research institution that is in charge of national research and extension business or its superior organization that will be chosen as our partner. It is because such institution is well equipped with network and human resources that can disseminate agricultural technologies.

### Final beneficiary

The final beneficiaries of the target country are the small holder famers who are in possession of small land. Large-scale farmers of some developing countries have already gotten hold of considerately advanced technologies. For instance, when I visited Kenya this year, I have observed that some Kenyan farmers use airplane to seed and to control pest and even manage water via large-sized sprinkler and gateway irrigation system. These farmland proprietors have already reached our level of technology.

## 4. TECHNOLOGY TRANSFER PROGRAMS

### 4.1 KOPIA Program

In order to transfer technologies effectively, it needs long-term investment and comprehensive approaches from its development to extension. It is better if the agents are involved in every step to identify needs of technology development, research and dissemination of new technologies or practices. It also needs enhancing institutional establishment and building capacities of human resources.

KOPIA (Korea Project on International Agriculture) is a program that operates at the research institution of the partner country and by the researchers and extension agents of both Korea and the partner country. It aims to develop and transfer new agricultural technologies or appropriate practices and adapt them to the diverse country conditions.

The program has been established to build mutually beneficial relationship between Korea and its partner countries through cooperation and joint development in agricultural
countries.

The major features of KOPIA program are as follows:

**Objective**
Its objective is to develop and distribute the technologies appropriate at the country conditions and reflecting needs of beneficiaries.

**Partnership**
Partner country: national agricultural research institutions and universities
Korea: RDA

**Staff**
7-13 persons are dispatched to the partner country: 1 director, 1-2 visiting scientists, 2-3 research fellows, and 4-8 research interns. Research interns are dispatched from universities in Korea. The Center directors are selected among the extension agents or the scientists from the public or private sectors.

**Financial resources**
Partner countries will provide KOPIA the office space, laboratories, experimental farms, equipments, staff housing in kind while Korea will shoulder the operational expenses of the Centers.

**Implementation of the program**
Both parties will participate in the overall processes of the program such as needs assessment, planning, implementation, evaluation and dissemination.

**Cooperation sectors**
- Joint technology development, identifying practices
- Dissemination of adopted technologies (the tools are demonstration field, demo farms, demo village, reflection of extension activities)
- Capacity building of researchers and extension agents thru training in Korea
- Field workshops at the demo farms
- Institutional establishment
- Expert consultations

As of today, KOPIA centers have been established in 10 countries with 5 more countries planning to open this year. They are as follows:

