CHAPTER II

LITERATURE REVIEW

2.1 Definition of agricultural extension

There are various definition in agriculture extension, the useful definition of agriculture is as a term of assistance to improve their knowledge's, attitudes, skill and increased productivity at communities and society (Jackline *et al.,* 2006). Moreover, agricultural is a bridge between technology farmers and technology developers. The role of bridge can applies to both formal and informal setting. Approaches can be either direct or indirect through education procedures that improve farming practices or methods and techniques aiming increased production efficiency and income generation, better living condition, and lift the social and educational standards in rural life (Isubikalu, 2007).

In addition, FAO (2003) defines agricultural extension is a non-formal educational function applies to any institution that disseminates information and advice with the intention of promoting knowledge, attitudes, skills and aspirations, although the term extension tends to be associated with agriculture and rural development. Extension is multidisciplinary. It combines education methodologies, communication and group techniques in promoting agriculture.

Farmers see, extension is a form of assistance to improve their knowledge, efficiency, productivity, profitability of their farms and contribution to their family and than in communities and society. But politicians, planners and policy makers in developing countries think that extension as a policy instrument to increase agricultural productivity, achieve national food security and poverty reduction for country (Courtney, 2002).

2.2 Agriculture extension system in Asian countries

Agricultural extension has long term developed in Asia. Agricultural extension activities were introduced to Asian countries as earlier as 16th century in Philippines, after that at middle of the 19th century in some region of Indian and starting the 20th

century in Malaysia. Their aims and performs were entirely different from what we perceive today. Most of them were established for promoting export crops for the benefit of the colonials' power. Subsequent, a great majority of countries created their respective extension system like China created in 1952, Nepal in 1966 and Thailand in 1967 (ADB, 2003).

While extension was originally conceived as a way of transferring technology to farmers there is now wide recognition that this task needs to expand considerably. In the same way, the earlier reliance on extension models that could be widely replicated across countries and regions has proved to be ineffective. There is an increasing realization that new extension approaches need to emerge locally, based on experimentation, learning and adaptation to prevailing circumstances (Rasheed and Andy, 2005).

The education is main principle of agricultural extension system so the effective education requires the use of the educational methods or extension approaches to transfer the improved technologies to farm producers. These extension approaches are hard to apply for all country because where depend on location, regional, and cropping patterns aspects in each country and other the systems also depend on location, regional, and cropping patterns aspects in each country. For example, In India was adopted farmers training, field trials, demonstrations, T and V approaches, while in Turkey where they used the contract farmers, farmers' field workshop and mass media (Michael, 2006).

Rasheed and Andy (2005) has summarized extension arrangements in Asian countries. It had disconcerted a large degree of similarity in terms of organization and underlying frameworks as follows:

1. Extension continues to be planned, funded and implemented by departments or units attached to the Ministry of agriculture and almost all of them are organized in a top-down fashion, mainly supply driven, implementing the programmes conceived by the state with little participation from farmers and other agencies and with little accountability to the client.

2. Technology dissemination continues to be understood as the primary and often the single mandate of extension. Inadequate technology adoption has been attributing to existing weakness in research extension linkages, although several measures in many countries to address this have been taken during last two decades.

3. Pluralistic institutional arrangements are emerging and this is finding wider acceptance everywhere. Farmer associations are equal partners in extension in countries like Korea, Taiwan and China. However, NGOs and the private sector play an important extension role in India, Bangladesh, Malaysia and Sri lanka. Extension provision by private companies to farmers growing crops under contract is gaining importance in China and India.

4. Increasingly realize the need for extension to engage with a wide range of issues beyond dissemination technologies in most countries in Asian. This has raised the need for better-qualified and specialized extension staff to meet the changing information and technical demands of farmers. Similarly it is now recognized that there is a need for extension to play a greater adaptive research role to better target technologies at the field level and to provide organizational and marketing support to farmers.

5. With a few exceptions, all countries in the region do not have an explicit extension policy. But the available evidence indicates that having an extension policy is not a sufficient condition to guide change. Quite often, policy related to extension stems from changes in country development plan, donor interests and change in agricultural and rural policy or change in governments. Extension services have always tended to respond to changes taken by other systems and have rarely guided changes in extension or rural development policy.

2.3 Models of agriculture extension

Recently, the basic of models of extension, there are six in various stages of development and implementation. Instead of trying to identify the best fit extension model for a particular country, the reality is that a pluralism of models is being used in most countries in Asian. Virtually every developing country now has a mixture of public, NGOs and private firms (example seed and fertilizer dealers) delivering

extension assistance to smallholders. The following six extension models are being used in Asian or developing countries (Robert and Tripp, 2003):

1. The national government extension model has been historically the dominant extension model throughout the world and it has usually been a key institution within and reporting to the Ministry of agriculture, where is responsible for the coordination and management of interlinked institution: agricultural research, and extension.

2. The extension and research model was introduced by colonial powers in Malaysia, Mali and other colonies exporting cotton, palm oil etc. The model combines research and extension and it is still in operation in many countries today. For example in Mali, smallholder cotton farmers are served by a self-financed cotton research and extension system while the public extension model serves farmers outside the cotton zone.

