Potential Role of Integrated Farming Systems (IFS) for Poverty Alleviation in the Mekong Basin: An assessment of farmer-based networks in promoting IFS

Thailand Country Report

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1. Introduction

Intensive agricultural systems are often based on optimizing the productivity of monocultures. In those systems, crop diversity is reduced to one or very few species that are generally genetically homogeneous, the planting layout is uniform and symmetrical, and external inputs are often supplied in large quantities. Such systems are widely criticized today for their negative environmental impacts, such as soil erosion and degradation, chemical contamination, loss of biodiversity, and fossil fuel use (Giller et al., 1997; Griffon, 1999; Tilman et al., 2002). Conversely, multispecies cropping systems may often be considered as a practical application of ecological principles based on biodiversity, plant interactions and other natural regulation mechanisms. They are assumed to have potential advantages in productivity, stability of outputs, resilience to disruption and ecological sustainability, although they are sometimes considered harder to manage (Vandermeer, 1989).

A majority of the world's farmers, particularly those located in tropical regions, still depend for their food and income on multispecies agricultural systems, i.e. the cultivation of a variety of crops on a single piece of land (Vandermeer et al., 1998). Those systems, which are often without synthetic inputs and based on integrated management of local natural resources and, in many cases, on rational management of biodiversity, theoretically offer numerous ecological advantages.

An important facet of agriculture in Thailand is that the sector, which involves about 30 million people or 50% of the Thai population, has a dualistic structure. Large-scale commercial farmers, who produce mainly for agro-industries and export markets, produce side-by-side with small-scale subsistence farmers, who struggle to produce enough food for household consumption and domestic markets. These small-scale farmers each own approximately 15-20 rai (2.5 - 3 ha) of land. They make up roughly 50% of the total farm population, but contribute only 25% of the total market value of agricultural production. The poorest groups of small-scale farmers are those who depend predominantly on rainfed production with scarce resources, limited opportunities, and poor access to markets. They produce food for their own consumption, selling the surplus to earn some income. If farm income is insufficient, off-farm employment is important for such farmers (Jitsanguan, 2001).

This group of small-scale farmers is estimated at 8 million households, using about 25 million rais (4 million ha) of land (Jitsanguan, 2001). Most of these small-scale subsistence farmers share some interesting common characteristics, including:

- They were once farmers who produced commercial monoculture system. However, they suffered net losses from their production, due mainly to increasing input prices and decreased commodity prices. They subsequently left the commercial sector and became subsistence farmers.

- The intensive chemical use on commercial farming enterprises damaged their health and quality of life. This forced them to seek alternative farming methods that were considered safer.
- Even though they are small-scale farmers who made limited contributes in terms of market value to national income and export earnings, their existence in rural areas is important in terms of non-market values. They contribute to food security and resource conservation and help build rural communities as well as conserve Thai culture and local wisdom.
- Some of these small-scale farmers have retreated from industrial and urban employment during the economic crisis. They considered the agricultural sector as their final safety net.

In general, the monoculture of economic crops in order to take advantage of economy of scale (decreasing unit cost from increasing production scale) is the pattern typical of commercial farm production. The types of crops or animals in the monoculture system will depend on the expected market demand and price. Thus, there is always the risk of excess supply and decreasing prices. At the same time, commercial farming will normally use external inputs such as chemical fertilizer, insecticides, pesticides and farm machinery. These mean higher production costs, and lower or even negative profits (Jitsanguan, 2001).

Small-scale farmers, on the other hand, have limited capital and farmland, and suffer from a seasonal shortage of water. Monoculture designed mainly to serve market demand may bring net losses to small-scale farmers. Moreover, farm resources and the environment will deteriorate from inappropriate farming system and technology (Jitsanguan, 2001).

Sustainable agriculture can thus be seen as an alternative solution for small-scale farmers who wish to have a different method of farming than mainstream agriculture, which is based mainly on market forces. The difference between the two approaches can be seen in terms of these fundamental objectives. Commercial large-scale production has as its ultimate goal the maximization of **profits**. Sustainable agriculture, on the other hand, takes into account the maximization of **benefits** such as household food security, the quality of life, environmental conservation and rural development (Jitsanguan, 2001).

The integrated farming system is an appropriate example of sustainable agricultural production. It involves the judicious use of limited farmland to increase the range and number of farm activities, thus reducing risk and making use of waste from one type of production in another type. Integrated farming implies at least two kinds of agricultural production operating simultaneously, and complementing each other in one way or another to reduce production costs (Jitsanguan, 2001).

In economic terms, the integration of complementary farm activities is considered economy of scope, because of cost sharing and recycling of farm inputs. Some types of successful integrated farming system include fish-rice

production and pig-fish-vegetable production. The resources needed for integrated farming system are found throughout Thailand, but are especially suitable in the Central region.

This study compares the performance of the integrated farming system (IFS) with that of the non-integrated farming system, which we denote as the commercial farming system (CFS). That is not to say that the IFS farmers are not commercial, but whereas the CFS has a clear focus on producing rice and other commodities for the market, the IFS farmers through diversification and resource integration pursues multiple objectives, that included food production for the household, the maintenance of natural resources for food security and the well-being of household members, and the support for local communities.

2. Method and Materials

A survey of farmer networks in five provinces of Northeast Thailand was undertaken between August 2008 and December 2008 using both quantitative and qualitative methods in semi-structured interviews. The five provinces that formed the basis of the study are presented in Figure 1. The total number of informants interviewed was 223 households of which 119 were classified as IFS farmers that belonged to recognized networks and 104 none IFS farmers. Focus group discussion within each of the five networks was undertaken to gain perspectives on the structure and workings of the networks. The criteria for selecting the study site and five networks were based on a literature review and the following:

- The IFS network had to have been formed in Northeast Thailand and existed for over five years.
- The network is well known and recognized widely and has a diverse set of activities.
- By size of IFS farm/key characteristics that are representative – including land area, number of members in networks and administrative coverage (Province, District, Tombol, village)
- Representative of Northeast Thailand's distinctive geographical locations, namely Upper Esan (Nakon Phnom, Sakon Nakon), Middle Esan (Roe Et, Kalasin) and Lower Esan (Buriram and Surin) as these are distinct agro-ecological systems.
- Historical importance and its origin. For example the original IFS network that was founded by Grandfather Maha Yoo, who brought the principles of IFS to Esan and has since expand its application.

A synopsis of the key characteristics of networks included in this assessment is presented in Table 1. Detailed descriptions and the activities of one of the networks targeted in this survey are presented in Annex 1 and discussion on the key attributes and advantages of being in a network are presented in the discussions section of the report.

In the analysis of data collected through the household survey a preliminary analysis has been undertaken comparing broadly the two groups of farmers, namely IFS and CFS. These results are presented in this report, however, further in-depth analysis will be undertaken to tease out some of the interesting trends observed between these groups.

3. Results and Discussion

Household survey

The gender and position in the household of key informants are presented in Figure 2. Key informants within the IFS group were distributed almost evenly between male (47.1%) and female (52.9%) (Figure 2a). Contrasting this within the CFS group 65.4% was female whilst 34.6% were male. When one considers the positions of the key informants interviewed 58.8% of the IFS interviewees were heads of households whereas only 43.3% were the equivalent in the CFS group which was dominated by the household spouse (Figure 2b).

It is clearly evident that in the case of the IFS farmer group a larger proportion of the family members (36.4%) are employed full-time on the farm compared to 21.0% in the CFS group (Figure 3). With respect to part-time employment on the farm 29.9% of family members in the CFS group were involved in this activity, compared with only 20.0% of IFS family members. Consequently 49.1% and 43.6% of family members were not involved in farming activities, this latter component of the family unit would include those of school-going age and the aged who are not able to work. A comparison of the non-farm employment figures of each of the groups indicates that 40.2% of all CFS family members generate incomes from this source compared to 35.2% of IFS family members. The results suggest that a higher proportion of IFS family members are employed full-time with on-farm activities thereby not needing to find alternative sources of income. Further there is a greater percentage of family members within the CFS group are seeking off-farm employment as an alternative to on-farm. This may reflect the greater financial stability of the farming enterprises of IFS farmers when compared to CFS farmer groups.

Approximately 18.5% and 19.2% of IFS and CFS family members make financial remittance to the household. The mean value of these remittances is Bht 46,248 and 43,642 for IFS and CFS groups respectively. This would suggest that each of the groups have a similar dependence on external sources of income.

The land holdings of the IFS were substantially larger (25.4 rai) than those of CFS (19.9 rai). These assets in both cases were completely owned by the farmers themselves and were not leased or rented. Hence the larger size of land holdings may suggest that farm size is a limiting factor in the viability of CFS farmers that necessitates a greater proportion of family members to seek alternative job opportunities that are off-farm. An assessment of the number of land parcels gives an indication of the structure of the farm holdings (Figure

4). Approximately 39% of IFS farmers have 3 or more parcels of land that make up the farming enterprise, contrasting with only 22.2% of farmers in the CFS group. This may reflect the need for IFS farmers to expand their farming enterprises through the acquisition of further land to enable the implementation of IFS approaches but more importantly the ability of these farmers to be able to expand their enterprises.

It is interesting to note the use of the land plots during to 2007. Within the CFS farmer groups the predominance of plots (47.2%) was used for the production of paddy; this contrasts with 29.3% of plots in the IFS group (Figure 5). This would confirm that the CFS farmers are predominantly rice growers with little diversification of their production systems. IFS farmers used the majority (36.6%) of the plots of land for multiple uses, this compares with only 17.1% of the CFS farmers. Again this is evidence of both diversification and intensification of the farming enterprise in the case of the IFS farmers.

