EFFECTIVENESS OF FARMER TO FARMER TRAINING IN DISSEMINATION OF FARM INFORMATION

QUAZI AFZAL HOSSAIN

A DISSERTATION

FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN AGRICULTURAL EXTENSION AND INFORMATION SYSTEM

DEPARTMENT OF AGRICULTURAL EXTENSION AND INFORMATION SYSTEM
SHER-E-BANGLA AGRICULTURAL UNIVERSITY
SHER-E-BANGLA NAGAR, DHAKA-1207, BANGLADESH

JULY – DECEMBER 2017

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BY

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A Dissertation
submitted to the faculty of Agriculture,
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SEMESTER: JULY-DECEMBER 2017

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CERTIFICATE

This is to certify that Dissertation entitled **"EFFECTIVENESS OF FARMER TO FARMER TRAINING IN DISSEMINATION OF FARM INFORMATION"** submitted to the **Faculty of Agriculture,** Sher-e-Bangla Agricultural University (SAU), Dhaka in partial fulfillment of the requirements for the degree of **DOCTOR OF PHILOSOPHY IN AGRICULTURAL EXTENSION AND INFORMATION SYSTEM**, embodies the result of a piece of bona fide research work carried out by **QUAZI AFZAL HOSSAIN, Registration no. 13-05802** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

I further certify that such help or source of information, as has been availed of during the course of this investigation has duly been acknowledged.

Dated: February, 2019

Place: Dhaka, Bangladesh

Prof. Dr. Md. Sekender Ali

Chairman, Advisory Committee
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SAU, Dhaka

DEDICATION

"LATE-LIFE MARRIAGE WITH PhD CRAMPS THE EARLY-LIFE REAL MARRIAGE".
BUT ONE LADY HAD THE UNIQUE PATIENCE TO GET THE WHOLE THING REPAIRED.
SHE IS NONE BUT MY BELOVED WIFE SHORMIN ROZY.

BIOGRAPHICAL SKETCH

The author was born on 15 November 1965 at Village- Kadmi, Upazilla- Boalmari, District- Faridpur, Bangladesh. He came from a reputed and enlightened Muslim family. He passed the S. S. C. examination from Rupapat B.C. High School, Boalmari, Faridpur in 1980 and H. S. C. examination from Notre Dame College, Dhaka in 1982 and obtained first division in both. He obtained B. Sc. Ag. (Hons) degree in 1986 and MS (Ag. Ext. and Rural Dev.) degree in 2006 from the Bangladesh Agricultural Institute, Dhaka and Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh respectively.

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The Researcher

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Dated: February 2019 **The Researcher**

SAU, Dhaka

ABBREVIATIONS AND ACRONYMS

%	Percentage
ADB	Asian Development Bank
AGEP	Agricultural Growth and Employment Programme
AI	Appropriateness Index
ASPS	Agricultural Sector Program Support
ASTD	American Society for Training Development
BARI	Bangladesh Agricultural Research Institute
BAU	Bangladesh Agricultural University
BBS	Bangladesh Bureau of Statistics
BRRI	Bangladesh Rice Research Institute
CAD	Command Area Development
CARE	Cooperative for Assistance and Relief Everywhere
CI	Cropping Intensity
CMU	Component Management Unit
CRSP	Collaborative Research Support Program (USA)
DAE	Department of Agricultural extension
DAES	Department of Agricultural Extension Services
DANIDA	Danish International Development Assistance
DT	Departmental Trainer
EC	European Commission
EID	Education and Information Division
e.g.	exempli gratia (for example)
et.al.	et all (and other people)
etc.	et cetera (and the rest)
FAO	Food and Agriculture Organization of the United Nations Organization
FF	Farmer Facilitator
FFE	Farmer to Farmer Extension
FFT	Farmer to Farmer Training
FFS	Farmer Field School

FS	Field School
FT	Farmer Trainer
GDP	Gross Domestic Product
GO	Government Organization
ICIPE	International Centre of Insect Physiology and Ecology
ICM	Integrated Crop Management
ICP	FAO’s Inter-Country Programme
IDM	Integrated Disease Management
i.e.	id est (that is)
IFAD	The International Fund for Agricultural Development
IFM	Integrated Farm Management
IFMC	Integrated Farm Management Component
IGA	Income Generating Activities
IGAD	The Intergovernmental Authority on Development is an eight-country trade bloc in Africa.
IPM	Integrated Pest Management
INTERFISH	Integrated Rice and Fish Project – CARE
KII	Key Informant Interview
MCC	Mennonite Central Committee
MOA	Ministry of Agriculture
NCDP	Northwest Crop Diversification Project
NGO	Non Government Organization
NIOSH	National Institute for Occupational Safety and Health
NOPEST	New Options for pest Management – CARE
PPT	Push-pull technology
PRA	Participatory Rural Appraisal
ODA	Overseas Development Association
RFLDC	Regional Fisheries and Livestock Development Component
SAIP	Smallholder Agricultural Improvement Project
SDGs	Sustainable Development Goals

SFFP	Soil Fertility and Fertilizer Management project
SMSs	Subject Matter Specialists
SPPS	Strengthening Plant Protection Services
SPSS	Statistical Package of Social Sciences
SRI	Systems Rice Intensification
TE	Technical Efficiency
TIER	Training Intervention Effectiveness Research
UAO	Upazila Agriculture Officer
UNDP	United Development Programme
USAID	U.S Agency for International Development
VFT	Volunteer Farmer Trainer
viz.	videlicet (namely)
WWII	World War II
$Y_{1,2,3,4,5}$	$\text{Year}_{1,2,3,4,5}$

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Quazi Afzal Hossain

ABSTRACT

The study was conducted to determine and describe the extent of effectiveness of Farmer to Farmer Training (FFT) as perceived by the farmers based on their knowledge, skill, attitude and practice regarding the content of Integrated Farm Management Farmer Field School (IFM FFS) guidelines and explore the contribution of the selected characteristics of the farmers to the effectiveness of FFT as perceived by them. Data were collected from 345 FFS trained farmers from a population size of 3450 from six Upazilas of six districts with help of an interview schedule during September 2016 to October, 2017. Data were also collected from 51 non-trained farmers from the study areas where no FFS was established to compare the perception of FFT effectiveness between trained and non-trained farmers. Findings indicated that about two-thirds (63.2%) of the respondent FFS trained farmers perceived medium to high effectiveness of FFT. Each of the four dimensions for measuring effectiveness like knowledge, skill, attitude, and practice of the farmers had significant positive relationship with the overall effectiveness of FFT. Again each of the dimensions had significant positive relationship with each dimension. Trained farmers perceived significantly higher effectiveness of FFT than non-trained farmers. Step wise multiple regression analysis indicated that the whole model of 17 variables explained 28.2 percent of the total variation in effectiveness of the farmer to farmer training as perceived by the respondents. But since the standardized regression co-efficient of 6 variables formed the equation and were significant, it might be assumed that whatever contribution was there, it was due to these 6 variables. As per descending order of standardized regression co-efficient these six variables were: aspiration, training exposure, agricultural diversification, sincerity status in FFS, agricultural experience, and decision making ability influence the effectiveness of FFT. Path analysis indicated that crop diversity had the highest (0.060) total indirect effect followed by training exposure, aspiration and decision making ability on the effectiveness of FFT. Sincerity in FFS and agricultural experience had negligible total indirect effects on effectiveness of FFT through other variables. Qualitative assessments revealed that to make FFT more effective, refresher training should be provided to the Farmer Facilitators, IFM FFS guideline should be revised as per current necessity, and new FFS should be introduced in non-disseminated areas and working spaces should be allowed sustainably for farmer facilitators as the complementary hands of the present extension system. Finally, this research has made several practical and theoretical recommendations regarding FFT interventions for development.

CHAPTER 1

INTRODUCTION

The opening Chapter introduces the study by exploring the agricultural background and historical perspective of the emergence of Farmer to Farmer Training (FFT) through Farmer Field School (FFS) approach worldwide and in Bangladesh in particular. The Chapter concludes with objectives, research questions, significance and limitations of the study and with definition of related terms.

1.1 General Background of the Study

Farmers are the real heroes in conquering the state of self-sufficiency in food for ever increasing population from ever decreasing agricultural land in Bangladesh. The farmers behind the plough are the champions in fighting hunger and malnutrition of millions. The landscape of Bangladesh is an intricate design of small fields where the green and gold of crops dominate year round. It is the farmers who design crop calendar to cultivate crops consecutively one after another around the whole year and scientifically convert the bountiful resources of the Sun, soil, water and weather into the food, fiber, livestock, fishes and forests. Thus agriculture sector becomes the dominant-factor in national economic development.

Although Bangladesh is on course for middle income country status by 2021, agriculture sector remains the largest employer in the country by far. Agriculture sector contributes about 17 percent to the country's Gross Domestic Product (GDP) and employed more than 45 percent of total labour force (Anonymous$_{a,}$ 2014). The performance of agricultural sector has immense impact on macro-economic situation like food and nutrition security, income growth, poverty alleviation, employment generation, judicious use of agricultural resources, sustainable development and environmental and ecological management improvement. The 7th Five Year Plan document highlighted agricultural growth and sustainability with due importance in its document. The document informed that about 47.5 percent of the population indirectly employed in agriculture and around 70 percent depends on agriculture in one form or another for their livelihood. However, as Bangladesh develops so as to other sectors grow (such as readymade garments, remittances etc.). The share of gross domestic product (GDP) of agriculture has naturally declined. During the fiscal year 2013-14, the broad agriculture sector contributed 16.5 percent to the total GDP. The contributions of crop, fisheries, livestock and forestry subsectors in GDP are 9.28 percent, 3.69 percent, 1.78 percent and 1.74 percent respectively. The contribution of the broad agriculture sector to GDP in 2014-15 came down to 16.0 percent comprising the subsector wise contributions in order of magnitude are fishery, livestock and forestry. The above scenario indicates the decreased growth of agriculture in 2013-14 as 4.7 to 3.3 in 2014-15. For turning Bangladesh into a middle income country by 2021, the GDP has to grow at a minimum rate of 7 percent per year. To attain this GDP and to keep pace with the population growth, agriculture should grow at a constant rate of 4-4.5 percent per year. There will be serious gap between demand and supply from domestic source if the current rate of productivity and production is not augmented (Anonymous$_b$, 2015).

The categorical status on the basis of farm areas reveals that nearly 85% of the farmers in the country used to cultivate less than one hectare of land as shown in Table 1.1.

Table 2.1 Farmers' Categories on the Basis of Farm Areas in Bangladesh

Categories	Percent of farm families
Landless (<0.02 hectare)	28.0
Marginal (0.02-0.2 hectare)	40.2
Small (0.2-1 hectare)	16.3
Medium (1-3 hectare)	14.0
Large (>3 hectare)	1.5

Source: DAE (2017), Agricultural Extension Manual, 2017

The most important feature of small-farm agriculture is that the farming system is embedded within the economy of the household and, thus, is organized to meet both the production and consumption goals of the farm family. The household uses an integrated system of productive activities like homestead garden, field crop and livestock and pond fisheries systems of both a subsistence and commercial nature, as well as off-farm labor and trade enterprises- in order to sustain itself. While searching and reviewing literature, the researcher of this study found that acreage is one of the ways to assess farm size and the scenarios of American farmers' categories on the basis of farm areas were, according to the USDA, small family farms average 231 acres; large family farms average 1,421 acres and the very large farm average acreage is 2,086. It was surprising to note that small family farms make up 88 percent of the farms in America (Mary Dunckel, 2013).

Over the past decade agricultural extension has evolved from a linear model of technology transfer to a more demand-driven service involving many actors. Nonetheless, extension-service delivery in many developing countries continues to face many challenges. These include low budgetary allocation, understaffing, and low staff morale due to poor remuneration. Passiveness of communities and a tendency of extension services to treat all farmers identically regardless of their particular contexts and needs, further limits the performance of extension programmes (Kiptot *et. al.* 2012). So, it is more than the necessity to directly targeting the landless, marginal and small farmers and arrange extension activities for resource poor farmers to boost up their skills as well as production.

Improved, demand driven, integrated and decentralized extension systems have been developed through FFS to support poor, marginal and small farmers' household through enhanced, integrated and sustainable agricultural activities for increasing productivity, profitability and ensuring food security through their farm and off farm management (Anonymous$_c$, 2010). In Bangladesh, FFS was first started in 1989 by the Department of Agricultural Extension (DAE) in Narsingdi district through FAO's inter-country IPM programme. Later on, several donors (UNDP, FAO, ADB, DANIDA, ODA and USAID) funded projects operated on IPM in Bangladesh and provided farmers' training in IPM mainly on rice and vegetables through FFS approach. . The FFS concept and approach is now used in over 60 countries and not limited to IPM in rice, vegetables and fruits but also use to teach wide variety of topics e.g. health education, soil management, animal husbandry, organic farming, fish farming and even on IGAs. In Africa, FFS approach of training is also used for Malaria and HIV control (Alam M.S., 2007). In this regard, DANIDA intervention in

Bangladesh had a chronological, synchronized and successive involvement in IPM, ICM and IFM FFS. Based on the hands-on experiences, ICM FFS ended up with pilot farmer to farmer training FFS in 2013 and IFM FFS begun fully with the farmer trainers/ facilitators.

From the standpoint of sustainability of agricultural innovations and technologies imparted through FFS training by DAE, a community approach was taken into consideration in 2007 (Anonymous$_{d}$,2008). It was then decided to select some proactive FFS graduates interested to run FFS. Through a logical need based additional training, selected farmers were then declared as trainers, later on, facilitators and entrusted with FFS conduction. To have a solid foundation, departmental trainer (DT) FFS and farmer trainer (FT) FFS (pilot or test basis) was then running side by side and it took up to 2013 in handing over FFS activities to FT or Farmer Facilitator (FF) fully in Bangladesh. Thus, keeping sustainability perspective of principles and practices of integrated, holistic approaches, community mobilization which included FFT and establishment of farmers' organization came in to view.

Farmer to Farmer Training - a new option or alternative for disseminating technologies apart from Departmental Trainers (DT), came into being through intervention of many foreign funded and government funded projects and program like DAE-UNDP-FAO IPM project, DAE-DANIDA Strengthening Plant Protection Services (SPPS), DANIDA funded Agricultural Sector Program Support (ASPS) and Agricultural Growth and Employment Program (AGEP) (Anonymous$_{e}$.2013). At present, about 2000 Farmer Trainers (FTs) have been developed who are engaged in running FFS for farmer to farmer extension. This system of training and FFS for farmer to farmer extension has proven to be very successful to strengthen farmers' capacity to grow/manage sub sectors of agriculture like fish, crop, household garden, poultry, livestock, fisheries etc.

1.2 Statement of the Problem

In defining the present research problems, it is found that though Bangladesh has achieved a lot in the agricultural sectors, still significant proportion of farmers are not getting adequate support and information for addressing the challenges they face in farming. Katalyst (2014) reported that in Bangladesh, agencies responsible for agriculture, livestock and fisheries extension services face resource limitations, both in manpower and finances. Upazila (sub-district) level Officers and their field staff are often unable to meet principal information needs of the majority of farmers within their jurisdiction. As the largest extension organization, Department of Agricultural Extension (DAE) has expert human resources for extension and advisory services for the farmers even at village level. But they are overloaded with responsibilities as such they cannot cover all farm families for which they are assigned. The aesa (2016) reported that the field level extension workers constituted the bulk of staff (13,323), with 89% of them holding 2 to 3 year Agricultural Diploma (since 80's, 4-years Diploma was introduced), and only 7% were female. Sub-Assistant Agriculture Officers (SAAOs) are working at the Block level and they are the front level workers of DAE. One SAAO has to supervise 900- 2000 farm families. Since the field level extension staff and farm families' ratio are very high, it impedes the supervision of the farming activities. In livestock and fisheries sector, there are very less numbers of front level workers at Union or village level. Rashid and Qijie (2016) observed that farmers' access to information sources like public and NGO services is still very limited.

Government extension service has a countrywide coverage to provide extension service to all categories of farmers. Lamentably, their service provision seems to be more concentrated on large farmers rather than small and marginal farmers. On the other hand, NGOs credited for creating space for small and women farmers. But their institutional capacity for handling sophisticated extensive service is very limited. Nevertheless, their coverage of extension service is limited based on location and number of clients and more importantly based on micro financial credit functions.

Private extension service (mainly input producers, dealers)b v is suffering severely from skilled manpower shortage and often criticized for high concentration in maximizing profits. At present farmers use a diversity of information sources originated mainly from public, private and NGO sectors. However, the extension service providers have not been able to satisfactorily address the information and knowledge needs of the small and marginal farmers. In addition, the farmers are often exploited by input dealers and manufacturers who sell spurious seeds and adulterated fertilizers and pesticides. The extension professionals need more and more practical, need based training to address the emerging challenges faced by farmers in Bangladesh (Kashem, 2014).

Some studies were undertaken in Bangladesh only on Integrated Pest Management Farmer Field School (IPM FFS) run by Departmental Trainers. The titles of those studies are mentioned in the Table 1.2.

Table 1.2 Research Activities regarding FFS in Bangladesh

Research Title	Author and year
Comparative Analysis between FFS and non-FFS farmers on Knowledge, Skill and Attitude towards IPM	Moniruzzaman, K.M. (2009)
Factors Influencing Adapting IPM Practices at Community Level	Rafiqul, I.M. (2006)
Factors Influencing Adoption of IPM by Vegetable Farmers	Kabir, H.M.(2015)
IPM Club for Fostering Farmers Empowerment in Rice Production	Haider, L.M. (2000)
Cost effectiveness of Integrated Pest Management Extension Method: An example for Bangladesh	Jacob *et. al.* (2012)

From the above table it is found that no study was undertaken so far on FFS run by farmers i.e. farmer to farmer training and effectiveness of farmer to farmer training not yet measured through any in-depth research study.

On the other hand, few studies on farmer to farmer trainer were found in some African countries and other places like Kenya, Uganda, Nigeria and Peru. The titles of those studies are mentioned in Table 1.3.

Table 1.3 International Research Activities Regarding FFS

Research Title	Author and year
Farmer Trainers; An Emerging Disseminating Pathways	Kirue *et. al.* (2009)
Volunteer Farmer Trainer: Improving Smallholder Farmers' Access to Information for a Stronger Dairy Sector	Kiptot *et. al.* (2012)
Farmers Teaching Farmers: Challenges and Opportunities of Using Volunteer farmers in Technology dissemination World Agro Forestry Centre	Kiptot *et. al.* (2014)
Assessment of the Effectiveness of Lake Chad Research Institute "Adapted Village Scheme" in Dissemination of Improved Farm Technology in Borno state, Nigeria	Mustapha *et. al.* (2013)
Assessment of Technical Efficiency of Farmer Teachers in the Uptake and dissemination of Push Pull Technology in Western Kenya	Amudavi, D.M. (2009)
Assessing the Effectiveness of the Volunteer Farmer Trainer Approach in dissemination of Livestock Feed Technologies in Kenya vis-à-vis other Information Sources	Mercy *et. al.* (2014)
Effectiveness of the Farmer to Farmer Extension Model in Increasing Technology Uptake in Masaka and Tororo Districts of Uganda	Ssemakula and Mutimba (2011)
Operationalising Participatory Research and Farmer to Farmer Extension: the *Kamayog* in Peru	Hellin and Dixon (2008)
Farmer Field School: Effectiveness for Soil and Crop Management Technology in Kenya	David *et. al.* (2014)

But most of these research studies were either based on single technology or issue. No embedded findings on kind of composite technologies as interwoven into integrated farm management (IFM) were found in any literatures reviewed. The context of the researches on FFS and FF were also found different from the context of Bangladesh. On the other hand, due to substantial variability in socio-economic and cultural settings, generalizations from the studies conducted abroad regarding the effectiveness of farmer to farmer training would not be relevant to Bangladesh context.

The National Agricultural Policy (2010) aims at creating an enabling environment for sustainable growth of agriculture for reducing poverty and ensuring food security through increased crop production and employment opportunity with specific objectives: 1) developing and harnessing improved technology through research and training and 2) increasing productivity and generating income and employment by transferring appropriate technology and managing inputs. Farmer to Farmer Training in tune with the objectives, is also kind of performing rehearsal of training and transferring appropriate technologies to farmers. The government is mandated to providing efficient and effective need based extension services to farmers to enable them to optimize their use of resources to augment self-sufficiency in food production and to improve their nutritional status. For this, there is an increasing need for strengthening agricultural extension services to ensure production system on a sustainable basis. Appropriate institutional arrangement needs to be established so that research and extension can interact efficiently with each other and with farmers to address the critical needs of the production practices at the farm level.

The policy documents also focused on some specific strategic extension objectives to achieve agricultural growth on a sustainable basis. These include:

- the Government recognizes agricultural extension as a service delivery system which would assist farmers through appropriate technical and farm management advice and information, new technology, improved farming methods and technologies aimed at increasing production efficiency and income.
- The government would promote public, private and voluntary extension initiatives to achieve diverse agricultural goals and to address needs of target population.
- Extension services would be provided to all categories of farmers; landless, marginal, small, medium and large with special emphasis on women and youths.
- The government would decentralize extension activity at the grass root level to deliver efficient and coordinated services.

- The government would make a shift from top-down hierarchical approach by bottom-up participatory approach in which farmers' research and extension will serve as peers.
- The government would recognize and adapt approaches that emerge locally through growing understanding of the nature of technological change, learning and adaption to prevailing situation.

1.3 Stating the research question

In the light of the above premises for investigating farmer to farmer training, this research work aims to provide insightful answers to the following questions:

i. What was the extent of effectiveness of Farmer to Farmer Training (FFT) as perceived by the farmers based on their knowledge, skill, attitude and practice regarding the content of Integrated Farm Management Farmer Field School (IFM FFS) guideline?
ii. What were the characteristics profiles of the FFS trained farmers?
iii. What extent of contribution made by characteristics of the farmers to effectiveness of Farmer to Farmer Training?
iv. What relationship existed among the knowledge, skill, attitude and practice of farmers regarding the content of Integrated Farm Management Farmer Field School (IFM FFS) guideline?
v. Was there any difference of effectiveness of FFT between the perception between the FFS Trained and Non-trained farmers?

1.4 Research boundaries

This research is a methodological evaluation of effectiveness of farmer to farmer training as deployed by the IFMC of AGEP project. The implications and impacts of FFT through FFS approach provided the basis of this thesis to extend existing theoretical concepts and forms of actions and extension practices. In addition, by considering learning areas in-built in different modules of FFS curriculum, this thesis seeks to identify meaningful insights that benefit not only the FFS participants but also the farmer facilitators in the race of information dissemination through farmer to farmer technology transfer model of extension.

1.5 Objectives of the study

In order to shape the research in a manageable and meaningful way the following specific objectives were formulated:

i. To determine and describe the extent of effectiveness of Farmer to Farmer Training (FFT) as perceived by the farmers based on their knowledge, skill, attitude and practice regarding the content of Integrated Farm Management Farmer Field School (IFM FFS) guideline;

ii. To determine and describe the characteristics profile of the farmers;

iii. To explore the contribution of the selected characteristics of the farmers to their effectiveness of FFT as perceived by them;

iv. To explore relationships among knowledge, attitude, skill and practice of the farmers regarding IFM FFS guideline;

v. To make a comparison of FFT effectiveness as perceived by the FFS trained and non-trained farmers;

vi. To qualitatively assess the effectiveness of FFT as perceived by the farmer respondents as well as departmental extension personnel.

1.6 Significance of the study

Agricultural extension services are being provided to the farmers by different GOs/NGOs and private organizations. But due to many constraints, agricultural technologies/information dissemination coverage to that end is not reflecting as much as aspired. There are many reasons add up to it like shortage of personnel, over burden of responsibilities, as compared to volume of works, inaccessibility to the clientele, farmers selected characteristics related to acceptance or reverse towards information and so on. As the demand of time or evolution of organizational strategies, many alternatives arise or existing ones disappear or become obsolete. Emerging of Farmer Facilitators (FFs) through season long training of IPM/ICM/IFM and tailored courses are like extended hands of the formal extension organizations. The potentials of these promising forces in the battle of poverty alleviation of small, marginal and poor farmers through agricultural and information technologies need to be studied to find out strengths and limitations in order to fit them effectively as change agents in the changing situations of farming communities.

1.7 Socio-economic importance of the study

The agricultural production system is being continuously supported through the innovation of modern technology, efficient transfer of technology and the supply of production inputs. At the same time different public and private extension agencies disseminate those technologies to the farmers/users as institutional mandate of transferring. Along with the above organizations, farmers themselves act as the extension agents for their neighbouring farmers. According to Rogers (2005), farmers may learn from their own experimentation, from agricultural extension services in the area, and from neighboring farmers. Two models of information dissemination by farmers to farmers are presented in Figure 1 and 2 as suggested by Alam (2007).

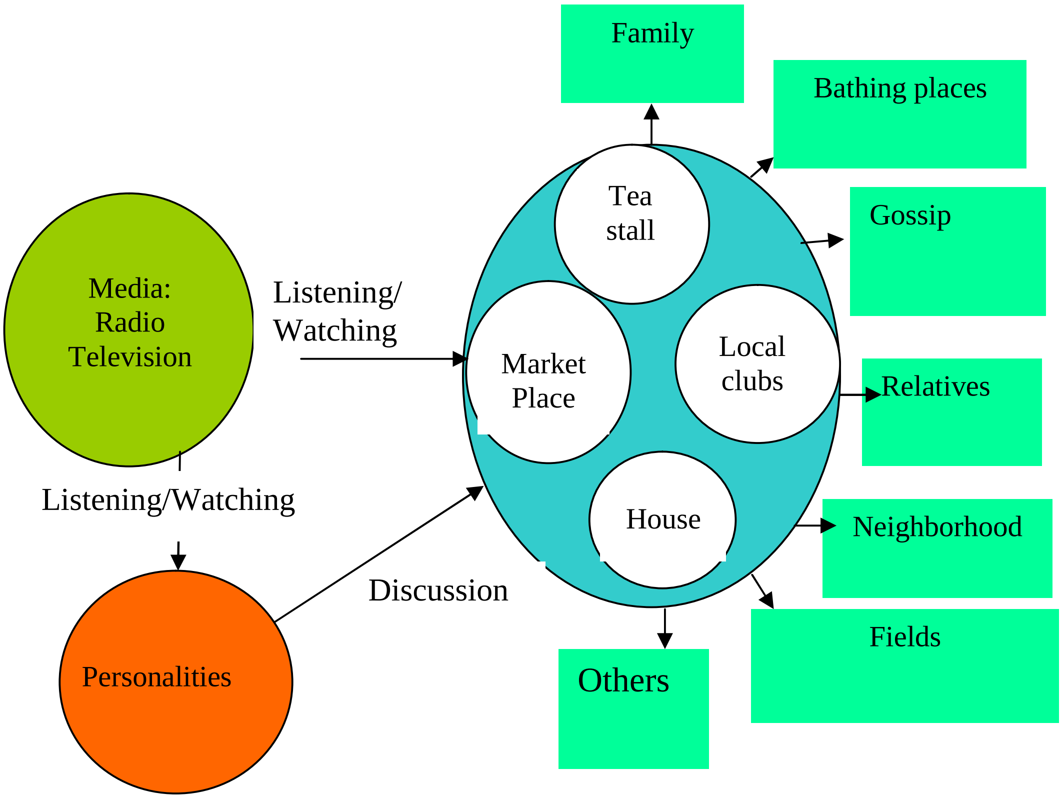

Fig.1.1 Information Dissemination by Farmers- model 1

Source: Alam, 2007

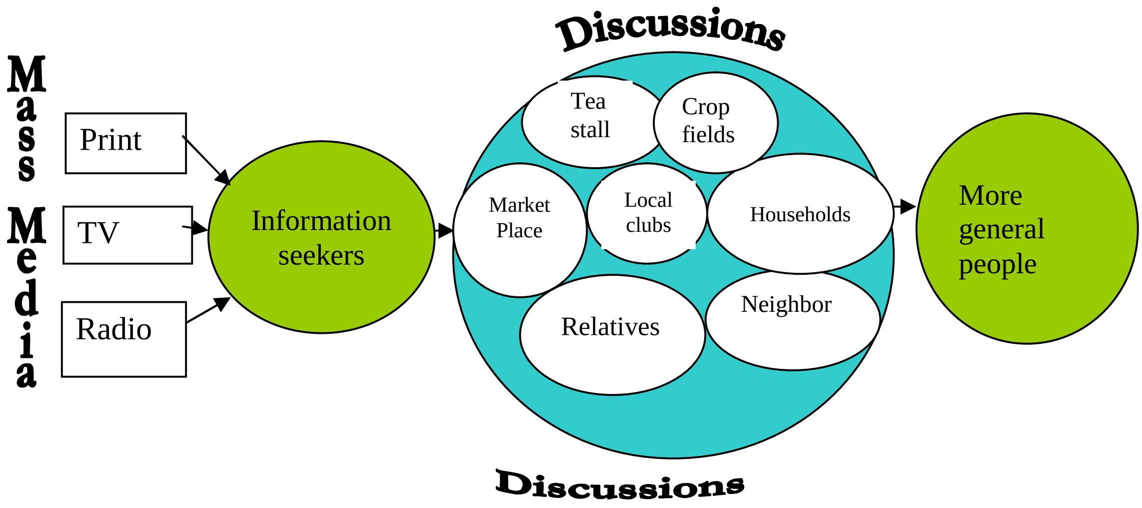

Fig.1.2 Information dissemination by farmers -model 2

Source: Alam, 2007

A third model of information dissemination by farmer facilitators through FFT, if develops in true sense, would add values to the existing extension systems of the country. Because, alike formal agricultural extension service providers, FFs have prospects of facilitating in-born access of farmers, their organizations and other market actors to knowledge, information and technologies; helping their interaction with partners in research, education, agri-business, and other relevant institutions; and assisting them to deliver their own technical, organizational and management skills and practices (Andrea B. 2013).

Recently, there has been a growing interest to use farmers in up scaling and out scaling new technologies to many farmers (Grisly,1994; Noordin *et. al.* 2001; Chikozho, 2005; Erbaugh *et. al.* 2007). This strategy is relevant where public extension is either insufficient or ineffective as in Kenya and other sub-Saharan African countries. The farmer-to-farmer extension (FFE) strategy serves a shared information and learning function of achieving economies of scale in technology diffusion system and financial sustainability; issues that perpetually constrain public extension in providing services (Quizon *et. al.* 2001; Feder *et. al.* 2003). In this strategy farmers are expected to influence fellow farmers to adopt new technologies and practices. Several studies have assessed the efficacy of using FFE model in technology transfer and have produced varying results and conclusions, partly because of differences in study locations, sample sizes, production practices and model specifications. Whereas Hasnah *et. al.* (2004) found that use of ‘progressive farmers’ as agents of promoting palm production in West Sumatra did not appear successful, Alene and Manyong (2006) on the other hand found in their study that the ‘lead farmers’, were more technically competent than the follower farmers in improved cowpea technology uptake in Northern Nigeria. Other studies have found that although farmers may gain skills and knowledge through farmer advising, they are often reluctant to share information (Tripp *et. al.* 2005; Davis, 2007). Such efficiency studies help to determine the extent to which productivity be raised by improving a neglected source, i.e. efficiency, with the existing resource base and the available technology.

However, the conflicting results in examining use of farmers as extension agents to disseminate technologies to many others raise an important question about the relevance and efficacy of this extension education approach. The process of information sharing among farmers is considered to be interactive and facilitates multidirectional information exchange. Use of farmers as extension agents contributes to strategies for overcoming barriers to utilization of information, understanding client information needs, and designing effective information delivery systems.

In a study, conducted in Western Kenya, some researchers evaluated the relevance and technical efficiency (TE) of farmer teachers (FTs) in the uptake and dissemination of a ‘push–pull’ technology (PPT). Push–pull technology (PPT) is being disseminated to farmers in eastern Africa through various methods including the use of farmers as extension agents to advise other farmers (Khan *et. al.*, 2008; Amudavi *et. al.* 2009). The farmer teachers (FTs) were selected by other farmers during group village meetings based on their experience with the technology, trust, interest, and commitment to reach out to their neighbours. They were trained by International Centre of Insect Physiology and Ecology (ICIPE) technical field staff and let to promote the technology at the farm and village levels, conveying knowledge and facilitating discussions on principles and practices of PPT. As part of their continued effort to develop effective and economical dissemination strategies, they undertook a detailed assessment of farmer teachers to examine the (i) influence of extension training on farmers' competencies of understanding and applying PPT on their farms, (ii) farmers' knowledge and skills of using PPT, (iii) influence of PPT on selected farm production constraints, (iv) extent of farmers' PPT dissemination to fellow farmers and their technical efficiency (TE) in promoting PPT uptake, and (v) factors influencing farmer teachers' technical efficiency of PPT uptake. The results obtained would help in improving competence and efficiency of farmer teachers as extension agents in PPT uptake and dissemination. They concluded as improving technical efficiency of farmers in maize farming systems under PPT would contribute immensely to improving the overall agricultural productivity of cereal crops in Western Kenya.

In Bangladesh, most of our rural people are dependent on agriculture and to disseminate modern information and new technology to them is a crying need today. The farmers are lagging behind in the race of technology generation to adoption as because of either delayed extension support or insufficient community coverage resulting farmers not familiar with modern agricultural technologies. It is thought that FFs can play a vital role for quick and timely transfer of technology through FFS for need based services to the farmers. Moreover, it is suggested from consultancy forums that FTs need to be strengthened as the strong change agents to disseminate information of agriculture to the rural mass, especially among small and marginal farmers for overall development of agriculture.

Farmer facilitators, through their full time presence and part-time regular services to the community, could be the complementary forces to the mainstream extension service providers. It has therefore, become imperative to increase effectiveness of agricultural support service by involving new community level actors like FFs with an initiative of organizational changes that can accommodate a decentralized and participatory approach in conducting diverse extension activities.

1.8 Justification of the study

To address the question of expansion of agricultural technologies to farmers and sustainability in the community, a concept of community based training system through farmer trainers and establishment of farmers' organization has emerged. Therefore, it is now strongly believed by the extension functionaries and the overall management in the Government of Bangladesh, that the FFS system as developed by the IPM operators can be used as a general vehicle, through which a variety of extension messages can be transferred to a large number and many types of farming groups (Ramaswamy 2003). Equally, the FFs are considered to be the promising drivers of this field-tested vehicle who have potentialities to render multi facet extension services. Opinions aroused that there might have diverse social gains if FFs are flourished as social resources and employed in facilitating neighboring farmers with agricultural technologies in tune with the sustainability perspective. So, the scenario demands an in-depth research on the effectiveness of FFT in disseminating agricultural information.

1.9 Scope of the study

In this study extent of effectiveness of FFT would be determined. This would enable to identify the factors which affect the effectiveness of FFT. This important aspect would ultimately help the extension providers in formulating appropriate strategies in developing FF and in running such type of training. The development agencies and stakeholders would utilize this key information for conducting FFT to disseminate wide range of information. However, the overall findings of the study would enable planners, policy makers, and extension providers to formulate extension policy and appropriate strategy to engage FF in diversified extension services. The findings might be supplementing existing ways and practices of FF in order to create spaces for FFT.

1.10 Limitations of the study

This research has some limitations as follows:

The success of the study depends on the willingness of respondents to cooperate. Some may not see the value in participation while others may view the topic as sensitive or irrelevant to their needs

The farmers did not have any recorded data regarding information on different demographic dimensions like income. They were facing confusion in memorizing the frequency of extension contact, income, training experiences etc. They tried to furnish databases on their assumption.

There were time constraints from farmers' side to talk in details to provide data of many issues.

Many factors of the respondent farmers were involved in relation to effectiveness of FFT but only 17 characteristics of the FFS trained farmers were selected for investigation in this study.

Data were collected for the study only from six selected Upazilas of Bangladesh.

Effectiveness of FFT was determined only based on the knowledge, attitude, skill and application of practices of the content included in the IFM FFS guideline.

1.11 Definition of terms

Age

Age of respondent was defined as the span of his/her life and was operationally measured by the number of years from his birth to the time of interview. It is measured as respondent’s age in number of years at the time of data collection. Age is a quantitative variable.

Education

Educational qualification refers to the number of completing years of schooling. Education is defined as the ability of an individual to read and write or as the formal education received up to a certain standard. Education of an individual was defined as the extent of formal education received by them from educational institutions. Farmers have various level of education formally, non-formally or informally. For easy understanding, the issues were resolved on the basis of formal education and it was determined as ‘cannot read or write’, ‘cannot read or write but can sign only’, and ‘number of classes passed’. Education is a qualitative variable. In this study education was seen as a variable which increase the training standard of farmer trainer.

Family size

Family size of a respondent referred to the total number of members of the family including the respondent him/herself, his wife/her husband, children and other dependents who lived, ate and acted together as a family unit. Family size of a farmer was defined as the number of individuals in his/her family including him/herself, his/her wife/husband, children and other dependent members.

Net cropped area

It represents the total area sown with crops. Area sown more than once in the same year is counted only once. The net cropped area (in hectare) was measured as regardless of number of crops raised in last year on which respondent’s family carried out farming operation. Net cropped areas or farm size plays a critical role in adoption process of a new technology. Many authors have analyzed farm size as one of important determinant of technology adoption. Farm size can affect and in turn be affected by the other factors influencing adoption (Lavison 2013). Some technologies are termed as scale-dependant because of the great importance of farm size in their adoption (Bonabana- Wabbi 2002).

Cropping intensity

Cropping intensity refers to the number of crops raised in a field during an agricultural year. It is a measure of land use efficiency, which is defined as ‘extent to which the net sown area is cropped or resown’. The total cropped area as percentage of net sown area, gives a measure of land use efficiency, which really means the efficiency of cropping.

It is expressed in percentage after measuring as follows:

$$\text{Cropping intensity} = \frac{\text{Total cropped area}}{\text{Net cropped area}} \text{ x } 100$$

Where,

Net cropped area= Single cropped area (SCA) + Double cropped area (DCA) + Triple cropped area (TCA)

Total cropped area = SCA×1 + DCA×2 + TCA×3

The cropping intensity can also be measured and expressed as -

Cropping intensity (%) : (Total cropped area ÷ Net cropped area) ×100

Thus, higher cropping intensity means that a higher portion of the net area is being cropped more than once during one agricultural year. This also implies higher productivity per unit of arable land during one agricultural year.

Cultivated homestead area

The cultivated homestead area of a farmer was determined by the area of land surrounding to his/her residential house on which his/her family carried out farming operation (usually vegetables, fruit, timber, etc.). Homestead size was measured as the size of one's homestead area (excluding living houses, kitchen, cattle shed) on which s/he conducted homestead agricultural operations all round the year. The area was being estimated in terms of local unit during interviewing and converted into hectare later on.

Agricultural annual income

The agricultural income comprises the incomes obtained from all sectors of agriculture including field crop, homestead vegetables and fruits, poultry birds, small ruminants, big ruminants and fisheries of all the family members of the respondent in a year. The agricultural annual income was determined by the summation of different sectors of agricultural income (e.g. Crop sector: field crops, vegetable/spices crops, fruits, Poultry sector: poultry birds, Livestock: goats, cows, Fishery sector: fishes etc.)

Agricultural commercialization

The term agricultural commercialization means production of agricultural crops for sale in the market, rather than for family consumption. In this study, as for small farmers, it was calculated with the surplus production after the family consumption. Agricultural commercialization of a respondent referred to the ratio of total sold price and total agricultural income of the respondent in a year. It was expressed in percentage.

Agricultural diversification

It was decided by the varieties of agricultural crops cultivated and the the range of different agricultural sectors undertaken by the household. Level of diversity was determined as more (> 4 species), medium (3- 4 species), less (1-2species), not at all (0 species). In the context of IFMC the introduction of new crop, livestock or aquaculture activities will be included as will an increase in the range of varieties or species. So while replacing one variety of rice with another will not be considered diversification, the addition of a new crop variety will be. The assessment of increased diversification will not be limited to agricultural activities directly promoted by IFM FFS as the principles of IFM FFS go beyond promoting particular enterprises to include the ability to identify opportunities. 'Having diversified crop', 'animal or other enterprises' and 'planting several varieties of crops' mentioned by Aditto *et. al.* (2012) would be considered here as the agricultural diversification suitable for the small and marginal farmers.

Agricultural experience

Agricultural experiences of a respondent farmer referred to the length of the time (year) s/he involved in agricultural activities up to the time of interview. It is the total number of years a subject (farmer) did agricultural farming particularly prior to data collection. An agricultural or farming experience is a quantitative variable.