3. The Training and Visited (T&V) extension model was launched in Turkey in the early seventies and then spread to India and throughout Africa under World Bank sponsorship in the late seventies and eighties. T &V model consumed about three billion dollars donor assistance over the 1975 and 1995 period. Nevertheless, some countries Like Zambia and Mali are currently using modified T &V extension programs.

4. The NGOs extension model: In the nineties, many NGOs shifted gears and moved from providers of food aid and humanitarian assistance to become agent of development. The NGOs establish food and community development projects in many African in 1990s that were primarily financed by bi-lateral donors. For example, In Mozambique in 2005, the NGOs employed 840 extensionists as compared with 770 government extension workers.

5. The private extension models is spreading in industrial countries such as the Netherlands, New Zealand, the United State and more recently in some middle income of countries such as Chile and low income countries such as Uganda. Under the private model, the farmer is expected to pay some of the cost of extension with the hope that public outlays on extension will be reduced. But there is little evidence to

date that small scale farms can “buy their way out of poverty” by paying for extension in Uganda but the jury is still out on the financial sustainability of private extension.

6. The Farmer Field School (FFS) approach (model). This model emerged in Asia in the 1980s when extension workers offered advice to farmers on using integrated pest management (IPM) to control pests in rice mono cropping areas in Philippines and Indonesia. The model was remarkably effective in reducing pesticide use by up to 80 percent on farms in these two countries. The FFS model is now being used in around 50 developing countries. But farmers completing a school are reported to have limited success in spreading the new technology to their neighbors. Thus explains why there is a need for research on the following issues: do the fields’ schools increase the knowledge of farmers who have completed a school lead to higher crop yields and increased agricultural productivity and is the spread of technology from farmers attending school to neighboring farmers (ADB, 2007).

2.4 Extension approaches

Kandal extension system is one of key role to transferring improved technologies that obtained from research institutes to the rural communities throughout the whole province. From the top down process of traditional extension dictated farmers to adopt technologies developed by agriculture scientists and resulted in poor extension performances in the past years (FAO and UNFP, 2005). The new approach of participatory extension methods advocated and supported by donor as NGOs project as follow FAO, DANIDA, CEDAC, Srer Khmer etc. In recently, all these projects have made consideration to improvement technology to assist the farmers.

WB (2005), shows that extension programs are promoted and adoption of the extension approaches, which will be effective in different leaning conditions. The methods should be organized, which can be considered the most effective in each learning condition compared with others, every methods has own character in real situation. Today, there are six extension methods populate to uses namely: farmer to farmer, demonstrations, farmer field school, training and visited, mass media, and farmer field day approach that the extension agent have been applying in

dissemination to promoted vegetable techniques to farmers in Kandal province, Cambodia.

2.4.1 Farmer to farmer

Farmer to farmer extension is a process in which key contact farmers become responsible for transfer of information and district agriculture staff facilitates the activities of these key contact farmers. The district agricultural agent has contact with the key farmers and the key farmers become responsible for training other farmers to share knowledge and skills in training process (sometimes as farmer participatory extension program). Farmer to farmer extension will require the identification of key contact farmers by the district agriculture office staff. The establishment of key farmer groups or farmer extension clubs and lead development of training program for those farmers are important in community (KDAFF, 2004).

The result of interview of training of trainer[2] (ToT) during field survey at Chroy Thore village found that using participatory learning approaches, the training focused on advanced levels of homestead production as the farmer trainers were experienced and committed to the FFS approach. At the end of training, all of the farmers could prepare home garden by themselves and demonstrate knowledge of how to grow vegetable such as cucumber, yard long bean, tomato and cabbage etc. Trainers expressed a high level of competence and enthusiasm toward the activities during implementation (Srer Khmer, 2006).

2.4.2 Demonstration

The demonstration methods are cooperation between the extension agent with farmers where new technologies and practices can be applied step by step. This approach found that can improve understanding and seeing believes for farmers that mean it is learning by doing. Farmers perform a model under direct supervision of extension worker. The demonstration is benefit that can help farmers like how to use a tool to preparation land, control pest or disease and how to harvesting vegetable.

[2] *Training of trainer: farmers who had received the training and have full practical experience individuals by extension program. Most of them are interested in learning as well as interested to share their knowledge and experience with other farmers (Srer Khmer, 2006).*

Demonstration method convinces that a particular technology is better then other by direct practicing. Generally, it is happened at present in Kandal province where the training has 12-14 weeks follow the seasonal of vegetable with participatory farmers between 10-20 farmers, which is a limitation of the demonstration approach occurs currently in real situation. Farmers get training at every crucial stage of demonstrations which builds up their capacity (FAO, 2003).