A critical factor in this semi-arid environment is having access to water resources other than rainfall. As a key element in IFS production systems, dry- season cropping is evident from Figure 6, showing that only 37.4% of the land plots used for crop production are entire dependent on rainfall. This contrasts with 57.6% of plots in the CFS systems. The alternative sources of water include farm ponds, community reservoirs, natural streams, and wells all of which would allow the farmer greater control over water resources management at the field level. Further this build a high degree of flexibility and resilience into these production systems that reduces the element of risk in these production systems. The biggest difference between the two groups with respect to water resources was observed with respect to access to well water with 19.8% of plots having access to this source in the case of IFS compared to 7.3% in CFS plots (Figure 6).

Figures 7 and 8 give an overview of the sources and extent of incomes derived from wet and dry season farming and from non-farm activities. Although this is a cursory assessment of the economics of these two groups and hence should be treated with caution, there are trends that provide insights into the financial viability of these two groups. It is of note that there is a high degree of variability within each of the groups. Dry season cropping appears to be the most profitable season for farm income when compared to the wet season as it is assumed that most of the crop produced in the wet season is for household consumption (Figure 7). It is of note that in both the dry and wet seasons the input costs for CFS group of farmers is higher than the ISF this being due to a higher dependence on purchased fertilizers, pesticides and labor (data not presented). The total net profit over the two production seasons was estimated to be Bht 23,000 and 18,000 for the IFS and CFS farmer groups (Figure 7). Contrasting this, non-farm income was considerably larger than on-farm income (Figure 8) with CFS and IFS groups generating Bht 129,919 and 99,370 respectively from this source. Clearly both groups of farmers are dependent on external source of income for household financial commitments. It is of note that there is less dependence on wages generated by members of the family who live on the farm in the case of IFS farmers when compared to CFS, suggesting that a greater proportion of family members in the IFS group are employed full time on the farm. Remittances

from family members that do not live on the farm form a significant component of the household income with the CFS group generating larger values from this source (Figure 8). It is clearly evident that borrowings are a significant source of household income in CFS (Bht 57,367) when compared to IFS (Bht 27,723) (Figure 8). This would suggest a higher debt load being carried by CFS farmers when compared to IFS. Hence one can conclude from this that within IFS households the degree of indebtedness is significantly lower when compared to CFS farmers supporting the notion of greater self reliance in the former group.

An assessment of non-farm expenditures at the household level clearly indicates the CFS group has a higher dependence on purchased food than IFS households (Figure 9). Most other expenditures are similar in both groups. If one undertakes a global assessment of household incomes (excluding borrowed finance) and expenditures (including borrowed funds) a clear picture of the economic viability of these two groups becomes evident (Figure 10). The expenditures associated with the production systems of CFS were Bht 127,292 whilst the net income is Bht 90,617 resulting in a net deficit of Bht -36,675. Contrasting this, IFS systems had a mean income of Bht 94,639 and expenditures of Bht 81, 721 resulting in a net profit of Bht 12,918 on an annual basis. Even though there is this dependence on off farm income in both of the to systems, the IFS farmers were still able to make a profit at the household level while one would assume the CFS farmers fell into a indebtedness trap that is common amongst farming communities in the Northeast.

In the group discussion with IFS farmers the question was posed concerning the reasons for becoming an IFS. The five most highlighted reasons identified were in order of importance:

- To lower farm production cost.
- To repair and enrich the poor soils on the farm
- To become a member of a farmers network
- The family has always practiced this farming approach
- A neighbor was undertaking IFS and so I decided to try it.

An economic imperative of reducing the costs of production waste rated as the number one reason for becoming an IFS farmer followed by the need to improve the quality of the farmers soil resources that clearly indicates the innate ability of farmers to identify that their resource base was degrading. Social factors that include being a member of a network and following a family tradition were also rated highly.

When asked the reasons for becoming a network member, the respondents indicated that the five most important reasons were:

- Opportunities to learn/and be exposed to new approaches and techniques for farming.

- Network provides a forum for mutual help /farmer problem solving means /venue that a member can attend.
- Chance for study tours and to meet farmers in other regions
- Privileges, benefits and rights by being member (cheap loan, free seeds, access to market via group)
- Interesting start up packages offered by agencies to members of the network.

In discussing the impact of IFS on the quality of life of those that have adopted the practices there were clear trends that match the findings that have been discussed previously. The five most important factors that have influenced lifestyles and quality of life for adopters are:

- They have more income to buy other things and hence an implied increase in disposable income.
- They have less debt.
- Households have enough rice for home consumption and are not dependent on having to buy rice in.
- They can save more money than in the past.
- There is less migration to the city for extra work during the dry season that would suggest that family structures are more cohesive.

3.1. Key findings associated with the development of farmer based networks from group discussions

Farmer networks are natural groups of individuals that have come together around a common purpose. This invariably has revolved around addressing economic problems /crisis that they (farmers) face including problems that have there roots in the countries macro development policy in the past. A key focus in the macro-economics of these countries (Thailand and Vietnam) has been an emphasis on export driven commodity agenda that emphasizes the use of intensive high input production systems. This has placed farmers at high risk and exposure to market forces. These networks are considered by community members to contribute significantly to social capital since they have demonstrated to farmers the potential role of self organization for a common purpose in rural areas

Support for these farmer networks include national government and international development agencies since they are viewed as development intervention organizations that have a role in addressing farmers problems that result in improved rural livelihoods in specific areas. Support includes financial and technical expertise. However, these “external interventions” have occurred after the problem arose, with accompanying social movement. In general this external support is only forthcoming after a network has been formed and hence these external agencies cannot be viewed as catalyzing change. These networks can therefore home grown local movements.

3.2 Context and characteristics of networks

Farmer networks, thus its members, undertake a range of diverse production based activities in order to increase supplementary income. More fundamentally, the subsequent adaptation in life style is viewed as being sustainable with a strong sufficiency focus. Some activities are undertaken by each member's families, and many are community development activities to enhance livelihood and income.

Each network in the study has a focus on the development "model farmers" that can expand and replicated through a module program to other members of the network and to community at large. This clearly a strategy that is common to all networks surveyed.

Many of these networks in Thailand are founded on the concept of a "sufficient economy" at the household level. In this respect the networks try to find pathways and options that enhance self reliance and reduce dependence of external drivers. They have no explicit expectations that external agencies will come to their assistance in times of economic turmoil and disasters and hence resilience at the household/community level is clearly nurtured.

A large number of networks have placed great emphasis in reducing the role of chemicals in their farming systems, and therefore have a focus on organic farming or natural farming. In the long-term, the main is aim of the network is to move towards more sustainable farming systems and livelihoods in the context of small farms.

3.3 Special features observed in IFS in Northeast Thailand

Models of integrated farming

IFS networks in this study are selected for their distinctive characteristics that are predetermined by their geographical location. The networks studied can be categorized into 3 distinctive models: 1) the regional origin that relate to where the IFS network was; 2) integrated farming networks for the uplands, and 3) integrated farming systems for the lowlands. The IFS network called "In Pang IFS network" (literal translation meaning " god created Integrated farming") in Sakhon Nakorn Province in Upper Esan maintains the old traditional form of integrated farming that was common to the region. This includes the raising of fish within rice fields and the use of integrated cropping systems. These changes to farming systems have resulted in a reduction in costs due predominantly to a lower reliance on chemical inputs. The network has develop small processing and packaging operations for the products that are produced that include the production of wine made from local berries (Mak Mao) and as an outlet for the products that they produce. All members of the networks are fully aware of the importance of the farming practices that are promoted and what they represent. For this reason, IFS can be considered as an alternative economic model at the household level. Members of the network spend effort to expand the concept and practice to other farmers as well as various other groups that are interested in the practices.

The benefits from IFS practice and lessons learned

A clear benefit from the adoption of IFS practices is in food security at the household level. In addition to this, some networks, for example the Learning Center of Tomhome IFS network in Burirum province, in the last 3 years, has asked members to keep family accounts to record income and expenditures as a means of assisting families in understanding household finances and to also to prove that the adoption of IFS has resulted in lower expenses and increased household income. For these networks the main purpose of production of IFS members is to produce food for family consumption, with supplementary cash income is a secondary objective.

Knowledge development of networks

The network often referred to as ' local wisdom groups' such as those of Grandfather Maha Yoo in Surin province, and Etoo Noi of Burirum province, are two networks that are rich in knowledge and experiences, and thus enhanced capacity to support its members, and disseminate this knowledge and experiences to others who are interested in this philosophy. Components of this extension are from member to member.

The knowledge dissemination and training associated with the networks have the following attributes:

- Information on cropping and propagation, animal raising in various forms of integrated systems.
- Herbal plant propagation, domestication, and herbal medicine production.
- Making compost from farm products as a means of producing homemade fertilizer.
- Processing and packaging of farm products into marketable products for sale and export; dry food packaging, canning, and bottling drinks for example.
- Conservation of environment such as soil improvement /conservation, efficient water use, and forest protection scheme.
- Development of short courses that is geographically appropriate. Lessons are drawn from the experiences of the older members. These include
    - Demonstration farms by selected members. i.e. 1 rai one household showing a model of integration and how it works.
    - Family accounting books and record keeping.

Many are said to be based upon the Philosophy of a Sufficient Economy which King Bhumiphol advocates to his peoples which has roots in mutual support within the community and between communities for peaceful coexistence of man and nature.