- 2009(6): Kenya, Myanmar, Paraguay, Uzbekistan, Vietnam, Brazil
- 2010(4): Algeria, Cambodia, D.R. Congo, Philippines
- 2011(1): Ethiopia
  * to be planned in Sri Lanka, Thailand, Bolivia, Ecuador.
<table>
<thead>
<tr>
<th>Country</th>
<th>Partner Organization</th>
<th>Collaborative Programs</th>
</tr>
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</table>
| Vietnam     | Vietnam Academy of Agricultural Sciences (VAAS)                                          | Vegetable cultivation  
Breeding and cultivation of bio-energy crops                                                                                                                                                                         |
| Myanmar     | Department of Agricultural Researches (DAR)                                             | Developing new varieties and technologies of leguminous crops  
Jointly using tropical agricultural resources for the development of pest control agents and fertilizers                                                                                                                  |
| Cambodia    | Cambodian Agricultural Research and Development Institute (CARDI)                       | Breeding and cultivation of maize                                                                                                                                                                                         |
| Philippines | Philippine Rice Research Institute (PhilRice)                                            | Developing labor-saving cultivation technologies of rice                                                                                                                                                                |
| Uzbekistan  | Uzbek Scientific and Production for Agriculture (UzSPCA)                                | Developing application technologies in food & forage crops (wheat, barley, etc)  
Practical use of Korean new technologies in vegetables                                                                                                                                                                   |
| Kenya       | Kenya Agriculture Research Institute (KARI)                                             | Enhancing artificial insemination technology in dairy cattle  
Developing breeding and cultivation technologies in potatoes                                                                                                                                                             |
| DR Congo    | Universite de Kinshasa (UNIKIN)                                                         | Developing greenhouse cultivation technologies of tropical vegetables                                                                                                                                                   |
| Algeria     | Institut National de la Recherche Agronomique d’Algerie (INRAA)                         | Developing new varieties of wheat and barley varieties  
Developing hydroponic culture of fresh vegetables                                                                                                                                                                       |
| Brazil      | Empresa Brasileria de Pesquisa Agropecuaria (Embrapa)                                   | Developing stable production technologies in mushrooms                                                                                                                                                                   |
| Paraguay    | Instituto Paraguayo de Tecnologia Agropecuaria (IPTA)                                  | Developing stable production system in sesame  
Developing high yield and pest-resistant variety in new value-added crops                                                                                                                                              |
<table>
<thead>
<tr>
<th>Activities</th>
<th>Details</th>
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</table>
| **Establishment of KOPIA** (May 5, 2009) | ✓ Signing MOU (May 5, '09): RDA Administrator and VAAS President  
 ✓ Organization: VAAS HQ - FCRI (Field Crop Research Institute)  
 ✓ Dispatching KOPIA scientist and 9 researchers (Aug. 3, 2009) |
| **Opening KOPIA-FAVRI** (Oct 21, 2009) | ✓ Venue: FAVRI (Fruit & Vegetable Research Institute)  
 ✓ Participants: 120  
 * Vice Agricultural Minister of Vietnam attended |
| **Joint Research** | ✓ Breeding and establishment of cultivation practices of bio-energy crops (FCRI), Sweet sorghum, sugarcane, cassava, jatropha, sweet potato  
 ✓ Establishment of production technologies of 12 fresh vegetables (FAVRI) |
| **Vegetable Harvest Workshop** (Oct 21, 2009) | ✓ Venue (Vegetable Collection Garden)  
 ✓ Participants: 120  
 ✓ Harvesting event (cabbage, cucumber, etc) |
| **Collection and Evaluation of Genetic Resources** | ✓ Testing 300 accessions from 5 bio-energy crops (sweet sorghum 66, sweet potato 87, cassava 93, sugarcane 43, jatropha 11) |
| **Knowledge-sharing Programs** | ✓ 5 personnel studied in Korea for 1 month in 2010 from vegetable, bio-energy crops, mushroom, etc  
 ✓ Field study on vegetable cultivation for farmers in KOPIA |
| **Seminar** | ✓ Breeding & cultivation in vegetables and bio-energy crops |
| **Exchanging Scientists** | Invite:  
 ✓ Experts in breeding and cultivating bio-crops and vegetables: 5 (2009-2010)  
 ✓ High-ranking officials in VAAS: 8 (2009-2010)  
 Dispatch:  
 ✓ 24 specialists in breeding and cultivation in bio-energy crops, vegetables, etc (2009-2010) |
| **Pilot Villages Development** | ✓ Village with good infrastructure and easy to sell agricultural products  
 ✓ Establishing vegetable cultivation system and farmers’ training |
4.2 AFACI Program

AFACI (Asian Food and Agriculture Cooperation Initiative) is a multilateral cooperation initiative that aims to transfer and share agricultural technologies for the improvements in food production, sustainable agriculture and extension skills among Asian countries. AFACI was inaugurated on November, 2009, in Seoul, Korea, with the participation of governmental representatives from 12 member countries - Bangladesh, Cambodia, Lao PDR, Indonesia, Mongolia, Nepal, Philippines, Sri Lanka, Thailand, Vietnam, Uzbekistan and Republic of Korea.

The purpose of the Initiative is to promote sustainable agricultural green growth in the Asian region, to eradicate poverty and hunger, and to contribute to consistent economic development in the Member Countries through technological cooperation in agriculture and food sector.

To achieve its purpose, the Initiative will undertake the following activities:

A. Technology development cooperation for food security and agricultural product & food;
   1) to develop technologies in crop, horticulture, and livestock sector for food security;
   2) to develop research policy on agricultural industrialization promotion and restructuring;

B. Technology development cooperation for sustainable agricultural environment and resource conservation and utilization;
   1) to develop technologies for environment-friendly organic farming and safe production;
   2) to develop new food resources to cope with climate change;
   3) to jointly explore the agricultural genetic resources and develop utilization technologies to the extent feasible under the existing legal provision of member countries; and
   4) to develop conservation technologies for agricultural eco-system.