Leadership trait

A leader usually leads by engaging in any organization in and around his surroundings for various purposes. Leadership trait is a qualitative variable. Leadership of a respondent farmer referred to the nature of participation of the respondent in various organizations. A review of the literature made it clear that an organization which is useful to members, and works efficiently, is often based on the leadership ability (Nilvises, 1988).

Lassey and Sashkin (1983) stated that leadership is clearly a role that leads toward goal achievement, involves interaction and influence, and usually results in some form of changed structure or behavior of groups, organizations, or communities.

Measuring leaders is not new but levels of objectivity and validity have to be significantly improved. This can only happen when a common scale for making meaningful comparisons is adopted. In this study, it was determined by the level of involvement in different organizations as 'not involved', 'general member', 'executive member', and 'executive officer'.

Extension contact

Extension contact was expressed as the degree of contact of an individual with different extension media (individual, group and mass) for varieties of purposes including sharing of ideas for agricultural activities. Extension contact is a qualitative variable. This variable measures the accessibility of farmers to extension services. It is hypothesized that this variable would be expected to exert a positive influence on adoption of modern technologies. It was determined by the level of contact and frequency with personal level, group level, mass level as 'regularly',' often', 'moderately', 'seldom', and 'never'.

Decision making ability

Decision making ability of a respondent referred to the degree of ability for making decision on various aspects by him/her-self or by the help of other family members or by outsiders of the family. It was decided by the extent of decision making as 'able to make self decision', 'able to make decision with family members', 'able to make decision with outsiders of the family'.

Leeuwis (2003) pointed out that ‘decision making’ in agricultural extension was the main concern among extension agents in the early years of extension research. With the persistent failure of farmers to make good decisions, there has been a shift in extension education from planning and decision making to learning approaches. Farmer to farmer training is one of the ways forwarded to those ends. John Musemakweri (2007) argued that it is more reasonable to view ‘decision making’ as the final outcome of a long-lasting process with varying degrees of deliberateness and consciousness.

Aspiration

Merriam-Webster dictionary, 2018 defines aspiration as having or showing a desire to achieve a high level of success or social status. According to the Cambridge English Dictionary, 2018 it is something that someone hopes to achieve. Here, in this study, it was determined as aspiration statements on life and development and extent of aspiration towards various issues (education, occupation, increase of own land, increase of field crop, increase of homestead garden, increase of poultry birds, increase of goats, increase of cows, increase of fisheries, increase of family nutritional status, increase of agricultural machineries, increase of renovation/ construction of houses, purchases of recreational instruments, purchases of communication devices, recreational/study tours, increase of income, position in social organization etc.).

Risk bearing ability

According to The Times (2017) risk bearing ability referred to the practice of identifying potential risks in advance, analyzing them and taking precautionary steps to reduce the risk. It was established as statements on risk related agricultural issues. It can be measured as on the extent of risk feeling towards the statements based on various agricultural risks.

Theoretical and empirical literatures have shown that risk and uncertainty play an important role in the adoption of new agricultural technologies (Marra *et al.* 2003). This is especially true for small and marginal farmers who have to manage risks on an everyday basis to secure their livelihoods.

Hans P. Binswanger. (1980), measured attitudes toward risk in 240 households using two methods: an interview method eliciting certainty equivalents and an experimental gambling approach with real payoffs which, at their maximum, exceeded monthly incomes of unskilled laborers. The interview method is subject to interviewer bias and its results were totally inconsistent with the experimental measures of risk aversion. Experimental measures indicate that, at high payoff levels, virtually all individuals are moderately risk-averse with little variation according to personal characteristics.

Wealth tends to reduce risk aversion slightly, but its effect is not statistically significant.

Training exposure

Training exposure of a respondent was measured by the total number of days of training related to agriculture or associated areas received by him/her in his/her entire life organized by different organizations. It also refers to the total number of days attended by the respondent in his/her life to the various subject matters of interest including agricultural training program.

Farmers' changes of technology use are influenced by technical training, extension contact, meeting, oral transmission, trust on technician/trainer and belief level on technology (Chi and Yamda, 2002).

Sincerity status in FFS

A sincere individual values himself, takes the tasks assigned seriously and seeks ways to execute his or her responsibilities with utmost diligence and perfection (Krishnan 2010). Sincerity status in Farmer Field School (FFS) of a respondent was referred to his/her sincerity in the activities of FFS like: attendance in FFS, taking part in day`s activities, sharing of experiences, regular field visit/observation, and implementation of learning in own fields.

Knowledge

It involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting. In this study, recall of the learning areas in FFS under different modules was considered. Knowledge domain was captured in this study as six levels of objectives as remember, understand, apply, analyze, evaluate, and create as per the Revised Bloom's Taxonomy (Mary Forehand, 2005).

Skill

Skills are usually learned through the transfer of knowledge and it requires competence in specific areas outside the practice environment. Skills are measured in terms of speed, precision and/or observation or monitoring. In this study, it was observation and monitoring of respondents' ability to perform tasks learnt from FFT.

Attitude

This refers to a respondents' mental readiness to react favorably or unfavorably toward farmer to farmer training. It is one's outlook and state-of-mind on a given task or issue. Attitude is generally developed over time as a result of expose to and assimilation of behaviours of treatment or essence of training. In this study, it is respondents' state-of-mind about FFT and is measured in terms of respondents' reactions towards some selected statements.

Practice

It is about whether the ultimate users practice the technologies applied in FFS during FFT and is measured by some level or extent of application like' high', 'medium', 'low', 'no' *etc.*

IFM FFS

Farmer Field School is an approach to extension that uses non-formal adult education methods based on experiential learning techniques, and participatory training methods that emphasize learning by doing. The training normally continues through season-long based on the agricultural crops or any issues of life. In IFM FFS, whole farm components of production (crops, homestead garden, poultry, small ruminants, large ruminants, fisheries, nutrition and other social issues) are addressed.

Departmental Trainer

When people from formal extension organizations run FFS, they are named as Departmental Trainer (DT). For ensuring sustainability of FFS learning, responsibility of FFS running has now been entrusted with farmer trainers. Monitoring and backstopping of FFS and FF are now done by DTs.

Farmer Facilitator

When trained farmers run FFS, they are named as Farmer Facilitators. There are many synonymous terms of it like *"farmer-to-farmer,"lead farmers*, *model farmers* or *extension multipliers, village extension multipliers, Para-professional, Local trainers, local facilitators, local service providers etc.*

Effectiveness

Effectiveness is the state of producing the intended or expected result of a program or project within the desirable period of time. It is an instrumental test in this study for assessing the effectiveness of farmer to farmer training of IFMC. Measures of Effectiveness (MOE) are measures designed to correspond to accomplishment of mission objectives and achievement of desired results. They quantify the results to be obtained by a system and may be expressed as probabilities that the system will perform as required.

Effectiveness of Farmer to Farmer Training (FFT)

Effectiveness of FFT of a respondent was referred to respondent farmers' knowledge, skill, attitude and practices conceived through FFS approach regarding the contents of IFM FFS guidelines. To determine Effectiveness of Farmer to Farmer Training Score was determined by the addition of the Scores obtained from knowledge, attitude, skill and application scores. Effectiveness of FFT programme also can be measured by combining and averaging knowledge, attitude and adoption scores of the farmers by the following modified formula (Afroz, 2014) and expressed as percentage:

$$ES=\frac{1}{4}\times\left(\frac{Ok_n}{Pk_n}+\frac{Os_k}{Ps_k}+\frac{Oa_t}{Pa_t}+\frac{Oa_p}{Pa_p}\right)\times 100$$

Where, ES= Effectiveness score

O_{Kn} = Observed knowledge score, P_{Kn}= Possible knowledge score

O_{sk}= Observed skill score, P_{sk}= Possible skill score

O_{At}= Observed attitude score, P_{At}= Possible attitude score

O_{Ap}= Observed application score, P_{Ap}= Possible application score

CHAPTER 2

REVIEW OF RELATED LITERATURE

Pertinent references on the effectiveness of training in general and farmer to farmer in particular along with origin of farmer field schools and its core concept, evolution of farmer to farmer training on IFM in Bangladesh, assessing FFT effectiveness were searched and divided into some areas and linked up with the current study.

2.1 General ideas on effectiveness of training

Normally we know that training is effective when the trainee demonstrates the desired behavior change (new skill, new knowledge, etc.) they learned during the training. Training effectiveness is essentially a measure that examines the degree to which training improved the trainee’s knowledge, skill, and behavioral pattern within the organization as a result of the training. To be effective, some simple questions are implied regarding training like i) did the training do what it was supposed to do? ii) Did trainees learn what they were supposed to learn? iii) Were the employees who attended training able to do what they should be able to do once they left the training venue? From a regulatory standpoint the training effectiveness can be adjusted as a two-pronged approach as below (Figure 2.1):

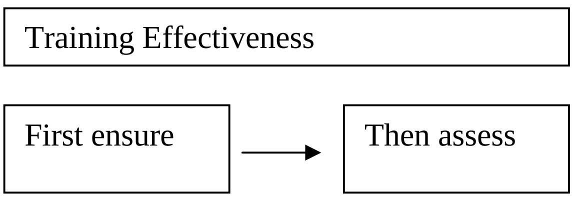

Fig.2.1 A two pronged approach to training effectiveness

Source: Anonymous$_f$ (2017)

An organization can ensure training effectiveness through key activities in its best practices training design, development, and delivery methodology. This is truly a quality by design approach, and it happens before any employee participates in the training. It also embeds best practices in adult learning and training design, development, and delivery into its standard training methodology which enables the organization to achieve the goal of Right Training delivered by the Right Trainers to the Right Persons at the Right Time to achieve the Right Outcomes (Anonymous$_g$, 2017).

2.1.1 Training evaluation versus effectiveness

Training evaluation and training effectiveness are sometimes used interchangeably; however, they are two separate constructs. Training evaluation is a measurement technique that examines the extent which training programs meet the goals intended. The evaluation measures used depend on those goals and can include evaluation of training content and design, changes in learners, and organizational payoffs. Training effectiveness, simply stated, is the study of the variables that likely influence training outcomes at different stages (*i.e.;* before, during, and after) of the training process. These effectiveness variables have the potential to increase or decrease the likelihood of successful training outcomes and are typically studied in three broad categories: individual, training, and organizational characteristics.

Koledoye*et. al.* (2013) in a review paper mentioned that the historical development of program evaluation has not been a smooth one. There has been a tendency towards conflict and short memory, with regards to the shortfalls of one approach against another. Most texts agree that modern program evaluation evolved primarily in the USA and was considered a ‘semiprofessional’ discipline by the 1960s. Although, the root of evaluation development lies in the US, in the 1960s; evaluation began to surface in Australia and later in Europe. The increase in public spending on programs led to an increase in evaluation activity to determine whether these programs were working. Evaluation consists of the following elements:
Systematic collection of information; Identifiable people or group of people; Making decisions about and or improving programme effectiveness.

In summary, training evaluation is a methodological approach for measuring learning outcomes. Training effectiveness is a theoretical approach for understanding those outcomes. Because training evaluation focuses solely on learning outcomes, it provides a micro-view of training results. Conversely, training effectiveness focuses on the learning system as a whole, thus providing a macro view of training outcomes. Evaluation seeks to benefit the organization by determining why individual learns or does not learn. Finally, evaluation results describe what happened as a result of the training intervention. Effectiveness findings tell us why those results happened and so assist experts with developing prescriptions for improving training.

2.1.2 Training efficiency, effectiveness and impacts

Some people say that the effectiveness of training is a measurement of learning. It is determined by comparing post-test scores with pre-test scores and then measuring the net change (Anonymous$_h$, 2017). There are several methods to measure this—on a per-trainee basis, on a per-'skill point' base or on a per-dollar basis. Some other argues that a measurement of learning is not training effectiveness - it's a measure of learning! One can learn everything required, but fail to put it to the required use and the required outcomes are not achieved. Generally effectiveness measures are defined in terms of the extent to which a set of objectives are met.

It would be quite easy to have a large overlap here with efficiency measures. Efficiency is generally defined as the number of units output for the number of units input. Taking a similar theme someone (Anonymous$_h$, 2017) suggests that the Training Efficiency (TE) can be measured by following several ways:

i) $$\text{TE} = \frac{\text{No.of training courses achieving the required outcomes}}{\text{No.of total training courses delivered}} \times 100$$

ii) $$\text{TE} = \frac{\text{No.of trainees behaving as required or Operating eqipment to required standard}}{\text{No.of total training courses delivered}} \times 100$$

iii) $$\text{TE} = \frac{\text{Total benefits}}{\text{Total costs}} \times 100$$

According to FAO$_a$ (2018) efficiency refers to the productivity of the implementation process. It examines whether the inputs of a project have been efficiently converted into outputs. It also refers to the ease with which costs are expended to realize benefits. The Field School (FS) approach is perceived to be an effective and comparatively cheap tool for speeding the uptake of technologies at community level. However, only a few evaluation reports addressed efficiency of FS. Furthermore, most of the reports did not do a comparative analysis of costs and benefits. Figure 2.2, broadly illustrates some of the aspects of efficiency as reported by various documents below:

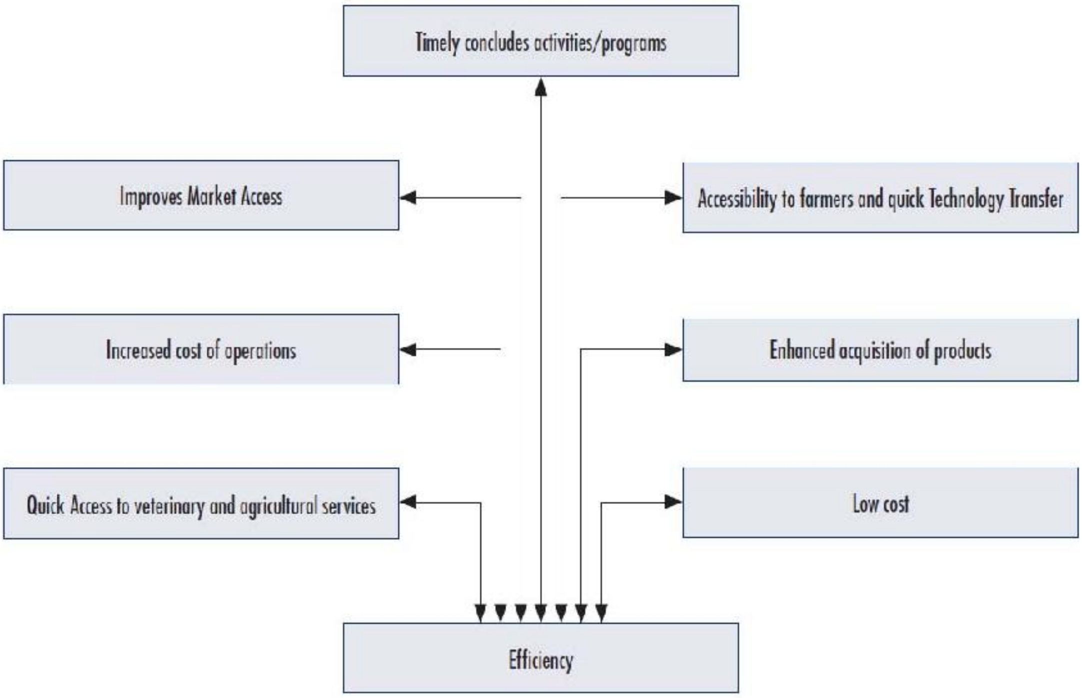

Fig.2.2 Aspects of efficiency at different perspective

Source: FAO$_a$ (2018)

Training effectiveness can be measured as: on- the- job observation, interviewing with the participants, taking the objective question test, review or feedback by superior and actual performance by participants. The following methods can be used for measuring training effectiveness at work as: observation by his/her team leader during the defined period (one month to 3 months), feedback from his/her team leader and members, feedback from all the concerned with whom s/he interacts professionally, monitor the performance in terms of quality and productivity (Anonymous$_i$, 2017). Measuring the training effectiveness should be an important asset for the organizations. Effective training enhances the knowledge, skills, attitudes and behaviour of people and hence their performance. There are some criteria for measuring the success of training; direct cost, indirect cost, efficiency, performance to schedule, reactions, learning, behavior change, performance change (Sheppard, 1999).

Training effectiveness is the study of the individual, training, and organizational characteristics that influence the training process before, during, and after training. Training needs analysis is recognized as one of the first important 'before' contributions to training effectiveness (Salas and Cannon-Bowers, 2001). Although a full description is beyond the scope of this study, basically it is understood that a thorough needs analysis required to take into account the individual differences of trainees, the organizational climate and objectives, and the characteristics of the task(s) to be learned. In sum, training cannot be effective unless it meets the individual, organizational, and task needs as identified by needs analysis.

Debriefing- 2017 Mid-term Review of AGEP categorically defined 'Effective' as doing the right things-having the right tools. So for FFT, it means having a good training design, training plans and farmer management etc. and 'Efficient' doing the things right- using the tools the best way. So for FFT, it means- is the training running well? Is it value- for-money and farmers need? (Anonymous$_j$, 2017).

Additional contributions to training effectiveness are three sets of characteristic. The first set is individual characteristics or the factors that trainees bring to the situation. These include personality traits, attitudes, abilities, demographics, experience, and expectations. Individual characteristics also include attitudinal constructs that are manipulated in training such as self-efficacy, goal orientation, and motivation. The second set of characteristics covers the context in which training is implemented or the organizational and situational characteristics. These include the organizations' climate for learning, history, policies, trainee selection technique, and trainee notification process. The final set is training characteristics, which includes aspects of the training program such as instructional style, practice, and feedback (Cannon-Bowers, Salas, Tannenbaum, and Mathieu, 1995; Tannenbaum *et. al.* 1993).

FAO's Farmer Field School Impact Meta Evaluation in the IGAD and Other Eastern African States, Nairobi – Kenya mentioned that evaluating effectiveness entails forming a judgment concerning the extent to which an intervention's initial objectives have been met, taking into account their relative importance and changes that may have taken place in the objectives. The objectives of the FS approach including those included in this review focus on imparting changes in recipient's knowledge and skills, application of appropriate interventions, production gains, and dissemination of information, gender equity and empowerment. Figure 2.3, broadly illustrates some of the aspects of effectiveness as reported by various documents below:

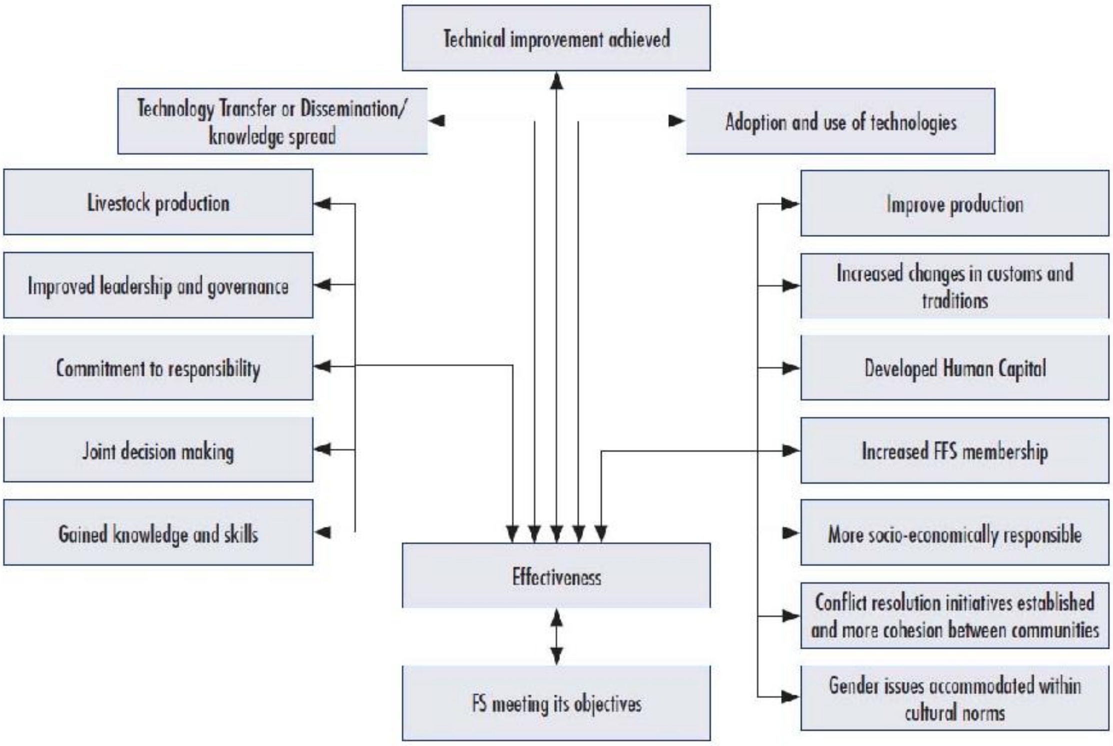

Fig.2.3 Aspects of effectiveness at different perspective

Source: FAO$_a$ (2018)

The same documents also described impacts as projects or programmes often make through interventions like FFS as well as FFT. Conceptually, as farmers adopt improved technologies, innovations and practices to realize impacts they go through a process that involves exposure and gaining of knowledge and skills (outputs), which they put into practice (behavioral change) for which they realize an impact (conditional change). Eventually, the impact needs to be sustained (Bwire, 2017). It should be noted that most of the impacts reported are actually changes that occurred at household, FFS or community level during or immediately after the completion of the respective FFS. Measurement of impacts was varied across the various FFS evaluations done; ranging from less rigorous approaches using farmer / evaluator perceptions with or without reference to non-FFS participants to rigorous and robust methodologies that have minimized selection bias with control or non-FFS participants. Figure 2.4, broadly illustrates some of the aspects of impact as reported by different documents below:

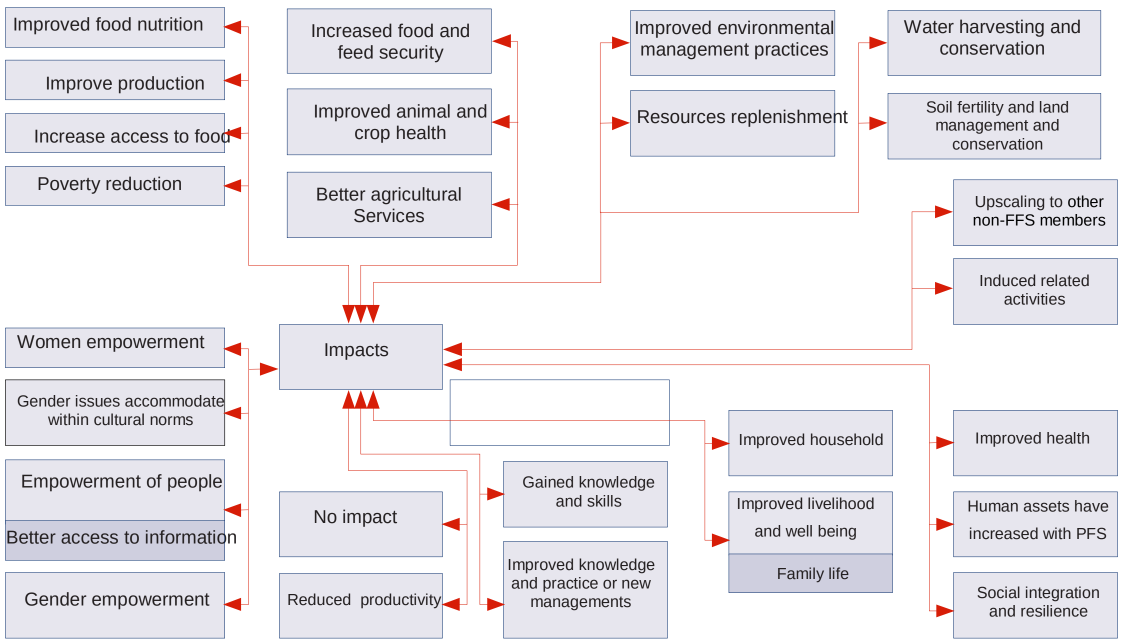

Fig. 2.4 Aspects of impact at different perspective

Source: FAO$_a$ (2018)

Impacts of FF's run IFM FFS aligned with the objectives were found achieved to many extent as documented by different evaluation by national and international teams. Main areas of impacts were knowledge of improved technologies and practices, income through production, nutritional status and employment and diversification of farming (Appendix-I).

2.2 Measuring training evaluation and effectiveness

2.2.1 Integrated model of training evaluation and effectiveness

Training experts typically study training effectiveness variables through the targets of evaluation. For example, the employment agency assessed how self-efficacy, practice, supervisor and coworker support were related to changes in learners and organizational payoffs. Four of the five effectiveness models found in the literature focus primarily on one evaluation measure- transfer performance. These effectiveness models focus on the relationship between learning as a whole (i.e., attitudes, cognitive, and behavioral) and transfer performance and provide insight into how the three sets of characteristics are related to learning and transfer performance. For example, Baldwin and Fords (1988) model suggests that individual and organizational characteristics are directly related to learning and transfer performance, whereas all three sets of characteristics have an indirect relationship with transfer performance through learning. Although not present in their model, Baldwin and Ford also suggested that individual characteristics are related to both training and organizational characteristics. These relationships also result in increases (or decreases) in learning and transfer performance. This model was extended by Holton and Baldwin's (2000) training effectiveness model, which more explicitly identifies particular characteristics affecting learning and transfer performance. These characteristics include ability, motivation, individual differences, prior experience with the transfer system, learner and organizational interventions (e.g., preparation, supports), and training content and design.

Holton's (1996) model of training effectiveness also has particular individual, training, and organizational characteristics as primary or secondary underlying variables that influence the outcomes of training. Overall, Holton's model suggests that the three sets of characteristics are directly related to learning and transfer performance. However, there are also indirect relationships because of interactions between the characteristics. For example, Holton suggested a primary individual characteristic, motivation, interacts with training and organizational characteristics, thus influencing the outcomes of training. Although Holton provided useful guidelines for measuring training effectiveness, few studies (e.g., Holton, 2003; Holton, Bates and Ruona, 2000) have simultaneously measured the various aspects suggested by the aforesaid author. These authors developed the Learning Transfer System Inventory with the effectiveness variables outlined in the model and found support for the models construction. The fourth training effectiveness model is not a model *per se*;

however, it clarifies the process nature of training effectiveness. That is, to enhance training outcomes, Broad and Newsroom (1992) prescribed strategies that organizations can implement before, during, and after training. The authors suggested that all three characteristics (i.e., individual, training and organizational) are related to learning and transfer performance.

The fifth and final training effectiveness model displayed relationships between the three characteristic types and four evaluation targets: cognitive learning, training and transfer performance, and results. In this model, Tannenbum *et. al.* (1993) suggested that individual and training characteristics are directly related to cognitive learning and training performance, whereas individual and organizational characteristics are directly related to transfer performance. This model also outlines underlying interactions between the three sets of characteristics. For example, similar to Baldwin and Ford (1988) and Holton (1996), organizational, individual, and training characteristics are posited to influence trainee motivation, which in turn is related to cognitive learning and transfer performance. The fact that the above discussion of training effectiveness could not be presented without mentioning evaluation measures demonstrates that, although training evaluation and training effectiveness are distinct concepts, they are also necessarily related. Therefore, models that fully integrate both concepts provide better pictures of their interrelations and help with understanding each individual concept better than nonintegrated models of the concepts on their own. Such a model integrated the past training evaluation and effectiveness research is presented below (Figure 2.5):

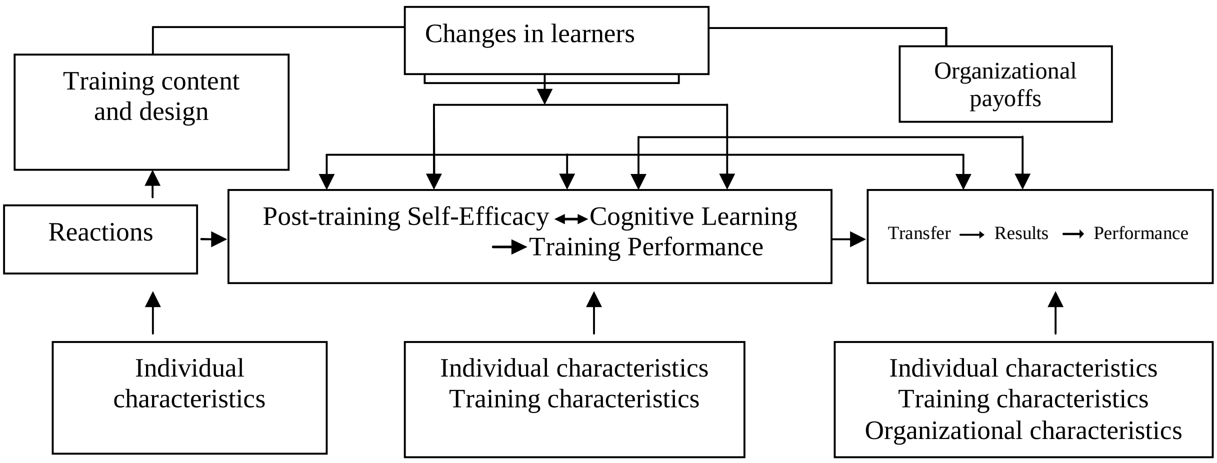

Fig.2.5 Integrated model of training evaluation and effectiveness

Source: **https://www.lifesciencetraininginstitute.com/training-effectiveness-quality-design-approach/**

2.2.2. The Kirkpatrick's four level approach

In order to classify areas of evaluation, the first one would be Kirkpatrick Four Levels of Evaluation. It was created by Donald Kirkpatrick in 1959, at the time; he was a professor of marketing at the University of Wisconsin. It is still one of the most widely used approaches. His four level of evaluation are: reaction – a measure of satisfaction, learning – a measure of learning, behavior – a measure of behavior change and results- a measure of results (Phillips, 1997). This conceptual framework answers four very important questions, as shown in Table 2.1.

Table 2.1 Kirkpatrick's four levels of evaluation

Level 1: Reaction	Were the participants pleased? What do they plan to do with what they learned?
Level 2: Learning	What skills, knowledge, or attitudes have changed? By how much?
Level 3: Behavior	Did the change in behavior positively affect the organization?
Level 4: Results	Did the participants change their behavior based on what was learned in the program?

Kirkpatrick model is now nearly 59 years old. Its elegant simplicity has caused it to be the most widely used methods of evaluation training programs. ASTD's (American Society for Training Development) survey, which reports feedback from almost 300

Human Resource executives and managers, revealed that 67 percent of organizations that conduct evaluations use the Kirkpatrick model (Stone J and Watson V, 1999).

2.2.3. Kaufman's Five Level of Evaluation

Some researchers, recognizing some shortcomings of Kirkpatrick's four level approach, have attempted to modify and add to this basic framework. Kaufman offers one such presentation. As shown in Table 2.2, Kaufman has expanded the definition of Level 1 and added a fifth level addressing societal issues (Philips, 1997).

Table 2.2 Kaufman's five level of evaluation

Level	Evaluation	Focus
5	Societal Outcomes	Societal and client responsiveness, consequences and payoffs.
4	Organizational Output	Organizational contributions and payoffs.
3	Application	Individual and small group (product) utilization within the organization
2	Acquisition	Individual and small group mastery and competency
1b	Reaction	Methods', means' and processes' acceptability and efficiency
1a	Enabling	Availability and quality of human, financial, and physical resources input

At level 1, the factor of the concept which is enabling the addresses of the availability of various resource inputs necessary for a successful intervention. At Level 5 is the evaluation of societal and client responsiveness, and consequences in payoff. This moves evaluation beyond the organization, and examines the extent to which the performance improvement program has enhanced society and environment surrounding the organization.

2.2.4 Apparao's conceptual model for effective training

In an article titled 'strategy for improving quality of training', Apparao (2010) described the effectiveness of training course and the degree to which a training course helps the trainee to make effective performance in her/his job through application of knowledge gained, skill acquired and changed attitudes. He ascertained that for evaluating the effectiveness of any training, it is important to : define effectiveness of training, identify the components of effective training, analyze the factors responsible for accelerating/ retarding the effectiveness and suggest suitable model/approach to enhance effectiveness of training. The desirable behavioural changes resulting from training should be reflected in the job performance of a trainee. The parameter of effective training could be visible in short and long term range depending on the opportunities given to the trainee on his/her job.

The main components of effective training would be the role played by the sponsoring agency, training institution, trainer and trainee. These four components are interdependent in respect of their roles to make the training more effective. In case of farmer training, nominating right persons/ farmers and their needs are very crucial. The trainee, as the immediate beneficiary of training, has to form positive attitudes toward training and learn as much as s/he can as the knowledge is an invisible wealth with which s/he shows better performance in her/his field.

There are several factors responsible for accelerating the effectiveness of training. These may be brought to discussion as-

Needs of training: The need for farmer training is felt when there is a gap between the actual and desired performance of a farmer trainer. The gap could be in knowledge, skills and attitudes.

Ensuring effective training: As no two individuals are alike, they do differ in learning. Hence, learning styles of trainees are to keep in view while designing the course to make the learning more effective. Learning has to be recognized by the trainer and trainee as a two way process.

Matching the objectives: The objectives of the trainers need to match with that of trainees. The training objectives should be specific and clearly defined to reflect the performance of an activity against a set of standard in a given situation, realistic and measureable.

Training content: If the training content is relevant to the work being performed by the trainee, the learning would be more effective.

Training methods: Depending on the learning styles of trainees, the training methods should be used.

Training aids: To create interest and induce effective learning interacting training aids need to be used. The choice and use of these aids, however, depends on the training content, trainees and finance.While organizing a training course, the trainer has to ensure the following to make the training more effective.

Preparing the trainee for learning: Motivate the trainee to learn by providing all the required information and guidance

Demonstrating operations: Provide opportunities to the trainee to observe the operations of the aspects taught. As seeing is believing, it promotes effective training.

Creating an ideal atmosphere: As the learning situation also contributes to effective learning, it should be ideal as needed by the trainees.

Ensure the trainee's practicing: Since people learn more by doing, suitable training methods may be used by which the trainees can practice and learn effectively.

Watching the progress: The trainer should observes constantly the progress that being made in learning by trainees, and that being introduced as suitable modifications in course design, content, methods, etc. to keep the learning process effective.The trainer should also see as to what extent the trainees have acquired the desired knowledge, skills, and attitudes through assessment at different intervals taking the assessment as an inbuilt process of training.

The trainee plays a crucial role in making the training effective. The training aims at helping the trainees to learn more knowledge, acquire skills and change the attitudes.

Unless the trainee is prepared to learn and recognize the importance and need for learning, the training cannot be successful. The trainee's personal characteristics like age, educational background, experience, etc., do determine the quality of learning. A need-based training with suitable design taking care of trainee's learning styles, appropriate training methods and aids would certainly help the trainee to learn more effectively.

A conceptual model (Figure 2.6) proposed by Apparao, G. (2010) reveals the major components, factors that accelerate/retard the effectiveness of training. The items enlisted in the model would accelerate/retard the effectiveness of training depending on how these factors are dealt with during planning and execution of training course.

Whether the training imparted is effective or not is solely dependent on the role played by each of the four components namely, as mentioned before, sponsoring agency, training institution, trainer and trainee. Even if one component makes an error and the remaining three components do well still the effectiveness of training remain affected. Hence, the success of training course in terms of 'effective training' depends on all the four components and how well these components play their role complimentary to each other. Since these components are interdependent, a systematic approach to examine the role played by these components be adopted to assess whether the training is effective or otherwise.

The sponsoring agency, training institution and trainers have to exercise utmost care in training need analysis, selection of trainees and training institution; designing the suitable course; recognizing the need for learning to acquire desirable knowledge, skills and attitudes; understanding the trainees learning styles and help them to learn effectively through appropriate training methods, aids, etc. 'Effective training' can be achieved only when these four components play their contributory role satisfactorily as the success of the training depends on each of these four interdependent components.

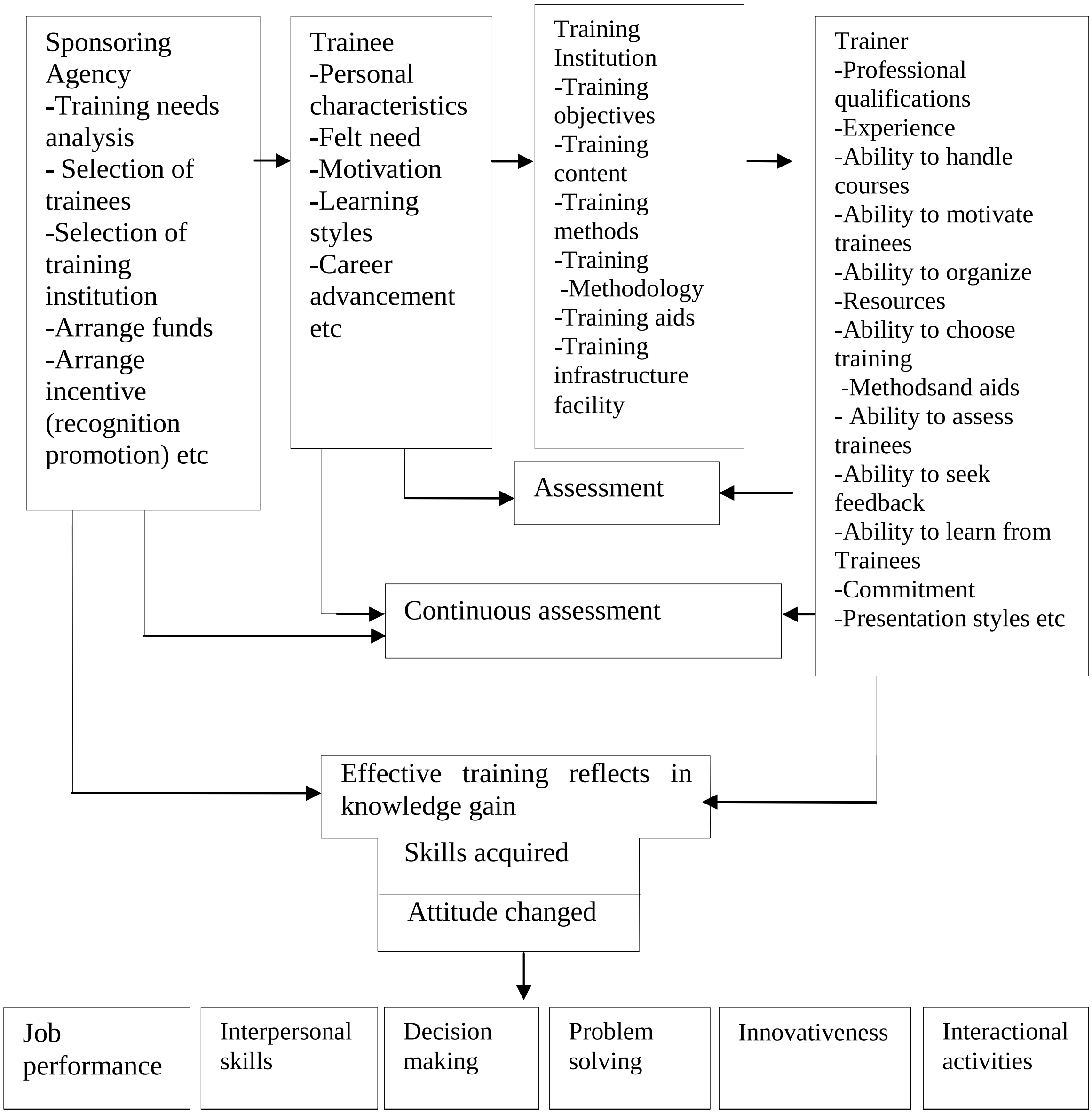

Fig. 2.6 Apparao's conceptual model for effective training

Source: Singh R.P. *et. al.* (2010)

2.3 Origin of FFS and emergence of farmer to farmer training

Farmer to farmer training formally came into being through the FFS approaches and activities started in Indonesia and extended to many countries all over the world. Farmer to farmer training stated in this study also means farmer to farmer training through FFS approaches. This is why a brief discussion on FFS approach and its evolution is very relevant to understand FFT elaborately.