Network expansion

Outreach activities that are targeted at expanding memberships or public awareness raising generally take the following approach:

- Develop at least one model farmer in each village for disseminate information. The model farm is designed to demonstrate practices and impacts of these new approaches. Expansion generally takes place from a few members in a village to more practitioners who join in after seeing the positive impact of these interventions.
- Study tours and exchange of lesson learned between members in various locations and with other networks.
- Mobilizing and organizing Youth Associations who are often children of IFS families to undertake common public service activities and to create an appreciation and awareness of local knowledge and farming practice. The aim of this is mainly to pass on knowledge to new generations, with a focus on preparing them for their future roles in running the IFS network.
- Conduct local research on seedling production practices, propagation, animal breeding and experimenting with various inter cropping approaches and different mixes and levels of integration.

3.4 External Support to IFS network

There are a number of agencies under the Ministry of Agriculture and Cooperatives that offer support to existing IFS networks. Most of this support comes in the form of assisting in basic infrastructure building, materials, farm tools, and farm inputs so that IFS farmers can enhance their production systems. However, IFS networks are predominantly dependent on the mutual support among IFS members/practitioners within the network themselves. Thus they are mostly self reliant and self contained.

3.5 Outcomes from practicing integrated farming systems and joining IFS networks

Economic Benefits

The economic advantages of being a member an IFS network is predominantly manifested at the individual farmer/family level. These include:

- Abundant food supply from their own farms throughout the year.
- Safe and organic farm products, and safe farming practice result in better health outcomes, and prevents illness associated with exposure to toxic agricultural chemicals.
- Reduce family expense on external food purchase, increase incomes and savings. These “savings” include” cash saving schemes that are managed by networks, saving/conserving soil and forest resources through the provision of training provided by the networks.

- Reduced farm production cost by using less external farm inputs especially inputs that are imported such as chemical fertilizers and pesticides
- Increase land value where IFS is practiced as the land is more fertile and more productive.

Social Benefit

One can discriminate the benefits at the family and community levels. At the family level the benefits that are derived include:

- Increase harmony and forging of stronger family units as more family members stay on the farm and work closely together. There is evidence of less out migration to the larger cities or abroad
- Establishes the concept of self-reliance and reduced risk from over spending thereby avoiding indebtedness. This is in line with philosophy proposed by the King “economic self sufficiency”. IFS families are more resilient to economic downturns.
- New knowledge and innovation in farming practices and land use are acquired. The IFS practices require close attention and constant care. Farmers learn through practice and experiences either by themselves or through exchange with others. New knowledge brings innovation and better productive use of the resources they have at hand.

At the community and network level the benefits that are derived included:

- Community has a structure and mechanism to strengthen itself via IFS organization. It is better able to develop a cohesive community by coming together under one common purpose and with the potential to expand to other activities for community good. It also can be viewed as mechanism through which they can relate to outside agencies collectively and with an informed single voice on a number of issues.
- Social harmony and the passing on village traditions: Participation in community development of village members is more effective by using existing network relations. By having more members staying and working in community there is a better chance of maintaining local traditions and practices through community ceremonies. This is considered as passing on local traditions, beliefs, and wisdom to younger generations.
- Community mutual support programmes are established out of IFS networks: These include establishment of a village fund which provide loans to members, as well as social welfare funds to help members in crisis and dire need.
- Better Knowledge Management by Network: These activities include producing master trainers from successful model farmers, creating short courses to upgrade member knowledge, developing communication tools and training materials and extension outreach.

- Organize community markets /or outlet shop where members farm products that are surplus to requirements and for those who wish to supplement their incomes can be sold through these outlets. This indirectly, gives members bargaining power with outsiders in terms of prices and in the negotiations for farm input purchases.
- Exchange and mutual learning from lessons learned: Exchanges include exchanges of knowledge, and farm products among IFS members, and with outside communities or joint marketing.
- Established networks build incentives for external support: A well self organized network finds it easy to attract support –funding / materials – from outsiders or state agencies. The internal strength of the network enhances its credibility with funding organization. In addition external funding agencies have confidence that activities that are implemented through an initiative will have a high degree of succeeding.

Environmental Impact

When there are several families practicing IFS, the acceptance of this approach progressively gains momentum and the support by other members of the community. This is an effective and efficient dissemination and outreach strategy. There are a number of such "model communities" where this approach has gained momentum through the establishment of a study/demonstration sites with other communities. In this case, the environmental impacts by network communities on natural resources and the environment are seen by members to be as follows:

- *Restoration of Natural Resources and Environment*: One of the starting points in adopting IFS practice in many instances is the fact that farmers face land degradation problems, that include leached soils (meaning degradation), nutrient depletion and a reliance on fertilizer use and monoculture based cropping systems. Hence one of the reasons for adopting a more conservative approach to their farming enterprises is to enhance the quality of the soil through the addition of organic based inputs that increase soil physical and chemical attributes. The combination of diverse components in the farming systems that are integrated enhances biodiversity and promote elements of natural systems. Water shortage problems for production are overcome by on-farm pond supply and changes in the type of plants and animal combinations that fit the system. Many IFS practitioners enhance the overall environment of the village including improve "clean" greenery, less water pollution and hazardous waste, land and water systems are improved and ecosystem services restored when compared to "intensive" production systems for commercial purposes. IFS farmers start small, and expand their operations as they learn the techniques and approaches. The restoration of agro ecosystem in individual production units with shared common goals among farmers, thereby contribute to the larger system at community indirectly.

- *Better health from less exposure to farm chemical and consumption of "safe" vegetables and other on-farm products:* IFS farmers are exposed and encouraged to adopt the concepts of "organic farm". They see the benefits associated with this approach and most have moved progressively towards having a lower reliance on external chemical inputs. In addition, through structured training they are taught to handle and use these products in a safe and sustainable manner. This has direct positive implication for both themselves and consumers of their products with respect to protecting these parties from exposure to pesticides in particular.
- *Improved biodiversity*: As there is a greater number of crops and animals in an IFS production unit, biodiversity is higher in these systems and over time slowly bring back biodiversity to community and the overall production area. Many places use integrated pest management (IMP) systems, and thus bring back life forms useful in the process of natural protection of crops and livestock.
- *Benefits in optimizing and effective use of natural resources*: In these production systems, IFS member's awareness is raised in their role in taking care of the wealth of natural ecosystem services that are provided and to restore balance in order to enhance sustainable production in the long-term. Techniques of water harvesting are taught and practiced, as well as devising production systems base upon productive capacity of the resource base that will allow all year round utilization of land and water resources. While not intensive, the productivity of these systems is high, there is little wastage due to recycling, and every resource that is used is seen as an integral part of the system that will contribute to the positive performance of the unit now and into the future.
- *The basic infrastructure of agriculture production systems are provided through the IFS network*; Small practical on farm irrigation systems, processing knowledge and market possibility are developed internally through the network that increases the knowledge base of the famer.

3.6 Challenges faced in adopting IFS practice, network formation and its maintenance

There are a number of challenges that were identified that have a direct bearing on the functional operation of these networks and the adoption of IFS practices and principles. These are highlighted below:

- There are significant hurdles in attaining sustained and regular support from related government agencies. Assistance when provided is sporadic and difficult to secure over the long-term. These groups are effectively often viewed as fringe elements of the agricultural sector.
- Competition with mono-crop production for commercial purposes for land and related resources. This issue is associated with land expansion and encroachment by commercial producers. For example sugar cane, and rubber producers (e.g. area around Pa Dong Lan

Conservation Forest). Some farmers in the area are threatened over land insecurity due to a lack of land titles.

- In many cases water resources for production is insufficient. This is a significant impediment to IFS farming systems particular in the region where for 8 months of the year rainfall is less than evaporative demand.
- Many farmers in Isan are heavily indebted, and IFS does not provide a quick solution to this problem. Some households have to send members of the family to sell their labor in the larger cities or abroad in order to meet financial obligations. This results in less labor to contribute to IFS farm which does require intensive management/ and continuity until the farm reaches a certain level where it is self sustaining.
- The start up costs associate with the adoption of IFS is high and many farmers can not afford to “kick start” their production systems due to the required investments in developing infrastructure and labor commitments that are often required.
- Many IFS farmers’ feel that skills associated with accounting / financial management at the family level are needed in order to maintain records of benefits and costs in order to demonstrate the positive impact of adopting a more conservative based production system.
- It is clearly evident that IFS farms require time before there is a sizable return on the investment. Many farmers who are in debt cannot wait for this to occur and hence are unable to adopt these conserving approaches.
- Nearly all networks find it challenging to produce effective materials/tools for effective communication and outreach to convey the substance and achievements of the practices that are promoted and the advantages of a network to a wider audience.

4. Concluding remarks

A preliminary assessment of survey data collected from IFS and CFS farmer groups has indicated clear trends on the functionality of these two diverse farming approaches. Whilst the adoption of IFS systems is still in its infancy with the majority of farmers having only practiced this approach for the past 5 years, there is overwhelming evidence to suggest that these farmers are significantly better off than their counterparts in CFS. There is clearly a greater emphasis on economic sustainability of the household that has as its focus reduced dependence on the purchasing of external inputs for their farming systems as well as the reliance on purchased food. Contrasting this, CFS farmers are heavily dependent on external inputs for their production system and also on purchased food for the household.