C. Capacity building and technology transfer for the development of agriculture and food industry;
   A. to provide education program and develop human resources in agriculture and food fields;
   B. to promote the technology transfer among Member Countries; and
   C. to assist workshops and conference on pending issues.

AFACI programs are composed of research projects, trainings, and workshops. It is now implementing 15 research projects for sustainable agricultural development in the region. The research subjects include the existing challenges and emerging needs of member
countries. Based on its activities, research projects are composed of three sectors: 1) Pan-Asian Project; 2) Regional Project; and 3) Country Project. The duration of all projects is 2 years + 1 year. It is possible to extend the duration of projects after evaluating and monitoring within 2 years. AFACI is now implementing two Pan-Asian projects with 11 countries, one Regional project with seven countries, and 12 Country projects by 11 countries

Table 6 - 2010 -2011 AFACI Workplan of Cooperation

<table>
<thead>
<tr>
<th>SECTION</th>
<th>TITLE OF THE PROJECTS</th>
</tr>
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<tbody>
<tr>
<td>PAN-ASIAN (2)</td>
<td>Establishment of Agricultural Technology Information Network in Asia</td>
</tr>
<tr>
<td></td>
<td>Construction of the Asian Network for Sustainable Organic Farming Technology (ANSOFT)</td>
</tr>
<tr>
<td>REGIONAL PROJECTS</td>
<td>Collaboration network for the management of migratory rice plant hoppers and associated virus diseases of rice in ASIA</td>
</tr>
<tr>
<td>COUNTRY PROJECTS (11 Country, 12 projects)</td>
<td>(BANGLADESH) Development of variety, cropping system research and technology transfer of major cereals (Rice and Wheat) for sustainable food security in Bangladesh.</td>
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<td>(CAMBODIA) KOPIA project³)</td>
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<td>(INDONESIA) Variety development and improvement production system of the tropical soybean</td>
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<td>(LAO PDR) Direct seeding much? based cropping systems (DMC)</td>
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<td>(MONGOLIA) Development of Vegetable Production Techniques in the Green House</td>
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<td>(NEPAL) Promoting conservation and sustainable use of genetic resources of food and agriculture for enhancing food security in Nepal</td>
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<td>(PHILIPPINES) 1. Bio-fertilizer technology for sustainable agriculture</td>
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<td>2. Establishment of a lignocellulosic feedstock data bank and a single agriculture and forestry bio-energy network</td>
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<td>(SRI LANKA) Post harvest management of fruits and vegetable</td>
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<td>(THAILAND) Maize seed village in Thailand</td>
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<td>(UZBEKISTAN) KOPIA project</td>
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<td>WORKSHOP</td>
<td>National Agricultural Research and Extension System in Asia</td>
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<td>TRAINING</td>
<td>Rural Development for high-level officers</td>
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<td>MEETINGS</td>
<td>General Assembly, Executive Council Meeting</td>
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In order to address the priority issues of the member countries, trainings and workshops are also held at least once a year. These activities cover a wide range of agricultural issues such as research, extension, and food security. Currently, training workshop has been implemented under the following subjects for two years: (1) Strengthening National Agricultural Research and Extension System for first year (2010), and (2) Rural Development to Improvement Quality of Rural Life for second year (2011).

4.3 KAFACI Program

KAFACI (Korea-Africa Food and Agriculture Cooperation Initiative) was launched in Seoul on 6 July 2010 in order to promote agricultural technology cooperation and transfer to 16 African developing countries. Members are Angola, Cameroon, DR Congo, Côte d’ivoire, Ethiopia, Gabon, Ghana, Kenya, Malawi, Morocco, Nigeria, Senegal, Sudan, Tunisia, Uganda, Zimbabwe, and Korea. Its objectives are the same as that of AFACI.

Unlike AFACI, however, KAFACI has difficulties in realizing its purpose. One of the main constraints is that Korea has insufficient knowledge of the diverse agricultural conditions in each member countries. We have little experience and expertise about African agriculture.

As its alternatives, KAFACI members resolved their issues at the 1st KAFACI General Assembly. It operates two programs on agricultural technology cooperation among members: (1) project development of each member country thru the on-the-job training in Korea; and (2) technology cooperation thru the partnership with international institutions.

In order to overcome the problem of less experience and relationships between Korea and African countries, the KAFACI Secretariat invited the scientists of member countries to Korea for the period of 8-12 weeks and deployed 45 scientists from RDA research institutes to Africa. This program was facilitated to share the knowledge about each other’s agricultural conditions and to identify needs of technology transfer and develop joint research projects.