2.3.1 Origin of FFS and its core concept

FFS approaches have been reported and celebrated over many years in many countries especially in Asia, Africa and Latin American countries. But the embryonic evidences of such sort of social learning can be traced from many Scandinavian countries as well as in Europe and America. Gallagher K. *et. al*.(2016), in an article titled Demystifying Farmer Field School Concepts mentioned that Dutch, Swedish and Danish farmers have met regularly for self-study since WWII in various study circles. Australian rice farmers meet on *Rice Check* methods throughout a growing season. Women take children to primary health care facilities regularly based on need for learning. Functional literacy groups meet regularly. Similar effective methods such as work done in Latin America with World Neighbors (Two Ears of Corn) and in community groups such as Land Care or Adopt-A-Stream would seem to testify to the suitability of the basic principles which FFS have in common with these other programmes. FFS adapted these models into the agricultural extension context moving from "technology transfer" to adult education. Tools widely used such as PRA exercises, transformative learning through drama and song and the action learning cycle were also modified to fit in an agricultural adult learning context through the FFS. During a training course in Denmark, the researcher observed that there were some nascent indications of such type of non-formal educational approaches in different name as of Folk school or a school for life where mainly social issues were addressed. The places and sitting arrangements for a group of community people, the system of learning without exams and out of universities, the use of local language etc. resemble the current placement, arrangement and other criteria of FFS.

Photo 2.1 Sitting arrangement for community people resembling FFS sitting arrangement (Photo by Lisbeth Junker Mathiassen, Denmark, 2017)

Photo 2.2 Sitting arrangement for farmers in FFS (Photo by Researcher)

Photo 2.3 Sitting arrangement for community people resembling FFS sitting arrangement (Photo by Lisbeth Junker Mathiassen, Denmark, 2017)

Photo 2.4 Sitting arrangement for farmers in FFS (Photo by Researcher)

Above photos are stone-based sitting arrangements in Nordic Business College campus, Odense, Denmark resembling the present FFS sitting arrangement common in different countries including Bangladesh. In one such stones, there was inscribed the year 1908.

In the 19th century, one of the leading figures of Denmark´s His solution was the Nikolaj Frederik Severin Grundtvig, most often referred to as N. F. S. Grundtvig, a Danish pastor, author, poet, philosopher, historian, teacher and politician and intellectual reformists advocated for democratic education in folk high school. His particular concern was that schools should bring dignity to rural people and to the life of the farmer, the majority of Denmark's population at the time. According to Grundtvig it should be "a school for life" with a focus on popular education and enlightenment (Smith 2011). As opposed to the formal education in the universities, the folk high school focused on giving the peasantry a higher educational level through personal development. The language in the school was that of common people and the contents of the teaching were the history and language of the fatherland, its constitution, its main industries and its folksongs, all taught within a Christian framework. The schools did not hold exams because the education and the enlightenment was sufficient reward in itself. Schools based on these principles, Grundtvig argued that it would provide the lower classes of society with the educational level required for them to be active participants in a modern and less elitist society. The *folkehojskole* (folk school) had long been a driving force in the rural life of Denmark. This schools for life helped transform the Danish countryside into a vibrant, creative force.

The essence of present FFS approaches could be traced out from many educationists of alternative thinking in different societies. Rabindranath Tagore was one of the shining personalities among them. Dutta and Robinson (1997) described the phase of Tagore's life as being one of the revolutionary thinkers citing from the writings of Tagore as "…. the schools in our country, far from being integrated to society, are imposed on it from the outside. The courses they teach are dull and dry, painful to learn, and useless when learnt. .... We learn our lessons with the aid of both body and mind, with all the senses active and eager. When we are sent to school, the doors of natural information are closed to us; our eyes see the letters, our ears hear the abstract lessons, but our mind misses the perpetual stream of ideas from nature, because the teachers, in their wisdom, think these bring distraction, and have no purpose behind them."

Educational history suggests that in almost every society such indications of non-formal learning scopes could be found. These statements are also supported by Kevin Gallagher (2003), one of the initiators of worldwide on-going FFS approaches, through his comments '…. FFS are comparable to programmes such as Study Circles, religious studies at a church, mosque or temple, or specialized study programmes for any skill (Gallagher, 2003).

The author of Farmers Field School Methodology; Training of Trainers Manual, Khisa Godrick (2004) described the historical background of the FFS. The FFS approach was developed by an FAO project in South East Asia as a way for small-scale rice farmers to investigate, and learn, for themselves the skills required for, and benefits to be obtained from, adopting on practices in their paddy fields. The FAO Technical Adviser, Dr. Peter Kenmore with his other colleagues e.g. Kavin Gallagher conceived the idea of FFS and started there on Pilot basis. The term 'Farmers' Field School' comes from the Indonesian *Sekolah Lampangan* meaning simply 'field school'. The first Field Schools were established in 1989 inCentral Java during the pilot phase of the FAO-assisted National IPM Programme. This programme was prompted by the devastating insecticide-induced outbreaks of brown plant hoppers (*Nilaparvata lugens*) that were estimated to have in 1986 destroyed 20,000 hectares of rice in Java alone. The Government of Indonesia's response was to launched an emergency training project aimed at providing 120,000 farmers with field training in IPM, focused mainly on recording on reducing the application of the pesticides that were destroying the natural insect predators of the brown plant hopper. The FFS based not on instructing farmers what to do but on empowering them through education to handle their own on-farm decisions, using experiential learning techniques developed for non-formal adult education purposes. Since then, the approach has been replicated in a variety of settings beyond IPM. The training program utilizes participatory methods to help farmers develop analytical skills, critical thinking and creativity and help them learn to make better decisions. In pointing out the nature of the FFS training, it is said that farmers do not master a specific set of contents or messages rather, they master a process of learning that can be applied continuously.

The by- born traits of FFSs are about practical, hands-on topics. A list of essential elements like the group (farmers), the field, the facilitators, the curriculum, the programme leader, financing etc. could be appeared in successful FFS programmes. Gallagher (2003) emphasized that in FFS, the field is the teacher, and it provides most of the training materials like plants, pests and real problems. Here school meaning crop field, book resembling crop and alphabet, word and sentences meaning pests, plants, problems, weather, soil, other biotic and abiotic factors and their relationships. The Figure no. 2.7 illustrates the analogy and the concept and ideas of FFS to easily understand FFS learning process.

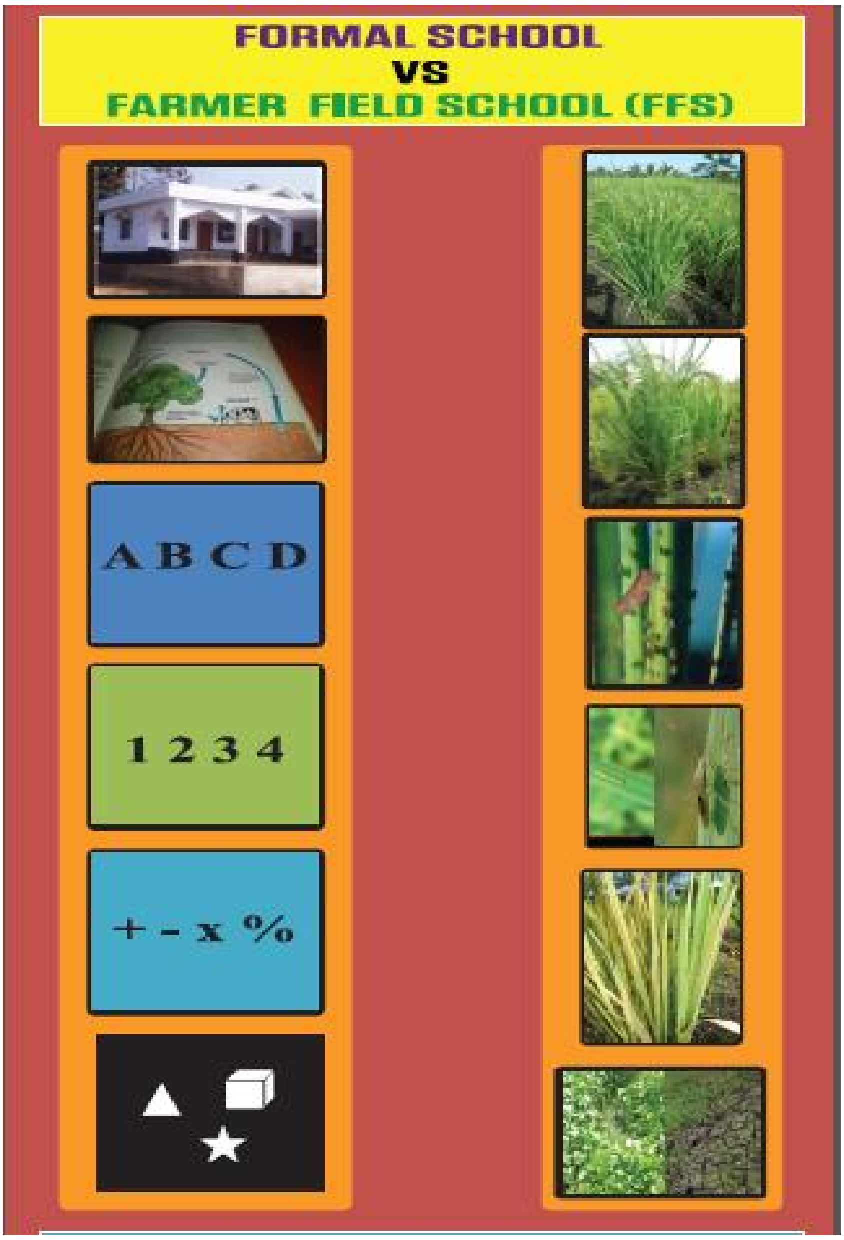

Fig. 2.7 Formal School vs. FFS

Source: Researcher

He stressed that the facilitators need farming and technical skills and needs to know how to ask good questions, guide participants through exercises and ensure that sound management decisions are taken by the group by introducing new information when appropriate.

The FAO’s document titled ‘Farmer Field School Guidance Document Planning for quality programmes’ described many essential elements of FFS approaches. The document stressed that when designing a project or programme that envisages using FFS as an education approach, it is important to consider whether an FFS is the most suitable solution in a given context (what is the educational goal to be addressed), the expected time-frame and the budget available.FFS are not the only option – in some cases other options might be preferable or more practicable. The decision tree, which starts with some root questions, (Figure 2.8) will guide programmers and practitioners through a set of questions and considerations in order to assess whether the FFS will work in a specific context, what capacity is in place, what additional training needs to be done, and what organizing needs to be done at community level.

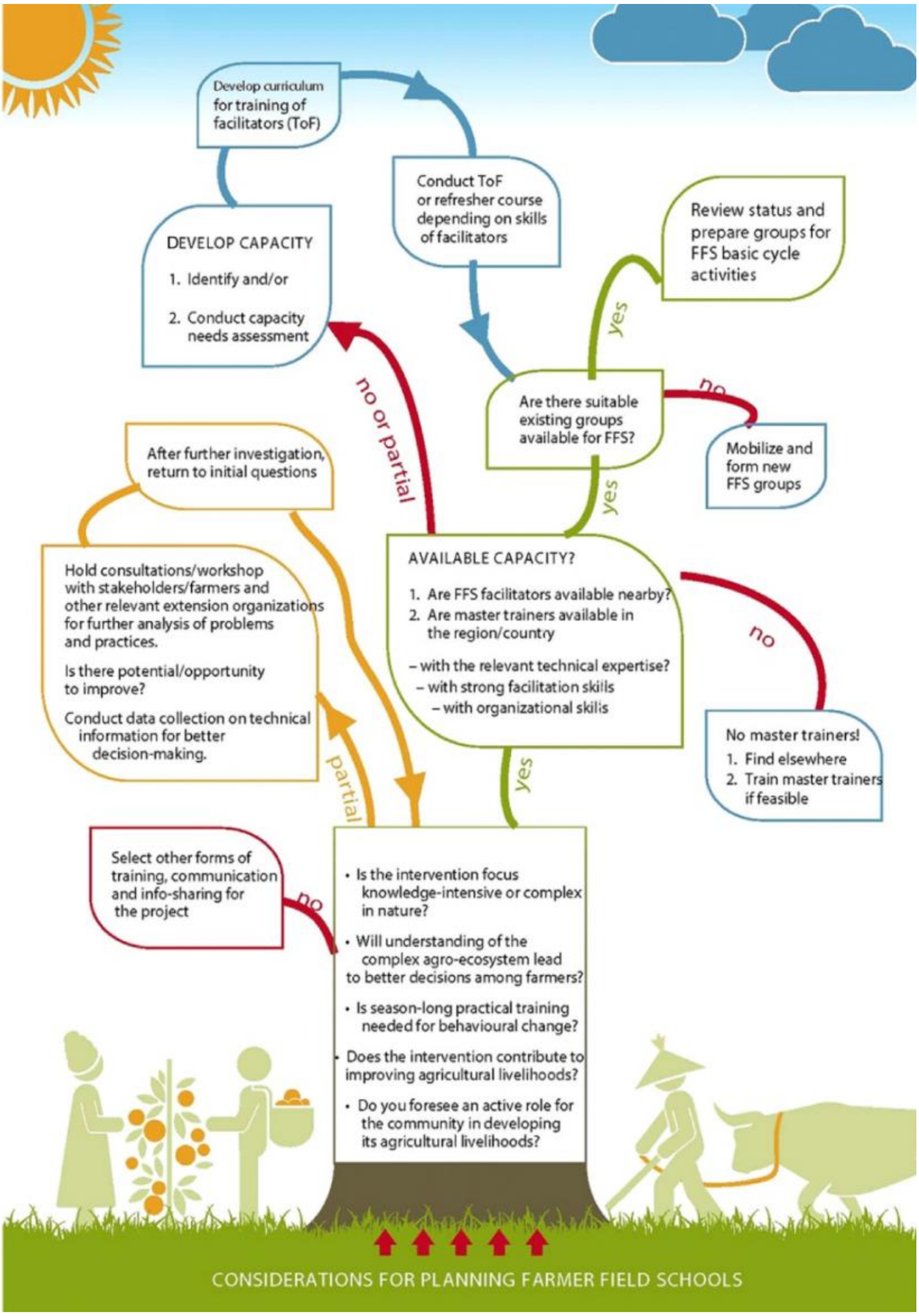

Fig. 2.8 The FFS decision tree

Source: FAOb, 2017. Farmer Field School Guidance Document Planning for quality programmes.

From farmer field school implementation phases it could the found that starting and developing FFS and FFS programmes consist of three phases: the preparatory phase, the first basic FFS cycle and the post-graduation phase. Each phase has a set of associated steps and activities (Figure 2.9).

The preparatory phase activities include a precondition survey, selection and training of facilitators, ground working and FFS group formation. This period entails group formation and organization, problem identification, selection of learning activity/ enterprise and the design and setup of the FFS experimental fields or herds. This phase takes between one and three months. The basic FFS cycle is based on regular learning cycles/ sessions and includes conducting field days, exchange visits and graduation. This period takes 3 to 18 months depending on the learning activity/enterprise. Post-graduation activities include follow up activities, networking, income generation and setting up second generation FFS, especially when new livelihood opportunities or challenges arise.

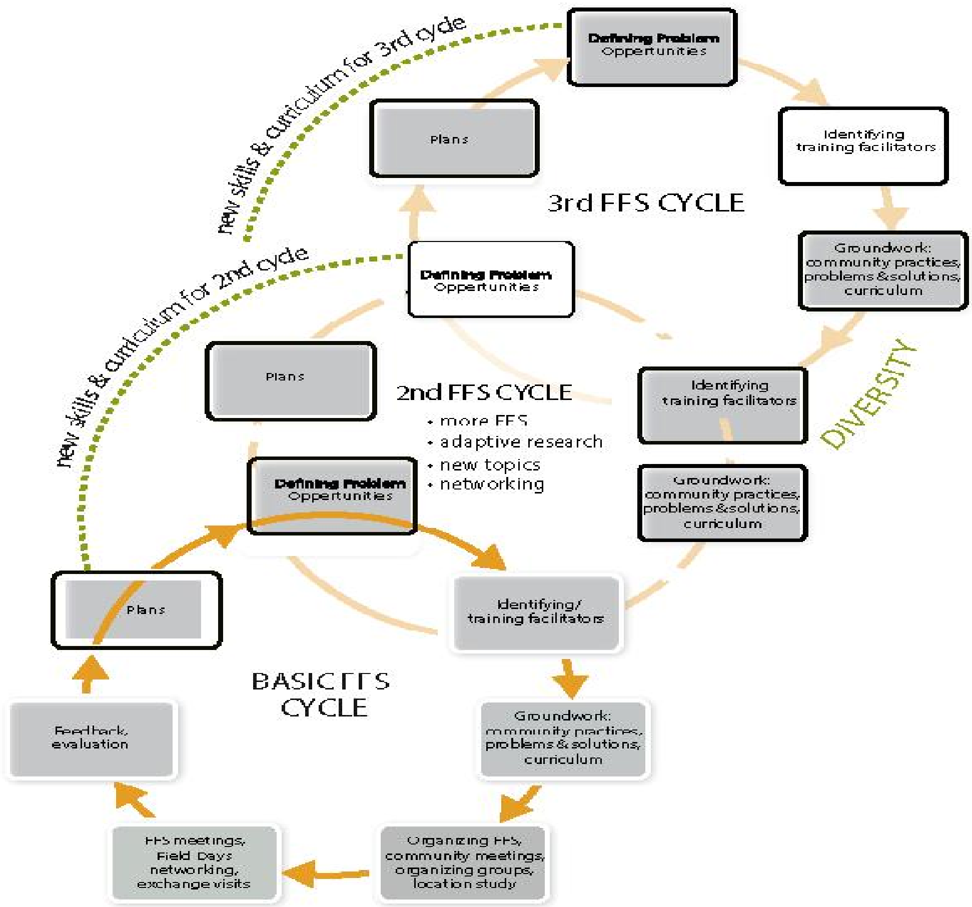

Fig. 2.9 The basic Farmer Field School Cycle

Source: FAO$_b$ (2017). Farmer Field School Guidance Document Planning for quality programmes

There has been a shift from a focus on a single constraint of a single crop (IPM for rice based systems) to an emphasis on the multiple aspects of crop production and management, to cropping systems, to non crop/forest (livestock production etc) to natural resource management (Soil fertility, water conservation etc) to socio-cultural dimensions of community life (food security and nutrition, savings, health, HIV/AIDS, literacy training, livelihoods etc). FAO_c(2018) stated that since 1989, when the FS was started in Indonesia, the approach had spread to all continents and was implemented in 87 countries worldwide with 10-20 million field school graduates by 2008 (Braun *et. al.* 2006; Braun and Duveskog, 2008). Marjon F.(2014) mentioned that in 1993, representatives from other regions of the world (Africa, Near East, Latin America) visited Asia to see and learn about FFS experiences first hand.

During Mid 1990s, FAO started to support the development of FFS core capacities in Africa, followed by other regions later on. Farmer field schools as the FAO's front-line innovation has grown from the promotion within government extension programmes of a new paradigm of experiential, hands-on education and empowerment, to address complex production threats and a range of technical and livelihood issues, in both government and civil society programmes in over 90 countries (Figure 2.10).

Fig. 2.10 Evolution and spread of Farmer Field School approach
Source: FAO_b, 2017. Adopted from the 'Farmer Field School Guidance Document Planning for quality programmes', FAO, Rome 2016

FFS enable and empower smallholders, their families and rural communities to understand and respond to present challenges and make their own critical contributions to the attainment of sustainable development goals (SDGs). FFS are earning growing support from partner governments, NGOs, researchers, international development and financing organizations, and social movements. There are now over 12 million FFS smallholder family farmer graduates, but what drives the results is not the quantity of attendees but the empowering quality of the process and how it enables participants to continue to grow, using the new skills and knowledge FAO_d (2016).The FFS is now used in a broad range of enterprises and life activities. Chhaya *et al.* (2004) showed the dimensions for adapting farmer schools (Figure 2.11).

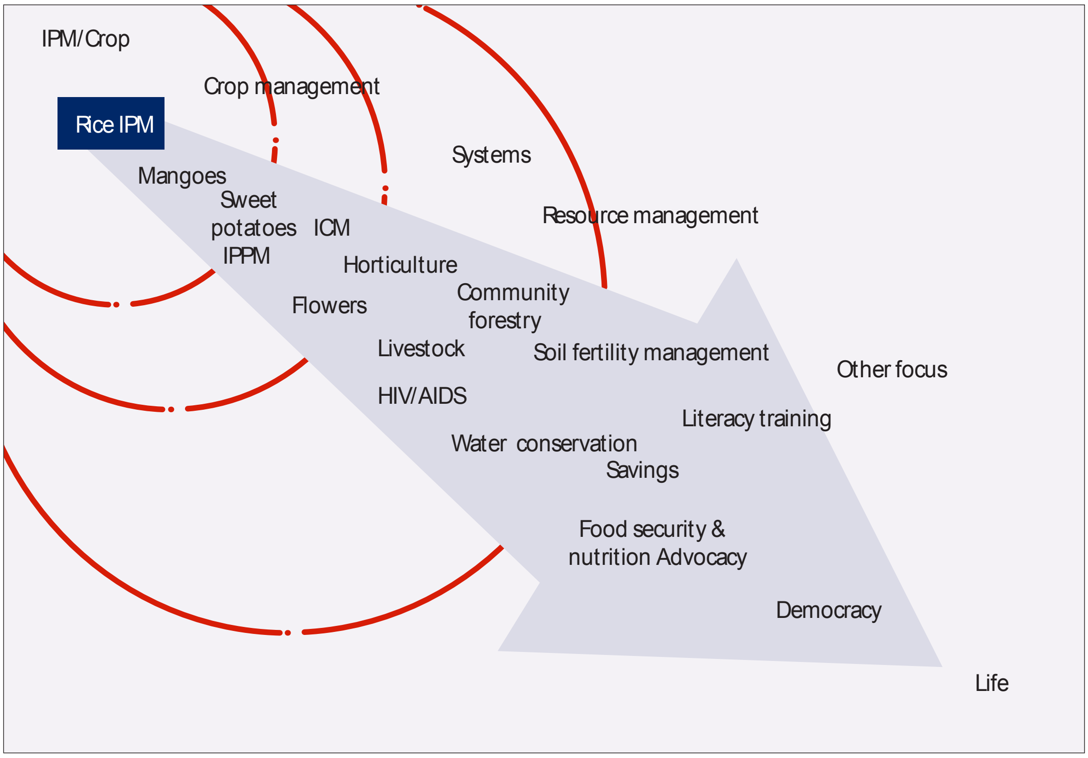

Fig. 2.11 The spread of the dimensions for adapting Farmer Schools

Source : Chhaya *et al.* (2004)

Through a systematic review by Waddington *et al* (2014) described that the hypothesized programme theory of FFS is some sort of linear assumption that imparting training through FFS by facilitators would add knowledge to farmers so as to adopt new technological and management practices thereby.

Even non-participants would also have same outcomes. They also tried to answer the pertaining questions of what the enablers were and barriers to effectiveness, diffusion and sustainability of FFS intervention (Figure 2.12 and 2.13).

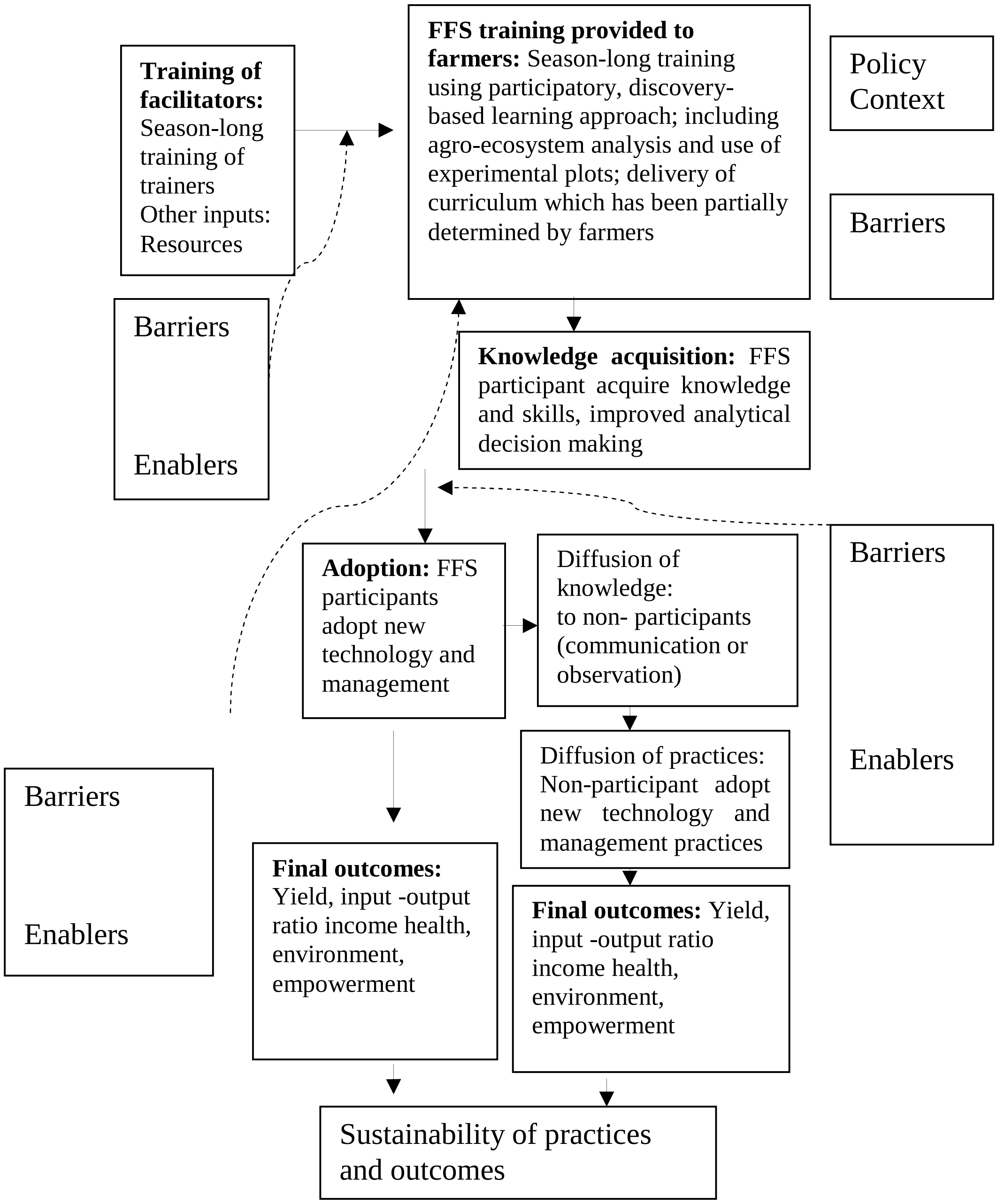

Fig. 2.12 Barriers to and enablers of knowledge acquisition, adoption and improved final outcomes

Source: Waddington et. al. (2014)

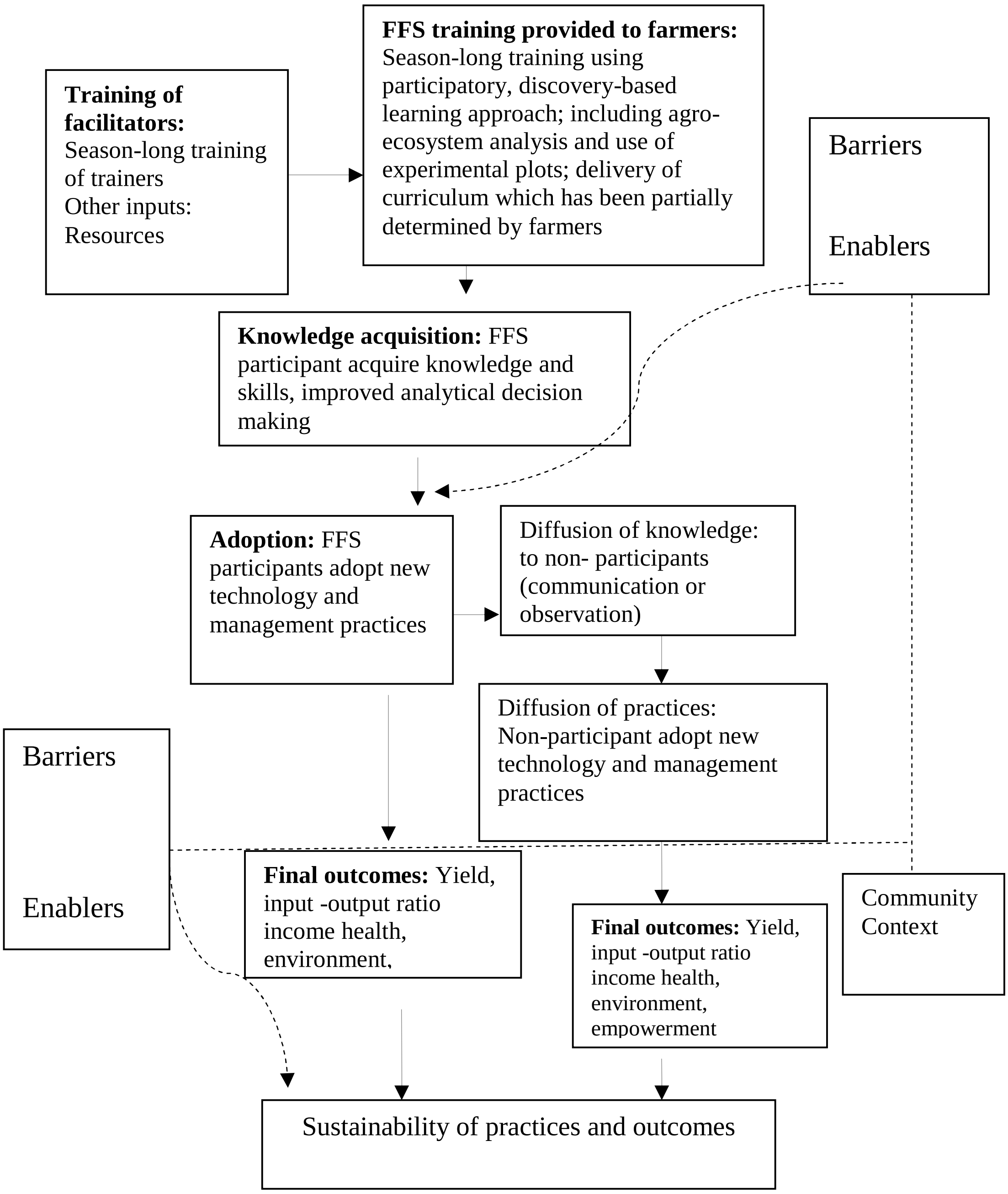

Fig. 2.13 Barriers to and enablers of IPM diffusion to non-FFS neighbour farmers and sustainability

Source: Waddington *et. al.* (2014)

2.3.2 History of FFS in Bangladesh

In 1981, IPM activities started in Bangladesh through FAO's inter-country program (ICP) in rice. Bangladesh Rice Research Institute (BRRI) was assigned to carryout rice research work to develop rice pest control methods and the Department of Agricultural Extension (DAE) for transferring those methods for famers through block demonstration. During 1989-1995, the ICP played strong catalytic role in promoting

IPM concept and approach among the government officials and donors. Thus, FAO inter-country vegetable IPM programme started working in 1996 in Bangladesh followed by a DAE-UNDP/ FAO IPM project (1996-2001). In Bangladesh FFSs were established first by FAO-UNDP in 1990. The project has also developed a draft IPM policy and a national IPM framework. The project also played a leading role in the building up a strong IPM base in Bangladesh.

During end of the 1990s there were seven IPM projects/programmers operating in Bangladesh. These projects were being implemented either by the Government or NGOs with funds received from different donors. The projects are listed below:

DAE-UNDP/FAO IPM Project (BGD/95/003)
DAE-DANIDA Strengthening Plant protection Services (SPPS) project.
CARE-New Options for Pest Management (NOPEST)
CARE-Integrated Rice & Fish Project (INTERFISH)
AID- Comillas Integrated Pest Management project.
USAID funded IPM Collaborative Research Support Programme (IPM CRSP)
FAOs Regional Cotton IPM Project

DANIDA FFS intervention started in Bangladesh from 1997 through Strengthening Plant Protection Services Project (SPPS-I) and continued up to 2006 through SPPS-II. Since then, several extensions led IPMFFS (donor funded and GoB funded) was operated in Bangladesh to train farmers on rice and vegetable IPM through DAE. The NGOs like CARE, AID Comilla, MCC etc. were also involved for farmers training through FFS. There were also couple of research oriented IPM projects (e.g. IPM CRSP etc.) implemented by Bangladesh Agricultural Research Institute (BARI) and Bangladesh Agricultural University (IDM,BAU).

The concept of Integrated Crop Management FFS (ICM) evolved in Bangladesh based on experiences learned from SPPS-I and SPPS-II and Soil Fertility and Fertilizer Management project (SFFP) during 2005-2006 and continued up to 2012. The RFLDC was also implementing FFS in parallel on livestock and fisheries by DANIDA support. The ICM FFS dealt with all the important aspects of better crop production along with homestead gardening, food use and family nutrition and community development. Based on the continuous experiences, the Integrated Farm Management (IFM) FFS came in to being during 2013-2018 involving all the aspect or issues of agricultural farming.

As per documents of FFS on IPM, ICM and IFM, in short, it could be summarized that after the success in Indonesia, the FFS approach started in many other Asian countries (eg. Vietnam, Cambodia, Bangladesh, India etc.) In Bangladesh, FFS on rice IPM started on pilot basis in 1989 through FAO and Dr. Ramaswamy was the Technical Adviser of FAO in Bangladesh at that time.The first IPM project (DAE-FAO/UNDP IPM Project) by the Govt. of Bangladesh started in May 1996 on rice IPM and continued up to 2001. At that time the IPM FFS sessions were 11 but during SPPS-I (DANIDA founded project) it was extended to 14 sessions. FFS in Bangladesh was limited to rice and vegetable IPM only. Thereafter DANIDA funded project AEC started FFS on Integrated Crop Management (ICM) with 21 sessions and AEC is considered to be the pioneer of starting ICM FFS in the world (Anonymous$_l$ 2015). Simultaneously, Government funded IPM FFS was also running in the country from 2006 for rice and vegetable crops. Besides, during 1998-2008 there were some activities of IPM FFS by couple of projects like Command Area Development (CAD –World Bank funded), Smallholder Agricultural Improvement Project (SAIP) and Northwest Crop Diversification Project (NCDP –World Bank funded) in a limited scale at localized project areas.

Starting from mid nineties there were also some interventions of FFS in different projects under DAE and different NGOs funded by GoB as well as other donor agencies (Appendix. II).

From all the interventions, it was estimated that approximately 2689294 farmers were trained through 78374 FFS on diversified issues. The total 5110 departmental and 8380 farmer trainers were developed through the process. Major visible steps for institutionalization of FFS in Bangladesh is shown in Figure 2.14.

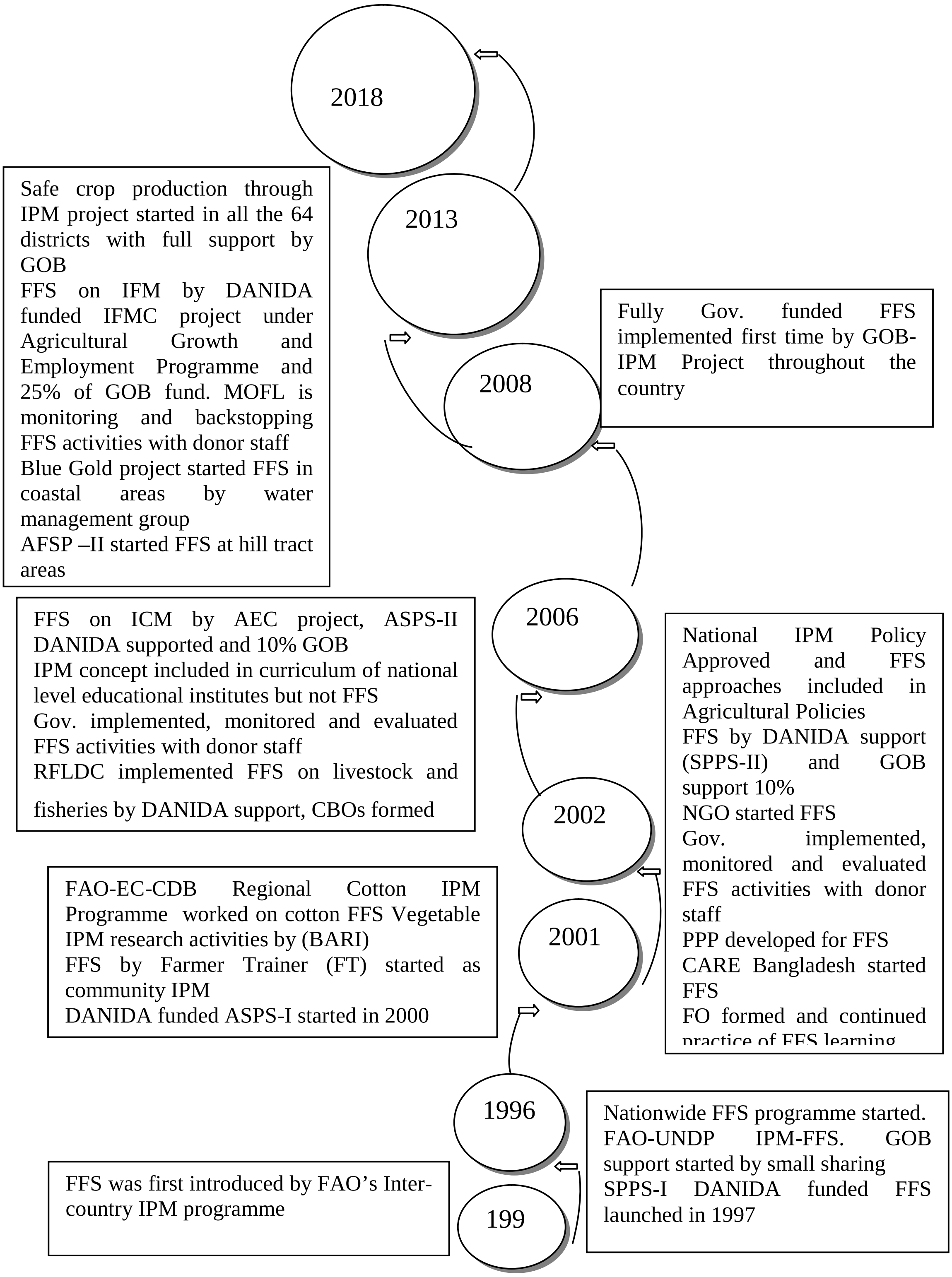

Fig. 2.14 Major steps for institutionalization of FFS in Bangladesh

Source: Anonymous$_k$ 2017.

In consultation between the GoB and Denmark in 2011, it was agreed that DANIDA would support a new program 'Agriculture Growth and Employment Program(AGEP)' which was designed in alignment with the Vision 2021, which aims at transforming the Bangladeshi socio-economic environment from a low income economy to the first stages of a middle income economy. Specifically, AGEP would provide a substantial contribution to promoting economic growth through creation of employment and raising income of the small and marginal arm households.

FFS was the main activity of the IFMC. Although, FFS is not a new concept in agricultural extension services, it was widely used in the DANIDA-supported Agriculture Sector Programme Support (ASPS) during 2000 to 2013 but in IFMC, the scope of FFS is more widened than earlier. It has used Integrated Farm Management (IFM) approach covering all farm enterprises, including rice, high value crops, livestock, poultry, pond aquaculture and homestead vegetable and fruit gardening. FFS builds farmers' capacity to analyses their overall farming system, identify problems, test possible solutions and eventually adopt the practices most suitable to their farming system.

2.3.3 Emergence of Farmer Facilitators worldwide and its justifications

A study from Indonesia found that a few inquisitive farmers played a prominent role in the ongoing process of knowledge formulation and transmission. These farmers progressively established their position within the community as `*experts*', `*farmer professors'* and '*consultants*' (Winarto, 2004), suggesting some spontaneous diffusion may be possible, but that carefule targeting of farmers with appropriate characteristics may be necessary.

Khaila (2015) observed that across Africa, many extension services and organizations providing extension functions choose individual farmers to work with them in implementing their outreach programs. Reasons for this include the ability to reach more farmers at less cost, the higher level of trust that farmers have in fellow farmers and the perceived enhanced sustainability of the approach. Those farmers selected to become lead farmers in farmer-to-farmer extension efforts were often called *model*, *master* or *lead farmers*, and were chosen based on their agricultural expertise. In other initiatives, they were called *farmer promoters* or *trainers*, emphasizing their networking or training skills. An additional variant was the *community knowledge worker*, sometimes equipped with a smart phone to improve farmers' access to information and virtually supported advisory services.