An interesting finding in this preliminary assessment of the data is the dependence of both groups on external sources of income generation and the roll of borrowed funds to support household livelihoods. Hence the notion that IFS farmers are free of debt and do not require external sources of income generation is does not appear to be the case. What is evident is that IFS farmers a less dependent on these source. The high level of indebtedness of CFS farmers is a concern as these farming operations appear to be non-viable, with expenses exceeding income. This is a significant issue with respect to establishing the financial viability of farmers in the Northeast and one that will probably require a concerted effort by policy makers to address this issue.

There are clear advantages that have been articulated with respect to being a member of a network. These include access to knowledge, social aspects and an array of other advantages. However, it is clearly articulated that the 'startup' costs associated with the adoption on IFS systems is high both financial and also labor intensive. This offers an opportunity for policy interventions that are incentive based mechanisms that would promote the adoption of IFS practices. The most appropriate may be through a direct financial incentive based scheme or other appropriate mechanisms.

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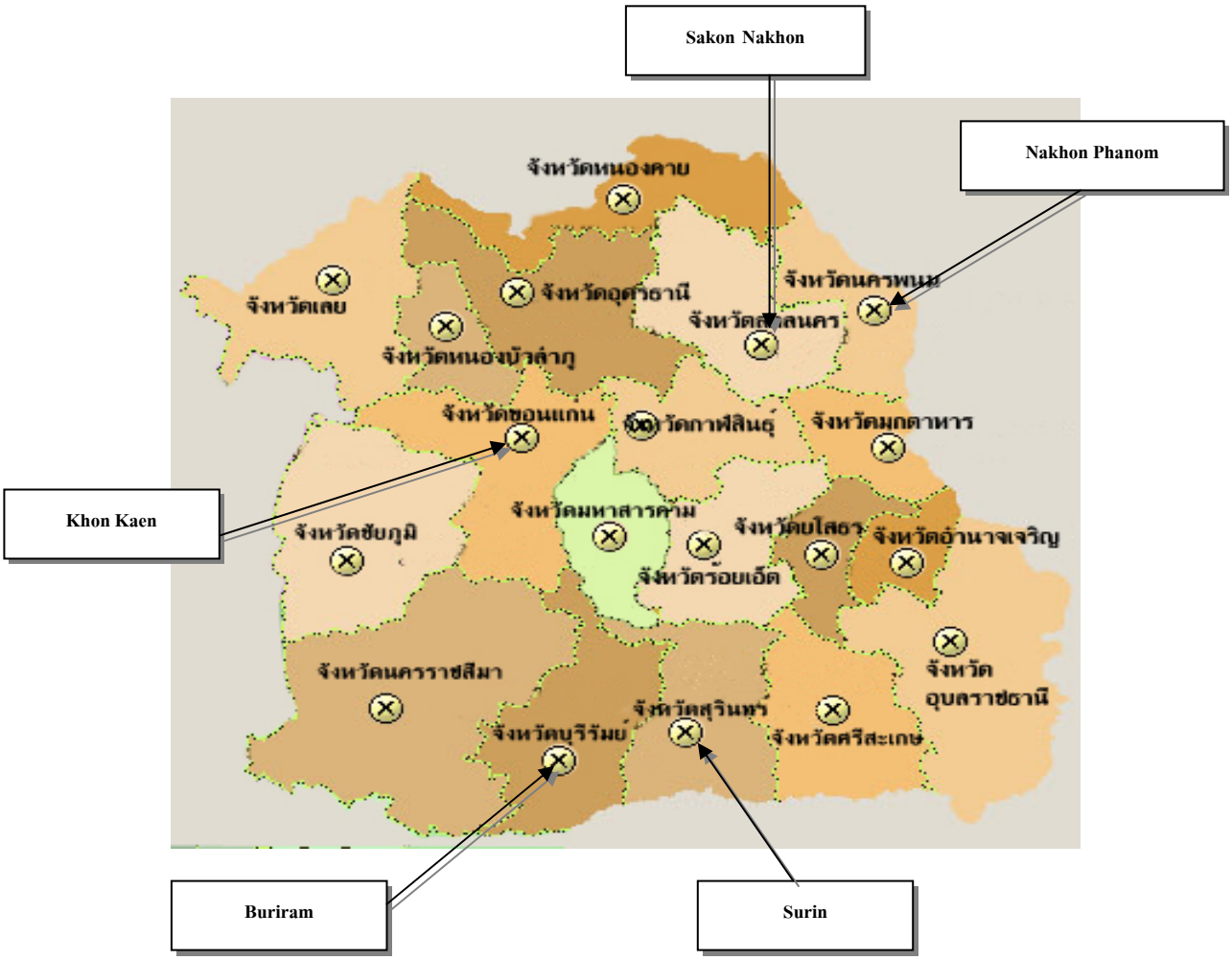


Figure 1. The five provinces in Northeast Thailand where the surveys were undertaken of IFS and CFS farmers

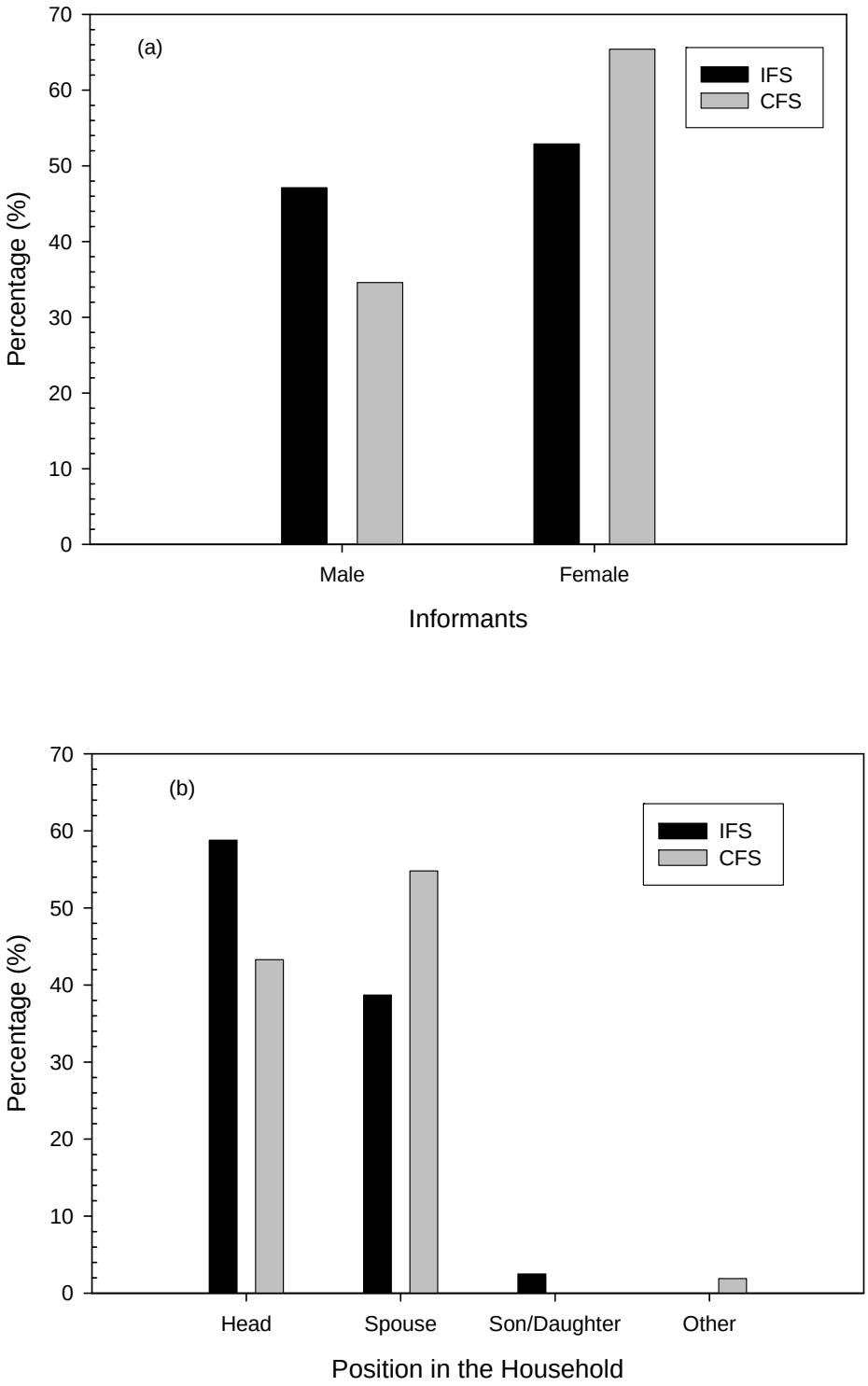


Figure 2. (a) The gender distribution of key informants of integrated farmers (IFS) and commercial (CFS) on which the household surveys were undertaken. (b) The distribution of roles of informants within the households surveyed. Total number of informants interviewed in the IFS and CFS groups were 119 and 104 respectively