KAFACI seeks to establish partnership in the international and country levels. In order to compliment the expertise and resources of the RDA for the agricultural cooperation in Africa, KAFACI aligned with international research institutions, NGOs, and universities in Korea. For example, KAFACI operates a training program with International Livestock Research Institute (ILRI) to promote improved livestock technologies in African countries.

KAFACI also works with the Alliance for a Green Revolution in Africa (AGRA) to realize Green Revolution in Africa. They plan to hold a joint workshop to share experiences and knowledge of Green Revolution, and to develop a concrete action plan.
that will contribute to Africa’s agricultural transformation using lessons from the Korean experience. Thru this cooperation, Korea aims to build and strengthen the network for the extension systems of the KAFACI members, as well as share extension knowledge and experiences around agricultural value chain that could be useful in achieving the African Green Revolution. It also aims to identify and discuss innovative extension approaches (methodologies) that can be adopted to deliver knowledge for achieving the African Green Revolution and to map out areas in the KAFACI member countries for piloting the successful extension approaches from the Korean Green Revolution.

The activities involved in the preparation for and holding of the workshop are: jointly oversee and conduct the workshop to ensure sharing of Korean and African experience in agriculture and the possibilities for adapting features from the Korean agricultural sector into the African context. The specific areas of focus will be on agricultural technology, capacity building, technology transfer, innovation, adaptation and environment-friendly technology, extension systems, village-based sustainable agriculture, markets and competitive agriculture, and nurturing new farmers.

5. ENHANCING THE TECHNOLOGY COOPERATION SYSTEM

5.1 Capacity building of development agents

As the demands for development agents expand continuously, it needs to foster experts with capabilities for agricultural technology, language ability, and understanding different cultures. Extension agents have the wealth of skills and experience of agricultural and community development. They can be good resource persons for technology transfer if they have linguistic competence.

5.2 Institutional establishment for technology transfer

The increasing role of agricultural cooperation needs the institutionalization of international agricultural development organizations. CIRAD of France, for instances, has 50 branch office and 1,800 staffs as an international agricultural development center. JIRCAS also has 190 staff and 18 branch offices. These international research and development agencies generate more effective technological achievements for the developing countries. In order for us to deliver technology effectively we may need to establish technology transfer institutions for developing countries.

6. CONCLUSION

Access to sufficient, safe, and nutritious food is the right of everyone. Korea will always strive for a world free from hunger and poverty, and participate actively in the global efforts to achieve food security. Development of infrastructure. agricultural technologies.
and institutional establishment are major factors in achieving food security in developing countries. Among them, technology is critical to agricultural development.

In accordance with the Rome Principle, the Korean agricultural technology transfer to developing countries will support country-led agricultural technology development programs.

On this basis, we focus the technology development cooperation on improving the national agricultural research and extension system, and capacity building of human resources to develop agricultural technology.

New technologies will contribute greatly in solving the food security problem. In Green Revolution, there is a saying that “a seed saved 100 million people.” RDA will focus on the development not only for new agricultural technology but also appropriate technologies or practices adaptable to the current development level of each country.

Supporting the assumption that government intentions and social agreements are critical to technology development, our cooperation will focus on the institutional capacity building for agricultural technology development and dissemination.

Partnership between domestic, regional, and international stakeholders will be emphasized. We will work together with technology development agencies like international research institutions, educational institutions and none-government organizations (NGOs). In the partner countries, national research institutions and educational institutions will be our major counterparts. RDA will cooperate with the Ministry of Agriculture, Forestry and Fishery, Ministry of Planning and Finance, Ministry Foreign Affairs and Trade, and the Korea International Cooperation Agency.

RDA will utilize its resources to transfer appropriate agricultural technologies and practices on food safety, research and extension system, and expert pool. On this basis, RDA has been implementing two programs: the KOPIA (Korea Project on International Agriculture) and the multilateral cooperation initiatives known as the AFACI (Asia Food and Agriculture Cooperation Initiative) and the KAFACI (Korea- Africa Food and Agriculture Cooperation Initiative)

As Korean Green Revolution was evaluated as a successful case of technology transfer from international society, we also hope to contribute in creating a successful agricultural development case with the cooperation of the international society.