Masangano and Mthinda(2012) described that one important factor that affects the capacity of an organization to carry out effective extension activities is the size and technical and management expertise of the extension staff. They documented the increase in the number of department's extension staff members and subject matter specialists (SMSs) from 2006 to 2009. Nevertheless, the ratio of extension worker to farmer remains very low, 1/1,848 in 2011, indicating a serious shortage of field extension staff members. In some extension areas there were no field extension staff members (Kaunda E, 2011).

Garforth (2011) noted that, globally, most research on farmers' access to information and advice on new technology points to 'other farmers' within the locality as their most proximate source, particularly at the point of decision about whether to make a change in their food production system. This reality affirms the theory of diffusion of innovations developed by Everett Rogers (2003) and is the main reason for the successful use of the farmer-to-farmer or lead farmer approach.

Mulwafu and Krishnankutty (2012) noted that the lead farmer approach had numerous benefits. They noted that the lead farmers provide a focal point in the community for introducing new technologies, for building farmer capacity, and as an entry point for service providers, such as input suppliers. Farmer trainers also help increase farmers' networking and linkages in the communities and enhance the exchange of knowledge and sharing of experiences for increasing agricultural production. Lead farmers help in changing attitudes of the farmers, who motivate and encourage one another in adopting technologies. Because of trust, closeness and shared common attributes, farmers tend to be inclined to learn from fellow farmers. Lead farmers also serve as an entry point for other development initiatives.

Mulwafu and Krishnankutty (2012) also defined a lead farmer as an individual farmer who has been selected by the community to perform technology-specific farmer-to-farmer extension and is trained in the use of the technology. According to the Government of Malawi (2010), an opportunity exists for farmers – lead farmers – to play a role as extension service providers in the new framework of service provision. Masangano and Mthinda (2012) noticed that the lead farmer approach is widely popular in Malawi, as indicated by its widespread use. They , in a survey of 37 field extension programs, found that 78 percent of them used the lead farmer approach. Of those organizations that used the approach, 66.7 percent perceived it to be effective and attributed this to issues of sustainability of activities initiated and community empowerment resulting in increased adoption rates of innovations. It was noted that lead farmers act as role models, which motivates others to try various innovations in their own fields.

Through an extensive research, Kundhlande (2014) informed that to improve smallholder farmers' access to information, many extension services use farmers to help disseminate information that their fellow farmers can use to help increase agricultural productivity. This extension approach is referred to as "*farmer-to-farmer,*" and the farmer extension agents are variously referred to as *lead farmers*, *model farmers* or *extension multipliers,* among others. The involvement of farmers in implementing extension services helps overcome the problem of inadequate staffing levels in public extension services. Lead farmers can reach larger numbers of farmers at lower cost, and their use is believed to improve the sustainability of service provisioning. The farmer-to-farmer extension approach is widely used in agricultural services in many developing countries, but few studies have been carried out to assess how organizations use the approach in varying contexts and how effective it is.

Kundhlande (2014) identified extension multiplier to refer to a farmer who helps to disseminate information on agricultural innovations to his/her fellow farmers. The organizations interviewed for this survey use several terms to refer to lead farmers. The majority of the extension organizations (68 percent) use the term '*lead farmer*,' following the designation used by DAES, to refer to a farmer who helps to disseminate information on agricultural innovations to his/her fellow farmers. Other terms used by the organizations are "*village extension multipliers*" (8 percent) and '*model farmer'* (8 percent). The term '*model farmer*' was used by the organizations involved in providing extension services to tobacco growers.

The reasons for adopting the farmer-to-farmer approach stated by many of the organizations were that it helps increase coverage - allowing the organization to reach more farmers (88 percent), it is efficient with more farmers being reached at a relatively low cost (36 percent), it increases rates of adoption of agricultural innovations through farmer-to-farmer communication (28 percent), and it is perceived to be a sustainable way to provide extension and rural advisory services (28 percent). Several organizations also cited the approach's contribution to building capacity of local communities (12 percent) and said that it helps smallholders to improve productivity and the quality of their products. Most organizations reported that they did not have adequate field staff and other resources to be able to reach the number of farmers targeted by their projects without using the approach. The organizations also stated that, since lead farmers reside among and are well-known to the farmers they help train, they are trusted as sources of information and are able to effectively demonstrate improved production practices. This was reported by many organizations to be a reason why adoption rates of innovations were much higher when organizations used lead farmers than when they used their own field staff.

One organization reported that, when its representatives revisited a project site several years after the project had ended, they noticed that many farmers still practiced the technologies that had been promoted. This was attributed to continued presence of lead farmers in the area who continued to provide information and support to their fellow farmers. In their use of the farmer-to-farmer approach, most organizations (92 percent) reported that the main role of the field staff is to build the capacity of lead farmers through training and provision of back-up support. The other roles of field staff members include follow-up support of the lead farmers (60 percent). Some examples of follow-up supports include monitoring their performance or obtaining feedback about the farmers' needs; working with lead farmers to disseminate information to farmers (56 percent); conducting trials of technologies jointly with lead farmers (28 percent); and designing and packaging technical messages (28 percent). They loosely translated *pompo pompo* to "on the spot," referring to ready availability of lead farmers to those who need support within their communities. These become the main collectors of the products and are referred to as "*core suppliers*." The "core suppliers" are expected to train others interested in collecting the wild products and also act as aggregators for the organization. The use of core suppliers to train other community members willing to engage in the collection of wild products is similar to the farmer-to-farmer extension approach.

While describing the advantages of farmer-driven extension, Kiptot *et al* (2012) opined that unlike traditional extension services, volunteer farmer trainers have an in-depth understanding of local conditions, culture, and practices, and are well known to the farmers they train. They live in the community; they speak the local language and use expressions that suit their environment. This instills confidence in their fellow farmers. He also mentioned that volunteer farmer trainers complement government extension services, rather than substitute them; the volunteers rely on extension staff for training as well as to address problems and questions they cannot handle on their own.

Mwambi M. *et. al.* (2015) stated that donors and policy makers would like to see agricultural extension systems that are more participatory, demand-driven, client-oriented and farmer-led, and that pay special attention to women and the poor. Such new approaches would focus on farmers as the principal agents of change in their communities, with extension workers serving as facilitators who train farmers on a wide ranges of farmers' needs ranging from production technologies to forming association, small agri-preneurship to link them to markets and credit institutions. However, for these new extension approaches to be institutionalized, they must demonstrate their superiority over old approaches.

Farmer-to-farmer extension (FFE) approach involves training farmers who in turn train and share their knowledge and skills acquired with other farmers. The FFE approach is based on social and experiential learning theories (Bandura, 1993; Kolb, 1984) where ordinary farmers learn more from innovative neighbours, experiment and eventually adapt and use new technologies grounded in their socio-economic and biophysical circumstances. These farmer trainers are not usually paid for their services but receive free training and inputs from institutions implementing the projects (Lukuyu *et. al*., 2012). Farmer trainers have been reported by Matata *et. al.* (2013), Shrestha (2013), Lukuyu *et. al.* (2012), Kiptot and Franzel (2013) and Kiptot *et al.* (2011) as to be those farmers who:

- Put into practice the farming practices being promoted
- Are able to experiment and implement new technologies
- Maintain a demonstration of good practices
- Train and coach other farmers and sometimes follow up on the progress of trained farmers

Various studies (Wellard *et. al*., 2013 and Shrestha, 2013) discovered that FFE was cost effective, enhanced access to extension services by the poor and disadvantaged groups and increased participation by farmers in planning. In addition, FFE helps in budgeting and implementation of agricultural development programmes. Besides, the approach empowers the disadvantaged by providing them with opportunities to become extension agents and increases adoption of new technologies. For example, about 80 percent of farmers in selected sites of Ghana, Uganda and Malawi were found to participate in training on soil conservation, tree planting, composting, crop storage and livestock production technologies offered through the FFE approach (Wellard *et al*., 2013). In another study, the number of farmers who adopted the System of Rice Intensification (SRI) in Ahero, Bunyala, West Kano and Mwea irrigation schemes in Kenya rose from 2 in 2009 to 2,000 farmers in 2010 as a result of learning from their trained counterparts (Mati, 2012). FFE is highly favourably compared to other approaches because of advantages that farmer trainers have over other extension providers. Matata *et. al.* (2013) noted that farmers and trainers face similar constraints as they both have similar potential and aspirations. Thus, farmer trainers have the advantage of understanding the difficulties faced by fellow farmers because they have a more in-depth understanding of the local conditions and cultures compared to extension staff. Similarly, farmer trainers are readily available and accessible, hence can be approached by farmers whenever they are faced with any problem. The Volunteer Farmer Trainer (VFT) approach, a farmer-to-farmer extension approach, has been used by the East Africa Dairy Development (EADD) project to disseminate information on livestock feed technologies from farmer trainers to other farmers.

The selection criteria as discussed by Kiptot and Franzel (2013) and Kirui *et. al.* (2009) include:

- The ability to read and write
- The ability to interpret extension materials to farmers
- Membership of a farmer organization or cooperative society working with the EADD project
- Being a dairy farmer
- Having the willingness, interest and ability to disseminate new innovations and knowledge to others without pay
- Being a resident in the community
- Being willing to set aside land for setting up demonstrations

In Bangladesh, FFS, natural volunteerism qualities of farmers, community demands, shortage of extension worker at public extension sectors, NGO intervention, Donor's choice and project provision, transformation in extension system is in process which may allow spaces for FFT on a sustainable basis.

2.4 History of Farmer to Farmer Training in Bangladesh and Research Gaps

Many national and international evaluation teams were engaged to observe the progression and benefits of IPM FFS. They expressed their utmost satisfaction on the FFS process and practices in the farmers' field. Different media coverage was also in place highlighting the successes of FFT and its potential strength to contribute in disseminating agricultural information (Appendix III). However, different missions recommended that the project should consider establishing a mechanism to ensure promotion, expansion and sustainability of IPM in Bangladesh. The then IPM steering committee and the donor agencies were also on the same opinion.

On the basis of the succession of the FFS field activities in Bangladesh and as response by farm community from the onset to ongoing different evaluation by national and international expert team and their satisfaction, farmer to farmer training was considered to be a cost effective, decentralized, community based, farmer first approach that would promote sustainability and expansion of IPM. It was also thought that this farmer to farmer training approach would help strengthen the interaction between farmers and government trained field staff/ extension personnel and set a stage for the continuation of IPM activities beyond the present phase of the project or future intervention of any of the projects of same category. Then, to incorporate this farmer to farmer training system in its training plan, a tentative guideline for establishment of FFS by farmer trainers under DAE-UNDP/FAO IPM project was set-up. The strategy was to select potential farmer trainers from the regular FFS run by the IPM trained DAE staff and engaged them as facilitator trainees in the FFS of the following season. The motivating forces behind this strategy was that it would empower the farmer trainers with organizational, managerial and facilitation skills necessary to establish and run FFS by themselves or with minimal supervision from DAE staff. In the next crop season following their training as facilitators, the farmer trainers would be able to establish and run their own FFS called FT-FFS (Farmer-Trained FFS).

For attaining sustainability of FFS, a community approach was thought of during mid of 1999 in Bangladesh under DAE-UNDP-FAO IPM Project. Based on Indonesian example of farmer facilitators and FFS by the farmers, for the farmers and of the farmers, the idea of farmer facilitators emerged in the country. From a ToT note titled 'Sustainability of FFS', it was discovered that FFS activities could be handed over to farmer facilitators after 04 seasons i.e. after 02 years of departmental interventions assuming that each year there would have 02 seasons for FFS (*Boro rice*-winter rice and *Transplanted Aman rice*-Monsoon rice) (Appendix IV) and in each season, certain number of FFs would be developed. In this way involvement of departmental trainers would gradually be decreased and community contributions towards FFS would be increased. A graphical representation to describe the phenomenon is shown in Figure 2.15. However, departmental trained personnel would be entrusted to do regular monitoring of FFS conducted by FFs. The facilitators' workshop on training of trainers for farmers (FT-ToT) in community IPM was also held in tune with the intention of community FFS (Appendix V).

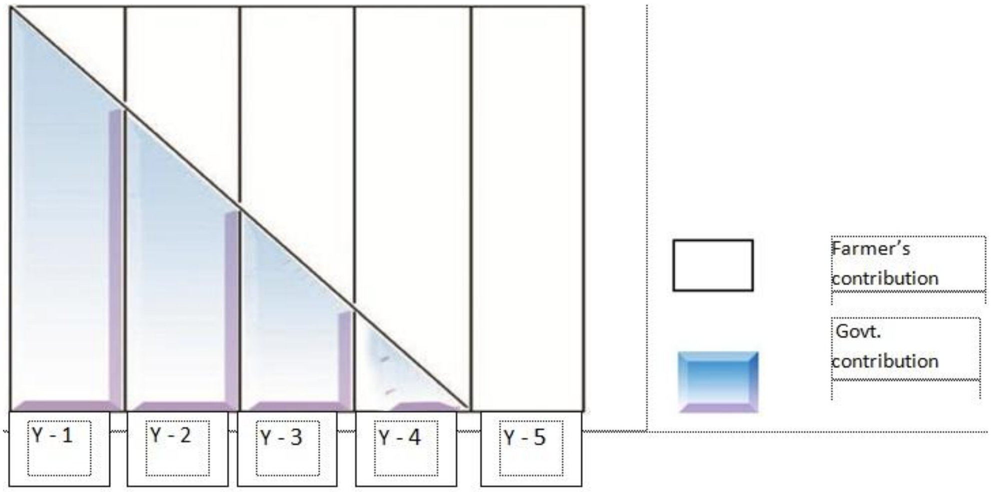

Fig. 2.15 A strategy of handing over FFS to farmer facilitator from departmental facilitator

Source: Researcher

Then, the proposed criteria for farmer trainer selection were like as below:

i. Farmer should be literate. Passing minimum primary school. Preference was given for those with higher qualification.

ii. Age not exceeded 50 years with preference to those who were 40 years or less.

iii. Must be energetic and physically fit.

iv. Should have good IPM knowledge and practical skill.

v. Should have commitment to spare time -for getting training as facilitator and later to plan, organize and run FT-FFS.

vi. Should have good communication, leadership, organization and managerial skill.

vii. Preferences can be given to women

On the basis of the succession of the FFS field activities in Bangladesh, scaling up of FFT started in Bangladesh.

In Bangladesh context, each FFS needs a pair of technically competent facilitators to lead FFS participants through the hands-on exercise. During the inception period of FFS, extension officer (departmental trainer) used to conduct FFS in the country. Thereafter, at the end of 1990s, FFS conduction was handed over to farmer field school graduate (farmer). The factors behind this shifting were sustainability perspective considering farmer facilitators better than outside extension staff because they know the community and its members, speak in a similar language, and are recognized by the participating farmers as their colleagues and know the area well. They can also work more independently outside formal hierarchical structures. The selected graduate needs to undergo an intensive course to improve their technical, facilitation and organizational skills.

2.4.1 Farmer Field School on Integrated Farm Management under IFMC

On the basis of Appraisal report (Appendix VI), a project proposal (Appendix. VII) was prepared and from October 2013, DANIDA funded IFMC project started FFS on Integrated Farm Management (IFM) with 52 sessions, considering the all activities of a farm family holistically but later on the sessions were reduced to 27 to 47 sessions with various FFS based on learning modules as needed by farm communities. With an immediate objective like increased agricultural production among female and male members of landless, marginal and small farming households, the Agricultural Growth and Employment Programme (AGEP) was launched for the period of 2013-2018. The schematic diagram of core IFM FFS implementation was as below (Figure 2.16):

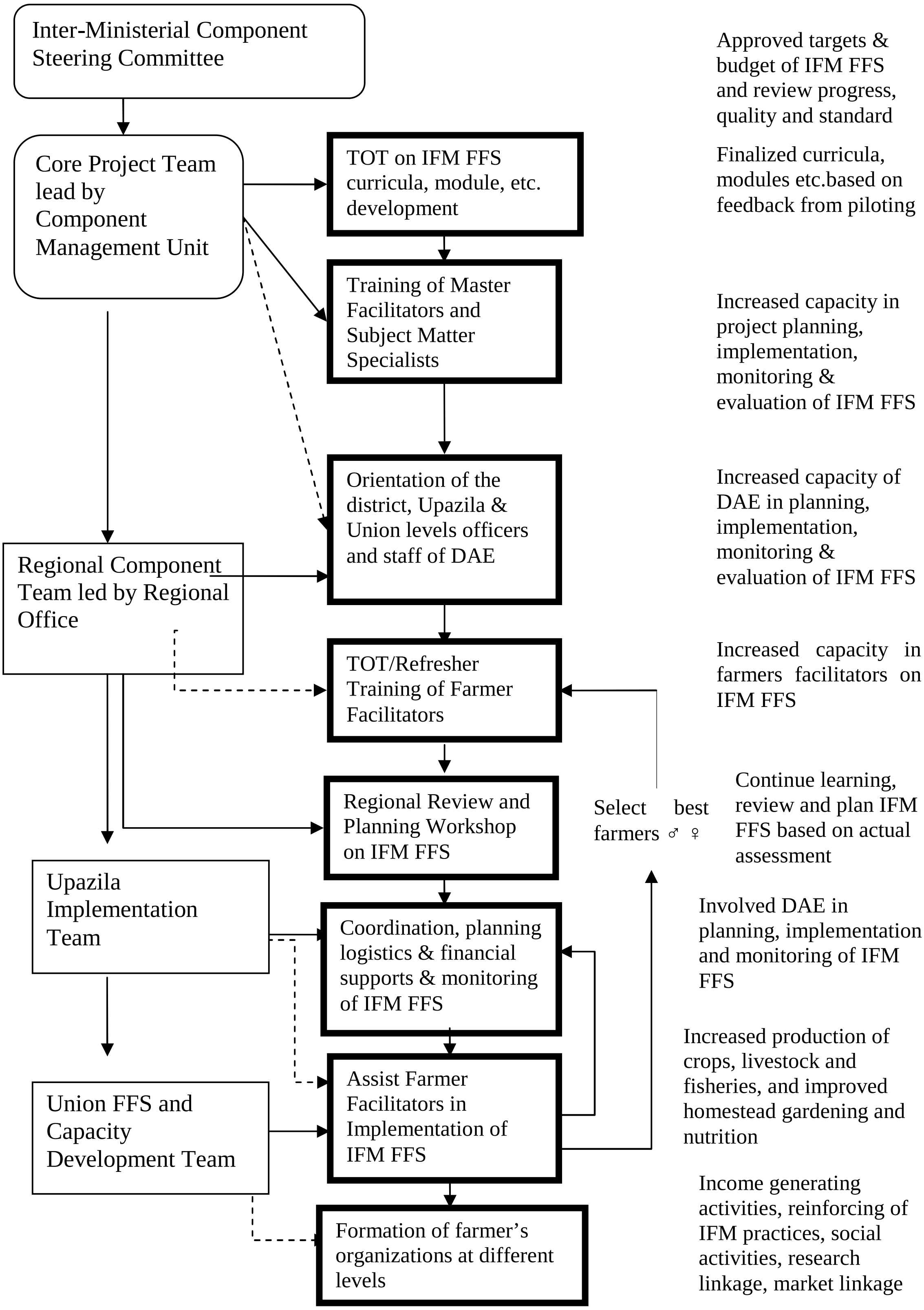

Fig. 2.16 The schematic diagram of core IFM FFS implemented by IFMC

Source: Anonymous[l], 2014. Development Project Proposal for Integrated Farm Management component (IFMC), (AGEP)

The IFM component started with proposed major impacts like increase income, improved food security and nutritional status, increase of full time equivalent paid and non-paid employment, increased agricultural production etc. Here, according to the assumptions incorporated in the FAO's Farmer Field School- Guidance document planning for quality programmes (2016), it could be mention that FFS are instruments of change. However, results can only be achieved if the required inputs are delivered and if activities and outputs are designed to steer changes towards the desired outcomes or impacts as shown below(Figure 2.17):

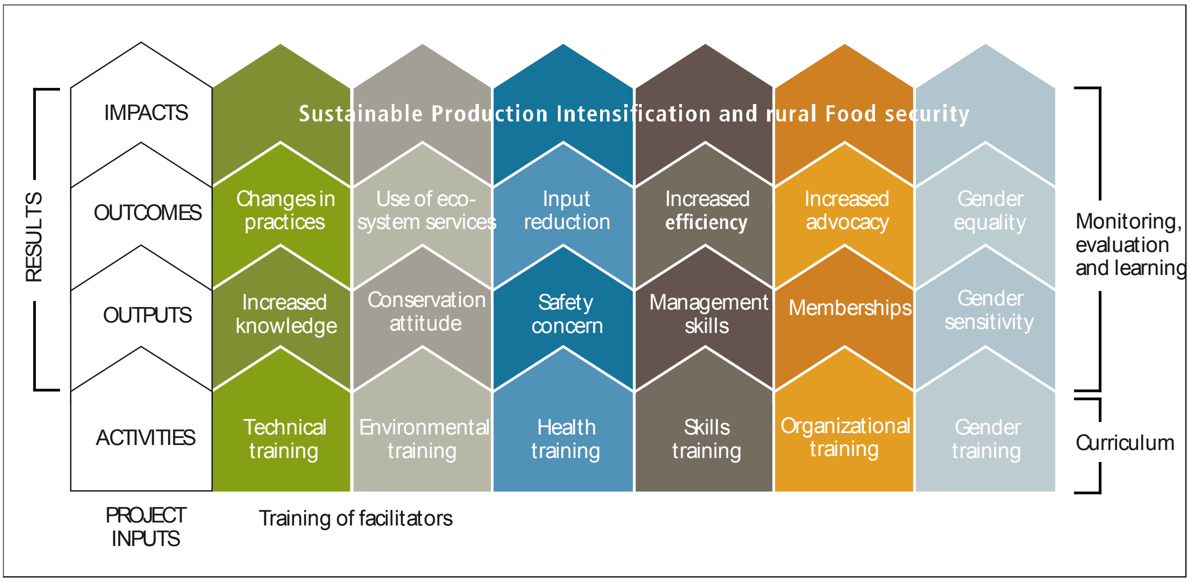

Fig. 2.17 A result chain for an FFS programme

Source: **FAO_b,2016.Farmer Field School- Guidance document planning for quality programmes, FAO (2016)**

However, the detail of the IFMC progamme is attached in Appendix VII.

The criteria followed by IFMC in selecting FF are also mentioned below:

- IPM/ICM/ IFM FFS trained Farmers
- Educational Qualification- At least class 8 years of schooling
- Age within 20-45 year. However, in case of the highly educated farmer the age would be 32-45 year.
- In case of creating a pair of FF/FT, a male and a female candidate should be given priority. However, per pair of FF/FT can be created by having 2 males and 2 females as well. But husband and wife can't be selected as a pair of FF/FT.

- Students/Businessmen/Service Holders/Teachers who will not be able to give time to operate FFS, they can't be selected.
- The selected farmer should have the skill to speak and capability to organize and operate the FFS.
- The selected farmer should have a sound health.

To develop farmer facilitators (FF) in order to be engaged in the FFS, IFMC follows the process of chronological steps starting from FFS graduation to several other tailored courses. The designated process of FF development for IFMFFS is shown below (Figure 2.18):

Farmer Facilitator (FF) Development process in IFMC

According to the criteria Upazilla Agriculture Office (IFM team) selects at-least 4 farmers for selection of a pair of FF

UAO along with his team and representative of IFMC (RIC/RTC/SMS/MFs) selects the facilitator(s) after written and

Every FF goes through 26 days TOT course. After successfully completed the course they will implement FFS

During first season,two SLL courses arranged for FFs.1^{st} spell after 2 months of FFS starting and 2^{nd} spell after 2 months of 1^{st}

FF receives minimum of 6 days refreshers course on IFM FFS during the project period for their capacity development

Fig. 2.18 Farmer facilitators' development process

Source: Developed by the researcher on the basis of IFMC document

2.4.2 Research Gaps

Though several studies have undertaken on mainly IPM FFS in Bangladesh (as in Table 1.2), focuses were on issues like; Comparative Analysis between FFS and non-

FFS farmers on Knowledge, Skill and Attitude towards IPM, Factors Influencing Adapting IPM Practices at Community Level. IPM Club for Fostering Farmers Empowerment in Rice Production, Cost effectiveness of Integrated Pest Management Extension Method: An example for Bangladesh. But no study was undertaken so far on FFS run by FTs *i.e.* FFT.

In contrast, several studies on FFT were found in some countries around African nations focusing mostly on single technology or issue (as in Table 1. 3). No findings on sort of IFM were found in any literatures so far reviewed. The context of the researches on FFS and FF were also found different from the context of Bangladesh. On the other hand, due to substantial variability in socio-economic and cultural settings, generalizations from the studies conducted abroad regarding the effectiveness of farmer to farmer training may not be relevant to Bangladesh context.

Research on farmer to farmer extension approaches can help extension services improve their effectiveness and efficiency in serving farmers. Surprisingly, as pervasive as these programs are, little has been done to describe them, assess the effectiveness of the farmer-to-farmer extension agents or draw out lessons on successful implementation of the approaches. The farmer-to-farmer training to disseminate agricultural information, though widely used since 2000s, has never been little studied in-depth and empirically in Bangladesh. There is inadequate information on the effectiveness of FFT in dissemination of technologies. This study was intended to fill this knowledge gap by examining the effectiveness of the FFT approach.

2.5 Assessing farmer to farmer training effectiveness

It is pertinent to mention that the terms ‘effective tiller’ is always used in the cultivation procedure of rice or for cereal crops alike. Farmers’ intension of growing rice is to have actually effective tillers mainly. To make a tiller effective, management practices starts from the very beginning of the cultivation protocol ranging from seed selection to onward. To become a tiller effective, it demands many essential interventions like good tillage, fertilizers, water, pest management etc. Similarly, in case of making the farmer to farmer training effective, lot of enablers starting from farmer selection to onward are needed keeping good farmer facilitators as constant and mandatory. To contrast the ideas, an analogy is developed (Figure 2.19).

Effective tiller

- Selection of good seed
- Good tillage and proper land preparation
- Proper dozes of fertilizers and water management
- Weeding, pest management, other intercultural operations

Effective FF

- Selection of proactive real farmers
- Proper regimentation at season-long ToT
- Proper incentives, motivation and adequate amount of materials
- Regular monitoring and backstopping

Fig. 2.19 An analogy: Effective tiller vs. effective FF for FFT

Source: Researcher

Training Effectiveness can be looked at from different perspectives. Several authors, such as Hellin and Dixon (2008) and Amudavi *et. al.* (2009), have used various methods to assess the effectiveness of the Farmer-to-Farmer Training (FFT) or extension model in different countries. Hellin and Dixon, for instance, measured the effectiveness of the farmer to farmer extension approach in the Andes by looking at the livelihood impact of the approach. They used the framework of the sustainable livelihood approach whereby five indicators; financial, social, human, natural and physical capital were used to measure the impact of the approach on the livelihoods of farmers. In contrast, Amudavi looked at technical efficiency of the farmer trainers' approach whereby various parameters were assessed; farmers' knowledge of and skills about the push and pull technology, diffusion and uptake.

Weinand(2002) and Lukuyu *et. al.* (2009) assessed trainees‟ perception of the farmer trainers‟ approach, motivational incentives, technologies disseminated and opportunities and constraints of the approach in Malawi and western Kenya respectively. Kiptot *et. al.* (2011) looked at the effectiveness of the farmer trainers' approach in terms of number of farmers reached, quality of information passed on, technologies disseminated and ability to reach women and poor farmers. In addition, factors influencing performance of trainers (social status, education, wealth, farm size, gender) and incentive measures for farmer trainers were also assessed. It was expected that such information would assist development agencies in designing extension programs that are effective and sustainable.

E. Ssemakula and J.K. Mutimba (2011) developed a conceptual model for measuring effectiveness of farmer to farmer training based on a four factors: a) the initial social and economic status of the farmers; b) the intervention of the farmer to farmer extension approach; c) the institutional support by NGOs; and d) the farmers' institutional networks. The framework also illustrated the independent variables consisting of the extension approach, methods and techniques used. The farmers' social economic characteristics also formed part of the independent variables. The dependent variables indicating the effects arising from the extension efforts applied in the areas which included level of participation, knowledge and skills, adoption of recommended farming practices, non-traditional technologies adopted, productivity, levels of income, and levels of food sufficiency, effective use of knowledge, and skills and thereby improve production (Figure: 2.20).

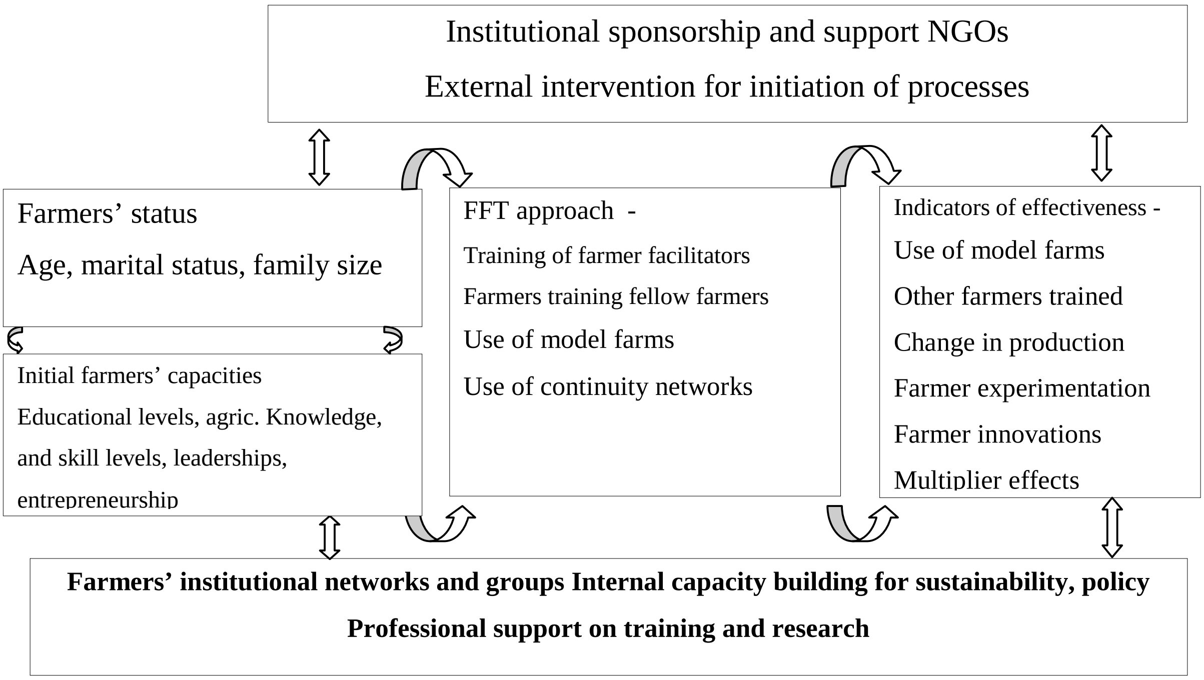

Fig. 2.20 Conceptual framework on effectiveness of FFT developed by E. Ssemakula and J.K. Mutimba (2011)

According to B. Lukuyu *et. al.* (2012), the specific indicators for assessing the effectiveness of farmer facilitators or trainers in disseminating technologies were technical characteristics, that is practical agricultural expertise, knowledge of subject, communication, availability and accessibility, and individual characteristics such as honesty, interest and willingness to work without expecting any reward. In addition, some researchers assessed the sustainability of the FFT approach that is whether farmer facilitators were able to continue operating after the project supporting them ended.

Going through literatures it was revealed that names used for farmer facilitator were meaningfully and purposefully diverse as Farmer trainer, Lead farmer, Village extension multiplier, Model farmer, Community agricultural worker/facilitator, Farmer-to-farmer (*pompo pompo*), Community animal health worker, Core suppliers (of wild products), Contract farmer, Community agricultural agent ,Volunteer farmer, Local Facilitator, Para-professional Extension worker, Emerging extension agent, community knowledge worker etc. For the purposes of this survey, we refer to farmer-to-farmer extension workers as "farmer facilitators" while acknowledging that many other names are used for them. In this report, farmer-to-farmer training is defined as the provision of training by farmers to farmers (Scarbourough *et. al.* 1997, Brent M. 2015). Khaila S. *et. al.* (2015) mentioned that often, this is done through the creation of a structure of farmer promoters and farmer trainers.

Kaufman and Keller (1994) adapted the framework in which effectiveness of training was assessed from four dimensions:

- Attribute pertaining to participants' learning. This attribute has the elements- knowledge, skill and attitude.
- The transfer of learning to farms meaning the application or practice.
- Participants' reaction to the training program. This criterion brings out issues pertinent to the level of learner satisfaction (Relevance).
- The application of the learning on farms. Increase in productivity and efficiency (Results).

In the present study, effectiveness was measured using all the dimensions involving knowledge, skill, attitude and application. The research works in these regard is shown in Table 2.3.

Table 2.3 Related references about FFT effect on knowledge, attitude, skill and practice of farmers

Author and Year	Main Results
Bunyatta *et. al.* (2006)	- Improve of farmer's knowledge about technologies - Improve of farmer's adoption about technologies
Davis *et. al.* (2009)	- Improve of farmer's knowledge about technologies
Dolly, D. (2009)	- Generation of new knowledge - Improve of adoption rate
David and Asamoah (2011)	- Improve of farmer's knowledge
Dinpanah *et. al.* (2010)	- Improve of farmer's knowledge about biological control - Improve of farmer's adoption about biological control - Improve of farmer's attitude about biological control
Endalew, B.D.(2009)	- Improve of farmer's knowledge about coffee management - Improve of farmer's practice - Improve of farmer's attitude toward promoting coffee management
Erbaugh *et. al.* (2010)	- Improve of farmer's knowledge about integrated pest management (IPM) - Improve of farmer's adoption about integrated pest management (IPM)
Khisa and Heinemann (2005)	- Improve of farmer's knowledge
Nicetic *et. al.* 2008.	- Improve of farmer's knowledge

Author and Year	Main Results
Gockowski *et. al.* (2010)	- Improve of farmer's knowledge about technologies
Davis, K. (2007)	- Improve of farmer's knowledge
Braun *et. al.(* 2000)	- Improve of farmer's knowledge
Mancini *et. al.* (2007)	- Improve of farmer's adoption about integrated pest management (IPM)
Todo and Takahashi (2013)	- Skills development programmes for agriculture, farmer field schools (FFS) have received particular attention
Ooi and Kenmore (2005)	- Improve of farmer's knowledge about biological control
Praneetvatakul and Waibel (2006)	- Improve of farmer's knowledge about coffee management
Osko *et. al.* (2007)	- Improve of farmer's knowledge about biological control - Improve of farmer's attitude about biological control
Reddy *et. al.* (2005)	- Improve of farmer's knowledge
Simpson and Owens (2002)	- Generation of new knowledge
Witt *et. al.* (2006)	- Improve of farmer's knowledge - Improve of farmer's adoption

2.6 Approaches to Effectiveness Research

Beginning with World War II, evaluation research has developed as a result of substantive support by the U.S. federal government in training and evaluation activities. It provides answers to the questions of "do we implement or repeat a program or not?" and "if so, what modifications should be made?" (Stone and Watson, 1999).

Two approaches to training intervention effectiveness research can be used to uncover results without committing extraordinary resources. One approach employs *triangulation* (use of multiple data sources and methods) to gather data from prospective end users and combine qualitative data (e.g., from focus groups, interviews, and observations) with various forms of quantitative data (e.g., those from controlled study situations) (Crabtree and Miller 1992). Data are then used to assemble a valid argument for the interpretation of results. The other approach to effectiveness research explores cause-and-effect relationships that are pertinent to the learning process and have been established through years of training research, including meta-analyses (Borich 1998). For the purpose of training assessment, the cause-and-effect relationships of interest are those between the process, outcomes, and impacts of training. In these relationships, the process variables (e.g., training methods and mediums used) are indicators of the outcomes (e.g., knowledge gained among trainees). The key to identifying the essential elements of effective training lies in understanding the correlation of these variables with the intended impact of training (e.g., diffusion of new skills and abilities) (Cohen and Colligan 1998). To identify the elements of training that are critical to increased effectiveness, the Education and Information Division (EID) of the National Institute for Occupational Safety and Health (NIOSH) has developed a research guide known as the training intervention effectiveness research model (TIER model). The TIER model regards five types of study variables as integral to training effectiveness research: independent, dependent, modifying, intervening, and confounding variables (Figure 2.21). Studies depend on access to measurable data for these variables.

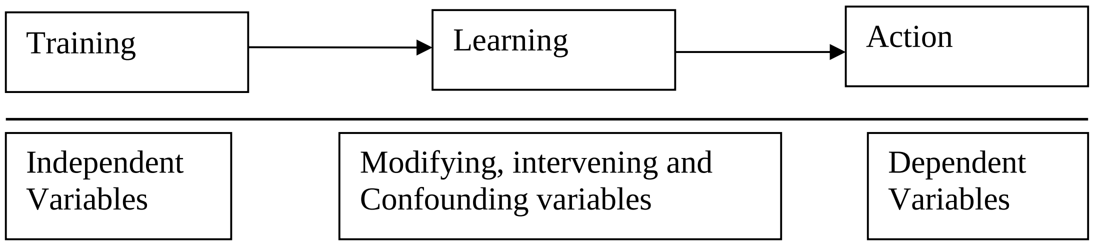

Fig. 2.21 Variables influencing the effectiveness of the training-learning-action continuum

TÜZÜN I. K. (2005) stated that training is one of the ways of improving organization's effectiveness. In order to implement right training methods, organization should be aware of the training methods and their effectiveness. Training can be described as "providing the conditions in which people can learn effectively". To learn is "to gain knowledge, skill, ability" (King, 1968). Knowledge refers to the information we acquire and place into memory, how it is organized into the structure of what we already know and to our understanding of how and when it is used. Thus knowledge can be seen as three distinct types; declarative, procedural and strategic (Kraiger and Salas, 1993). Declarative Knowledge is a person's store of factual information about a subject matter.

Procedural knowledge is the person's understandings about how and when to apply the facts what has been learned. Strategic Knowledge consists of the person's awareness of what s/he knows and the internal rules for accessing relevant facts and procedures to be applied toward some goal. Strategic knowledge is used for planning, monitoring, and revising goal-directed activity (Blanchard and Thacker, 1998).

Skill is the capacities needed to perform a set of tasks that are developed as a result of training and experience (Dunette, 1976). A skill is a proficiency at doing something beyond just knowing what something is about. Abilities have been defined as general capacities related to performing a set of tasks that are developed over time as a result of heredity and experience (Flesihman, 1972).Training focuses on the acquisition of knowledge, skills and attitudes needed to perform more effectively on one's current job. Role of training may be seen as "ensuring that the organization has the people with the correct mix of attributes, through providing appropriate learning opportunities and motivating people to learn, and thus enabling them to perform to the highest levels of quality and service" (Bentley, 1990). To be effective, training method should; motivate the trainee to improve his or her performance, clearly demonstrate desired skills, provide an opportunity for active participation by the trainee, provide an opportunity to practice, provide timely feedback on the trainee's performance, provide some means for reinforcement while the trainee learns, be structured from simple to complex tasks, be adaptable to specific problems, encourage positive transfer from training to the job (Woods, 1995).

Training methods could be classified as cognitive and behavioral approaches. Cognitive methods provide verbal or written information, demonstrate relationships among concepts, or provide the rules for how to do something. These types of methods can also be called as off-the- job training methods. On the other hand, behavioral methods allow trainee to practice behavior in real or simulated fashion. They stimulate learning through behavior which is best for skill development and attitude change. These methods can be called as on-the-job training methods. Thus; either behavioral or cognitive learning methods can effectively be used to change attitudes, though they do so through different means. Cognitive methods are best for knowledge development and behavioral methods for skills (Blanchard and Thacker, 1998). The decision about what approach to take to training depends on several factors that include the amount of funding available for training, specificity and complexity of the knowledge and skills needed, timeliness of training needed, and the capacity and motivation of the learner.

Training is widely understood as communication directed at a defined population for the purpose of developing skills, modifying behavior, and increasing competence. Training focuses exclusively on *what* needs to be known. Correspondingly, education explains *why* certain information must be known (NIOSH, 1999).