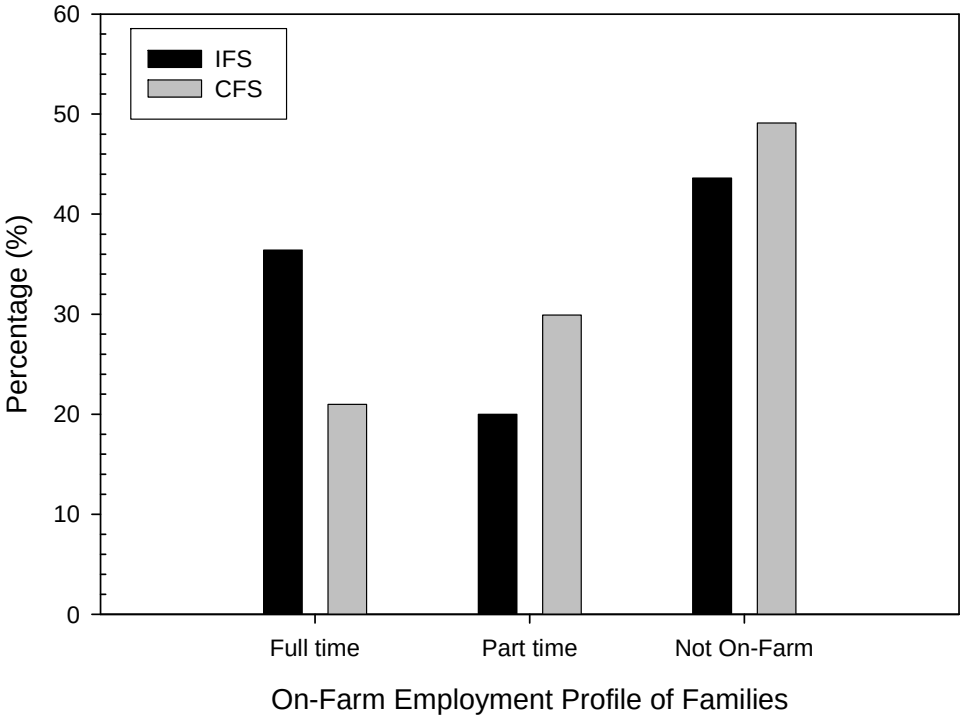


Figure 3. The profiles of full time, part time and not employed on the farm of family members in the IFS and CFS survey groups. The total number of family members in each of the IFS and CFS groups were 579 and 485 respectively

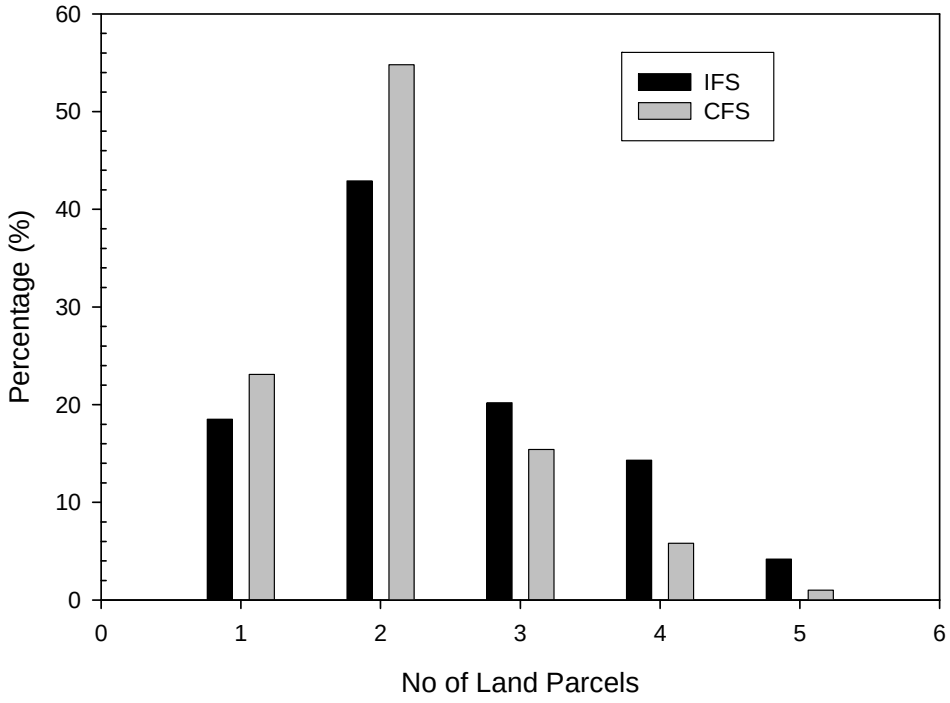


Figure 4. The distribution of numbers of parcels of land between IFS and CF farmer groups

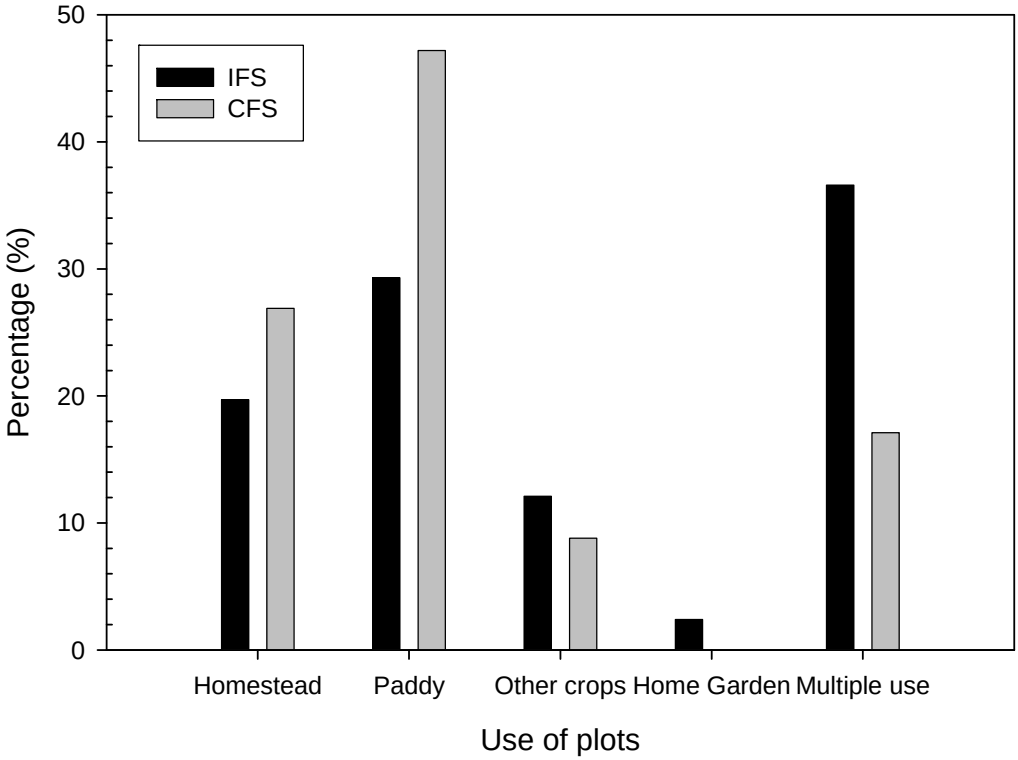


Figure 5. The distribution of land use in 2007 for the total number of plots in each of the farming system groups. The total number of plots in the IFS and CFS groups were 290 and 216 respectively

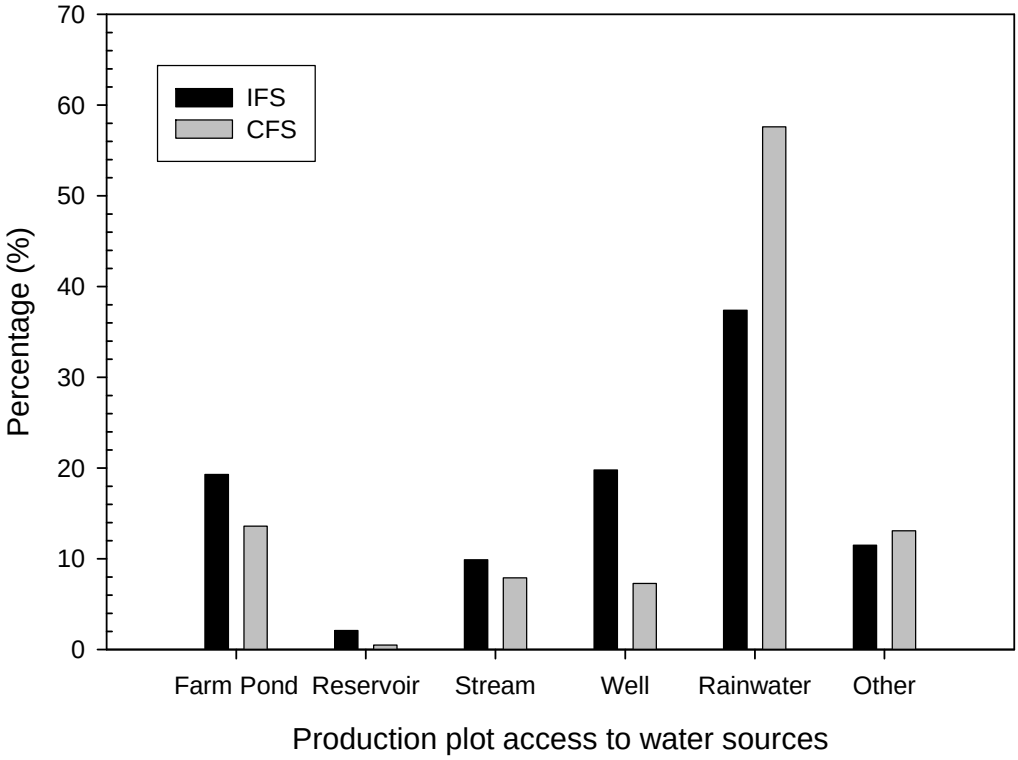


Figure 6. Access and dependence of production plots on difference water resources. Total number of plots in IFS and CFS groups were 243 and 191 respectively