Demonstration encourages farmers to try out innovation themselves. Farmers can see source of problems and find the solution without complicated technical details. The outcome of demonstrations can be known on demonstration field during harvesting season, where farmers can observe the real results and discuss their implication. Mostly, demonstration fields used to compare the result of the traditional practice with the new practice. For example, in Somroung Thom commune, demonstration field have to compare practice between traditional method with the IPM method for growing yard long bean and cucumber. Demonstration plot is very useful method for convincing farmers who have not learned only by thinking and can practice too. So farmer can apply this method to fit their areas. It was found that field days let farmers to see what they have been hearing for the lesson, for this reason giving the opportunity for building the decision making or attitude towards the innovation. Usually, the contact farmers are under supervision of the extension agents carrying out the demonstration model. The demonstration field are very successful where can produce positive result for extension agents by creating convinced in their judgment and ability. One of the effective way to promote the new practice and can open the way for further interaction between farmers, who demonstrated the practice to their neighboring. For other farmers' visited the result of demonstration plots foster improved communication situation at local community. This chance provides farmers opportunities on exchanging experiences and gaining more specific and shared information about new technologies (DOAE, 2007).

2.4.3 Farmer field school (FFS)

Indicated by Jaime *et al.* (2001) that farmer field school approach has been in implement IPM used with great success in many Asian countries in rice and vegetable cropping systems. This methods combines training with field based, local specific research to give farmers the skills, knowledge and confidence to make ecologically and cost effective in decision making on crop health.

Farmer field school is an approach to educate farmers in their own environment. Farmer field school has provides an opportunity for learning by doing based on principles of non-formal education. Extension workers or trained farmers facilitate the learning process, encouraging farmers to discover key agro-ecological concepts and develop IPM skills through self discovery activities in the field work (Henk and Janice, 2006).

Observed in field survey, farmer field school is usually made up 20-25 participants from the commune or village where collective action and follow-up activities can be consolidated. Interested farmers are invited to a community meeting where farmer field school objective and processes are explained, as well as the importance of attendance at weekly meeting. The process is starting at the time of planting and continuing for about three to four months until harvest. A team of two or three facilitator or trainers guides each FFS, each team being capable of facilitating up to five FFSs in any cropping season.

At each meeting of the FFS the members are dividing into five to seven smaller groups, which make detailed observations of crop and field conditions called agro-ecosystem analysis. This observation are recorded, discussed and interpreted by the groups. As the season progresses, the member of the FFS discover how the different components of the agro-ecosystem interact with each other. In particular, they find out the dynamic relationship existing between plants, pests, and natural enemies etc. The members of the FFS have also started examining other aspects of crop production, such as selection seed, land preparation, plant nutrition and water management. The participants attended field schools include farmers, disabled farmers, school teachers and students.

2.4.4 Training and visit system

The training and visit system (T and V) was evolved on the basis of experience gained in the area where extension worker can reasonably be expected to cover. The system envisions a direct and effective transfer of available technical recommendations through a close linkage between research, extension service and farmers. The features of T and V system are professionalism, single line of command, concentration of effort, time-bound work, and field farmer orientation, regular and continuous training linkage with research. Flow information on modern technology to farmers of varied background where farmers increased production (Michael, 2006). Farmer at Preak Thaker said that the extension agent often come visit farmers' field on vegetable garden at home one or two times per month at seasonal periods, such as at land preparation, pest and especially disease outbreak periods. Frequently, the extension agents have discussion with farmers either individual or group of farmers directly at vegetable gardens related to proposal technologies from farmers. Most of techniques are focus to reducing the cost of input and improvement of basis agriculture practice such as water, fertilizer application, weeding and maintaining etc. In the field, extension workers teach farmers how to run perform these practices, encourage them to adopt on their fields. Also teach farmers how to evaluation production constraints and can advise or guide farmers to discover way to improving productivity. T and V approach has developed the farmers' adoption of new technologies thought intensive farming. Several this models are interaction between the government extension workers and contract farmers in order to disseminate of technologies in term of package of key agricultural communication sector.

2.4.5 Mass media and broadcasting agricultural technologies

Mass media play an important role in disseminating of farm information to farmers like radio, television and print media (new papers/poster). It means training of farmers thought distances by communication facilities. The reach of mass media helps the extension agent in large numbers of farmers simultaneously (Pascal *et al.,* 2006). At the present, Cambodia mass media and broadcasting agricultural technology aimed to assist farming community to the quantity and quality of

agricultural production through increasing awareness and access of agricultural knowledge, information and technology. The disseminated thought radio station twice a week and TV station one a week. The program's purpose to improve/support to the farmers and farm's association, in term to increasing quantity and quality of agricultural products, through improving the knowledge, skill, information and agricultural technologies. Mass media and broadcasting agricultural technology also published about 80,000 booklets, leaflet and posters including rice, vegetable, and pest control etc for distributing to farmers and producers through extension workers, district agricultural office, field agents and farmer field schools in whole country (Michael, 2006).

2.4.6 Farmer field day

Field day is the culmination of the ToT and FFS where were organized to allow farmers from each FFS and the participants of the ToT interact, meet, share and learning from each other. All participants are from ToT, IPM farmers, non-IPM farmers, NGOs worker, government offices from relevant departments were invited to take part in the field day. Also it allows farmers and participants of ToT to present and share their finding from field demonstration to all participatory (Yech, 2002).