Independent Variables

Independent variables are the manipulated variables—that is, the training inputs and activities that are implemented and studied. They are presumed to cause or influence certain training outcomes. Depending on the study, independent variables could include timing, format, and location of training as well as modifications to the training rationale, content, or educational approach under study (Gagné 1985).Safa *et. al.* (2002) and Safa (2004) showed that as the Independent Variables, socio-economic attributes of farmers, including age, family size, education, farming experience and land size are strongly related to farming success. Socio-economic attributes such as size of landholding, livestock numbers, education level and farmers' age were found to influence positively the income from farming activities, though with some exceptions.

Dependent Variables

Dependent variables are the intended aims of training, which are expected to result from exposure to the independent variables. As exposure varies, results may differ, allowing effectiveness to be measured. The TIER model differentiates between dependent variables that are immediate effects of training (termed "outcomes") and dependent variables that are later-emerging effects of training (termed "impacts") (Mohr 1992).

Sample *outcomes* of training include participant satisfaction with the course; changes in knowledge, attitude, and behavioral intent; and demonstrated skills or abilities. Sample *impacts* of training include the following: diffusion of course material into the field, retention of knowledge and attitudes, transfer of behavioral intent into practice, application of learned skills and abilities, transfer of training to new populations, and acceptance of instructional content as normal operating procedure.

Modifying Variables

Modifying variables can modify the influence of independent variables on dependent variables. Therefore, to preserve the integrity of results, modifying variables must be controlled or neutralized for all study conditions. Learner variables (age, sex, socioeconomic status, etc.), trainer variables (experience, teaching style, etc.), and context variables (class size, classroom instruction versus apprenticeship training, etc.) can all modify learning outcomes. Typically, when modifying variables are suspected, research design techniques such as stratified sample selection can be used to control and study their effects on dependent variables.

Intervening Variables

Intervening variables are inferred concepts intended to explain the processes between stimulus (independent variables) and response (dependent variables). Intervening variables cannot be meaningfully observed, manipulated, or measured. In educational research, such constructs frequently relate to learner attentiveness, ability and motivation to learn, learning style, and individual coping mechanisms when investing new material (Dunn and Griggs 1988). Intervening variables may also pertain to (1) the trainer's ability to engage learners with the subject matter, and (2) contextual attributes such as the structure and formality of the educational environment. Random selection and assignment of subjects are presumed to control for most intervening variables.

2.7 Conceptual Framework of the Study

Training effectiveness is the study of the individual, training, and organizational characteristics that influence the training process before, during, and after training. Training needs analysis is recognized as one of the first important "before" contributions to training effectiveness (Salas and Cannon-Bowers, 2001).Training cannot be effective unless it meets the individual, organizational, and task needs as identified by needs analysis.

Cannon-Bowers *et. al.* (1995) and Tannenbaum *et al* (1993) mentioned three sets of characteristic as additional contributions to training effectiveness. The first set is individual characteristics or the factors that trainees bring to the situation. These include personality traits, attitudes, abilities, demographics, experience, and expectations. Individual characteristics also include attitudinal constructs that were manipulated in training such as self-efficacy, goal orientation, and motivation. The second set of characteristics covers the context in which training is implemented or the organizational and situational characteristics. These include the organization's climate for learning, history, policies, trainee selection technique, and trainee notification process. The final set is training characteristics, which includes aspects of the training program such as instructional style, practice, and feedback.

Through incorporating all the inputs collected as references and discussed above as logical details, a new schematic framework was build-up for the present study (Figure 2.22). This framework justifies the measuring effectiveness of farmer to farmer training through four dimensions of learning namely knowledge, skills, attitudes and practice with added considerations of the policy attributes, political consensus and enabling environment as compulsory for effectiveness.

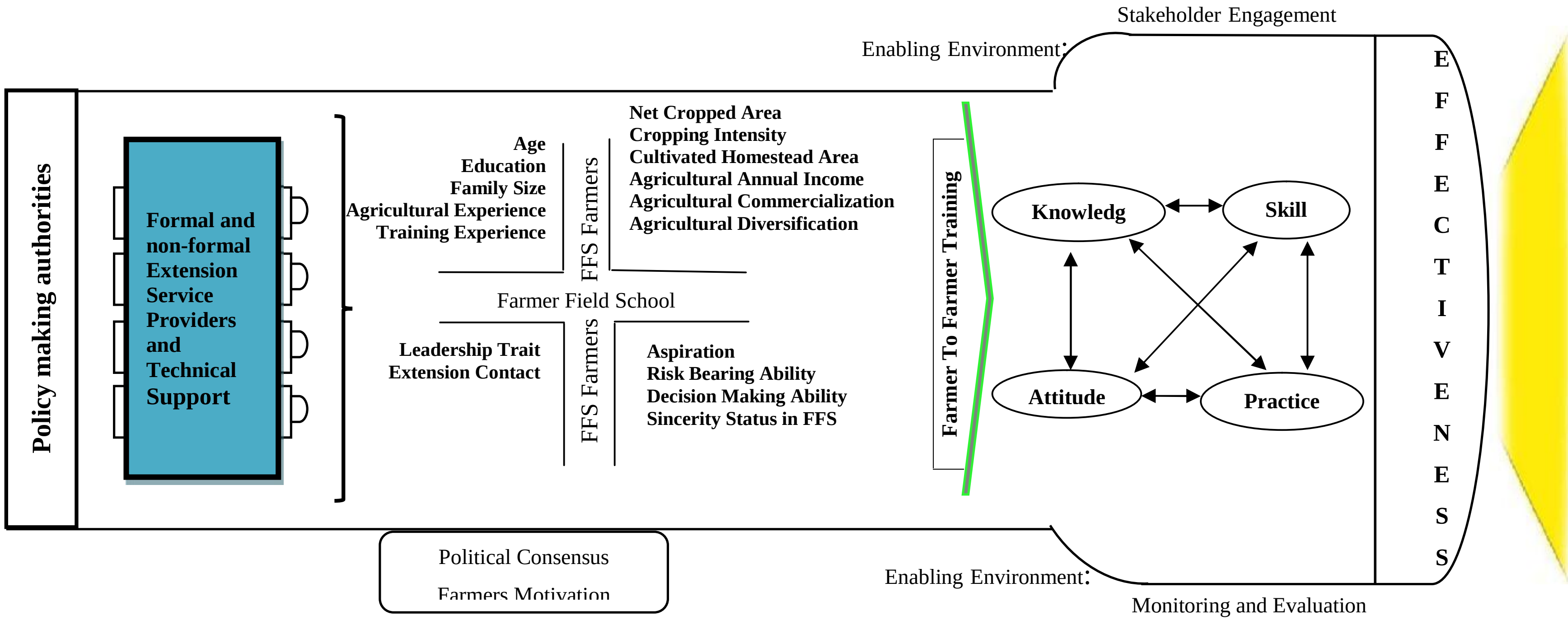

Fig.2.22 Schematic framework of the study: A torchlight mechanism of farmer to farmer training effectiveness

Source: Researcher

Simultaneously, a conceptual framework of the effectiveness of farmer to farmer training in dissemination of farm information based on statistical relationship was also developed (Figure 2.23).

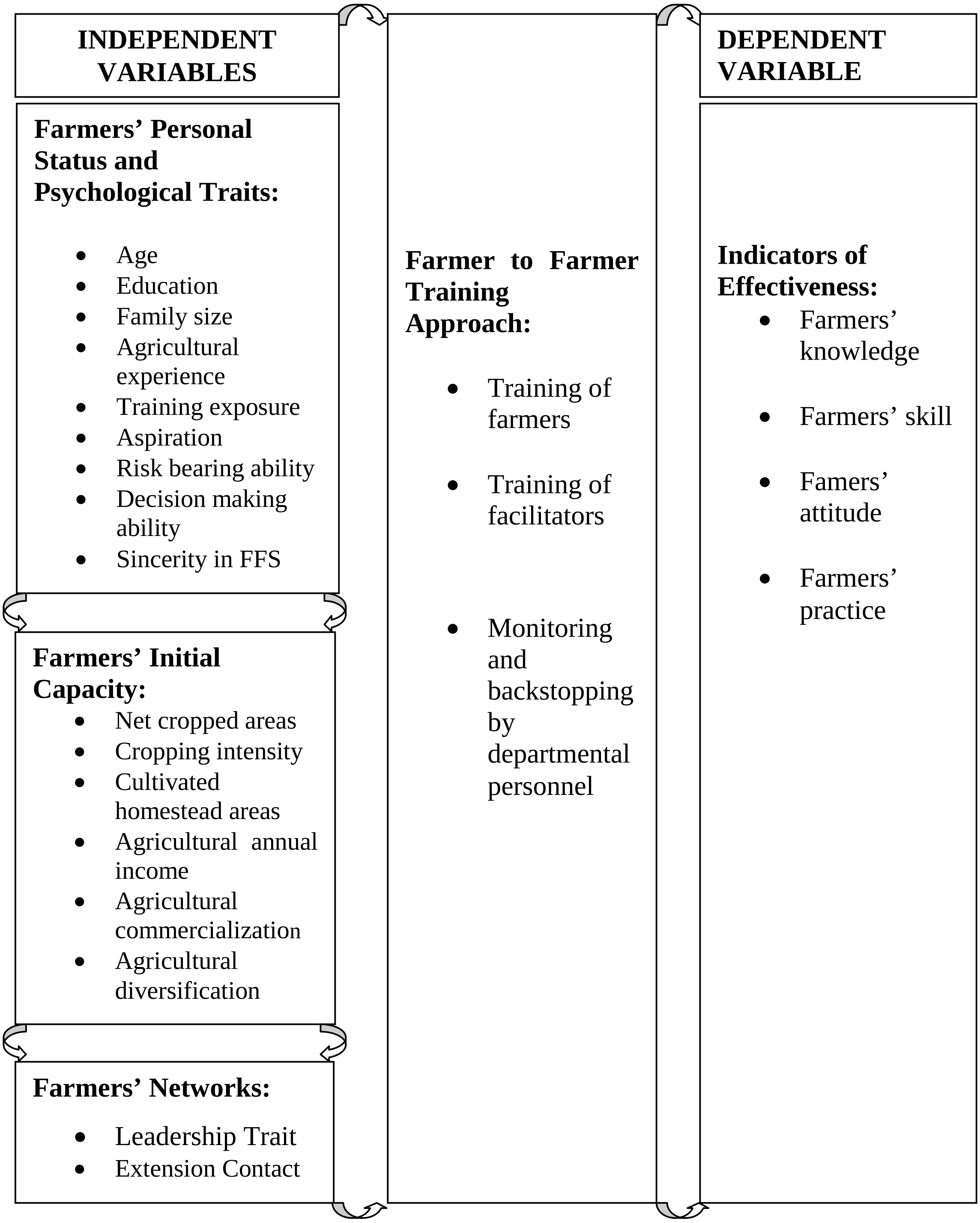

Fig. 2.23 Conceptual framework of the effectiveness of farmer to farmer training in dissemination of farm information based on statistical relationship

CHAPTER 3

METHODOLOGY

The purpose of this chapter is to describe the methods and materials of the study as per objectives. This chapter also spells out the methods used to test hypotheses.

3.1 Choosing methodology

Methodology is accepted as a set of theoretical ideas that justify the use of particular method or methods (Midgley, 2000). The justification for employing one methodology over another depends upon the context of the research being undertaken and in this instance FFT called for a primarily quantitative approach because its dominant mode of engagement with research domain was the extent of phenomenon. Contrasting the definition of qualitative research with that of quantitative research helps clarify the reasons why employing a qualitative methodology was also appropriate.

Quantitative Research: is concerned with measuring the magnitude, size, or extent of a phenomenon. Data collection derives from a scientific, positivist cause-effect model, characterized by researcher control, constraints, formal rules of procedures and verification and standardized statistical format based of probability theory and other theories from classical physics and mathematics. Prediction and generalization are the desired outcome of this technique (Gbrich 2000).

Qualitative Research: is concerned with describing behaviour and processes of intentions as well as revealing the meanings, values, intentions of a person's life experience. Data collection is based on an interpretative (power sharing) model, it is creative and idiosyncratic and utilize the technique of interviewing, observation and document analysis which are informed by various theoretical perspective (Gbrich 2000).

3.2 Design of the study

The design of the study was descriptive survey research. It has been designed mainly to determine the extent of effectiveness of Farmer to Farmer Training (FFT) as perceived by the farmers, explore the contribution of the selected characteristics of the farmers on the effectiveness of FFT. Effectiveness of FFT was also compared by the trained and non-trained farmers' opinion as well as by male and female farmers. Similarly, relationship among four dimensions like knowledge, attitude, skill and application regarding FFT effectiveness were determined.

3.3 Study area

Integrated Farm Management Component (IFMC) of Agricultural Growth and Employment Program(AGEP) funded by Danish International Development Assistance (DANIDA) started its work under Department of Agricultural Extension (DAE) in Bangladesh in 2013. Under this program, to maintain a decentralized management, whole Bangladesh was divided into six regions (not as administrative regions) namely Barisal, Comilla, Jessore, Mymenshing, Rajshahi, and Rangpur. IFMC activities were stretched out at 373 Upazilas (Sub-district) under 61 districts in these 6 regions. A total of 1221 Farmer Facilitators (FF) were involved for running FFT through 2987 Farmers' Field School. Farmer Facilitators (FF) and FFS status of Bangladesh during 2013-2014 are mentioned in Table 3.1 as stated in Database of IFMC in the year 2014-2015.

Table 3.1 Integrated Farm Management FFS status in Bangladesh during 2014-2015

Name of Region	Number of Districts	Number of Upazila	Number of Farmer Facilitators	Number of FFSs	Number of Trained Farmers
Barisal	11	66	327	648	32400
Comilla	12	68	136	390	19500
Jessore	10	51	86	268	13400
Mymensingh	12	65	145	409	20450
Rajshahi	08	66	281	650	32500
Rangpur	08	57	246	622	31100
Total	61	373	1221	2987	148350

Initially, six districts namely Barisal, Comilla, Khulna, Sherpur, Chapainawabganj and Dinajpur were selected randomly by taking one district from one region for the study.

Again 6 Upazilas were selected randomly by taking one from each selected districts. Thus, Babuganj Upazila of Barisal district, Homna Upazila of Comilla district, Batiaghata Upazila of Khulna district, Sreebardi Upazila of Sherpur district, Chapainawabganj Sadar Upazila of Chapainawabganj district and Chirirbandar Upazila of Dinajpur district were considered as the locale of the study. Six maps of 6 districts of Bangladesh showing the study Upazilas are presented in Figure 3.1, 3.2, 3.3, 3.4, 3.5, and 3.6 respectively.

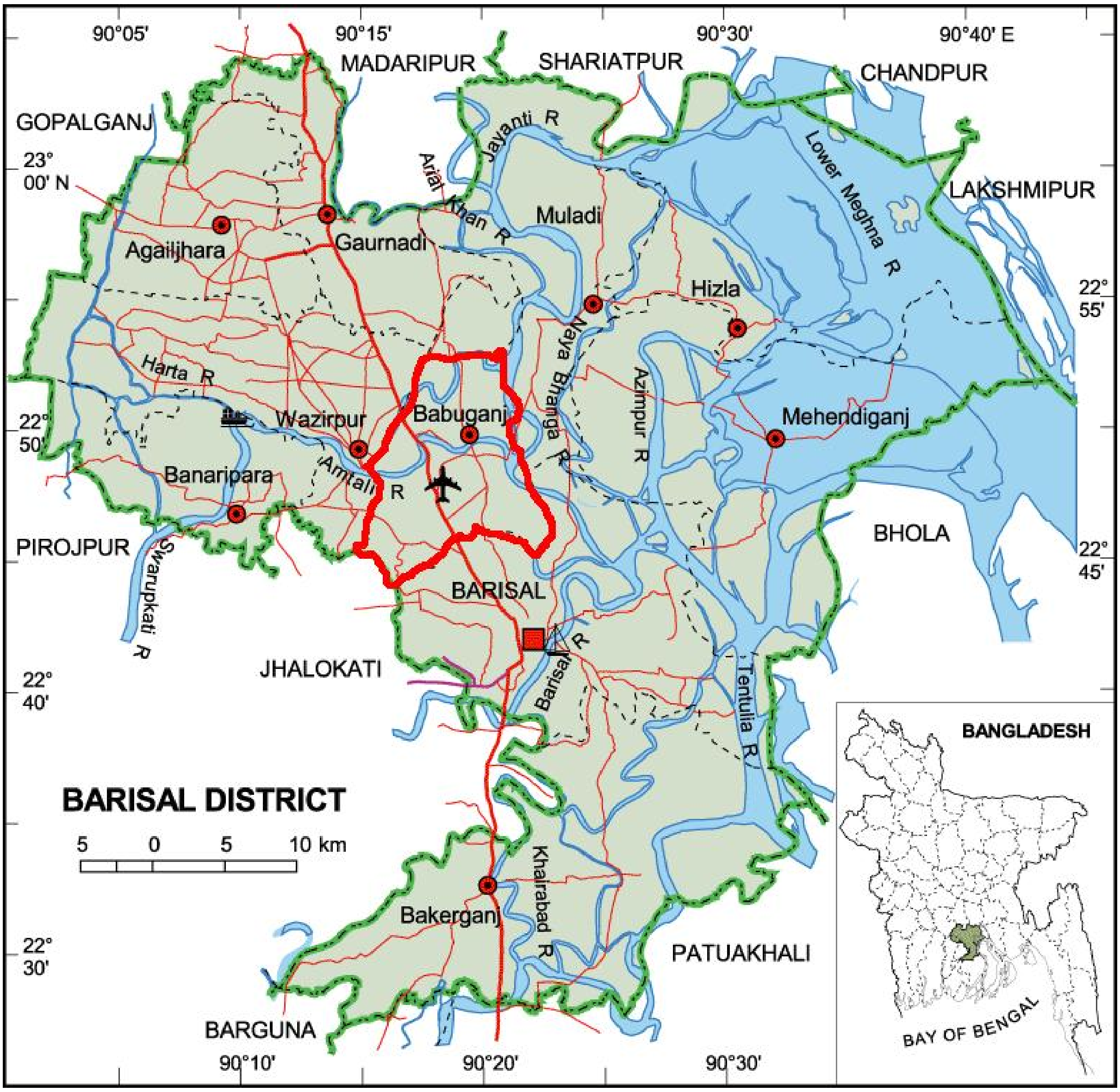

Fig. 3.1 Map of Barisal district showing Babuganj Upazila

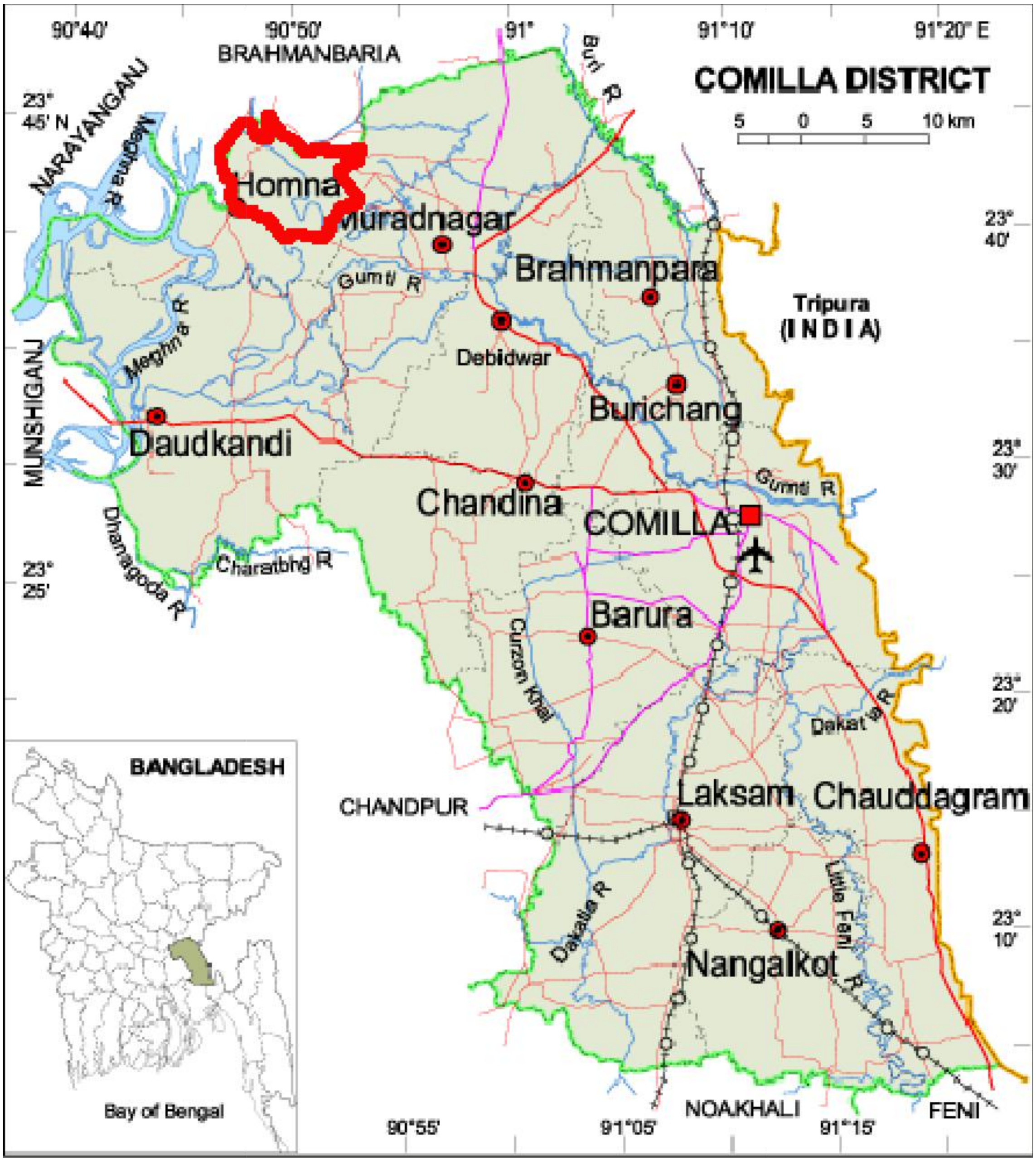

Fig. 3.2 Map of Comilla district showing the Homna Upazila

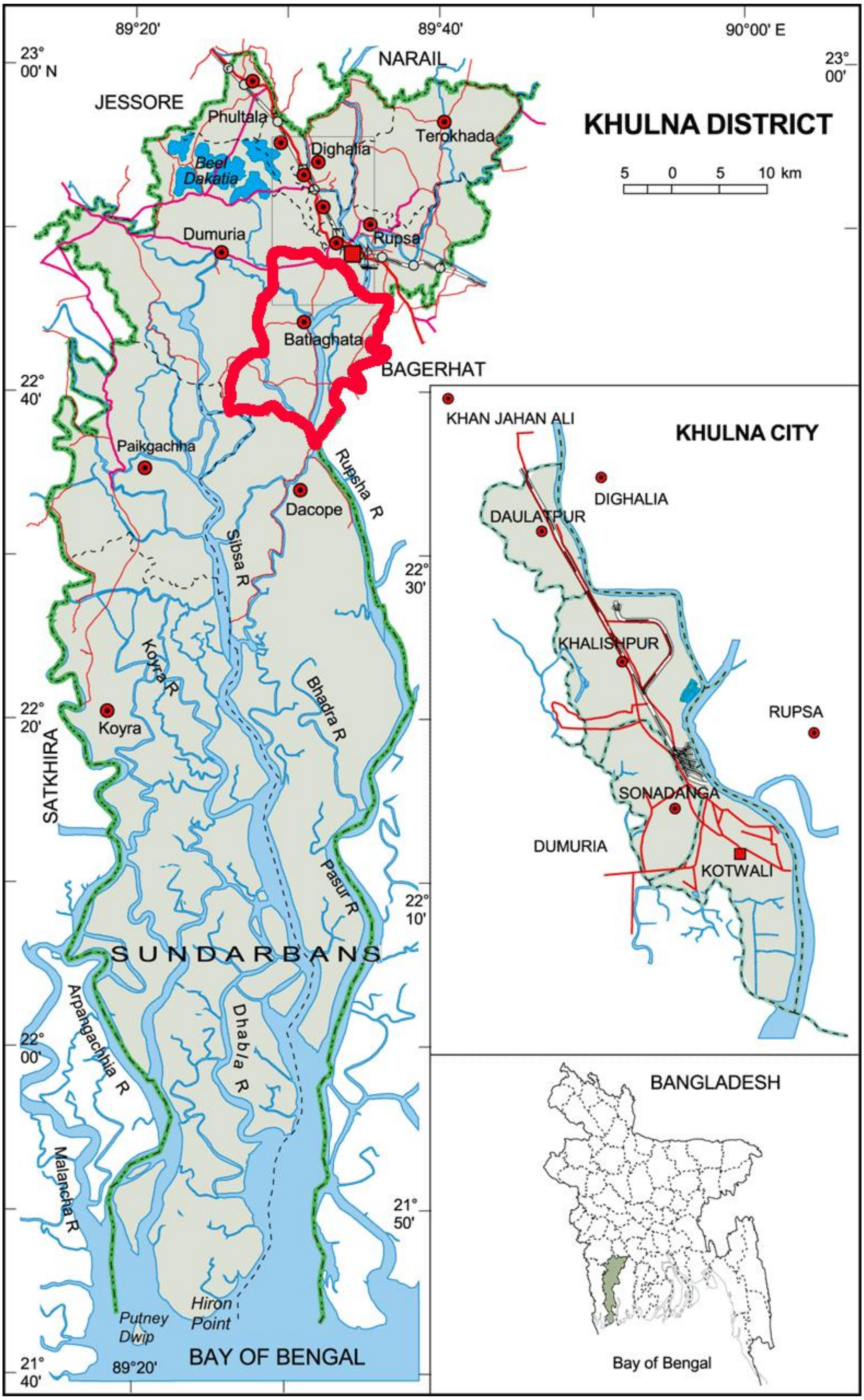

Fig. 3.3 Map of Khulna district showing the Batiaghata Upazila

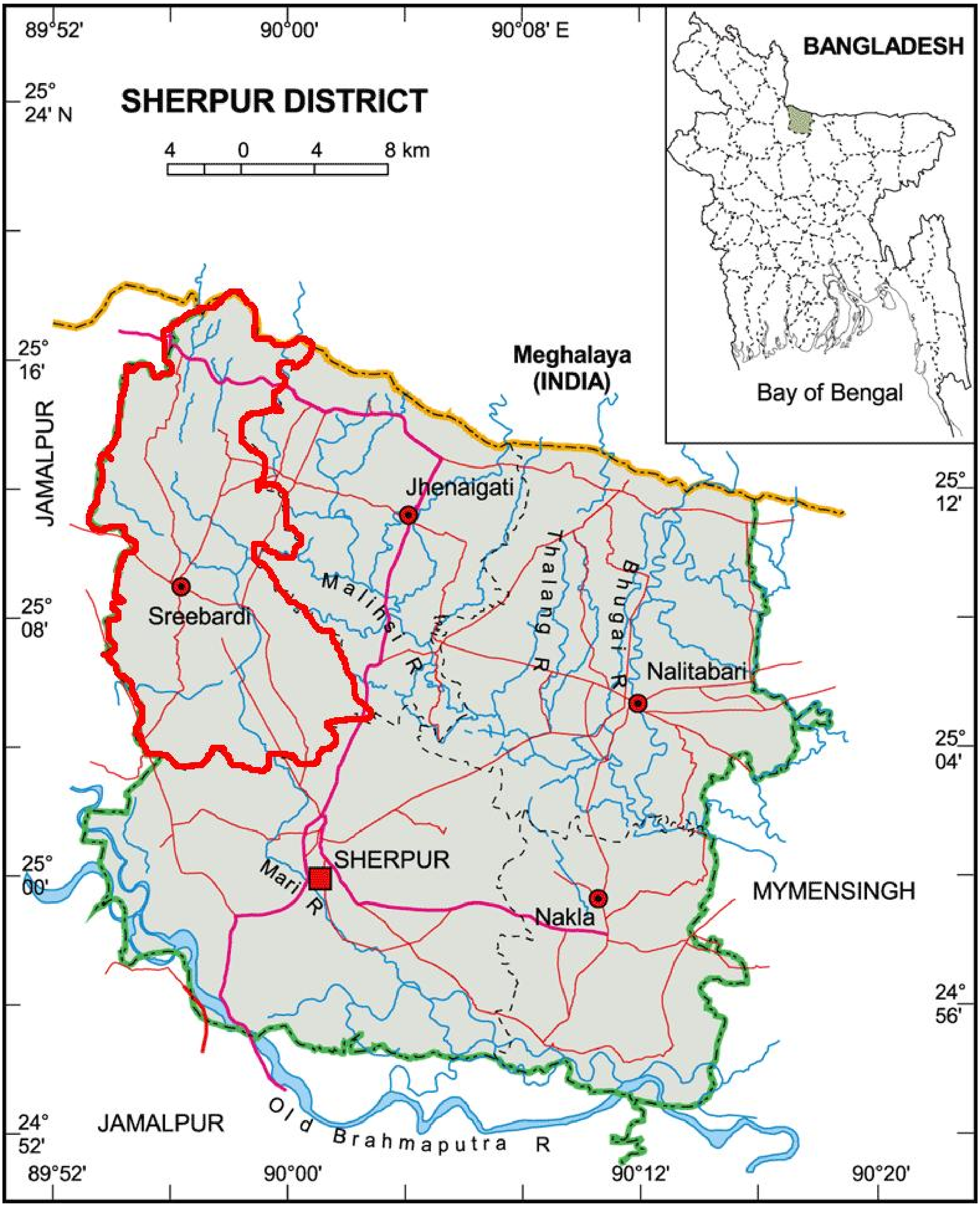

Fig. 3.4 Map of Sherpur district showing the Sreebardi Upazila

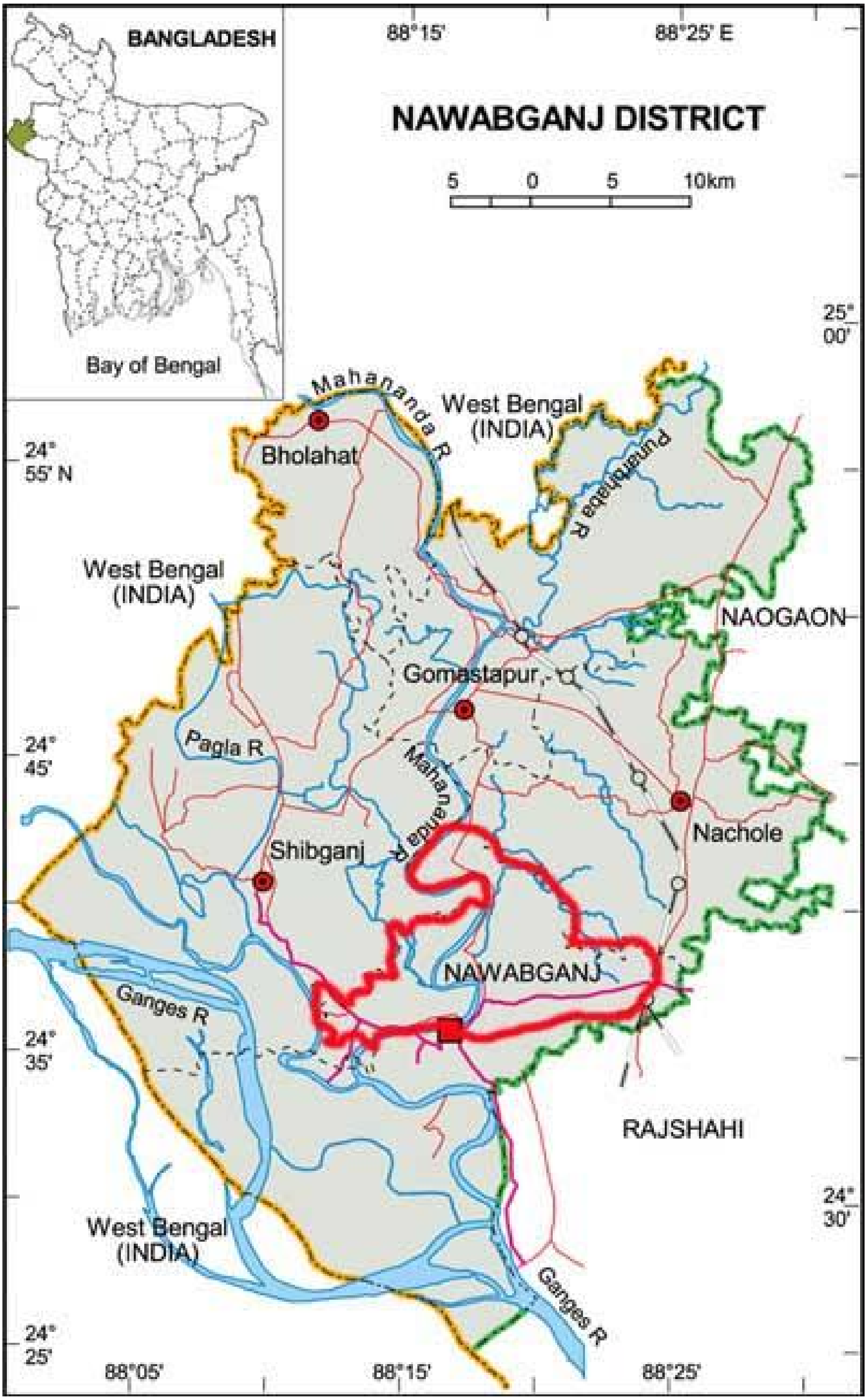

Fig. 3.5 Map of Chapai Nawabganj district showing the C'Nawabganj Sadar Upazila

Fig. 3.6 Map of Dinajpur district showing the Chirirbandar Upazila

The advisory service approach of the IFMC of AGEP was named as Integrated Farm Management Farmer Field School (IFMFFS). The main function of this approach was to disseminate agricultural knowledge and skill on homestead farm management which includes i) Homestead garden, ii) Field crop management, iii) Poultry, iv) Small ruminant (goat), v) Big ruminant (cow), vi) Fisheries, vii) food and nutrition and viii) Farmers' organization and Social issues. Some relevant agricultural facts of the study Upazilas are pointed out in Table 3.2, 3.3 and 3.4 mentioned below:

Table 3.2 Some general agricultural facts of selected Upazilas of Bangladesh

Upazila	Agro ecological Zone (AEZ)	A rea(Sq.Km)	Cultivable land (hectare)	Cropping Intensity(%)	Number of Households					Population	Literacy rate
					Landless	Marginal	Small	Medium	Large		
Babugonj	12 13	152.47	11964	225	2524	9217	9864	3575	275	**146166** (♂70381 ♀75785)	75
Homna	16	132.79	9956	193	7113	16100	10400	2400	520	**214652** (♂104262 ♀110390)	40
Batiaghata	13	236.22	19127	178	3812	8103	15481	5275	884	**171691** (♂86685 ♀85006)	55
Sreebardi	8 9 22	252.44	20387	219	11484	17998	34307	6573	922	**292284** (♂71100 ♀ 22419)	50
Chapai	10 11 26	451.92	32054	217	13150	20310	22150	8730	1463	**530592** (♂254629 ♀275963)	46
Chirirbandar	13 25 27	31.285	26070	232	10749	21097	26709	27360	1265	**292500** (♂145881 ♀146619)	53

Source: Upazila database (2015-2016)

Table 3.3 Some relevant livestock facts of selected Upazilas of Bangladesh

Items	Babugonj	Homna	Batiaghata	Sreebordi	Chapai Sadar	Chirirbandar
A. No. of big ruminants						
i. Local breeds	38550	51321	143750	91027	147878	51572
ii.Improved	4723	21996	28367	13600	42777	11326
B. No. of small ruminants						
i. Local breeds	9725	44690	22360	30600	203185	100115
ii.Improved	546	2352	1180	-	12350	10404
C. No. of poultry birds						
i. Local breeds	361990	630793	1078993	228000	220865	5080076
ii.Improved	133240	94256	170000	158000	95117	54290
D. No. of farms						
a. Big ruminant (cow)						
i. Dairy	108	74	96	43	76	204
ii. Beef fattening	212	25	714	56	150	151
b.Small ruminants	38	27	35	34	99	161
E. Poultry						
i. Layer	38	05	52	10	30	43
ii. Broiler	184	85	187	70	74	104
F. Livestock and poultry feed businessmen						
	06	06	21	30	-	36
G. Livestock poultry Association						
	-	01	01	-	-	-
H. Annual production						
i. Milk (Mt.)	11940	15707	23796.900	14550	46000	15882
ii.No. of eggs	18800000	11784928	31489900	34400000	46000000	24889907
iii. Meat (Mt.)	12980	8807	12999	13820	27000	12950
I. Annual needs						
i. Milk (Mt.)	13338	19587	15667	24625	48417	26690
ii. No. of Eggs	15201264	22323808	17855864	28065960	55181568	30420000
iii.Meat(Mt.)	6402	9402	7520	11820	23240	12812

Source: Upazila database (2015-2016)

Table 3.4 Some relevant fisheries facts of selected Upazilas of Bangladesh

Items	Babugonj	Homna	Batiaghata	Sreebordi	Chapai Sadar	Chirirbandar
No.of fish farmers	3050	1250	2960	5720	630	8900
No. of fishermen	3064	5130	3000	1478	2945	1070
No. of ponds and areas	4070	891	2575	6577	1290	9348
No. of canal and areas	12	3	85	03	04	01
No. of rivers	03	3	5	02	03	03
No. of *beel* and areas	-	5	07	06	12	01
No. of *haor* and areas	-	-		-	-	-
Flood land areas (ha.)	555.5	20	578.85	06	16	-
No. of commercial fish farms	80	15	52	30	85	150
Fish hatchery	-	-	3	-	02	1
Fish nursery	192	48	09	27	29	36
No. of association of fish farmers	14	04	39	20	1	30
Fish depot/*arot*	-	07	19	-	-	-
Annual production (Mt.)	3051	5955	54401	5295	5876	6027
Annual needs (Mt.)	2668	3917	3133	4925	9603	5338

Source: Upazila database (2015-2016)

3.4 Population

Farmers who received training from Integrated Farm Management Farmer Field School (IFMFFS) of the six selected Upazilas were considered as the population of the study. Six separate lists of the FFS farmers of six selected study Upazilas were obtained from the data base of IFMC Headquarter in Dhaka (Appendix-VIII). There were 69 FFS in these Upazilas. Fifty (50) farmers were trained in each FFS by the FFs. Thus, the population of the study was 3450 IFMFFS trained farmers.

3.5 Sampling procedure and sample size

Data were collected from a sample rather than the entire population. Sample size is of primary importance for any applied scientific research as it directly influences the validity and generalisability of the research findings (Sivakumar, 2016). The task of determining the sample size was to find out a size that fitted within the desired range for precision and available time, financial resources and constraints. The sample size equation as per Yamane (1973) was used as below to find out the sample size:

$$n = \frac{z^2 p(1-p) N}{z^2 p(1-p) + N(e)^2}$$

Where,

n= Sample size

N= Population

e= Level of precision

Z= Value of the standard normal variable at the chosen confidence level

p= Proportion or degree of variability

In calculating sample size 5% precision level, 50% degree of variability and 1.96 as the value of Z at 95% level were chosen.

According to the formula, the sample size was determined as 345. A large sample was drawn than the desired sample size for the cause of the probability of drop out, non response or non availability. The following formula as suggested by Kranti Associates Ltd (2016),with slight modification was used for the purpose:

LS= DS/(1+d%)

Where,

LS = Large sample

DS= Desired sample

d%= Drop out percentage (here 5%)

Therefore, large sample= 345(1+5%) = 363

Thus, 345 farmers were the desired sample size and rest 18 was kept in reserved list. Proportionate random sampling method was used to select the sample respondents from the population of each selected Upazilas. The population, sample size and reserved lists are shown in Table 3.5.

Table 3.5 Population, sample size and reserved list size

Region	District	Upazila	No. of Farmer Facilitator	No. of FFS	Population size	Sample size	Reserved list size
Barisal	Barisal	Babuganj	06	12	600	60	03
Comilla	Comilla	Homna	06	09	450	45	03
Jessore	Khulna	Batiaghata	06	12	600	60	03
Mymensingh	Sherpur	Sreebardi	06	12	600	60	03
Rajshahi	Chapai nawabganj	Chapainawa b-ganjSadar	06	12	600	60	03
Rangpur	Dinajpur	Chirirbandar	06	12	600	60	03
Total			36	69	3450	345	18

Control group sample: The non-trained farmers as control group was selected through accidental sampling. Non-trained farmers were selected from same socio economic condition but having no exposure through FFS approach. Thus, a total of 51 non-trained farmers were selected as the control group by taking 9 from each of Babuganj, Batiaghata, Sreebardi, Chapainawabganj and Chiribandar Upazila and 6 from Homna Upazila where FFS were not established.