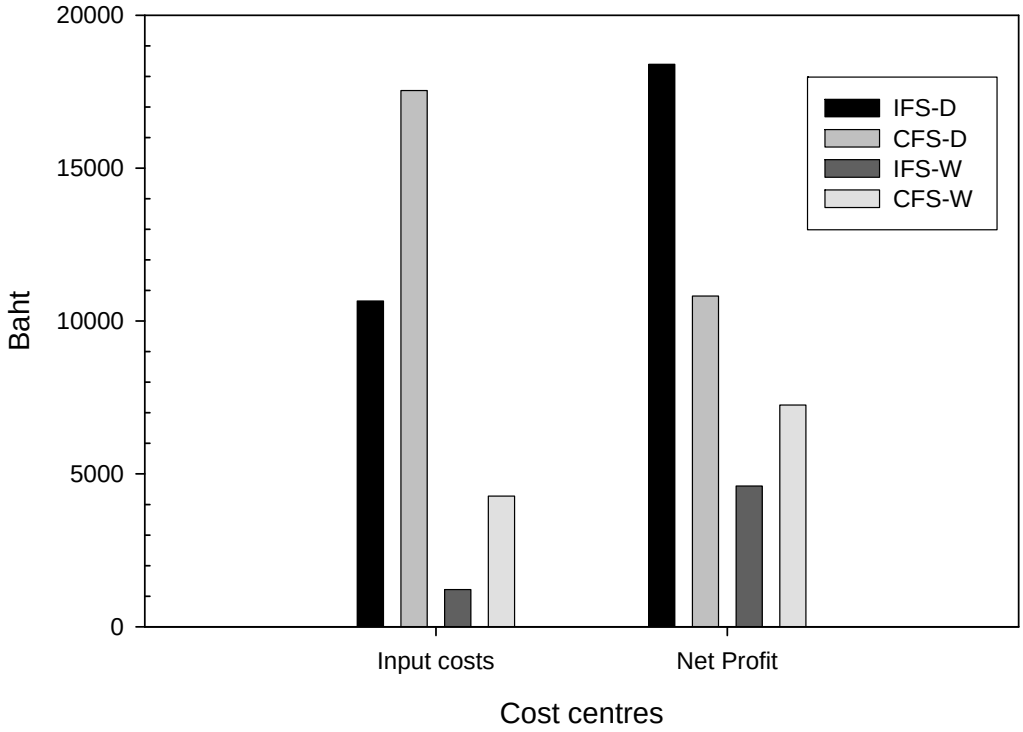


Figure 7. Mean input costs and profits from farm production enterprises for the wet (W) and dry (D) seasons crops

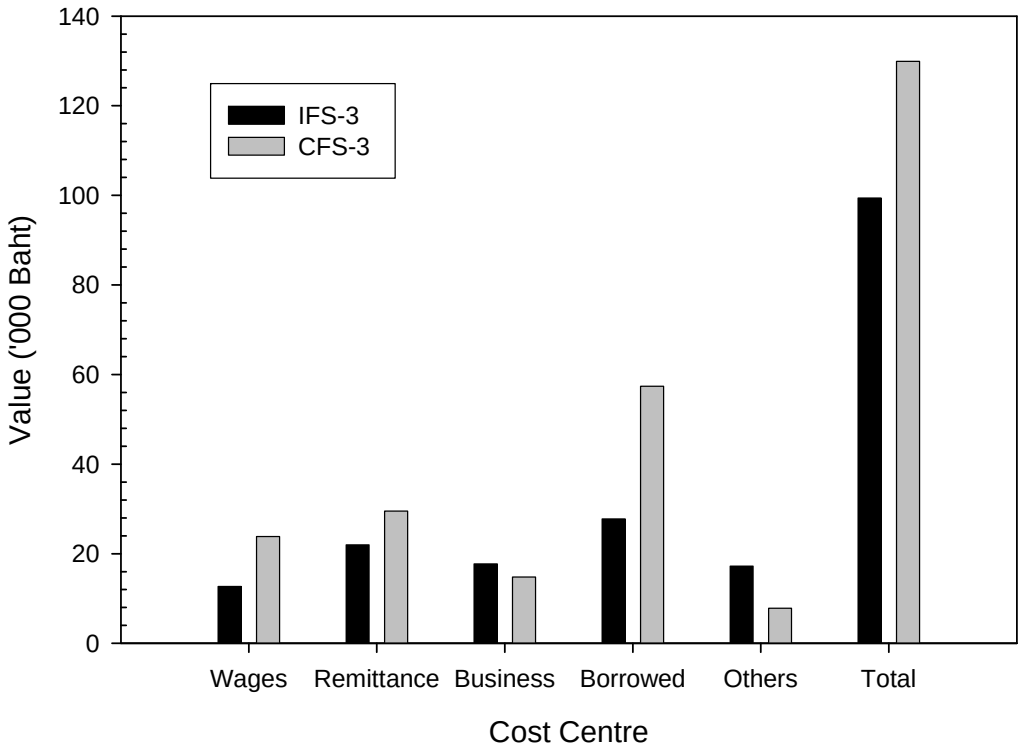


Figure 8. Other forms of income derived from non-farm activities. These include wages by household members, remittances from family members permanently away from the household, small family businesses, moneys borrowed and from other unspecified sources

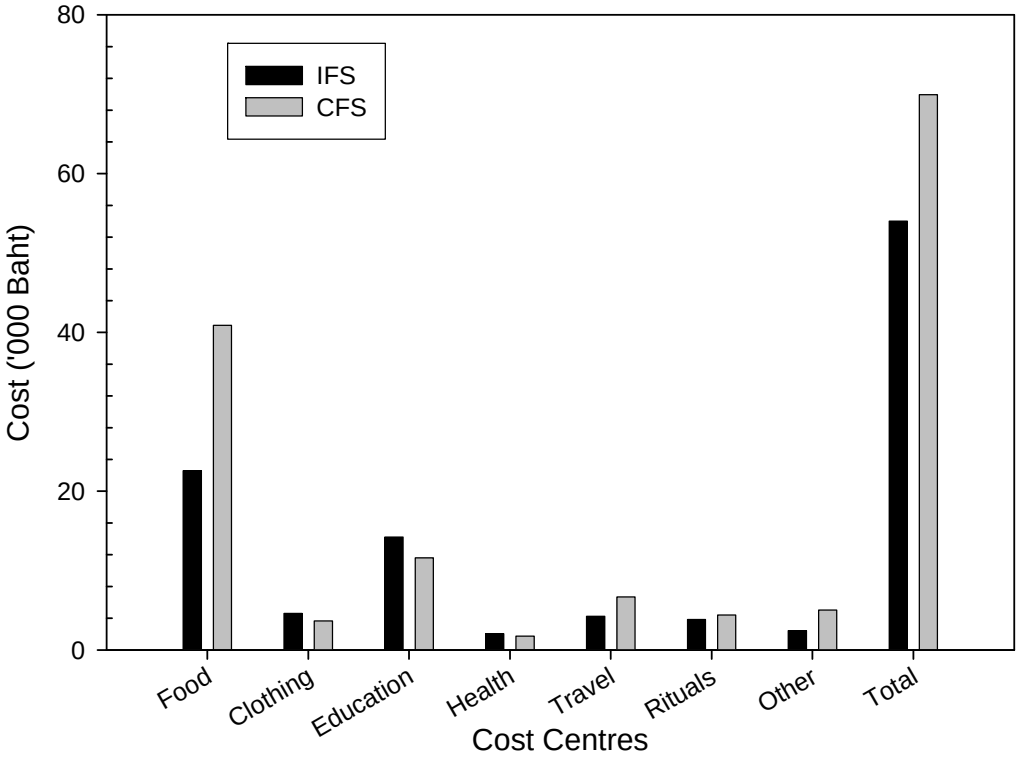


Figure 9. Cost centres at the household level that are non-agricultural

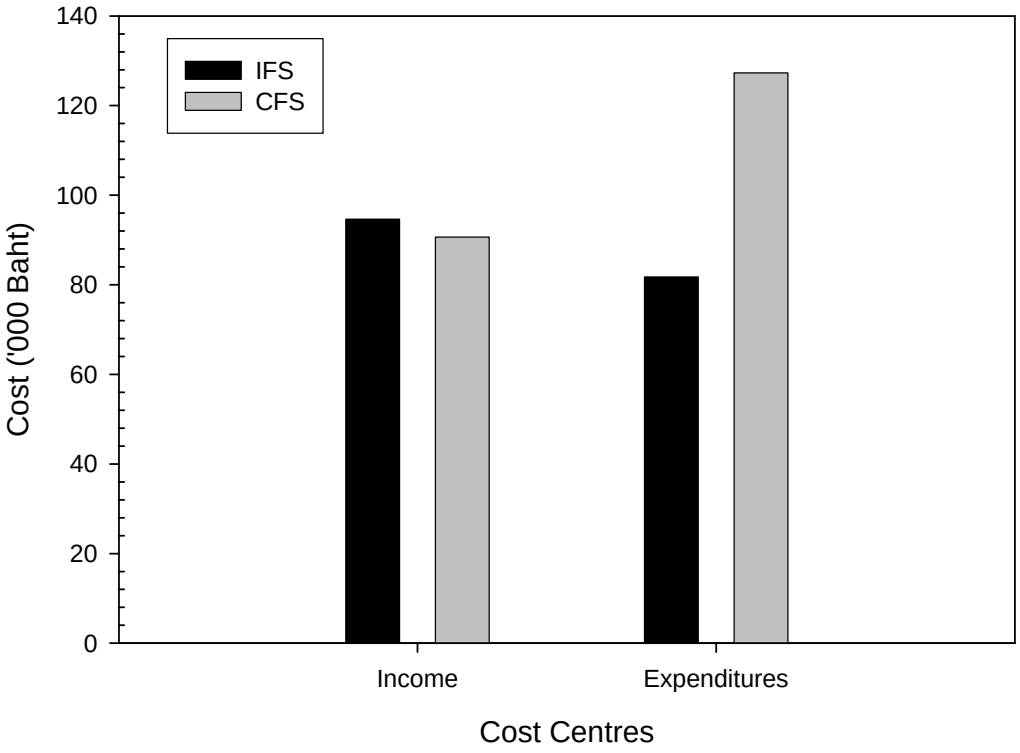


Figure 10. The global net income and expenditure (including borrowed moneys) for IFS and CFS farmers

Table 1. Selected attributes of each of the five IFS networks from which household surveys were undertaken

Network	Activities	Local wisdom leader/ Committee	Member expansion	Remarks
Surin: 'Local Wisdom of Esan People'. Founded by grand father Maha Yoo Soonthorn Chai and Father Chiang Thai Dee. The network was official formed in 2002, however Guru Maha Yoo had been practicing and teaching the approaches since 1991 and has gain wide acceptance in the Isaan region.	There are 5 main activities: Integrated farming; Organic rice farming; Natural farming; Local research on indigenous plant species and crops; Production of training curriculum.	The original group expanded to a further group headed by Father Chiang Thai Dee. The latter group has established an IFS learning center. There are currently 46 model farmer persons in the network in 20 villages.	Area of coverage by the network in Surin Province is in 2 Districts- Muang and Singkorapoom and in 3 Tombols (sub districts).	This is the original model of integrated faming in Thailand Northeast. Production units rather large in size and based upon Buddhist philosophy of self reliance and self sufficiency. Membership expansion takes place within a community through adoption by none members by seeing the results of adoption. Data collection location: Tombol Slak dai, Somrong, Yang, and Nongwang in 3 districts- Muang, Singkorapum, and Sri Narong.
Sakon Nakorn: The Pang Group (meaning "God creation") It is the Learning Center of Mother Pim Tokumton established in 1987. The network covers 3 provinces – Sakon Nakorn, Udon Thani, and Kalasin	There are 5 main activities: IFS farming; agroforestry and local herbal farming; Product/agro processing and packaging; Propagation of local trees and fruit trees; Organize training courses on IFS.	The network has expanded to create learning centers and it has 30 model/demonstration farmers.	In Sakon Nakron, each district is assigned to expand the network by itself with its own governance structure. Network covers 210 small groups and participating IFS of 22,793 farmers in 35 villages, 15 Tombons and 6 districts, including Kudbak, Phupan, Nikhom Nam Oon, Panna	

			Nikhom, Warij Phum, and Muang)	
Khon Kaen: The Dong Lan Network was established in 1991. Most of farmers in the network were resettled for forest conservation purposes away from Dong Lan National Park, and relocated to government allocated land.	The network undertakes 6 activities: Growing of fruit trees and animal raising using inter cropping systems; Agroforestry and indigenous herbal planting /multiplication; Local research and seed banks of local seed varieties such as rice and vegetables (genetic bank); organic farming and natural farming; Natural fertilizers and energy generation and efficient use.	Multiple activities are undertaken to develop livelihoods and improve the living standards of settlers and strengthen community capacity. There are 9 model farmers.	Originally, cover 2 provinces (Phetchaboon and Knon Kaen). The districts covered were; Namnao District of Petchaboon, 3 district of Khon Kean; Sri chompoo, Poo Pa Man and Choomape covering totally of 8 tombols Buriboon, Srichompoo, , Ban mai, Boriboon, Donglan, Nong toom, Wang swad, Poopa man with a total 360 families involved in the network.	Note: Mostly agriculture in upper plateau lands. There has been significant mass social mobilization and negotiation with the State on a dispute associated with land allocation issues. At present active work in genetic bank and indigenous species research and conservation is being undertaken. Key thematic area of network 1. Participatory Forest Management. 2. Integrated farming – emphasis on agro-ecosystem. 3. Water resources Management Information collected from 5 tombols; Nongtoom, Srichompo, Boriboon, and Ban Mai
Eto Noi Learning center in Burirum Province. Father Pai Soi sakang is the network leader that was formed in 1999.	There are four main activities of the network: - IFS practice using the New Theory approach of the King.	The network produces trainers and facilitators for IFS activities. It has establish a youth group know as “Love our village”	Originally the network covered 2 provinces – Buriram and Korat including Chom Pauang district, and Lumprai Mad. There are 12	The network is: Expanding activities associated with the production of seedlings for sale.

	-Development of model farm for demonstration and training. - Farm product processing and packaging from members products. - The centre offers training course to farmers.	to carry on the network programmes. There are 23 model farms that have been established through the network.	groups in 12 villages within this geographical location.	Training farmers and their families in basic accounting approaches. Information collected in the survey was undertaken in tombol Kok Sa-ad, and District Lamprai mad
Tum Home (translation meaning togetherness) learning center in Nakon Phnom Province. Formed year 2000.	There are 6 activities that are undertaken by the network: Organic Faming through the promotion of using organic fertilizer. IFS / and Natural Fertilizer production. Integrated farming with local herbs. Community Markets. Farm product processing groups /packaging. Training course for farmers.	24 persons	Originally covered 6 province- Yasothron, Roi Et, Kalasin, Sakorn Nakorn, Nakorn Phnom in 7 districts, 8 Tombols and 16 villages	Each subgroups to this networks has its own activities appropriate to locations /its key features/own management This network has received substantial and continuous support from various agencies – such as the Research Council, Land Development Department /offices, Bank of Agriculture and Cooperatives of Thailand, Nakon Phnom University, Provincial Livestock office Data collected from: 4 districts (Pla pak, Renu Nakorn, Nakae, Narajkwai and within that 4 Tumbol (Non ghee, Renu Dtai, Piman, Narajkwai)

ANNEX 1.

The In Pang Group: Sakon Nakorn

Background:
The In Pang Group was founded by Por Lek Kudwongkaew (Por Lek've), advisors and a group of indebted people in 1987 whose objective was to improve their financial status and rehabilitate surrounding community forests. From more than 10 years of monoculture cropping, Por Lek've learned that the more he worked the more he was indebted; the richer he wanted to be, the poorer he became. He, then, tried to reduce his expenses by doing integrated farming, which at the time seemed the most appropriate option in addressing this cycle. This became the starting point in the establishment of the network.

There are several basic elements that have contributed to the formation and subsequent structure of the network. The network includes the accommodation of local beliefs, culture, traditions and indigenous knowledge in their management. They consider natural resources as valuable social capital that is to be protected in line with community participatory management system. One of the networks key tasks is the expansion of the group and to disseminate its knowledge and experiences to the wider community.

The network is situated within the lower part of the basin and hence is dominated by rice based production systems. Most of the area are used for growing monoculture crops that include rice-rice, rice-economic dry crop, rice-vegetable, vegetable-rice-economic dry crop. Rice is an important crop, but the number of rice crops per year is entirely dependent on irrigation and water allocation to individual farmer's plots i.e. pumping systems and natural water resource management. Sustainable agriculture is demonstrated in In Pang Group by processing most of the products themselves to reduce costs and ensure healthier food products for their own consumption.

Network Activities

The network undertakes a range of activities that include:

- The collection of raw materials from group members for the processing of herbal drinks from Mamao *(Antidesma velutinosum Blume)*, Mangaew *(Nephelium hypoleucum Kurz)*, Ma phai *(Baccaurea ramiflora Lour)*, Makho *(Schleichera oleosa).*
- Processing of various kinds of products utilizing a range of resources.
- Establish what could be termed internal social networks that have a focus on family that include "Hometown Lover Children Group", "Youth Group", "Housewife Group" and "Savings Group" in order to address social problem and to develop community.
- Eco-tourism with a focus on conservation.
- Forest resources management and the propagation of local species.
- The establishment of a community fund

The In Pang Group is viewed as implementing an ethos that espouses the concepts of investing in life and environment. The learning center that has been established focuses on biodiversity, creating an industrial based community and enterprises are managed under a philosophy of self-reliance.

Network Information

Network Development/Motivation to establish the network and work on integrated farming

In 1999, the In Pang Group was established and having network in sub-district level. Namong Sub district played an important leading role in establishing the learning center with support from leading members i.e. Polawat Thodasa, Pim Thokamtan, Wanchai Pilachan, Sompol Tho Kham Chai and Khun Boonlert. The objectives of the network were to build up self-sufficiency awareness. Model farmers were introduced to encourage members to study from the learning center integrated farming, food safety, mobile forum as an outreach activity.

Before the learning center was launched, the In Pang Group disagreed to for the group to have building for learning, members thought that they could learn under the tree. But in 2007 they approved the budget for constructing the learning center and basic infrastructure such as building and greenhouse. The learning center officially operated in 2008. NAmong Learning center is the group's first learning center for strengthening community. Primarily, the learning center cooperated with the main center to run activities as follows:

1. Build model farmer to comply with In Pang Center
2. Self-sufficiency training
3. Mobile agriculture forum in Sawat's farming plot, which was accepted as a model farm

In 2007, the Ministry of Agriculture and Agricultural Cooperative gave financial support for constructing Namong as a coordinating center, with ambitious goal to train farmer in the nearby areas. Initial number of member was just 10 people which can be categorized in 3 groups: coordinator, leader and trainer. They were assigned to mobilize more members. The group made PR and expanded its services area by itself. Firstly, it searched for interested farmers to join the training. They could train children of model farmers to be trainers. Now, there are 5 In Pang center scattered in 5 provinces: Sakon NAkorn, Udorn Thani, Mukdahan, Kalasin and Amnatchareon Provinces which has been trained many batchs of trainers.