3.6 Development of Data Collecting Instrument

There are a number of devices like questionnaires, check sheets or schedules, records or reports, case stories etc. which can be used to get evidence for measurement purposes. Instruments of measurement are very valuable in evaluation. These are usually in the form of tests, inventories, and scales and they may or may not be standardized. These instruments are used in measuring attitude skills, manual abilities, mental abilities and knowledge (Morgan *et. al* 1976).

The IFM FFS curriculum was built on nine modules with 58 sessions including four sessions of preparatory module. Preparatory sessions were mainly concerned with the implementing facilitators rather than farmer trainees. So, in measuring effectiveness of FFT to be reflected by the trainees' opinion, preparatory sessions were not included in preparing the schedule. So, this schedule was based on the rest of eight modules (Rice, Homestead garden, Poultry, Small Ruminants, Big Ruminants, Aquaculture, Nutrition, and Farmers organizations and Social issues) and sessions within it (Appendix IX). An interview schedule written in Bangla containing mostly of direct questions and some scales were used for data collection from the selected sample respondents. An English version of the schedule has been shown in (Appendix X) of this thesis. The interview schedule was prepared considering the objectives of the study in line with the measurement procedures for different variables developed. Adequate review of literatures was done to build the structure of the interview schedule. Direct and simple questions along with multiple choice and rating scales were included in the schedule to collect data on different variables including perceived effectiveness of farmer to farmer training. The schedule was shared with the Chairman and Members of the Advisory Committee. Their opinions were debated and then incorporated in the schedule. The schedule then judged by a panel of experts comprising Experts of different agricultural universities and Subject Matter Specialists of extension departments. A letter from the Chairman of the Advisory Committee of the Researcher was sent to 36 different relevant Experts of different agricultural universities of Bangladesh, Department of Agricultural Extension (DAE) and other organizations by email and hard copy for seeking judgment of different scale of the interview schedule and for necessary cooperation for further developing the interview schedule as shown in (Appendix XI). Out of 36 Experts, 28 Experts responded with their judgments and opinions. Based on the judgments and opinions of the Experts, the draft interview schedule was prepared.

The draft schedule was pretested among 36 IFMFFS trained Farmers by taking six (6) from each selected Upazila by using accidental sampling to test its suitability. Validity and reliability tests were carried out on the results of pre-test data. Necessary corrections, additions, deletions and adjustments were made on the basis of pretest experiences. A meeting of Advisory Committee of the concerned researcher was arranged to finalize the data collecting instrument before going for final data collection. Then the final interview schedule as the data collecting instrument was multiplied as required number.

3.7 Variables of the Study

The variables of the study had been selected after a systematic searching of literatures and discussions with the Advisory Committee Members and relevant Experts. Based on caused and effect relationship in which one variable affects another variable, one categorization scheme for variable is to speak of independent and dependent variables. An independent variable is a variable that is presumed to cause a change to occur in another variable. Sometimes, the independent variable is manipulated by the researcher i.e. the researcher determines the value of the independent variable. A dependant variable is the variable that is presumed to be influenced by one or more variables. The dependent variable is the variable that is dependent on the independent variable(s) (Johnson and Chriestensen, 2012). The 17 selected characteristics of the farmers were considered as independent variables of the study and these were Age, Education, Family Size, Net Cropped Area, Cropping Intensity, Cultivated Homestead Area, Agricultural Annual Income, Agricultural Commercialization, Agricultural Diversification, Agricultural Experience, Leadership Trait, Extension Contact, Decision Making Ability, Aspiration, Risk Bearing Ability, Training Exposure, and Sincerity in FFS.

The Effectiveness of Farmer to Farmer Training (FFT) in disseminating information constituted the dependent variable of the study. Four dimensions like knowledge, attitude, skill and application of the farmers were considered to measure the Effectiveness of FFT in disseminating information.

The variables of the study were operationalized through direct questions, developing relevant scales by the researcher and adopting scales developed by the others as shown in Table 3.6.

Table 3.6 The Summarized operationalization of the variables with measuring unit

Variables	Measuring Unit	Operationalization
Independent Variables		
Age	Actual years	Direct question
Education	Scores (Schooling years)	Direct question
Family Size	Number of family members	Direct question
Net Cropped Area	Hectare	Scale developed for this study based on Ali M.S. (2008)
Cropping Intensity	Percentage	Scale developed for this study with the help of Ali M.S. (2008) and Kumar (2018)
Cultivated Homestead Area	Hectare	Scale developed for this study with the help of Ali M.S.(2008)
Total Agricultural Annual Income	Scores ('000' Taka)	Scale developed for this study
Agricultural Commercialization	Percentage	Scale developed for this study
Agricultural Diversification	Scores	Scale developed for this study
Agricultural Experience	Number of years	Scale developed for this study
Leadership Trait	Scores	Scale developed for this study
Extension Contact	Scores	Scale developed for this study
Decision MakinAbility	Scores	Scale developed for this study
Aspiration	Scores	Scale developed for this study
Risk Bearing Ability	Scores	Scale developed for this study
Training Exposure	Scores (days)	Scale developed for this study
Sincerity Status in FFS	Scores	Scale developed for this study
Dependent variable		
Effectiveness of Farmer to Farmer Training (FFT)	Score	Scale developed for this study

3.8 Measurement of Independent Variables

3.8.1 Age

The age of a respondent was measured by the length of the time from his/her birth to the time of interview. Age was expressed in terms of years (Appendix-X. Item No.1).There are many findings supporting the notion that, adoption of new farming technologies is greatly influenced by the young age of farmers. Young farmers are eager to participate in agricultural research more than old farmers and would be expected to be more curious in trying out new agricultural technologies and more concerned to adopt new agricultural technologies. Contrary to these findings, usually older farmers are more likely to explore agricultural technologies as well as information through learning by doing in FFS and thus more likely to depend on results of field activities experiences. It is hypothesized that the increase in age would have influence on farmer to farmer training. Muchang's (2016) study found that age of the farmers was found to have no influence on their adoption decision across the four age categories.

Ainembabazi and Mugisha (2014) argued as factors that trigger adoption of new technologies comprise of progressive, young and educated male farmers. Factors limited adoption of technology included conservative old men, and weak belief on ensure high yield of new technology. In a study, Chi and Yamda (2002) stated that old age farmers do not believe new technology and only believe their own experience. Old behavior of cultivation practices embedded in farmers for long period, were not persuaded to use new technology.

3.8.2 Education

Education of an individual was defined as the extent of formal education received by them from educational institutions. A score of one (1) was assigned for each year of successful schooling from a formal institution. A score of zero (0) was given to a respondent who could not read and write and a score of point five (0.5) was given to those who could sign their name only (Appendix X, Item No.2).

3.8.3 Family size

Family size of a respondent referred to the total number of members of the family including the respondent him/herself, his wife/her husband, children and other dependents who lived, ate and acted together as a family unit. It was measured by the total number of family members of the respondent (Appendix X, Item No.3).

3.8.4 Net cropped area

Total area of land (in hectare) regardless of numbers of crops raised in last year on which respondent's family carried out farming operation. It is the summation of single cropped area, double cropped area and triple cropped area. Initially it was collected in local unit and finally it was transformed into hectares (Appendix X, Item No.4).

3.8.5 Cropping intensity

Cropping Intensity (CI) (Appendix X, Item No.5) of the cultivated land of a farmer was measured in percentage by using the following formula as used by Ali (2008):

$$\% \text{ CI} = \frac{\text{TCA}}{\text{NCA}} \times 100$$

Where,

TCA = Total Cropped Area = SCA x1 + DCA x2 + TCA x3

NCA = Net Cropped Area= SCA + DCA + TCA

Again, SCA = Single Cropped Area

DCA =Double Cropped Area

TCA = Triple Cropped area

3.8.6 Cultivated homestead area

The cultivated homestead area of a farmer (Appendix X, Item No.6) was determined by the area of land surrounding to his/her residential house on which his/her family carried out farming operation (usually vegetables, fruit, timber, etc.). Initially, it was collected in local unit and finally it was expressed in hectare.

3.8.7 Agricultural annual income

The income obtained from all sectors of agriculture including field crop, homestead vegetables and fruits, poultry birds, small ruminants, big ruminants and fisheries of the family. One (1) score was assigned for 1000 taka of annual income from agriculture of the respondent's family (Appendix X, Item No.7).

3.8.8 Agricultural commercialization

Based on total agricultural income and total sold prices of agricultural products, agricultural commercialization of a farmer was determined by using the following formulae:

$$\text{Agricultural Commercialization} = \frac{\text{Total sold price of agricultural products}}{\text{Total agricultural income}} \times 100$$

Agricultural commercialization was expressed in percentage (Appendix X, Item No.8).

3.8.9 Agricultural diversification

Diversification primarily involves a substitution of one crop or an increase in the number of crops carried out by a particular farm. The concept of crop diversification is seen as referring to the shift from the dominance of one crop to production of a number of crops which takes into account the economic return from different value added crops. With complementary marketing opportunities, crop diversification is intended to give a wider choice in the production of variety of crops in a given area so as to expand production related activities on various crops and also to lessen risk.It is generally viewed as a shift from traditionally grown less remunerative crops to more remunerative crops (Hazra, C.R.2001). It was determined for quantifying the level of diversity based on the number of species or varieties of crop grown in last year for nine (9) different types of enterprise (crop, livestock and fisheries) as mentioned in the interview schedule (Appendix X, Item No.9) on the following basis:

Level of agricultural diversification	Score
more (>4 species)	3
medium (3-4 species)	2
less (1-2 species)	1
not at all (0 species)	0

For determining the score of agricultural diversification of a respondent farmer, scores obtained from all the nine (9) categories of enterprises were added together. Thus, the possible range of agricultural diversification score of the respondent farmers were 0-27, where ‘0’ indicated no diversity and ‘27’ indicated highest diversity.

3.8.10 Agricultural experience

An agricultural experience of respondent farmer was measured by the length of the time (year) of his/her agricultural activities up to the time of interview. It was expressed in years (Appendix X, Item No.10).

3.8.11 Leadership trait

A leader usually leads by engaging in any organization in and around his surroundings for various purposes. Leadership trait of a respondent farmer was measured by his/her four alternative nature of participation viz. ‘Executive Officer’, ‘Executive Member’, ‘General Member’ and ‘Not involved’ in eight (8) different types of organizations. Weights were assigned to these alternative natures of participation as 3, 2, 1 and 0. Level of leadership of a respondent was finally measured by adding the scores obtained by him/her from all the eight (8) types of organization. Thus, the possible score of leadership of respondents was ranged from 0 to 24, where ‘0’ indicated no leadership trait and ‘24’ indicated highest leadership trait (Appendix-X, Item No.11).

3.8.12 Extension contact

Extension contact is expressed as the degree of contact of an individual with different extension media (individual, group and mass) for varieties of purposes including sharing of ideas for agricultural activities. A total of 21 extension media of individual, group and mass contact were considered for the study. Each of these media was administered to the respondents with five (5) alternative responses as ‘regular’, ‘often’, ‘occasional’, ‘rare’ and ‘not at all’ contact and scores were assigned to this alternatives responses as 4, 3, 2, 1, and 0. Logical frequencies of contact was considered for each of alternative responses of each of 21 media as shown in the interview schedule (Appendix X, Item No.12). Finally, extension contact of a respondent was measured by summing up all the scores obtained by him/her from all the 21 extension media. Thus, the possible score of extension contact of the respondents was ranged from 0 to 84, where ‘0’ indicated no extension contact and ‘84’ indicated highest extension contact.

3.8.13 Decision making ability

Decision making ability of a respondent was measured by using a 3 point rating scale. Each respondent was asked to indicate the extent of his/her decision making ability in each of the seven selected items by checking any one of the responses viz. 'able to make self decision', 'able to make decisions with the family members' and 'able to make decisions with outsiders of the family'. The weights were assigned to the responses as 3, 2 and 1 for the alternative responses respectively. Finally, decision making ability of a respondent was computed by summing up all scores obtained by him/her from all the seven (7) items of decision. Thus, decision making ability scores of the respondents could range from 7 to 21, where ‘7’ indicated lowest decision making ability and ‘21’ indicated highest decision making ability (Appendix X, Item No.13).

3.8.14 Aspiration

Marriam-Webster dictionary defines aspiration as having or showing a desire to achieve a high level of success or social status. The researcher in the present study constructed a 20-item aspiration scale based on the aspiration scale developed by Ali (2008) with slight modification and addition of items as shown in the interview schedule (Appendix X, Item No.14). To have clear response from the farmers, the items were provided with five point response categories weighed from 0-4 indicating low to high level of aspiration. Level of aspiration score of a respondent was determined by adding the scores for his/her responses to all the items in the scale. Thus, aspiration score of a respondent could range from 0 to 80, while ‘0’ indicated no aspiration and ‘80’indicated highest aspiration.

Validity of aspiration scale: The items of aspiration scale were collected from the scale developed by AIi (2008) with slight modification and addition of items. Modification and addition of items were done carefully by thorough consultation with the Advisory Committee and other relevant Experts. Thus, the items included in the scale were represented the universe of content of aspiration. Accordingly, the content validity was built in the process of constructing the scale.

Again, validity of aspiration scale was measured by the relationships between the scores of individual items of aspiration and the composite aspiration score of 36 farmers by taking 6 from each of 6 Upazilas of the study area (Based on pretest data). The coefficients of correlation between the scores of individual items and the composite aspiration score were found to be 0.591, 0.642, 0.603, 0.334, 0.375, 0.746, 0.547, 0.608, 0.829, 0.340, 0.599, 0.648, 0.607, 0.334, 0.375, 0.744, 0.543, 0.602, 0.821 and 0.345 which were significant at 0.000 to 0.05 levels with 34 degrees of freedom. On the basis of the procedure followed, it could be said that the aspiration scale had content validity.

Reliability of aspiration scale: The reliability of aspiration scale was measured by split-half method. On the basis of a pretest data of 36 farmers (by taking 6 from each of 6 Upazillas), all the 20 items of aspiration scale were divided into 2 equal halves. The scale had two sets of items each having 10 items, one with odd numbers and the other with even numbers. The coefficient of correlation between the two sets of score was computed and the value was found to be significant (0.759) at 0.000 level with 34 degree of freedom. The reliability co-efficient, thus obtained indicated that the 'internal consistency' of aspiration scale developed for the present study was high.

3.8.15 Risk bearing ability

According to The Economic Times (22 Nov, 2017), it could be stated that risk bearing ability refers to the practice of identifying potential risks in advance, analyzing them and taking precautionary steps to reduce the risk. When an entity wants to make a decision, it exposes itself to a number of risks either financial or alike. The quantum of such risks depends on many things. In case of agricultural decisions, the areas are elongated from seed sowing to harvest and also to market and consumption. In the present study, risk bearing ability scale was developed with some modification of the items of the scale developed by Ali (2008). Modifications of items were done after thorough consultation with the Advisory Committee of the Researcher, reviewing of literatures and discussion with extension experts. As such, 12 statements containing 7 positive and 5 negative were considered for the scale. Each of these 12 statements were administered to the respondents with five (5) alternative choices of responses viz. `strongly agree` , `agree` , `no opinion`, `disagree` and `strongly disagree`. Weights were assigned to these five alternative responses as 4,3,2,1 and 0 respectively for the positive statements. The weighing system was reversed for the negative statements. Risk bearing ability score of a respondent was finally determined by adding all the scores obtained by him/her against all the 12 statements. As a result, score risk bearing ability of the respondents could range from 0 to 48 while ‘0’ indicating no risk bearing ability and ‘48’ indicating high risk bearing ability (Appendix X, Item No.15).

Validity of risk bearing ability scale: The statements of the scale was obtained from the scale developed by Ali (2008) with slight modification after thorough consultation with Advisory Committee and other relevant experts and reviewing of relevant literatures The statements were examined carefully in the light of 14 criteria suggested by Edwards (1957). The statements indicating at different phases of risk orientation were representing a broad universe of opinion regarding agricultural risk. Accordingly, the content validity was built in the process of constructing the scale.

Again, validity of risk bearing ability scale was measured by the relationships between the scores of each of 12 individual statements of the scale and the composite risk bearing ability score of 36 farmers by taking 6 from each of 6 Upazilas of the study area (Based on pretest data). The coefficient of correlations between the scores of each of 12 individual statements and the composite score of risk bearing ability scale were found to be 0.449, 0.682, 0.345, 0.544, 0.798, 0.522, 0.757, 0.458, 0.779, 0.830, 0.361 and 0.616 which were significant at 0.000 to 0.05 level with 34 degree of freedom. On the basis of the procedure followed, it could be said that the risk bearing ability scale had content validity.

Reliability of risk bearing ability scale: The reliability of risk bearing ability scale was measured by split-half method. On the basis of pretest data of 36 farmers (by taking 6 from each of 6 Upazilas of the study area), all the 12 statements of risk orientation scale were divided into 2 equal halves. The scale had two sets of statements each having 6 statements, one with odd numbers and the other with even numbers. The coefficient of correlation between the two sets of score was computed and the value was found to be significant (0.637) at 0.000 levels with 34 degree of freedom. The reliability co-efficient, thus obtained indicated that the 'internal consistency' of the risk bearing ability scale developed for the present study was high.

3.8.16 Training exposure

Training exposure of respondent (Appendix X, Item No.16) was measured by the total number of days of training related to agriculture or associated areas received by him/her in his/her entire life organized by different organizations. A score of one (1) was assigned for each day of training received.

3.8.17 Sincerity status in FFS

Five (5) areas like i) attendance in Farmers Field School (FFS), ii) taking part in day`s activities, iii) sharing of experiences, iv) regular field visit/observation, and v) implementation of learning in own fields were considered to measure the sincerity in FFS(Appendix X, Item No.17) . The items were administered to the respondents with three (3) alternative responses as 'regular' 'occasional' and 'rare' involvement and weights were assigned for the alternatives responses as 3, 2, and 1 respectively. Finally sincerity in FFS of a respondent was determined by adding all the scores obtained by him/her against all the five (5) items of sincerity status. Thus, the possible score of sincerity status in FFS of the respondents could range from 5 to 15, while '5' indicated lowest sincerity status and '15' indicated highest sincerity status in FFS.

3.9 Measurement of the dependent variable

Effectiveness of Farmer to Farmer Training (FFT) was the dependent variable of the study. Farmer to Farmer Training meant the season-long training imparted by a pair of trained farmers i.e. Farmer Facilitator (FF) through the Farmer Field School (FFS) approaches to develop Knowledge, Attitude, Skill and Application of a group of farmers. The training was conducted on integrated farm management covering eight modules and associated issues of the farm enterprises like i) field crop (rice), ii) homestead garden (vegetable and fruits), iii) poultry rearing, iv) big ruminants (cow), v) small ruminants (goat), vi) fisheries, vii) nutrition, and viii) farmers organization and social issues. Finally, Effectiveness of FFT as perceived by the respondent farmers was measured by the addition of the scores of: i) Knowledge on the content of the modules, ii) Attitude towards the contents of the modules, iii) Skill on the practices of the modules, and iv) Practices on the technological contents of the modules.

Collection of items: For knowledge assessment, as suggested by Bloom's Taxonomy, 6 levels namely ‘remembering’, ‘understanding’, ‘applying’, ‘analyzing’, ‘evaluating’ and ‘creating’ were considered. Three (3) questions relevant to each of the six levels from each of the eight modules were collected. Thus, a total of 144 questions were set by taking 3 for each level of knowledge from each of eight (8) modules. For attitude assessment, a total of 64 statements were set by taking 8 for each of the eight (8) modules. For the assessment of skill of respondent farmers, a total of 48 inquiries were set by taking six (6) from each of the eight modules. For practice assessment, a total of 48 practices were set by taking six (6) from each of the eight (8) modules.

Judges’ rating: Each item (question for knowledge test /statement for attitude scale /query for skill test /practice for application) was attached with the 9 point continuum for judging the appropriateness of the items and sent to the Judges. Judges were requested to mention their opinions in 9-point appropriateness continuum against each of the items.

The Judges were selected from different agricultural universities as process experts and from Department of Agricultural Extension as Subject Matter Specialists. Letter to Judges from the Chairman of the Advisory Committee of the present Researcher appears in Appendix-XI. Out of 36 Judges, 28 replied. Therefore, the responses of 28

Judges were retained for selection of items from different modules to measure the Effectiveness of FFT for disseminating information through determining Knowledge, Attitude, Skill and Practice regarding FFT modules. Upon receipt of opinions of the Judges, Appropriateness Index (AI) of each of the items of each of Knowledge, Attitude, Skill and Practice domains were determined by using the following formulae:

$AI = 9xf_9+8xf_8+7xf_7+6xf_6+5xf_5+4xf_4+3xf_3+2xf_2+1xf_1$

Where,

f_9= No. of Judges mentioned their opinions as the respective item was most appropriate i.e. No. of Judges mentioned their opinion by giving 9 score out of 9

f_8 = No. of Judges mentioned their opinion by giving 8 score out of 9

f_7 = No. of Judges mentioned their opinion by giving 7 score out of 9

f_6= No. of Judges mentioned their opinion by giving 6 score out of 9

f_5= No. of Judges mentioned their opinion by giving 5 score out of 9, i.e. No. of judges mentioned their opinions as the respective item was moderate appropriate

f_4= No. of Judges mentioned their opinion by giving 4 score out of 9

f_3= No. of Judges mentioned their opinion by giving 3 score out of 9

f_2= No. of Judges mentioned their opinion by giving 2 score out of 9

f_1= No. of Judges mentioned their opinion by giving 1 score out of 9, i.e. No. of judges mentioned their opinions as the respective item was least appropriate

Determination of knowledge score: For determination of knowledge on the contents of the training modules, multiple choice type questions were set for six levels (remembering, understanding, applying, analyzing, evaluating, and creating) of knowledge test as per Bloom's Taxonomy. Initially there were 3 questions for each levels from each of eight (8) modules. Thus, a total of 144 questions (3 questions x 6 levels x 8 modulus) were collected and sent to the judges to measure the appropriateness of the questions. After judge's rating as per descending order of the Appropriateness Index (AI), 2 questions were finally selected for each level from each of the eight (8) modules. Thus, a total 96 questions (2questions x 6 levels x 8 modulus) were finally selected to test the knowledge of the respondents on the contents of the modules items. A score of one (1) was assigned for each correct answer and zero (0) for wrong answer or no answer. Thus, the possible knowledge score of the respondents could range from 0 to 96, where '0' indicated very poor knowledge and '96' indicated highest knowledge on the contents of the modules.

Determination of attitude score: Initially, 64 statements were collected by taking eight (8) from each of eight (8) modules for measuring the attitude of the respondents towards the contents of the modules. The statements were carefully examined in the light of 14 criteria suggested by Edwards (1957). These statements were sent to judges to test the appropriateness of the statements. After Judges' rating, based on the descending order of the Appropriateness Index (AI), 3 statements were selected for each module. Thus, a total of 24 statements (3 statements x 8 modules) were finally selected to measure the attitude of the respondents towards the contents of the modules. To quantify the level of agreement with each statement, Liekert's technique of summated ratings was used. Out of these 24 statements, 12 were positive and another 12 were negative statements. Each of 24 statements were administered to the respondent farmers with five (5) alternative choices of responses viz. 'strongly agree', 'agree', 'neutral', 'disagree' and 'strongly disagree'. Weights were assigned to these five alternate responses as 4, 3, 2, 1 and 0 respectively for the positive statement and weighting system was reversed for the negative statements. Thus possible range of score of attitude of the respondent farmers towards the content of the modules was 0-96, where '0' indicated lowest unfavorable attitude, '48' indicated neutral attitude and '96' indicated highest favorable attitude towards the content of the modules.

Determination of skill score: For determination of skill on the practices of the modules, initially a total of 48 queries were collected by taking six (6) from each of the eight (8) modules and sent to the Judges. After Judges 'rating, based on the descending order of the Appropriateness Index (AI), four (4) queries were finally selected from each module. Thus, finally, a total of 32 queries were selected by taking four (4) from each of eight (8) modules to determine the skill performance of the respondent farmers on various practices of the modules. To qualify the level of skill, each of the these 32 queries were administered to the respondent farmers to know the level of their skill with four alternative responses as 'high skill' , 'medium skill', 'low skill' and 'no skill'. Weights were assigned to theses alternative responses as 3, 2, 1 and 0 respectively. Thus, the possible range of skill of the respondent farmers on different practices of the modules was 0-96, where ‘0’ indicated no skill and ‘96’ indicated highest skill.

Determination of practice score: Initially 48 practices were collected by taking 6 from each of eight (8) modules to determine the level of practice on technological contents of the modules by the respondent farmers and sent to the Judges to test the appropriateness of the practices. After Judges’ rating, based on the descending order of the Appropriateness Index (AI), four (4) practices were finally selected from each module. Thus, a total of 32 practices were finally selected by taking four (4) from each of eight (8) modules to determine the level of practice of the respondent farmers on the technological contents of the modules. To quantify the level of practice on each of the 32 technological contents were administered to the respondent farmers with four (4) alternative choices of respondents *viz.* 'regular practice ', 'moderate practice ', 'rare practice ', and 'no practice'. Weights were assigned to those alternative responses as 3, 2, 1 and 0 respectively. Thus, the possible range of practice score of the practices was 0-96, where ‘0’ indicated no practice and ‘96’ indicated highest practice.

Determination of Effectiveness of FFT: Effectiveness of Farmer to Farmer Training Score was finally determined by the addition of the Scores obtained from Knowledge, attitude, skill and application scores. Thus, the possible score of Effectiveness of FFT was ranged from 0-384, where ‘0’ indicated no effectiveness and ‘384’ indicated highest effectiveness of FFT.

3.9.1 Validity and reliability of FFT

Effectiveness of Farmer to Farmer Training (FFT) was measured by the addition of scores of four dimensions. The validity and reliability of the scale of the four dimensions are described in following sub-sections.

Validity of knowledge scale: Questions for determining degree of knowledge of the respondent farmers on the contents of the training modules were collected mainly from the "Integrated Farm Management Farmers Field School Guidebook (IFMFFS Guidebook). It was found encouraging that DANIDA funded IFM component developed the guidebook on the basis of many year's field experience. Literature reviewed revealed that many FFS implementing agencies has no written guidebook to be followed by FFs. Khaila (2015) observed that most organizations (60 percent) do not have written guidelines for their field staff on how to use the farmer-to-farmer approach. Only 28 percent of the organizations indicated that they have guidelines that the field staff can use. The DAES does have guidelines on the use of the farmer-to-farmer extension approach, but many organizations reported that they were not aware that DAES had developed guidelines that they could use as a basis for developing their own. The lack of guidelines on using the approach leads to a diversity of practices that organizations label as farmer-to-farmer extension, making it difficult to monitor and evaluate the quality of extension services provided to farmers.

But the IFMC had a well designed guidebook on IFMFFS (Appendix. XII).The IFM FFS Guidebook was thoroughly consulted with the Advisory Committee of the Researcher and other relevant Experts. Then, three (3) questions for each levels (remembering, understanding, applying, analyzing, evaluating, and creating) from each of eight (8) modules were collected. Thus, a total of 144 questions (3 questions x 6 levels x 8 modulus) were collected and sent to the judges to measure the appropriateness of the questions. After judge's rating as per descending order of the Appropriateness Index (AI), 2 questions were finally selected for each level from each of the eight (8) modules. Thus, a total 96 questions (2 questions x 6 levels x 8 modules) were finally selected to test the knowledge of the respondents on the contents of the modules items. Aforesaid discussion indicates that the content validity was built in the process of constructing the scale. Hence, it was assumed that the scores obtained by administering this test measured the knowledge of the respondents on the content of the modules as intended.

Again, validity of knowledge scale was measured by the relationships between the scores of individual questions of knowledge and the composite knowledge score of 36 farmers by taking 6 from each of 6 Upazilas of the study area (based on a pre-test data). The coefficient of correlations between the scores of 96 individual questions of knowledge and the score of composite knowledge of the scale were found to be 0.423, 0.436, 0.343, 0.492, 0.390, 0.445, 0.432, 0.443, 0.488, 0.486, 0.437, 0.412, 0.486, 0.462, 0.338, 0.523, 0.309, 0.363, 0.479, 0.417, 0.448, 0.307, 0.436, 0.473, 0.423, 0.436, 0.343, 0.492, 0.390, 0.445, 0.432, 0.443, 0.488, 0.486, 0.437, 0.412, 0.486, 0.462, 0.338, 0.523, 0.309, 0.363, 0.479, 0.417, 0.448, 0.307, 0.436, 0.473, 0.423, 0.436, 0.343, 0.492, 0.390, 0.445, 0.432, 0.443, 0.488, 0.486, 0.437, 0.412, 0.486, 0.462, 0.338, 0.523, 0.309, 0.363, 0.479, 0.417, 0.448, 0.348, 0.413, and 0.469 which were significant at 0.000 to 0.05 level with 34 degrees of freedom. On the basis of the procedure followed, it can be assumed that the knowledge scale had content validity. Therefore, the scale may be taken as valid instrument to measure the knowledge of the farmers on the contents of the modules.

Reliability of knowledge scale: The reliability of knowledge scale was measured by split-half method. The scale was administered to 36 farmers by taking 6 from each of 6 Upazilas of the study area (based on pre-test data). All the 96 items of the knowledge scale were divided into 2 equal halves. These two sets of items, each having 48 items, one with odd numbers and the other with even numbers were the major two components of the scale. The coefficient of correlation between the two sets of score was computed and the value was found to be strongly significant (0.768) at 0.000 levels with 34 degrees of freedom. The reliability co-efficient, thus obtained indicated that the ‘internal consistency’ of the knowledge scale developed for the present study was quite high.

Validity of attitude toward contents of the modules scale: Mahaliyanaarachchi *et. al.* (2006) opined that measuring attitudes as a psychological natural tendency provides a basis for planning and also affects desirable changes in the existing system.

The content of the scale was obtained from the IFMFFS Guidelines and by discussion with FFS experts and extension specialists, and review of previous studies made in this connection. Initially, 64 statements were collected by taking eight (8) from each of eight (8) modules for measuring the attitude of the respondents towards the contents of the modules. The statements indicated different phases of attitude towards the contents of the modules representing a broad universe of opinion collected mainly from IFMFFS Guidelines and other different sources. The statements were carefully examined in the light of 14 criteria suggested by Edwards (1957). These statements were sent to judges to test the appropriateness of the statements. After Judges' rating, based on the descending order of the Appropriateness Index (AI), 3 statements were selected for each module. Thus, a total of 24 statements (3 statements x 8 modules) were finally selected to measure the attitude of the respondents towards the contents of the modules. Accordingly, the content validity was built in the process of constructing the scale.

Again, validity of attitude towards the contents of the modules scale was measured by the relationships between the scores of individual statements of attitude towards the contents and the composite attitude towards the contents score of 36 farmers by taking 6 from each of 6 Upazilas of the study area on the basis of pre-test final data. The coefficient of correlations between the score of each of individual 24 items of attitudes and the score of composite attitude scale were found to be 0.476, 0.381, 0.453, 0.412, 0.341, 0.467, 0.569, 0.543, 0.541, 0.584, 0.521, 0.437, 0.472, 0.383, 0.454, 0.412, 0.341, 0.467, 0.569, 0.547, 0.541, 0.584, 0.521, and 0.538 which were significant at 0.000 to 0.05 level with 34 degrees of freedom. On the basis of the procedure followed, it could be said that the attitude towards the content of the modules scale had content validity. Therefore, the scale may be taken as valid instrument to measure the attitude towards the content of the modules of IFMFFS Guideline.

Reliability of attitude towards the contents of the modules scale: The reliability of attitude towards the contents of the modules of IFMFFS Guideline scale was measured by split-half method. On the basis of pretest data of 36 farmers (by taking 6 from each of 6 Upazilas), all the 24 statements of attitude scale were divided into 2 equal halves. The scale had two sets of statements each having 12 statements, one with odd numbers and the other with even numbers. The coefficient of correlation between the two sets of scores was computed and the value was found to be significant (0.496) at 0.000 level with 30 degree of freedom. The reliability co-efficient, thus obtained indicated that the 'internal consistency' of the attitude towards the contents of the IFMFFS Guideline scale was high.

Validity of skill of performance scale: Initially, a total of 48 queries were collected by taking six (6) from each of the eight (8) modules to determine the skill performance of the respondent farmers on various practices of the modules. The queries were collected from the IFMFFS Guidebook after through consultation with the Advisory Committee of the Researcher. These were then sent to the Judges. After Judges' rating, based on the descending order of the Appropriateness Index (AI), a total of 32 queries were selected by taking four (4) from each of eight (8) modules to determine the skill performance of the respondent farmers on various practices of the modules. Therefore, the content validity was built in the process of constructing the scale.

Again, validity of skill of practices scale was measured by the relationships of the scores of each of the individual queries of practices with the score of composite skill of practices of 36 farmers by taking 6 from each of 6 Upazilas of the study area on the basis of pre-test final data. The coefficient of correlations between the score of each of individual 32 queries and the score of composite skill of practices scale were found to be 0.576, 0.384, 0.4594, 0.613, 0.446, 0.466, 0.579, 0.548, 0.591, 0.510, 0.511, 0.432, 0.473, 0.384, 0.455, 0.416, 0.371, 0.468, 0.519, 0.340, 0.741, 0.583, 0.432, and 0.622 which were significant at 0.000 to 0.05 level with 34 degrees of freedom. On the basis of the procedure followed, it could be said that the skill of practices of the content of the modules scale had content validity. Therefore, the scale may be taken as valid instrument to measure the skill of practices of the content of the modules of IFMFFS Guideline.

Reliability of skill of performance scale: The reliability of skill of practices scale was measured by split-half method. The scale was administered to 36 farmers by taking 6 from each of 6 Upazilas of the study area. All the 32 queries of practices scale were divided into 2 equal halves. The scale had two sets of items each having 16 items, one with odd numbers and the other with even numbers. The coefficient of correlation between the two sets of scores was computed and the value was found to be significant (0.615) at 0.000 level with 34 degree of freedom. The reliability co-efficient, thus obtained indicated that the 'internal consistency' of the skill of practices scale developed for the present study was high.

Validity of practice of performance scale: Initially 48 practices were collected by taking 6 from each of eight (8) modules to determine the level of practice of the practices by the respondent farmers. The practices were collected from the IFMFFS Guidebook after through consultation with the Advisory Committee of the Researcher. These were then sent to the Judges to test the appropriateness of the practices. After Judges' rating, based on the descending order of the Appropriateness Index (AI), four (4) practices were finally selected from each module. Thus, a total of 32 practices were finally selected by taking four (4) from each of eight (8) modules to determine the level of practice of the respondent farmers on the technological contents of the modules. Therefore, the content validity was built in the process of constructing the scale.

Again, validity of practices scale was measured by the relationships of the scores of each of the individual practices of the contents with the score of composite practices of the contents of 36 farmers by taking 6 from each of 6 Upazilas of the study area on the basis of pre-test final data. The coefficient of correlations between the score of each of individual 32 practices and the score of composite practices scale were found to be 0.479, 0.382, 0.454, 0.413, 0.345, 0.466, 0.579, 0.548, 0.591, 0.510, 0.511, 0.432, 0.473, 0.384, 0.455, 0.416, 0.371, 0.468, 0.519, 0.540, 0.541, 0.582, 0.523, and 0.534 which were significant at 0.000 to 0.05 level with 34 degrees of freedom. On the basis of the procedure followed, it could be said that the practices on the content of the modules scale had content validity. Therefore, the scale may be taken as valid instrument to measure the level of practices of the content of the modules of IFMFFS Guideline.

Reliability of practice of performance scale: The reliability of practice of practices scale was measured by split-half method. The scale was administered to 36 farmers by taking 6 from each of 6 Upazilas of the study area. All the 32 practices of application scale were divided into 2 equal halves. The scale had two sets of items each having 16 items, one with odd numbers and the other with even numbers. The coefficient of correlation between the two sets of scores was computed and the value was found to be significant (0.516) at 0.000 levels with 34 degree of freedom. The reliability co-efficient, thus obtained indicated that the 'internal consistency' of the practices scale developed for the present study was high.

3.10 Data Collection

For the study, data were collected by means of interviewing with the sample respondents. The researcher himself collected the data by using interview schedule to maintain the quality. Before going to the respondents for interview, helps were taken from respective Upazila extension agents working at field level to ensure the availability of the sample respondents. A request letter (Appendix. XIII) from the Chairman of the Supervisory Committee was send to the Component Management Unit (CMU) of IFMC seeking help from the field staff of project areas. Similarly a letter (Appendix-XIV) was issued from CMU to the Regional Coordinators for proving help as necessary for data collection. While starting interview with any respondent, the researcher took all possible care to establish rapport with them so that s/he does not feel hesitant to furnish data. A commendable corporation was obtained from all the respondents during data collection. The questions were explained and clarified whenever any respondent failed to understand. The interviewing time was fixed on the basis of the farmers' less involvement in the field activities and carried out during September 2016 to October of 2017. Besides, adequate measures were taken to make the information valid and reliable in order to make them meaningful for the study.

For having selves-disclosing and in-depth information and ideas, six FGDs (One FGD in each Upazila) were arranged with FFS farmers during October 2017.

In IFMFFS, FFs were the ultimate implementers and DTs were the developers of FF and monitors of FFS conducted by FF. Effectiveness of FFT also dependent too many extents on the quality of FF. The opinions of DTs were of immense value to determine the extent of dissemination and effectiveness of farmer to farmer training. Their opinions mirrored immense significance as because FFs' training, monitoring and backstopping were carried out by them. So, FFs were evaluated on the basis of opinions collected through Key Informant Interview (KII) of departmental trainers (DT) working in the Department of Extension (DAE) as well as in the IFMC project dealing with the FFS issues. So, 23 DTs were interviewed during May 2017. The list of DTs is attached in (Appendix- XV).

Photo 3.1 Interviewing farmer

Photo 3.2 Interviewing farmer

Case studies, in their true essence, explore and investigate contemporary real-life phenomenon through detailed contextual analysis of a limited number of events or conditions, and their relationships (Zaidah Zainal, 2007). It is the microscope of social research (Bhuiyan 2018).To make holistic views of farmer to farmer training situation and to investigate certain phenomena in this regard, one case study on a successful farmer facilitator and one case study on the successful IFMFFS farmer were conducted. Some predetermined interview guides and cell phone recorder were used for conducting the case studies. Several visits were paid to collect information and records regarding their achievements.

3.11 Integration of Quantitative and Qualitative Results

After collection, the quantitative and qualitative data were analyzed, and integrated. Two methods are used to integrate quantitative and qualitative data in a mixed methods of study. In the first method, the Researcher transforms qualitative data into quantitative data and analyze the results. In the second method, the Researcher analyzes the quantitative and qualitative data separately and integrate the results to present the outcomes for the entire study (Creswell & plano Clark, 2007; Ivankova, Creswell, stick, 2006). The first method was used in this study. The sequential explanatory research design used in this study provides the researcher with an opportunity to explain quantitative findings with qualitative results and use qualitative results to fill in any gaps that exist in quantitative results (Creswell, J.W. and Plano Clark, V.L. (2007).

3.12 Hypothesis of the study

In the present study, the 17 selected characteristics of the farmers considered as independent variables. Effectiveness of farmer to farmer training including 4 dimensions, namely knowledge, skill, attitude and application was considered as dependent variable. The selected characteristics of the farmers (independent variables) might have contribution to the Effectiveness of Farmer to Farmer training. On this consideration, the following research hypothesis was formulated to conduct statistical treatment of the study:

"There was contribution of each of the selected characteristics of the farmers to the effectiveness of farmer to farmer training."

The selected characteristics of the respondent farmer were age, education, family size, net cropped area, cropping intensity, cultivated homestead area, agricultural annual income, agricultural commercialization, agricultural diversification, agricultural experience, leadership trait, extension contact, decision making ability, aspiration, risk bearing ability, training exposure, and sincerity status in FFS.

The research hypothesis was then transferred into null hypothesis as follows:
"There was no contribution of each of the selected characteristics of the farmers to the effectiveness of farmer to farmer training."

To compare the effectiveness of FFT as perceived by the trained and non-trained farmers, following null hypotheses was also formulated:
"There was no difference of effectiveness of FFT as perceived by trained and non-trained farmers."

3.13 Data processing and statistical tests

After compilation of the final data, the collected data were classified, tabulated and analyzed in accordance with the objectives of the study. Local units were converted into standard unit scales. In some cases, qualitative data were converted into quantitative data by means of suitable scoring to facilitate interpretation. A number of tables and figures were prepared keeping in view the objective of the study and for better clarification and easy understanding.

Descriptive statistics like possible and observed range, frequency and percentage distribution, mean, standard deviation, coefficient of variance and rank order were used. Both Microsoft Excel and Statistical Package of Social Science (SPSS) computer programs were employed in order to analyze the data.

Pearson Product Moment correlation test was initially done. Full model regression analyzing was also done. Due to misleading results from multicollinearity, stepwise multiple regression analysis was used to find out the contribution of the independent variables to the dependent variable.

Finally, path analysis was done to find out the direct and indirect effects of the independent variables on the dependent variables.

To compare the effectiveness of FFT as perceived by the Trained and Non-trained farmers, simple t-test was used.

In all statistical test 0.05 level of probability was used as the basis to reject or accept the null hypotheses.

CHAPTER 4

EFFECTIVENESS OF FARMER TO FARMER TRAINING

4.1 Effectiveness of Farmer to Farmer Training

Effectiveness of Farmer to Farmer Training (FFT) through Farmers Field School (FFS) was the main focus i.e. the dependent variable of the study. Integrated Farm Management Component, a project under the Department of Agricultural Extension (DAE) in Bangladesh is being operated through FFSs. Effectiveness of FFT was measured on the basis of the perception of the FFS trained farmers on four (4) dimensions like Knowledge, Skill, Attitude and Application regarding the content of Integrated Farm Management Farmer Field School (IFM FFS) guidelines described in Chapter 3 of this dissertation. Each of the four dimensions was measured against a set of questions having a possible score ranging from 0-96 as shown in the interview schedule (Item numbers 18, 19, 20 and 21). Finally, effectiveness of FFT as perceived by an individual FFS trained farmer was measured by adding the scores obtained by him/her against all the four dimensions having a possible score of 0-384, where ‘0’ indicates not effective at all and ‘384’ indicates highest effective of FFT. The salient features of these four dimensions and effectiveness of FFT are presented in Table 4.1 and described in the following sub-sections:

Table 4.1 Measuring unit, possible range and observed range of the selected dimensions of effectiveness of FFT

Dimensions	Measuring unit	Possible range	Observed range
Knowledge	Score	0-96	25-85
Skill	Score	0-96	18-93
Attitude	Score	0-96	42-77
Practice	Score	0-96	22-95
Overall Effectiveness of FFT	Score	0-384	132-337

4.1.1 Knowledge

The procedure followed in computing knowledge of the farmers on agricultural practice has been described in Chapter 3. Knowledge scores of the respondents or FFS trained farmers of the study area ranged from 25 to 85 against the possible range of zero (0) to 96. The mean, standard deviation and co-efficient of variation were 60.47, 13.70 and 22.66 percent respectively. According to observed range of knowledge score, the farmers were classified into three categories as follows:

Categories	Basis of categorization (score)
Low knowledge	Up to 32 (1st one-third of the possible range)
Medium knowledge	33-64 (middle one-third of the possible range)
High knowledge	65-96 (last one-third of the possible range)

Distribution of the respondent farmers based on the above categories is shown in Table 4.2.

Table 4. 3 Distribution of the respondent farmers according to their knowledge

Categories	Number	Percent	Mean	SD	CV
Low knowledge (25-44)	49	14.2	60.47	13.70	22.66 %
Medium knowledge (45-65)	157	45.5			
High knowledge (66-85)	139	40.3			
Total	**345**	**100**			

Data contained in Table 4.2 indicated that highest proportion (45.5 percent) of the farmers had medium knowledge, while 14.2 percent and 40.3 percent had low and high level of knowledge respectively. The data again revealed that the overwhelming majority (85.8 percent) of the farmers had medium to high level of knowledge on agricultural practices. It highlights the contribution of training in increasing farmers' knowledge.

Tesfaye *et. al.* (2010) found the t-test result clearly showed that the mean score knowledge of trained farmers on extension package was significantly higher ($p < 0.01$) than the mean score knowledge of untrained farmers. This confirmed that the training offered by EIAR was effective in terms of improving knowledge of farmers.

4.1.2 Skill

Skills development is a crucial element in improving the effectiveness with which individual or an organization operates their farm or any other business. In the current global arena, the farmers need to experience growth in terms of technical or potential capacity to perform certain functions. It can also be argued that skills development has a higher goal: to empower the individual and enable him to grow in his career (Johanson and Adams, 2004). In the literature on skills development programmes for agriculture, farmer field schools (FFS) have received particular attention, although the results reported have been mixed (Todo and Takahashi, 2013). FFS promoted by the Food and Agriculture Organization (FAO), a specialized agency of the UN, in one study showed that income had increased by 61 percent, that younger farmers were more likely to participate and that femaleheaded households benefited the most (Bennell, 2011). Gerard McElw (2005) stated that when we use the term skills, it actually need to mean as the management skill of the farmer. Thus management skills are the complete package of skills that a farmer would use in order to develop the farm as business. There are many dimensions of skills in farm activities. In an interesting Polish study of farmers' skills, Duczkowska-Małysz (1993) found that the entrepreneurial skills of farmers are mostly depending on their spouses' preferences. The more open to change are the spouses the more willing are the farmers themselves to take risk.

The procedure followed in computing skill of the farmers on agricultural practice has been described in Chapter 3. Skill scores of the respondent FFS trained farmers of the study area was ranged from 18 to 93 against the possible range of zero (0) to 96. The mean, standard deviation and co-efficient of variation were 58.89, 19.45 and 33.03 percent respectively. According to observed range of skill score, the farmers were classified into three categories as the following manner:

Categories	Basis of categorization (score)
Low skill	Up to 32 (1st one-third of the possible range)
Medium skill	33-64 (middle one-third of the possible range)
High skill	65-95 (last one-third of the possible range)

Distribution of the respondent farmers based on the above categories is shown in Table 4.3.

Table 4.4 Distribution of the respondent farmers according to their skill

Categories	Number	Percent	Mean	SD	CV
Low skill (18-42)	122	35.4	58.89	19.45	33.03 %
Medium skill (43-68)	114	33.0			
High skill (69-93)	109	31.6			
Total	**345**	**100**			

Data contained in Table 4.3 indicated that more or less one-third of the respondent farmers had low (35.4 percent), medium (33.0 percent), and high (31.6 percent) skill on agricultural practices. The data again revealed that about two-third (64.6 percent) of the farmers had medium to high skill on agricultural practices. The changes which occur as a result of skills development need to be addressed effectively. This requires new and more advanced or diverse skills from employees in addition to these employees being strategically deployed in their various roles (Clardy, 2007; Erasmus *et. al.* 2008).

4.1.3 Attitude

The procedure followed in computing attitude of the farmers towards agricultural innovations has been described in Chapter 3. Attitude scores of the respondent FFS trained farmers of the study area were ranged from 42 to 77 against the possible range of zero (0) to 96. The mean, standard deviation and co-efficient of variation were 59.87, 06.32 and 10.56 percent respectively. According to range of attitude towards agricultural innovations score, the farmers were classified into three categories as the following manner:

Categories	Basis of categorization (score)
Unfavorable and neutral attitude (up to 32)	(1st one-third of the possible range of favorable attitude)
Low favorable attitude (33-64)	(1st half of the possible range of favorable attitude)
Medium favorable attitude (65-96)	(last half of the possible favorable attitude)

Distribution of the respondent farmers based on the above categories is shown in Table 4.4.

Table 4.4 Distribution of the respondent farmers according to their attitude

Categories	Number	Percent	Mean	SD	CV
Unfavorable and neutral attitude (42-48)	14	4.1	59.87	06.32	10.5 %
Low favorable attitude (49-63)	255	73.9			
Medium favorable attitude (64-77)	76	22.0			
Total	**345**	**100**			

Data contained in Table 4.4 indicated that highest proportion (73.9 percent) of the farmers had low favorable attitude towards agricultural innovations, while 22.0 percent had high favorable attitude and rest 4.1 percent had unfavorable to neutral attitude towards agricultural innovations. The data again revealed that the overwhelming majority (95.9 percent) of the farmers had low favorable to medium favorable attitude towards agricultural innovations. This needs a impetus for the department and project people to focus the intervention which might increase farmers' attitude from lower to higher level. Motivational incentives and instructional program must be strengthened and continued. Attitude plays the pivotal role in forming knowledge and skill base of farmers. So, unless one develops favorable attitude, no substantial progress in knowledge and skill will be evident.

The comparison between attitude of trained and untrained respondents using paired difference test indicated that the attitude of trained farmers significantly ($p < 0.01$) improved by the training offered by the training centre (Tesfaye *et. al.* 2010).

4.1.4 Practice

The procedure followed in computing agricultural practice of the farmers has been described in Chapter 3. Agricultural practice scores of the respondent FFS trained farmers of the study area was ranged from 22 to 95 against the possible range of zero (0) to 96. The mean, standard deviation and co-efficient of variation were 57.36, 23.24 and 40.52 percent respectively. According to observed range of practice score, the farmers were classified into three categories as the following manner:

Categories	Basis of categorization (score)
Low practice (up to 32)	1st one-thirds of the possible range
Medium practice (33-64)	Middle one-thirds of the possible range
High practice (65-96)	Last one-thirds of the possible range

Distribution of the respondent farmers based on the above categories is shown in Table 4.5.

Table 4.5 Distribution of the respondent farmers according to their practice

Categories	Number	Percent	Mean	SD	CV
Low practice (22-45)	154	44.6	57.36	23.24	40.52 %
Medium practice (46-71)	47	13.7			
High practice (72-95)	144	41.7			
Total	**345**	**100**			

Data contained in Table 4.5 showed that nearly three fifths of the respondents perceived low to medium practice level. It revealed the need for more practices to make the FFS farmers more effective in different intervention as recommended by the project personnel as practice makes a man perfect. However, the data again revealed that the above half (55.4 percent) of the farmers had medium to high agricultural practices based on the knowledge, skill and attitude gained on agricultural technologies from FFT through FFS.

The mean score of practice of trained farmers on extension packages was found to be highly improved when compared to untrained farmers practice of the same extension package. The paired comparison between the mean score of practice of trained and untrained sampled farmers showed that trained farmers were able to perform better than untrained ones (Tesfaye *et. al.* 2010).

Though farmers have positive perception of technology, they faced problems in technology practice/application due to lack of capital, lack the direction from the government and extension, lack compensation policy in ensure of yield (Ainembabazi and Mugisha, 2014).

4.1.5 Overall effectiveness of FFT

The overall effectiveness of FFT as perceived by the respondent FFS trained farmers was computed by adding the scores from each of knowledge, skill, attitude and practice dimensions as described in Chapter 3. Effectiveness of FFT score as perceived by the respondent FFS trained farmers of the study area was ranged from 132 to 337 against the possible range of zero (0) to 384. The mean, standard deviation and co-efficient of variation were 230.77, 51.69 and 26.73 percent respectively. According to observed range of effectiveness score, the farmers were classified into three categories as the following manner:

Categories	Basis of categorization (score)
Low effective (132-199)	(1st one-third of the possible range)
Medium effective (200-269)	(middle one-third of the possible range)
High effective (270-337)	(last one-third of the possible range)

Distribution of the respondent farmers based on the above categories is shown in Table 4.6.

Table 4.6 Distribution of the respondent farmers according to their overall perception on effectiveness of FFT

Categories	Number	Percent	Mean	SD	CV
Low effective (up to 128)	127	36.8			
Medium effective (129-256)	103	29.9	230.77	51.69	26.73 %
High effective(257-384)	115	33.3			
Total	**345**	**100**			

Data contained in Table 4.6 indicated that 36.8 percent of the farmers perceived FFT as low effectiveness, while 29.9 percent perceived medium effectiveness and rest one-third (33.3 percent) of the respondent perceived high effectiveness of the FFT. Since, nearly 37 percent of the respondents had still perceived low effectiveness, there is yet to be done much activities in this regard to make FFT more effective. However, about two-thirds (63.2 percent) of the respondent FFS trained farmers perceived that the FFT through FFS of IFMC under DAE was medium to high effective.

As per Tesfaye *et. al.* (2010), in general, the knowledge, attitude and practice test clearly indicates that training significantly improved knowledge of farmers, improved attitude towards the packages and application of technology related to durum wheat, onion and potato production technology.

4.2 Inter-relationships among knowledge, attitude, skill and practice

The effectiveness of FFT as perceived by the respondent FFS trained farmers was computed by adding the scores from each of knowledge, skill, attitude and practice dimensions of the farmers regarding the content of Integrated Farm Management Farmer Field School (IFM FFS) guideline. On this consideration, attempt has been taken to determine the inter-relationship among the four dimensions and overall effectiveness of FFT. Pearson Product Moment correlation was done for this purpose. The result of inter-relationship among the four dimensions and effectiveness is shown in Table 4.7.

Table 4.7 Results of inter-relationship among the four dimensions of effectiveness and overall effectiveness of FFT (n=345)

	Knowledge	Skill	Attitude	Practice	Effectiveness
Knowledge	-				
Skill	0.285**	-			
Attitude	0.198**	0.569**	-		
Practice	0.501**	0.795**	0.475**	-	
Effectiveness	0.624**	0.881**	0.605**	0.943**	-

**Significant at the 0.01 level (2-tailed)

Findings of the Table 4.7 indicated that each of the four dimensions (Knowledge, skill, attitude, and practice) of the farmers considered for measuring effectiveness of

FFT had significant positive relationship with the overall effectiveness of FFT as perceived by them.

Again each of the dimensions had significant positive relationship with each dimension. It means agricultural knowledge of the trained farmers had significant relationship with their agricultural skill, attitude towards agricultural innovations and agricultural practices. Agricultural skill of the trained farmers had significant relationship with their agricultural knowledge, attitude towards agricultural innovations and agricultural practices. Attitude towards agricultural innovations of the trained farmers had significant relationship with their agricultural knowledge, skill, and practices. Similarly, Agricultural practice of the trained farmers had significant relationship with their agricultural knowledge, agricultural skill, attitude towards agricultural innovations and agricultural practices. It signifies that all dimensions of effectiveness were equally important.

Actually, training increases the ability of an individual to do his/her job properly. After taking training, the knowledge and skill on the subject matter of the trainee is increased, formed favorable attitude towards the matter, and finally s/he practiced the matter. These were the reasons for having significant positive inter-relation among the four dimensions and overall effectiveness of FFS based on the content of IFM FFS.

4.3 FFT Effectiveness as perceived by the trained and non-trained farmers

Integrated Farm Management Component (IFMC) of the Department of Agricultural Extension (DAE) in Bangladesh provided training to 148350 farmers through 2987 Farmer Field School (FFS) by Farmer Trainers. Out of which 345 trainee farmers were selected as the sample of the study from six upazilas of six districts by taking 60 from each of five Upazilas and 45 from one Upazila for measuring the effectiveness of the FFT as perceived by the trained farmers. Effectiveness of FFT was measured by adding the scores of four dimensions like agricultural knowledge, skill, attitude towards agricultural innovations and agricultural practices. Attempt has been made to compare the effectiveness of FFT as perceived by the FFS trained farmers and no-trained farmers. For this purpose, 51 non-trained farmers were selected from the areas of same Upazilas where no FFS was established by taking 9 from each of five Upazilas and 6 from one Upazila. Independent sample t-test was run to compare the effectiveness of the FFT and the results are shown in Table 4.8.

Table 4.8 Results of independent sample t-test for comparing the Effectiveness of FFT as perceived by trained and non-trained farmers

Category	N	Mean	Std. Deviation	Std. Error Mean
Trained	345	230.77	51.69	2.78
Non-Trained	51	174.53	87.30	12.22

FLevene's Test for Equality of Variances	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Differenc e	95% Confidence Interval of the Difference	
							Lower	Upper
102.12	.000	6.53	394	.000	56.24	8.62	39.30	73.19

Findings of the independent sample t-test revealed that there was statistically highly significant (t= 6.53 at 394 df) difference of effectiveness of FFT as perceived by the trained and non-trained farmers. Trained farmers perceived higher effectiveness of FFT than non-trained farmers. The mean of effectiveness of trained and non-trained farmers were 230.77 and 174.53 respectively. The mean difference was 56.24. The value of t was 6.53 which was significant at 0.01 level at 394 degree of freedom. It means that the training provided by Farmer Facilitators under IFMC through FFS was very effective for disseminating agricultural innovations. Through this trainings, farmers gained agricultural knowledge and skill, formed favorable attitude towards agricultural innovations. As a result, they started agricultural practices as per IFM FFS guidelines. The more training they got, the more effectiveness was perceived as such training may be considered as an essential component for improving effectiveness of the farmers.

4.4 Determining FFS farmers' opinions through Focus Group Discussion and Key Informant Interview

Focused Group Discussion

A focus group is a form of qualitative data extraction and perspective documentation tool in which a group of people from similar backgrounds or experiences are inquired open-ended reactions conveying, thoughts or feelings, perceptions, opinions, beliefs, attitudes and explanations towards a specific idea or a designated topic.

Six Focused Group Discussions (FGD) were conducted during October 2017 at the study areas to determine the FFS farmers' perception related to different issues of usefulness perceived by FFS modules, activities/ learning obtained from FFS. Questions were asked in an interactive group setting where participants were free to talk with other group members about IFM FFS activities. During the process, the researcher and his associated took notes and recorded the vital points getting from the group. Care was also taken to select members of the group carefully for effective and authoritative responses on FFS.

Participants in FGD: In each FGD, 25 IFM FFS farmers were participated. The participants were grouped into 5 groups by taking 5 in each group. Discussions following three dimensions as below were made in the FGD:

i. The importance of different modules in IFMFFS
ii. The usefulness of activities in IFMFFS
iii. The benefits received from practicing FFS activities

Photo 4.1 FGD with FFS farmers

Photo 4.2 FGD with FFS farmers

For first discussion, participants of each group were asked to identify IFMFFS modules as per importance. They did it by assigning points/ scores from 1 to 10 for each module on the basis of importance. Thus, total possible score of each modules could range from 0 to 100, where '0' indicated not at all important and '100' indicated highest important. Then all the modules marked by all the groups were accumulated on a separate sheet and were added together. For second issue, participants were asked to identify different activities/ learning obtained from FFS. Again they were asked to mark the activities out of 10 score on the basis importance. Then all the activities identified and marked by all the groups were accumulated on a separate sheet. Some activities/ items were common to all groups and some were different and there were 15 activities all together. In the next step, the scores of each activity/ item marked by all the groups were added together. Thus, total possible score of each item could range from 0 to 100, where '0' indicated not at all important and '100' indicated highest important item of activities learned in FFS.

For third issue, participants were asked to identify benefit levels from different activities/ learning obtained from FFS. Participants of each group were asked to identify ten IFMFFS activities from fifteen activities as per benefits through practicing. They did it assigning scores similarly as the first and second issues.

On the basis of the descending order of total obtained scores for first issue (importance of modules), second issue (activities/ learning obtained from FFS on the basis importance), and third issue (activities as per benefits through practicing) rank order was made. These findings are presented in the following Table 4.9, 4.10, and 4.11.

Table 4.9 Rank order of designated modules in IFMFFS as per importance

Items/ Modules	**Score from each FGD**						**Obtained total score**	**Rank order**
	FGD1	FGD2	FGD3	FGD4	FGD5	FGD6		
Rice	82	82	86	80	84	82	496	**1**
Poultry	83	81	77	81	83	84	489	**2**
Homestead garden	80	83	80	84	80	79	486	**3**
Small ruminants (goat)	75	68	75	70	80	78	446	4
Big ruminants (cow)	75	63	73	69	77	75	432	5
Nutrition	71	70	70	72	70	63	416	6
Fish culture	76	70	71	67	62	59	405	7
Farmer organization and social issues	60	58	65	65	67	60	375	8

From Table 4.9, it was found that on the basis of importance of different modules in IFMFFS, FFS farmers ranked the rice module, poultry modules and homestead gardening as 1st, 2nd and 3rd respectively.

Table 4.10 Rank order of activities in IFMFFS as per usefulness

Items/ Modules	Score from each FGD						Obtained total score	Rank order
	FGD1	FGD2	FGD3	FGD4	FGD5	FGD6		
Egg hatching pan (*Hazol*)management	90	89	82	87	90	88	507	**1**
Rice pest management	91	90	87	88	79	82	506	**2**
Seed management	80	84	82	79	82	90	497	**3**
Bad effect of pesticides	83	76	80	82	77	86	484	4
Farm yard manure	82	85	78	79	82	77	483	5
Pest management of vegetable and fruit trees	79	81	80	74	85	78	477	6
Quality cooking	80	78	80	84	77	69	468	7
Fertilizer management	77	78	80	77	83	72	467	8
Food requirement as per ages and functions	75	71	78	82	80	76	462	9
Beef fattening	78	78	80	81	68	70	455	10
Homestead planning	81	79	77	81	68	56	442	11
Food and housing management for poultry and goat	77	74	73	70	67	60	421	12
Supplementary food for fishes	65	74	72	77	62	60	410	14
Bagging of fruits	78	60	67	70	57	62	394	13
Fingerling release as per three layers of water level	60	68	70	58	54	61	371	15

From Table 4.10, it was observed that on the basis of usefulness of activities in IFMFFS, FFS farmers ranked the egg hatching pan management as the most useful followed by seed management and bad effect of pesticide .

Table 4.11 Rank order of the benefits received from practicing FFS activities

Items/ Modules	Score from each FGD						Obtained total score	Rank order
	FGD1	FGD2	FGD3	FGD4	FGD5	FGD6		
Egg hatching pan (Hazol) management	93	87	84	88	80	84	516	**1**
Bad effect of pesticides	81	86	89	85	80	90	511	**2**
Seed management	85	83	80	87	92	78	505	**3**
Rice pest management	92	89	76	90	81	76	504	4
Farm yard manure	79	87	80	78	83	87	494	5
Beef fattening	83	69	82	79	68	82	463	6
Homestead planning	83	76	82	77	78	64	460	7
Food requirement as per ages and functions	80	68	79	89	70	67	453	8
Fertilizer management	90	81	75	78	62	66	452	9
Pest management of vegetable and fruit trees	66	84	81	76	73	72	452	9

From Table 4.11, it was found that on the basis of perceived benefits received from practicing FFS activities, egg hatching pan management, bad effect of pesticides and seed management raked as 1st, 2nd and 3rd respectively.

Key Informant Interview

A number of twenty three DTs of vast working experiences in the department of extension with responsibilities of FFS monitoring and backstopping were interviewed as Key Informants with a short interview schedule (Appendix-XVI) and measured their opinions to determine their ideas on farmer facilitators. The profile of the key informants or departmental trainers were as below in Table 4.12.

Table 4.12 Profile of departmental trainers as opinion leaders about FF

Sl. No.	Age	Working experiences in extension department	FFS experiences	No. of FFS established	No. of FFS monitored and backstopped	No. of FFS ToT Facilitated	No. of RPW on FFS attended
1	41	17	03	00	80	04	08
2	48	24	16	50	59	26	12
3	39	12	04	0	100	02	08
4	38	16	08	0	40	05	10
5	48	20	15	32	100	15	20
6	40	02	03	0	100	07	08
7	40	02	05	0	80	04	08
8	41	02	05	40	150	04	06
9	47	19	15	40	69	18	16
10	49	23	18	00	13	05	05
11	48	22	16	13	125	58	12
12	35	06	05	32	12	12	04
13	50	21	10	30	100	32	12
14	53	29	12	36	88	00	12
15	50	26	16	00	60	00	40
16	52	31	14	100	30	00	40
17	55	33	14	28	32	00	30
18	30	07	05	00	08	00	04
19	32	10	08	10	04	00	04
20	37	10	08	03	06	00	02
21	37	22	09	14	22	00	10
22	46	27	06	20	17	00	05
23	32	05	02	00	03	00	01

Opinions of selected DTs about FFs were captured according to the main areas like fundamentals of adult and FFS learning, facilitation skill in running FFS, quality grades of FFS run by FF, attitudes towards FF. A brief findings of Key Informant Interview (KII) is presented in Figure 4.1, Table 4.13, Table 4.14, and Table 4.15.

Fundamentals of adult and FFS learning were determined considering 10 related key areas on the issues. The areas were adult learning principles, participatory discussion in FFS, ‘what is this and what is that’ technique (answering question through questions), group dynamics, motivational technique, managing different types of people in FFS, differences between a trainer and a facilitator, technological knowledge and application, adaptation with changed situation and time management.

Opinions on the issues were captured as percentage of FFs' knowledge and applying the principles of adult learning in FFS. The figure below (Figure 4.1) shows the opinions of DTs about FFs as per fundamentals of adult learning principles.

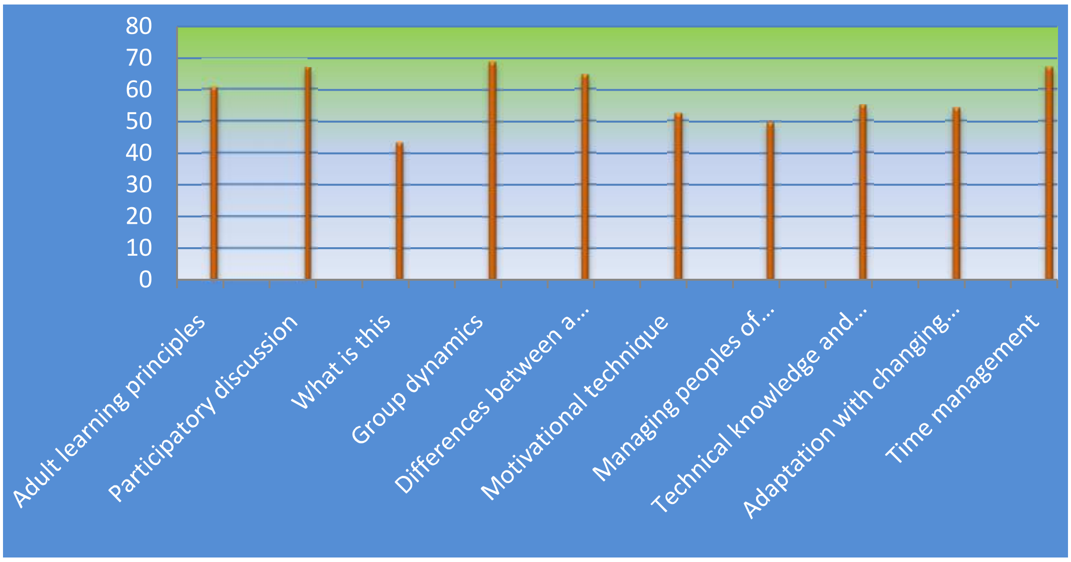

Fig. 4.1 DTs' opinions on the extent of FFs' grading as per fundamentals of FFS and adult learning approaches

Facilitation skill in running FFS was determined on the level of 11 areas of facilitation domain. These areas were theoretical concept analysis of the session, convincing farmers on the importance of the session, farmers' participation in the discussion, using training materials, participation of farmers in the field woks, trial plot setting, data collection from trials and analysis, identification of crop insect pests, identification of diseases, agro-ecosystem analysis and farm management analysis. To determining the score on level of facilitation, scores obtained from 11 areas of facilitation domain. The possible ranges of the level of facilitation skill expressed by the DTs were 11-55, where '0' indicated not at all skilled and '55' indicated very skilled level of facilitation. According to observed level of facilitation skill, FF could be categorized as the following manner (Table 4.13).

Table 4.13 Level of facilitation skill of FF

Categories	Score	Number(N=23)
Very low skilled	< 12	00
Low skilled	12-22	00
Moderately skilled	23-33	11
Skilled	34-44	12
Very skilled	>44	00

The level of facilitation by the FFs was found moderately skilled to skilled (nearly 50:50). There were no ‘very low’ or ‘low skilled’ level as per the opinions of DTs.

Quality grades of FFS run by FFs were determined by the categories mentioned in the FFS Monitoring Form of IFMC as ‘Excellent’, ‘Good’, ‘Satisfactory’, and ‘Improvement needed’ on the basis of some set criteria (here 12 criteria) like farmers selection by FFs, presence of farmers in the FFS, sitting arrangement , session planning and practice, methods of session conduction, trial plots set-up, fulfillment of trial objectives, agro-ecosystem or farm management analysis, making field decision, implementation of decision, documentation of FFS information and overall grade level of FFS. The possible ranges of the quality level of FFS run by FFs expressed by the DTs were 12-48, where ’12 ’ indicated ‘Improvement needed’ and ‘48’ indicated ‘Excellent’. According to the opinions as per criteria of grading, FFS run by FFs, categories were developed as the following manner (Table 4.14).

Table 4.14 FFS quality grade

Categories	Score	Number(N=23)
Excellent	12-21	02
Good	22-31	17
Satisfactory	32-41	04
Improvement needed	42 and above	00

Out of 23 DTs, seventeen (74 percent) DTs opined that FFS run by FFs ranked as ‘Good’ and four DTs mentioned as ‘Satisfactory’, while only two DTs labeled FFS as ‘Excellent’.

The level of facilitation by the FFs was found moderately skilled to skilled (nearly 50:50). There were no ‘very low’ or ‘low skilled’ level as per the opinions of DTs.

Finally, attitudes of DTs towards FF were determined as per 10 statements (5 positives and 5 negatives) were set on different dimensions of FFs’ present and future scenarios.

To quantify the level of agreement with each statement, Liekert's technique of summated ratings was used. Each of 10 statements were administered to the qualified DTs with five (5) alternative choices of responses viz. 'strongly agree', 'agree', 'neutral', 'disagree' and 'strongly disagree'. Weights were assigned to these five alternate responses as 5,4,3,2 and 0 respectively for the positive statement and weighting system was reversed for the negative statements. Thus possible range of score of attitude of the respondent DTs towards FFs was 10-50, where ‘10’ indicated lowest unfavorable attitude, ‘30’ indicated neutral attitude and ‘50’ indicated highest favorable attitude towards FFs.

According to the opinions furnished by DTs to highlight attitude towards, attitude categories were developed as the following manner (Table 4.15).

Table 4.15 DTs attitude towards FFs

Categories	Score	Number (N=23)
Very low	10-19	00
Low	20-29	06
Moderate	30-39	13
High	40 and above	04

The attitude of more than 50 percent DTs towards FFs appeared as ‘Moderate’ though nearly 25 percent hold the attitude towards FFs as ‘Low’. However, it was found that more than 80 percent DTs embraced the attitude level moderate to high towards FFs.
Findings revealed in these FGDs and short interviewing of opinion leaders have significance in determining knowledge, skill, attitude and application while searching the effectiveness of farmer to farmer training. This also provides the researcher with an opportunity to explain quantitative findings with qualitative results and use qualitative results to fill in any gaps that exist in quantitative results (Schindler A. L. 2012). Though some researchers interpreted these as transforming narratives into numbers would diminish their breadth and depth (Drisoll,Apiah- Yeboah, Salib, and Rupert, 2007).

4.5 Case Studies of a Successful Farmer Facilitator and a Successful IFM FFS Farmer

Case study-1

Alam Sarkar, a model Farmer Facilitator

Md. Alam Sarkar, father of two kids, resides in the village of at Sadar Upazila under Lalmonirhat District in the Northern part of the country. He was forced to be separated from the joint family after marriage. Only 60 decimal of lands were in possession of Alam when he started life with his wife. He was able to earn such a small amount of money and produces that hardly could maintain their livelihood properly. In 1996, he joined as the field worker in an NGO named `*Apon Gram'* meaning own village. Still the production from small land holdings and little income as field worker hardly meet their family expenses.

Context and approach: Mr. Sarkar got a season-long training in `*Dhaknai* IPM FFS' in 2000. He started to follow the technologies in his own fields and earned confidence on profitable production. Then Mr. Alam gained reputation as the follower of training packages and came into the good book of the Department of Agricultural Extension. (DAE). He was selected as the future Farmer Trainer (FT) and undergone a tailored courses for trainers (ToT). He also got an improved training on rearing poultry and livestock from RFLDC. When IFMC project was launched, he again received a ToT on IFM. Thus he conducted 20 IPM FFS, 18 ICM FFS and 16 IFM FFS so far. He started implementation of advanced agricultural farming method with homestead gardening and improve poultry and livestock rearing and fish culture under the concept of IFM. Her wife was also became part and parcel of Mr. Alam to support her husband in order to add some extra income to ensure improved food and education for their children. Gradually, they converted the homestead areas in to a model of IFM.

Processes and challenges: Through a thoughtful planning, their homestead and adjacent areas has been transformed into such a model farm that neighboring people frequently come and visit the farm and try to accommodate in their own homestead. Lateral expansion of IFM technologies could be seen in the village and beyond. Even neighboring junior kids used to arrange picnic in adjacent areas of Alam Sakar's house. At present they increased the land holdings to 195 decimal which is beautifully cultivated with homestead gardening, all-season fruit trees, and spices and medicinal plants. The coverage accordingly 111 decimal with homestead gardening, field crops 60 decimal, pond fish culture 9 decimal, fodder crops 7 decimal and 8 decimal with bamboo bushes and other. There are challenges of market prices but Alam can manage the good prices with integrated approaches and good mixes of diversified items which lower the production cost. A good will also been developed as chemical free produces in Alam's farm.

Results: By transforming a household in an integrated manner, many types of benefits is being harvested by Alam's family. His household now accommodated with 501 fruit trees of 21 varieties, timber trees 17 of 4 species, medicinal 31 of 9 species, uncommon spice crops like cinnamon, *Daruchini*, bay leaf etc. A Homestead plan based activity is being practiced at present to accommodate fodder crops, shade loving crops even crops on trail.

Alam's family also well experienced in rearing poultry, goat and cows. They have also a pond for fish culture. After family consumption, Alam's family earned a handsome income from different sub-sectors of their homestead farms as below:

Vegetable and fruits	20,000.00
Quality Saplings of different plants	35,000.00
Organic manure and vermi-compost(2000Kg)	6,000.00
Poultry	4,000.00
Cows -02	1,20,000.00
Goats -04	25,000.00
Fishes	1,200.00
Total income (Taka)	**2,11,200 .00**

Lessons learned: IFM worked like magic wands in converting a homestead in to an enterprise. Alam's family can be called a mini-scale agri-preneur also. Integration of homestead resources in a befitting manner as learned through IFM FFS can change the scenario of the family well-being and sustain in a positive ways. Even a female farmer can start a profitable business; if she is ambitious and can make a good plan. However, they need training from the Extension Department and need proper technical support from the AGEP, the DAE DANIDA project.

A Pictorial sketch of Alam Sarkar's Case Study

Photo 4.3 Alam`s wife engaged in homestead vegetable cultivation

Photo 4.4 Safe vegetable production by Alam1`s Family

Photo 4.5 Alam Sarkar taking care of fruit trees

Photo 4.6 Plant nursery of Alam Sarkar

Case Study -02

Nazma Begum: Success story of FFS farmer

Mrs. Nazma Begum lived with his husband Md Rezaul Karim Khandokar in Attaram village of Belgacha union Parishad of Kurigram Sadar Upazilla in kurigram district. The couple had two sons. Younger one was at Class four and elder one in twelve class. Her husband was a soldier of Bangladesh Army. After retirement from the job of her husband, they fall in a problem to maintain the family of 4 members. Mrs. Nazma and her husbands were thinking how to overcome the challenges. For maintaining the family cost, they started a small business at Kurigram town but it did not run well to maintain their family. On the other hand, they had to maintain education cost of their sons. The cost of maintaining the family was increasing day by day and they were unable to manage that costs.

Context and approach: At that time, Nazma become acquainted with the Farmers Facilitator Md. Ruhul Amin in front of their house in 2014. Mr. Amin discussed about the IFM School and its activities with Nazma and her neighbors. After successful discussion with the villagers, Mr. Ruhul Amin formed an IFM FFS with the help of tag Sub Assistant Agriculture Officer (SAAO), and Upazila Agriculture Officer, Kurigram Sadar. Thus, a FFS named "Ataram IFM FFS" was started in the area.. Nazma and her husband got involved as famers in that FFS. They attended in the IFM School in their respective session and learnt different technologies. Learning technologies were mostly feasible to apply in their 44 decimal homesteads, including 12 decimal ponds. Nazma attended each session specially homestead gardening, poultry rearing and cattle rearing. She was delighted to learn all those technologies because she has scope to implement it on her homestead areas. She applied all the technologies in her homestead and maximizes farming output following integration among different farming component.

Processes and challenges: Firstly she developed a four storied poultry house where poultry and chicken were reared in a hygienic environment which she learnt from poultry session. She had two *Hazol* (egg laying pan) which was being utilized for hatching eggs 6 times in a year. She followed improved management techniques of poultry rearing - like feed preparation and management, vaccination and chicken separation.

Secondly, she utilized all of the technologies of house management, concentrate feed preparation and utilization, UMS preparation and utilization, timely de- warming, timely vaccination and improved fodder cultivation to be utilized for beef fattening, cow rearing in her own farm at house.

Thirdly, she utilized improved technology of fish culture like: pond preparation, lime and fertilizer application , layer wise fingerlings releasing in a mixed culture method, complementary feed supply , water quality testing to know the presence of natural feed and rationally food ensuring etc.

Fourthly, utilization of fallow homestead spaces was one of the most important technologies of IFMC. She learnt the technology from IFM FFS and utilized the different homestead spaces effectively with fruits, vegetables, trees, medicinal plants. She cultivated different types of vegetables round the year on six beds at sunny places of the homestead.

Results: Last year, she spent 875 Tk. for seed, fertilizer, fencing net and trellis. The vegetable produced in the homestead was utilized for family consumption and the rest of the vegetable they sold at Taka 2850. Beyond this, 84 fruit trees of 18 varieties, 258 trees of 6 varieties and 57 medicinal saplings / plants of 5 varieties in her homestead areas were about to enter onto the commercial lives which approximately cost about 200000 Tk. Year round vegetables and fruits were mostly available in her house.

She utilized her non-bearing unimportant trees for supportive to *"Chui"* (Popular Vine spices crop) cultivation and has produced 60 kg *chui* products which cost about 12000-15000 Tk. without any investment. It is being utilized for medicinal purposes and also for substitute of chili for increasing pungent of curry at the time of shortage of chili and when its price goes up. It is an ideal food of the southern part people. Besides this, she cultivated potato yam in 5 trees. She also cultivated sweet potatoes, ginger, indigenous taro and turmeric in four decimal of shady and marshy land expecting 2000 Tk. Two vermi- compost rings were established in her homestead areas and got 160 kg of compost which estimated price was 1600.00.

Nazma prepared an improved house for poultry birds and hatching pan for hen. She used to manage her poultry birds with regular vaccination, home-made balanced foods and separation of chicken from hen. The amount of investment for those purposes was 4950.00. Their investment for livestock (cow) was about 92000.00 and got a return worth of 103690.00. In addition, they had two calves worth of a very good prices within 2-3 years. They also invested an amount of 4700.00 in fisheries for pond preparation, lime, fertilizers, and for fingerlings. The total incomes from different sub-sectors of agriculture of Nazma's family is mentioned below:

Vegetable and fruits	4850.00
Spices(*Chui* vines)	12000.00
Vermi-compost	1600.00
Poultry birds, eggs and pigeons	14200.00
Cow, milk	103000.00
Fisheries	15500.00
Total income (Taka)	**151150 .00**

Lessons learned: At present, Nazma Begum is able to utilize integrated farm Management knowledge in her homestead niches with different vegetables, fruits, spices and medicinal plants. She and her husband are engaged in different farming activities and their sons also engaged during their leisure time. Now their income from homesteads brings happiness to her family. Nazma describes her family happiness like as " I need not to purchase any vegetables, fruits, fish and animal protein from market rather than I sell vegetables, poultry, eggs , milk, fruits and earned handsome money. Community people come to my house for getting suggestion and also observed my activities. I am so pleased to give them suggestion and encourage them for utilizing the IFM –FFS technologies. But I need more training to address new challenges". Lastly, smiling Nazma said things would not be easy if she was not involved in IFM FFS.

A Pictorial sketch of FFS Farmer Nazma Begum's Case Study

Photo 4.7 Nazma`s family with spices vine *chui*

Photo 4.8 Poultry of Nazma Begum

Photo 4.9 Nazma`s big ruminants

Photo 4.10 Family fishing

CHAPTER 5

CHARACTERISTICS PROFILE OF THE FARMERS

Every individual has some sort of uniqueness. Individual uniqueness spells out the underlying characteristic attributes that make difference from individual to individual. The characteristic attributes include personal, economic, social and psychological parameters that construct and shape farmers’ behavioral patterns. Difference in farmers’ characteristics might therefore have considerable influence on farmers’ behavioral change that occurs to farmers participating in IFM training programme. Eventually the learning outcome of FFS educational approach of IFM programme reflects in their knowledge, skill, and attitude to put IFM practices into effects/practices/application at field level. Reasonably, the attributes that figures out individual farmers' characteristic profile can best explain the extent of effectiveness of farmer to farmer training as influenced by IFM programme.