Batch 1 children of trainers in every district

Batch 2 Sawang Dandin District's community leaders were trained for 4 days. They have studied about integrated farming, motivation for farming, demonstration of farming, practicum, soil nurturing and improvement of plant species. They also needed to join home stay program to learn way of life directly from 10 stations in the model farms. Currently, the In Pang Group arranged 13 trainings for the farmer with additional curriculum such as making consuming products (soap, shampoo and dish washer), making fertilizer, propagating local plant and animal species. Each learning stage was prepared by the farmers who are equipped with knowledge and capable to disseminate their knowledge to the trainees.

Curriculum

- Integrated farming
- Study tour 10 stations in the model farms
- Household accounting
- Community enterprise management

Motivation for establishing network

1. Various interesting activities, - disseminate self-sufficiency philosophy and integrated farming knowledge, - increase knowledge/skills/techniques in farming (propagating local plant and animal species and improving farming plot) in order to improve their own livelihood

2. To exchange agricultural products with other members
3. To exchange different farming techniques for increase household incomes
4. Interested in reduce household expense as seen in model household farmers
5. Limitation of living and farming areas make farmers to find more space to grow plant (in the farm corner)
6. Participation in In Pang Training joining with Agricultural Land Reform Office in 2008 helped them learn more how to manage their farming land
7. Friend persuade farmers to join the center for training
8. Financially and in-kind support from many organizations such as Agricultural Land Reform Office for giving away breeding species
9. Having good model farmers/community leaders to disseminate knowledge
10. Financially support from Agricultural Land Reform Office
11. Can adapt knowledge learnt about social capital to practice
12. Increase incomes, reduce expenses
13. Exchange opinion and learn how to solve problem

Network Structure

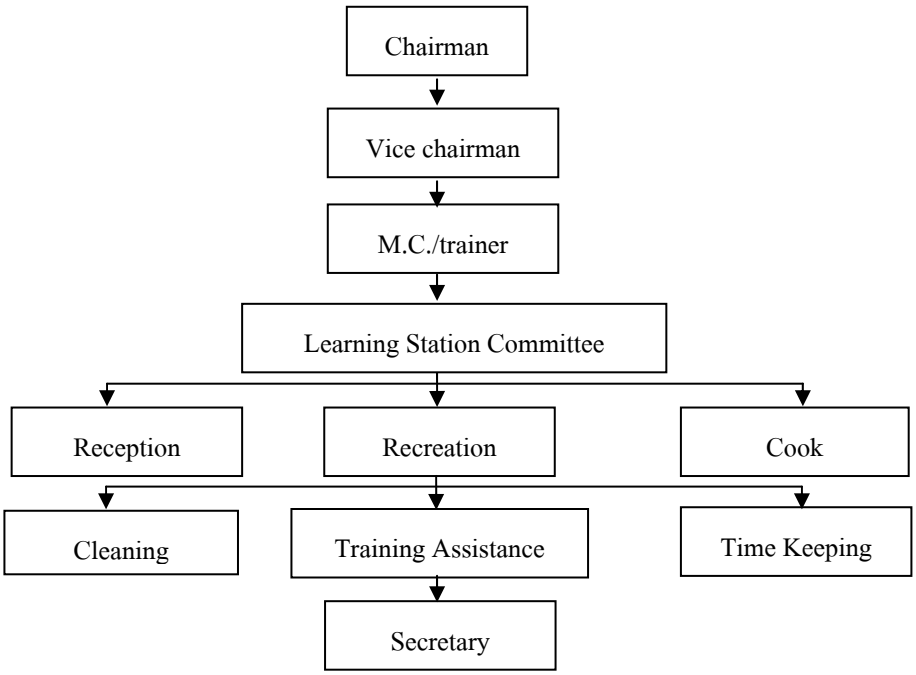
1. In Pang Center Network Committee is represented 9 network areas including districts in 4 provinces which are Sakon Nakorn, Udorn Thani, Kalasin and Mukdahan Provinces.

2. **In Pnag Network Promotion Committee** comprises 4 sub-committees: Agriculture/ Environment, Fund and Welfare, Enterprise and Health

In Pang Coordinators and Officers

1. Thawatchai Kunwong	Philosophy and policy coordinator
2. Prasert Songsiri	North and West coordinator
3. Wacharaporn	East and South coordinator
4. Chirachaya Chamwongla	Udornthani coordinator
5. Thidaporn Rajlongchai	Mukdahan coordinator
6. Waraporn Chaknarai	Kalasin coordinator
7. Waraporn On-keaw coordinator	Fruit juice and wine processing

Organization Structure



Roles and responsibilities

- Chairman: coordinate network/allocate budget
- Vice chairman: assist chairman
- M.C./Trainer(4-5): M.C.-facilitate training, trainer-train farmers, coordinate in local area level
- Reception committee (3): accommodate coordinator and participants, coordinate and make PR for network
- Training assistant (2): prepare training venue and material
- Time keeper: keep training time
- Learning Station Committee: evaluate participants and training
- Recreation team: entertain participants during training

In Pang Network Members

1. Sakon Nakorn: Kudbak District, (Kud-hi, Dongnimit, Nongsang, Kudbak, Nongka, Nakham, Namong, Kudhad, Pon-ngam, Nonsaikham and Nateng Villages) Akart Amnuay District, Phupan District, Nikhom Nam-Oun Disrict, Muang District, Sawang Dan Din District, Kusumal District, Somdej District, Buakhao District and Charoensilp District
2. Udon Thani: Wangsammo District
3. Kalasin: Kammuang District

Remark: 30 model farmers and 46 network members

Supporting organizations

Year	Organizations	Support
2000	Kudbak District Agricultural Office	-agricultural/livestock training -giving away breeding plants and animals
2004	Sakon Nakorn Agricultural Land Reform Office	-giving away breeding perennial
2005	JBIC	-springer for using in 1 rai of land (Baht 35,000)
2006	- Sakon Nakorn Agricultural Land Reform Office - Sakon Nakorn CEO Governor	-Basic agricultural infrastructure (water tank, learning center) -underground water well (Baht 10,000)
2007	- Sakon Nakorn Agricultural Land Reform Office	-agricultural equipment (Baht 200,000) -fund (Baht 100,000)
2008	- Sakon Nakorn Agricultural Land Reform Office - Ministry of Agriculture and Agricultural Cooperative -Namong District Administration Office	-training budget for 600 participants (Baht 120,000) -rice processing
2008	-Department of local Administration	-giving away cow and buffalo and 11 wells digging -Build self sufficiency learning center according to the king initiative (Baht 50,000)
2008-2009	-Bank for Agriculture and Agricultural Cooperative - Bangkok Agricultural Land Reform Office	-training budget, modification of training curriculum -Cow and buffalo growing promotion -21 wells digging

Agricultural Techniques and Knowledge

1. Inputs i.e. manure, liquid bio fertilizer, green manure
2. Soil improvement technique
3. Efficient agricultural techniques: propagate plants/animal/fish Use of herb as a medicine
4. Processing of agricultural products such as fish sauce, dish washer, shampoo powder

Agricultural products processing

- Fish sauce
- MSG
- Dish washer
- Shampoo
- Brown rice/other processing rice products
- Preserved food pickled vegetable, pickled fish

Problem and obstacle

1. Misunderstanding of IFS concepts caused dispute among members and relevant organization
2. The learning center development was not sufficient for the extended outreach activities; the agricultural infrastructure such as water tank has not built yet.
3. Leaders and trainers' agricultural knowledge and skills are not adequate to disseminate
4. Spread of chemical used in the adjacent farming plot affect to the integrated farming plot including golden apple snail
5. Insufficient support from government entities in publication
6. Policy/ related laws
   - Agricultural information is not promoted to widely share
   - Role of network representative in the social stage is low

In Pang Network expansion and impact

1. Create local social network such as local indigenous network to support, strengthen relationship and exchange knowledge among each other (with support from various organizations related to agriculture) in neighborhood, village and community
2. Ecological system in the integrated farm has more biodiversity of plants and animals; and soil is more fertile since the farmers use bio fertilizer to nurture the soil
3. Land use in the farm is well organized for growing plants and livestock
4. When encounter problem, the network members will brainstorm to find the way out
5. Network members can reduce their household expenses and have sufficient stored food for their family

Personal and Social Impact

Personal and household level impact

1. Household can have sufficient stored organic food for their family all year round. In some case, the food is almost 100% organic
2. Encourage farmers to do small size farming (within family)
3. Generate income and have product all year round
   - Increase job

- Have savings
- Reduce household expense

4. Reduce household expenses
5. Decrease debt
6. Reduce cost of investment/inputs for producing such as fertilizer, livestock feed
7. Develop new body of knowledge and skills in order to increase products and value added such as processed food

Social Impact

1. Tie members and community together
2. Exchange experience among network members and with other network widely
3. Members help each other to solve the problem occurred/ have negotiation power
4. Related organizations provide financial and technical support to the network
5. Farmer exchange products in/outside harvesting season

Environmental Impact

1. Better quality of natural resources
   - Soil, water resources and forest are more plentiful which can increase agricultural products
   - Soil and keep more water
   - Balance ecological system
2. Better biodiversity in farming plot
   - more variety of plants and animals
   - plants and animals rely on each other eventually