This Chapter deals with17 selected characteristic of the farmers including personal, economic, social and psychological characteristics those are considered as independent variables. Procedures followed in measuring the characteristics have been described in Chapter 3. The results have been presented in tabular from. However, the range, mean and standard deviation have been presented at the bottom of each table. The findings in respect of these characteristics are discussed in the following sections.

The purpose of this chapter is to describe the 17 selected characteristics of the respondent farmers as was indicated in the objectives of the study. Some of the salient features including measuring unit, possible range and observed range of these 17 selected characteristics of the farmers have been presented in Table 5.1 and described in the following sub-sections:

Table 5.1 Measuring unit, possible range and observed range of the selected characteristics of the respondent farmers

Characteristics	Measuring unit	Possible range	Observed range
Age	Years	Unknown	20-67
Education	Schooling Years	Unknown	0-16
Family size	Number	Unknown	2-13
Net cropped area	Hectare	Unknown	0.06-2.53
Cropping intensity	Score (percent)	Unknown	100-330.23
Cultivated homestead area	Hectare	Unknown	0.00-0.12
Agricultural income	'000' Taka	Unknown	14.21-831.97
Agricultural Commercialization	Score (percent)	0-100	2.61-90.30
Agricultural diversification	Score	0-27	3-25
Agricultural experience	Years	Unknown	3-48
Leadership trait	Score	0-27	0-13
Extension contact	Score	0-92	2-59
Decision making ability	Score	7-21	9-21
Aspiration	Score	0-80	17-79
Risk bearing ability	Score	0-48	13-45
Training exposure	Score(days)	Unknown	22-195
Sincerity status in FFS	Score	5-15	9-15

5.1 Age

Age is the maturity index of a person. The age of the farmers ranged from 20 years to 67 years, the mean being 38.66 with standard deviation of 9.64 and co-efficient of variation of 24.9 percent. The respondent farmers were classified into 3 categories on the bases of their age (years) as young, middle-aged and old (Table 5.2).

Table 5.2 Distribution of the respondent farmers according to their age

Categories	Number	Percent	Mean	SD	CV
Young ($\leq$35 years)	151	43.80	38.68	9.63	24.90%
Middle aged (>35 to 50 years)	155	44.90			
Old (> 50 years)	39	11.30			
Total	**345**	**100**			

Data contained in the Table 5.2 indicated the majority of the farmers were middle-aged (44.90 percent) and young (43.80 percent) compared to 11.30 percent being old.

Co-efficient of Variation of age of the respondents (24.90 percent) indicated that the respondent farmers were homogenous based on their age. However, age of the respondent farmers was not significantly related (r= 0.32^{NS}) with their perceived effectiveness of Farmer to Farmer Training. Findings again revealed that overwhelming majority (88.70 percent) of the farmers were young or middle aged. It was very logical that IFMC selected young and middle aged farmers as trainees for farmer to farmer training (FFT) through Farmer Field School (FFS). Age was hypothesized to have a negative relationship with the propensity to adopt precision agriculture technologies. The general notion found from the introduction of most new technologies both within agriculture and outside of it is that older generations are the last to adopt them, while the younger generations typically embrace them more quickly (Dhraief, 2018). Truong Thi Ngoc Chi and Ryuichi Yamada (2002) stated that factors that trigger adoption of new technologies comprise of progressive, young and educated male farmers. Factors limited adoption of technology included conservative old men, and weak belief on ensure high yield of new technology.

5.2 Education

The schooling years of respondent farmers ranged from 0-16, the mean being 7.87 with standard deviation of 3.25 and co-efficient of variation of 41.30 percent. The respondent farmers were classified into four categories according to their level of education as ‘illiterate’, ‘primary’, ‘secondary’ and ‘above secondary’ level of education as shown in Table 5.3.

Table 5.3 Distribution of the respondent farmers according to their education

Categories	**Number**	**Percent**	**Mean**	**SD**	**CV**
Illiterate (0 year of schooling)	6	1.7	7.87	3.25	41.30%
Primary (upto 5 years of schooling)	79	22.9			
Secondary(6-10 years of schooling)	211	61.2			
Above secondary(>10 years of schooling)	49	14.2			
Total	**345**	**100**			

Data presented in Table 5.3 indicated that the highest proportion (61.2 percent) had secondary level of education, followed by 22.9 percent primary level while 14.2 percent above secondary level of education, and rest 1.7 percent respondents were illiterate. These finding indicated that about cent percent (98.3 percent) of the respondents were literate with primary to above secondary level of education and it was higher level of education than the national average literacy rate compared to the current average literacy rate 72.3 percent, while the male literacy rate was 75.62 percent and for females, it is 69.9 percent (BBS, 2017). The reason was that the respondent farmers were selected for FFS training by IFMC on the basis of relatively educated (above primary level) so as to understand the relatively complex training where some sort of writing, presenting skill were required.

Co-efficient of Variation of education of the respondents (41.30 percent) indicated that the respondent farmers were homogenous based on their education. However, education of the respondent farmers was positively significantly related (r=0.172**) with the perceived effectiveness of FFT.

As per the study of Dhraief *et. al.* (2018), among the adopters, 27.3 percent had not received formal education, 30.7 percent had attained primary school education while 50 percent had attained education beyond primary school level. Therefore as the level of education increases, the level of adoption of the whole package also increases. The p-value of 0.050 reveals some relationship between education level and adoption of the whole package at 5 percent level of significance (p≤0.05percent)). This concurs with Nkonya *et. al.*'s (2002) study in Northern Tanzania on adoption of improved maize technologies who made similar observations that, farmers 'level of education' had significant influence on adoption of fertilizer and hybrid seeds. This implies that, formal education is vital in promoting adoption of agricultural technologies as farmers may use the information given more effectively. Education enables them to assess the relative benefits and risks from using alternative complex technologies and therefore, make rational decision on farming. Also, it may widen their scope of understanding the rationale behind adoption of all the technology components contained in a package.

Fatmawati *et. al.* (2008) described the result of free variable analysis with dependent variable, showed that, correlation coefficient is 0,786 which means it had strong relation with education level to farmer behavior in application of environment friendly agriculture. The result of coefficient of determination showed 61.80 percent of farmer's behavior of environment friendly farming in Pattapang Village Gowa Regency of Indonesia and the researchers' suggestion was to the government and stakeholders to conduct eco-friendly agricultural counseling and training continuously to horticulture farmers.

Eric *et. al.* (2014) investigated the effects of education on agricultural productivity of farmers; how the varying kinds of education affect agricultural productivity; to suggest policy interventions that will facilitate the use of education to increase agricultural productivity and how educational level of farmers in the Municipality can be improved. The major findings in the study were as the educational level increases, output increases with secondary school education having the highest returns on agricultural productivity. Extension service has a greater impact on agricultural productivity than formal education even though coverage is low. The study concluded that education is important to the improvement of agricultural productivity such a way that formal education opens the mind of the farmer to knowledge, non-formal education gives the farmer hands-on training and better methods of farming and informal education keeps the farmer abreast with changing innovations and ideas and allows farmer to share experience gained. It is recommended that the government would improve the quality of formal education, extension services and adult literacy classes in the Municipality. Factors that affect productivity such as transportation, access to input and credit facility to farmers should be improved. Relating educational level to average land size cultivated shows primary school leavers having the largest land size among the others. It was found out in the studies that highest educational level attained does not affect the size of land cultivated but rather factors such as tribe, resources availability and age rather determine the size of land cultivated.

Welch (1970) emphasized that the productive value of education has two main effects on agriculture: “worker effect” and “allocative effect”. Worker effects is described as the situation whereby an educated farmer, given the same number of input can produce a greater output that is a better use of current resources. It is seen as increased output per unit change in education holding all other factors constant. With allocative effect, a worker is able to acquire information about cost and characteristics of inputs and interpret the information to make decisions that will enhance output.

Educational level and development status go hand in hand. The assumption is that basic skills of literacy and numeracy can make a difference to productivity in the home, farm or household enterprise has long informed research around skills development and agriculture (King and Palmer, 2010). Lockheed and colleagues' (1980) stated an influential finding that four years of education makes a difference to farmer productivity has since been qualified as only being effective in more dynamic agricultural environments. For instance, UNESCO (2014) cites evidence that educated farmers were more likely to make better use of technologies (irrigation technology in China, increased fertilizer use in Ethiopia) and move into higher-value crops. Bhuiyan (2008) mentioned that farmers with low level of farm experience, low level of school education and low level of training certainly would have knowledge gap in using agricultural technologies.

Education is one of the important factors that influence farmer's decision to bear the risks associated with new technologies and modern information sources. Farmers with better education are earlier adopters of modern technologies and apply modern inputs more efficiently throughout the adoption process (Feder *et. al.* 1985). Phanhpakit and Onphanhdala (2009) argued that education and information relevant to the small farmer might usefully be categorized as "formation of competences" and "transmission of information".

Oladejo O. O. (2003) emphasized farming education as farmers require ongoing education to stay aware of fast-moving developments in technology, science, business management, and an array of other skills and fields that affect agricultural operations.

Education is a qualitative variable. Education may promote adoption of new technologies by increasing household's access to information and ability to adapt to new opportunities. It is expected that education have a positive impact on adoption (Dhraief *et. al.* 2018).

Education increases managerial competence, thereby enhancing the ability to assess, comprehend and respond to new ideas. It also enables the farmers to choose wisely from a stock of available technologies. These findings concur with those by (Amudavi (1993) in which education was found to invariably enhance technology utilization. Extension system must, therefore, seek to compensate for lack of formal education among the farmers by going beyond the extension role of prescriptive communication and emphasize on education and skill enhancement (Byerlee, 1994).

Many adopters who had attained formal education beyond primary school show the importance of formal education in promoting adoption of agricultural technologies among the farmers. Educated farmers are more likely to undertake risks associated with adoption of new agricultural technologies in their efforts to practice agricultural skills learnt from various institutions or agricultural seminars, hence, high level of adoption among them. However, the relatively high number of non-adopters who had attained formal education is an indication that, there are other factors that influence adoption of the package components other than education levels (Muchangi, 2016).

5.3 Family size

Family size of the farmers was found to range from 2 to 13 with mean and standard deviation of 4.80 and 1.56 respectively. The co-efficient of variation was 32.48 percent. The respondent farmers were classified into three categories based on their family size as ‘small’, ‘medium’, and ‘large’ family (Table 5.4).

Table 5.4 Distribution of the respondent farmers according to their family size

Categories	**Number**	**Percent**	**Mean**	**SD**	**CV**
Small ($\leq$4 Members)	176	51.0	4.80	1.56	32.50 %
Medium (5-8 Members)	160	46.4			
Large (>8 Members)	9	2.6			
Total	**345**	**100**			

Data highlighted in Table 5.4 indicated that above half (51 percent) of the farmers had small family size followed by 46.4percent medium and only about 2.6 percent had large family size. Data also indicated that average family size (4.8) of the farmer were higher than the national average of 4.060 (BBS, 2016).About cent percent (97.4 percent) of the respondent farmers had small to medium family size. However, family size of the respondent farmers was not significantly related ($r=0.008^{NS}$) with their perceived effectiveness FFT through FFS.

Family size is simply used as a measure of labor availability. It determines adoption process in that, a larger household have the capacity to relax the labor constraints required during introduction of new technology (Mignouna et al, 2011; Bonabana-Wabbi 2002). The presence of a larger active-labor in a family, have a positive influence on the adoption of modern technologies (Dhraief *et. al.* 2018).

5.4 Net cropped area

Net cropped area of the respondents were found to range from 0.06 to 2.53 hectares with an average of 0.60, standard deviation of about 0.40 and co-efficient of variation 66.67 percent (Table 5.5). Depending on the net cropped area, the farmers were classified into marginal, small and medium farmers as per guidelines of DAE (2007).

Table 5.5 Distribution of the respondent farmers decorating to their net cropped area

Categories	Number	Percent	Mean	SD	CV
Marginal (0.02-0.2 hac.)	39	11.3	0.60	0.40	66.67%
Small (0.2-1.0 hac.)	261	75.7			
Medium(1-3 hac.)	45	13.0			
Total	**345**	**100**			

Data furnished in Table 5.5 indicated that the highest proportion (75.7 percent) of the respondents were small farmers while 13 percent and 11.3 percent medium and marginal farmers respectively on the basis of net cropped area. This was because IFMC set rules to select farmers for FFS mainly from landless, marginal and small categories. However, net cropped area of the respondent farmers had significant relationship ($r = 0.133^{*}$) with their perceived effectiveness of FFT.

Amare *et. al.* (2018) described that net crop area *i.e.* land size has a positive effect on both crop area and income diversification in Nigeria. This result may suggest that farmers with relatively larger pieces of land are more likely favourable for experimentation than their counterparts to have more cultivatable space to experiment with different crops. In Uganda, however, land size has a negative effect on both crop area and income diversification, suggesting that farmers with larger landholdings specialize in a certain number of crops for sales.

Many studies have reported a positive relation between farm size and adoption of agricultural technology (Kasenge, 1998; Gabre-Madhin and Haggblade, 2001; Ahmed, 2004; Uaiene *et. al*., 2009; Mignouna *et. al*. 2011). Farmers with large farm size are likely to adopt a new technology as they can afford to devote part of their land to try new technology unlike those with less farm size (Uaiene *et. al*., 2009). In addition, lumpy technologies such as mechanized equipment or animal traction require economies of size to ensure profitability (Feder, Just and Zilberman, 1990). Some studies have shown a negative influence of farm size on adoption of new agricultural technology. Small farm size may provide an incentive to adopt a technology especially in the case of an input-intensive innovation such as a labor-intensive or land-saving technology. Farmers with small land may adopt land-saving technologies such as green house technology, zero grazing among others as an alternative to increased agricultural production (Yaron, Dinar and Voet, 1992; Harper *et. al.* 1990). Other studies have reported insignificant or neutral relationship with adoption. For instance a study by Grieshop *et. al.* (1988), Ridgley and Brush (1992) Waller *et. al.* (1998); Mugisa-Mutetikka *et. al.,* (2000), Bonabana- Wabbi (2002) and Samiee *et. al.* (2009) concluded that size of farm did not affect Integrated Pest Management (IPM) adoption implying that IPM dissemination may take place regardless of farmers' scale of operation. Kariyasa and Dewi (2011) also found that extensive of land holdings had no significant effect on the degree of Integrated Crop Management Farmer Field School (ICM-FFS) adoption probability. The above mentioned studies consider total farm size and not crop acreage on which the new technology is practiced. Since total farm size has an effect on overall adoption, considering the crop acreage with the new technology may be a superior measure to predict the rate and extent of adoption of technology (Lowenberg DeBoer, 2000). Therefore, in regard to farm size, technology adoption may best be explained by measuring the proportion of total land area suitable to the new technology (Bonabana-Wabbi, 2002).

5.5 Cropping intensity

Cropping intensity of the respondents was found to range from 100-330.23 percent with an average of 223.88, standard deviation of 42.30 and co-efficient of variation of 18.89 percent. Depending on the cropping intensity, the respondent farmers were classified into three categories viz., low, medium and high cropping intensity as shown in Table 5.6.

Table 5.6 Distribution of the respondent farmers according to their cropping intensity

Categories	Number	Percent	Mean	SD	CV
Low (< mean±1sd, i.e. <181.58)	51	11.0	223.88	42.30	18.89%
Medium (mean±1sd, i.e. 181.58 to 266.18)	255	75.1			
High (>mean ±1sd, i.e.>266.18)	39	13.9			
Total	**345**	**100**			

Data furnished in Table 5.6 indicated that three-fourths (75.1 percent) of the farmers' land had medium cropping intensity compared to 11.0 percent and 13.9 percent farmers' land had low and high cropping intensity respectively. The average cropping intensity (223.88 percent) of the land of the respondent farmers was found higher than the national Cropping Intensity of 190 percent (BBS, 2016).The findings again revealed that overwhelming majority (89 percent) of the land of the respondent farmers had medium to high cropping intensity.

The IFMC through FFS, encouraged farmers to increase the intensity or diversity of crops that may account to the increased cropping intensity of the farmers of the study areas. However, cropping intensity of the land of the respondent farmers was positive significantly related (r=0.158**) with their perceived effectiveness of FFT.

According to Jain *et. al.* 2013, smallholder farmers, who grow crops using low cropping intensity or low-intensity practices or on small parcels of land (typically ≤ 2 ha), comprise approximately 50 percent of rural population in developing nations and contribute up to 90 percent of developing nations' staple food production (Morton, 2007; Singh *et. al.*, 2002).

Kumar (2018) stated that there are only two ways to satisfy the increasing food and other agricultural demands of the country's rising population: *either expanding the net area under cultivation or intensifying cropping over the existing area.* When net sown area of the country rises and reaches at a point where it is not possible to make any appreciable increases; *raising the cropping intensity is the only viable option left.*

Cropping intensity, the number of crops planted annually, can be used as a measure of food security for smallholder farmers given that it can greatly affect net production (Jain *et. al.* 2013).

Cropping Intensity Index refers to the changes in the cropping intensity of crop compared to a given base year. Cropping intensity is the number of times a crop is planted per year in a given agricultural area. It is the ratio of effective crop area harvested to the physical area.

The introduction of improved cultivation and management techniques and technologies (like crop duration, fertilizers, irrigation, improved varieties, machineries etc. are responsible for the phenomenal increases in cropping intensity vis-à-vis yields in the country.

5.6 Cultivated homestead area

Integrated farm management component (IFMC) through its FFSs encourage activities of homestead to increase the family income. Cultivated homestead areas of the respondents were found to range from 0.00-0.12 hectares with an average of 0.02 hectare, standard deviation of 0.017 and co-efficient of variation of 85.0 percent(Table 5.7). Depending on the cultivated homestead area, the farmers were classified into three groups such as farmers with no, low and medium cultivated homestead areas.

Table 5.7 Distribution of the respondent farmers according to their cultivated homestead area

Categories	Number	Percent	Mean	SD	CV
No (0 hectare)	7	2.0	0.02	0.017	85.0%
Low (0.01-0.05 hectare	319	92.5			
Medium (above 0.05 hectare)	19	5.5			

Data furnished in Table 5.7 indicated that the overwhelming majority (92.5 percent) of the farmers belongs to the category of low cultivated homestead area compared to 2.0 percent and 5.5 percent respondent farmers had no and medium cultivated homestead area. However, cultivated homestead area of the respondent farmers had no significant relationship ($r=0.007^{NS}$) with their perceived effectiveness of FFT.

5.7 Agricultural annual income

Agricultural income of the farmers ranged from Tk. 14.21 thousand to 831.97 thousand with the mean and standard deviation of 229.30 and 111.75 respectively. The co-efficient of variation was 48.74 percent. On the basis of agricultural income, the respondent farmers were classified into three categories such as low, medium and high agricultural income as shown in Table 5.8.

Table 5.8 Distribution of the respondent farmers according to their agricultural income

Categories	Number	Percent	Mean	SD	CV
Low (<mean $\pm$1sd) i.e. <117.55)	37	10.7	229.30	111.75	48.74 %
Medium (mean $\pm$1sd) i.e. 117.55 to 341.05)	262	76.0			
High (> mean $\pm$1sd) i.e. >341.05)	46	13.3			
Total	**345**	**100**			

Data presented in Table 5.8 is the distribution of the farmers on the basis of their agricultural income. It indicated that above three-fourths (76.0 percent) of the respondent farmers belong to the medium agricultural income category followed by high agricultural income (13.3 percent) and low agricultural income (10.7 percent). The co-efficient of variation (48.75 percent) of the respondent farmers indicates medium homogeneity based on their agricultural income. However, agricultural income of the respondent farmers had positive significant relationship (r=0.239**) with their perceived effectiveness of FFT through FFS. Sadeghi *et. al.(*2001) regressed farm income on socio-economic characteristics of Iranian farmers, and found that area of cropland, fruit land and livestock holding significantly affects income. Phandanouvong (1998) found that the income of Lao AF farmers was positively related to farm size, and farmer education level and age.

Muchangi (2016) emphasized that an increase of a farmer's income would probably raise the level of acceptance of the entire package by improving the ability of that farmer to buy farm inputs. Income level was positively related to application of the entire package at 5 percent significant level.

Jerry W. Dunn and Jeffery R. Williams (2000) highlighted that among the income variables, changes in gross crop income had the largest impact. Among cross-section data, increases in interest costs, age, and diversification were found to have positive relationships with net income variability. However, only the diversification variable was significant when deviations below mean net farm income were used as the measure of risk. Increasing farm size also was found to have a positive relationship with net income variability.

Farmers with an increase income are able to afford the costs involved in the package adoption. This increment of income also assigns resources to support the technologies. However, this was contrary to Juliet's (2004) findings that, increase of income had no positive relationship with intensity of adoption of soil fertility management technologies in Western Kenya.

5.8 Agricultural commercialization

Over the years, farmers are striving from subsistence farming to commercial farming. Agricultural commercialization of the respondent farmers was found to range from 2.61 to 90.30 percent with mean, standard deviation and co-efficient of variation of 40.92, 20.18 and 49.32 percent respectively.

On the basis of commercialization, the farmers were classified into three categories as low, medium and high commercialization (Table 5.9).

Table 5.9 Distribution of the respondent farmers according to their agricultural commercialization

Categories	Number	Percent	Mean	SD	CV
Low (up to 33.33)	123	35.7	40.92	20.18	49.32 %
Medium (33.34-66.66)	180	52.1			
High (>66.66)	42	12.2			
Total	**345**	**100**			

Data presented in Table 5.9 showed the distribution of the farmers on the basis of their commercialization. It indicated that above half (52.1 percent) of the farmers belong to medium commercialization group compared to 35.7 percent and 12.2 percent low and high commercialization group respectively. However, the agricultural commercialization of the respondents was positively related to the effectiveness of farmer to farmer training ($r = 0.167^{**}$).

Chamberlin's (2008) findings from the probit regression analysis revealed that production level (in value terms), use of improved seeds, use of irrigation and total landholding size are the most important factors affecting the ability of a smallholder to participate in output markets. Moreover, the findings from ordinary least squares (OLS- a type of linear least squares method for estimating the unknown parameters in a linear regression model) estimation showed that the level of food and cash crop production (in value terms), gender, technology use (irrigation, improved seeds), use of fertilizer and the number of oxen owned per household are important factors determining the level of commercialization of smallholder farms. Finally, findings from one-way ANOVA analysis indicated that farm households with high degree of commercialization enjoyed better welfare outcomes (represented by consumption of basic non-grain consumables and expenditure on education, shoes and clothes, durables and housing). Therefore, the findings indicate that farmers with high level of commercialization are better-off in welfare outcomes. In addition, the findings indicate that farmers can be better integrated with the market if better support services are provided and efforts to enhance farmers' access to technology and assets are strengthened.

Sokoni (2007) defined commercialization of smallholder production as 'a process involving the transformation from production for household subsistence to production for the market.' Hazell *et. al.* (2007) found out that most definitions refer to agricultural commercialization as 'the degree of participation in the output markets with the focus very much on cash incomes.' However, there are some writers who attach profit motive as an integral part of agricultural commercialization. Among others, Pingali and Rosengrant (1995), Hazell *et. al.* 2007) noted that agricultural commercialization goes beyond just selling in the output market. They claim that a household's marketing decisions, both in the output and input choice, should be based on profit maximization. According to Pingali and Rosengrant (1995), commercialization does not only occur by the reorientation of agriculture to high valued cash crops but it could also occur by reorienting it to primary food crops.

According to Von Braun *et. al.* (1994), commercialization of subsistence agriculture takes many forms. They stated that "Commercialization can occur on the output side of production with increased marketed surplus, but it can also occur on the input side with increased use of purchased inputs. Commercialization is not restricted to just cash crops: The so called traditional food crops are frequently marketed to a considerable extent, and the so called cash crops are retained, to a substantial extent, on the farm for home consumption, as, for instance, groundnuts in West Africa. Also, increased commercialization is not necessarily identical with expansion of the cash economy when there exists considerable inland transactions and payments with food commodities for land use or laborers. Finally, commercialization of agriculture is not identical with commercialization of the rural economy." This study focuses on the degree of participation of farm households on the output market. But, as Von Braun *et. al.* stated above, commercialization refers both to marketing of high value cash crops (such as pulse, oil and horticultural crops) as well as primary food crops (such as teff, wheat and barley).

The findings from the statistical analysis mentioned by Chamberlin (2008) and showed by Goitom (2009) that landholding size and land slope, irrigation use, and membership in extension package program have positive and significant association with commercialization while participation in non-farm activities has significant but negative association with commercialization.

Govereh *et. al.* (1999) define agricultural commercialization as 'the proportion of agricultural production that is marketed'. According to these researchers, agricultural commercialization aims to bring about a shift from production for solely domestic consumption to production dominantly market-oriented.

Leavy and Poulton (2007) found out that three different modes of agricultural production exist side by side and interact with each other. These are:
a. Small-scale farmers: these are further classified into two groups: i) Small-scale "non-commercial farmers" (Type A) - these farmers are subsistence oriented but may also sell some of their production in the output market; but they cannot wholly dependent on agriculture for living. ii) Small-scale commercial farmers (Type B) – these are better integrated with the market than the first group. In fact, they produce crops both for own consumption as well as for the market. They even exert effort to specialize on high value cash crops.

b. Small-investor farmers- these are exclusively engaged in market-oriented agriculture even though their size dictates their modest scale production. Samuel and Sharp (2007) refer to this people as being often educated and urban-based. They are known also as 'emerging commercial farmers' (Samuel and Sharp, 2007).

c. Large-scale business farming- these refer to the capital intensive enterprises that are either private or state-owned (Samuel and Sharp, 2007). These three categories indicate the different policy scenarios the government can possible adhere to in the course of assisting smallholder farmers to increase their income and mainly to come out of poverty through the process of commercialization. There are three levels of market orientation as far as food production systems are concerned, according to Pingali and Rosengrant (1995 cited in Leavy and Poulton 2007). These three levels are termed as subsistence systems, semi-commercial systems and commercial systems based on the farm households' objective for producing a certain crop, their source of inputs, their product mix and their income sources.

5.9 Agricultural diversification

agricultural diversification score of the respondent farmers was found to range from 3-25 against the possible range of Zero (0) to 27 with mean, standard deviation and co-efficient of variation of 13.52, 3.46 and 25.59 percent respectively. On the basis of agricultural diversification, the respondent farmers were classified into three categories as low, medium and high agricultural diversification group (Table 5.10).

Table 5.10 Distribution of the respondent farmers according to their agricultural diversification

Categories	Number	Percent	Mean	SD	CV
Low (0-9)	37	10.7	13.52	3.46	25.59%
Medium (10-18)	278	80.6			
High (19-25) or >18	30	8.7			
Total	**345**	**100**			

Data showed in Table 5.10 signified that overwhelming majority (80.6percent) of the farmers belonged to medium level of agricultural diversification group while 10.7 percent and 8.7percent were in low and high agricultural diversification group respectively. However, there existed a positive significant relationship between agricultural diversification of the respondent farmers and their perceived effectiveness of farmer to farmer training ($r = 0.274^{**}$).

5.10 Agricultural Experiences

It was found that agricultural experiences of the respondent farmers ranged from 3-48 years with mean, standard deviation and co-efficient of variation of 17.74, 9.08 and 51.21percent respectively. Experience is a great teacher. The people who become experienced has a better chance to go for different interventions because experience is a great check against new risks.

On the basis of agricultural experiences, the respondent farmers were classified into three categories, such as, low, medium and high agricultural experiences (Table 5.11).

Table 5.11 Distribution of the respondent farmers according to their agricultural experience

Categories	Number	Percent	Mean	SD	CV
Low (0-16)	185	53.6	17.73	9.08	51.21%
Medium (17-32)	134	38.90			
High (33-48) or >32	26	7.5			
Total	**345**	**100**			

Data presented in Table 5.11 indicated that the highest proportion (53.6 percent) of the farmers belonged to low agricultural experience category compared to 38.90 percent had medium experience and only 7.5 percent represented the high agricultural experiences group. It means that overwhelming majority (92.5 percent) of the farmers were in low to medium agricultural experiences category. However, there existed a significant positive relationship (r = 0.115*) between agricultural experiences of the respondent farmers and their perceived effectiveness of farmer to farmer training.

Dhraief *et. al.* 2018 measured this variable with the average of the livestock owners experiences' in dairy sector and expected to show a negative sign. This is indicating, as a result of the fact that most of the farmers adopting an innovative technology are young livestock owners that those with long experience are more adhering to traditional methods of farming, and are less receptive to adopting modern technologies.

They find an inverted-U relationship between adoption of and experience with agricultural technologies in banana, coffee and maize. This suggests that farming experience is useful in early stages of adoption of a given technology when farmers are still testing its potential benefits, which later determine its retention or disadoption over time. Thus, gradual advances in technology development and continuous retraining of farmers are essential for sustainable adoption of agricultural technologies for some crops (Ainembabazi and Mugisha , 2014).

5.11 Leadership trait

There is a great saying that a pure leader is one who knows the ways, goes the ways and shows the ways (John C. Clergyman, an American Priest, 1947). The computed leadership trait scores of the respondent farmers was ranged from 0-13 against the possible range of zero (0) - 27. The mean, standard deviation and co-efficient of variation were 2.28, 1.72 and 76 percent respectively. On the basis of the leadership trait scores, the farmers were grouped into three categories such as low, medium and high leadership trait (Table 5.12).

Table 5.12 Distribution of the respondent farmers according to their leadership trait

Categories	Number	Percent	Mean	SD	CV
Low (0-4)	316	91.6	2.28	1.72	76%
Medium (5-8)	26	7.5			
High (9-13)	3	0.9			
Total	**345**	**100**			

Data showed in Table 5.12 signified that overwhelming majority (91.6 percent) of the respondent farmers had low leadership as compared to 7.5 percent medium leadership and only an insignificant proportion (0.9 percent) had high leadership. However, leadership of the respondent farmers was positively associated with their perceived effectiveness of farmer to farmer training ($r = 0.136^{*}$).

According to Hamid and Sawicka (2017) one can observes that opinion leaders tend to have access to mass media information and external contacts that provide them new ideas from outside. Additionally, the opinion leaders have greater contact with change agents, social participation, higher social status, and more innovativeness. Opinion leaders are used as role models in the adoption of innovations. This can be effective at the social and economic levels of the diffusion process. From the economic perspective of projects' implementation when diffusing an innovation, opinion leaders multiply the efforts of the change agent, by carrying the message to more possible adopters. This translates into effectiveness by achieving more diffusion in less time.

At the social level, once opinion leaders have adopted an innovation, that innovation acquires local sponsorship and credibility. Where, opinion leaders are heterophilous individuals who observe and evaluate innovations proven by innovators, they are considered early adopters of culturally acceptable innovations and generally are opponents of culturally unacceptable ones. Once opinion leaders approve and adopt innovation, it influences others in the group who also adopt the innovation to maintain a social and economic status among the social system. Leadership trait is important determinant of rapid and sustained change, as diffusion happens faster when it is initiated by them. Leaders are considered the bridge between farmers and sources of innovations. Being a member of an association, the leader can help farmers to have information on modern technologies and to have also more opportunities to adopt them.

5.12 Extension contact

Extension contact scores of the respondents ranged from 2-59 against the possible score of zero (0) to 92. The mean, standard deviation and co-efficient of variation were 28.20, 12.28 and 43.55 percent respectively.

On the basis of extension contact scores, the respondents were classified into three classes as low, medium and high level of extension contact (Table 5.13).

Table 5.13 Distribution of the respondent farmers according to their extension contact

Categories	Number	Percent	Mean	SD	CV
Low (up to 30)	199	57.69	28.20	12.28	43.55%
Medium (31-60)	146	42.31			
High (61-92)	0	0			
Total	**345**	**100**			

Data furnished in Table 5.13 revealed that nearly 58 percent of the respondents had low and 42 percent had medium level of extension contact while no one has high level of extension contact. Extension people should make it a point to have more contact with the respondents as far as possible.

However, extension contact of the respondent farmers had positive significant relationship with their perceived effectiveness of farmer to farmer training (r= 0.182*). Muchangi (2016) found that though contact with technology promoters is hypothesized to promote adoption of new agricultural technologies, the p-value of 0.812 is an indication of no relationship between contact with extension staff and adoption of the package at significant level of 5 percent. This is congruent with Omiti *et. al*. (1999) that extension contact had no significant influence on adoption of fertilizer because extension messages may neither be practical nor relevant to the large number of farmers contacted.

In transfer of technology, diffusion agencies should have a clear understanding about preferences of stage-wise use of extension (mass media) channel of farmers at various stages of motivation - decision process emphasizing on eocio-economic characteristics (Bhuiyan 2017). Truong Thi Ngoc Chi and Ryuichi Yamada (2002) stated that Farmers' changes of technology use are influenced by technical training, extension contact, meeting, oral transmission, and trust on technician and belief level on technology. Though farmers have positive perception of technology, they faced problems in technology application due to lack of capital, lack the direction from the government and extension, lack compensation policy in ensure of yield.

Murari *et. al.* (2017) mentioned that adoption decisions were mainly affected by extension-related variables – training, membership in a farmers' group, and off-farm employment. Extension participation was found to be influenced by socioeconomic variables – age, education, household size, and distance to the extension office.

Farmers who have access to extension services are more likely to diversify their crop portfolios indicating that farmers would diversify more in their farm production if given improved access to extension services.

5.13 Decision making ability

Decision making ability scores of the farmers ranged from 9-21 against the possible range of 7-21 having the mean 15.58, standard deviation of 2.30 and co-efficient of variation of 14.76 percent. Based on the decision making ability scores, these farmers were classified into three categories as low, medium and high decision making ability (Table 5.14).

Table 5.14 Distribution of the respondent farmers according to their decision making ability

Categories	Number	Percent	Mean	SD	CV
Low (9-13)	44	12.8	15.58	2.30	14.76%
Medium (14-17)	217	62.9			
High (18-21)	84	24.3			
Total	**345**	**100**			

Table 5.14 indicated that majority (62.9 percent) of the respondents had medium level of decision making ability while 12.8 percent and 24.3 percent had low and high level of decision making ability respectively. However, there was a positive significant relationship between decision making ability of the respondent farmers with their perceived effectiveness of farmer to farmer training (r = 0.107*).

An overwhelming majority (62.9) had medium level of decision making ability. Since decision making ability is a sort of managerial process, so the extension workers should arrange activities necessitated for decision making ability.

Lubowski *et. al.*(2008) objectively mentioned that crop choice decisions are made by utility-maximizing individuals implying that economic factors that influence crop choice decisions are rooted in neoclassical economic theory of profit maximization. As such, factors that encourage increasing returns to farm investment will guide decisions of farming families, such that resource allocation is made toward achieving pecuniary goals. Farmers choose to maximize the present discounted value of the stream of expected net benefits from the land and base their expectations of future land-use profits on current and historic values of relevant variables, such as costs of land conversion. Therefore, a farmer decides how to use a parcel of land after estimating, either implicitly or explicitly, the costs and benefits of the proposed actions. Furthermore, the combination of crop portfolios follows the differential input (land and labor) productivity and risk status of farmers.

Aubry *et. al.* (1998) stated that a farmer's crop choice decision making process is thought to be implicit and internal, cyclical and recurrent, leading to a better understanding and evaluation of production terrains over time.

Seline *et. al. (*2014) mentioned that the expected utility theory of Daniel Bernoulli predicts that the decision-maker chooses between risky and uncertain prospects by comparing the expected utility values of their outcomes to maximize profit.

Wallace and Moss (2002) mentioned that as the basic farm decision-making unit, the farmer makes critical decisions in agricultural production, particularly on land use and farm resource allocation. The nature and extent of such decisions are usually motivated by the goals, objectives, and values of the farming households. They are also guided by prevailing socioeconomic and environmental constraints including those outside the farmers' control. The determinants of crop choice decision-making processes, particularly among smallholder farmers, have been examined in various empirical studies and can be broadly classified into economic, biophysical, psychological, technological, policy and institutional (Wallace and Moss 2002) and sociocultural factors such as demographics, endowment, and credit constraints (Mottet *et. al.* 2006) .

5.14 Aspiration

The computed aspiration scores of the respondents ranged from 17-79 against zero (0) to 80 with mean, standard deviation and co-efficient of variation of 15.58, 2.30 and 14.76 percent respectively. Based on the aspiration scores, the farmers were classified into three categories as low, medium and high aspiration classes (Table 5.15).

Since, aspiration is the inherent desire of an individual to make more decision making ability, so the extension personnel, change agent should give greater emphasis in the training program to make the respondent highly aspirant towards different innovations. In a highly competitive society like the present ages, an individual will be nearly out of place if s/he has no aspiration for development.

Table 5.15 Distribution of the respondent farmers according to their aspiration

Categories	Number	Percent	Mean	SD	CV
Low (0-37)	26	7.5	15.58	2.30	14.76%
Medium (38-58)	172	49.9			
High (59-79) or >58	147	42.6			
Total	**345**	**100**			

Data contained into the Table 5.15 indicated that about half (49.9) of the respondents had medium level of aspiration as compared to 42.6 percent high and 7.5 percent low aspiration. However, aspiration of the respondent farmers had a positive significant relationship with their perceived effectiveness of farmer to farmer training ($r = 0.362^{**}$).

A research on relationship between aspirations and personal, socio-economic and psychological characteristics of rural youth was conducted in Ramtek and Kamthi taluka of Nagpur district of Maharashtra State by Mali, M.D., Tekale, V.S. and Shaikh, J.I. (2015). They revealed that in case of relationship of selected characteristics of respondents with their role in village development age, education, experience in farming, family size, land holding, social participation, extension contact, mass media exposure and cosmopoliteness were found to be positively and significantly correlated with overall role of rural youth in village development.

Gerber *et. al.* (2018) identified the effect of aspirations on the adoption of agricultural innovations in the context of rural Ethiopia. While most studies on agricultural innovations had focused on identifying observable and resource-related deprivations or ‘external’ constraints, a related stream of literature suggests that ‘internal’ constraints, such as the lack of aspirations, could reinforce external constraints and lead to self-sustaining poverty traps. Since both aspirations and the adoption of innovations are forward-looking, they are likely to be intimately linked. Aspirations are motivators that can enhance innovations or their adoption not only in their own right but also through their determinants, including self-efficacy, locus of control and other internal traits that may be unobserved. This implies that aspirations may affect innovations through multiple channels and hence may be endogenous.

On the other hand, aspirations are also affected by a person's level of achievement, implying that aspirations and innovations are simultaneously determined. To identify the effect of aspirations on the adoption of agricultural innovations, they conducted both plot-level and household-level analysis using purposely collected data from households in rural Ethiopia. Using econometric strategies that account for the endogenous nature of aspirations, they found that a narrow or a very wide gap between aspirations and achievement in a farming household is strongly associated with low levels of innovativeness and low adoption rate of innovation products such as chemical fertilizers.

5.15 Risk bearing ability

The observed range of risk bearing ability score of the farmers was 13-45 against possible scores of zero (0) to 48 with the mean, standard deviation and co-efficient of variation were 31.17, 5.14 and 16.49 percent respectively. Based on the computed risk bearing ability scores, the farmers were classified into three categories as low, medium and high risk bearing ability (Table 5.16). The early adopter is characterized by his/ her risk bearing capacity. It natural that who have risk bearing capacity showed positive impact on effectiveness of FFT.

Table 5.16 Distribution of the respondent farmers according to their risk bearing ability

Categories	Number	Percent	Mean	SD	CV
Low (13-23)	16	4.6	31.17	5.14	16.49%
Medium (24-34)	172	69.3			
High (35-45)	147	26.1			
Total	**345**	**100**			

Data contained into the Table 5.16 indicated that the majority (69.3 percent) of the respondent farmer had medium risk bearing ability as compared to 4.6 percent and 26.1 percent had low and high risk bearing ability respectively.

However, risk bearing ability of the respondent farmers had a positive significant relationship with their perceived effectiveness of farmer to farmer training (r = 0.161^{**}).

Asravor Richard, 2017 asserted that the effects of the variations in crop yield, fertilizer prices and crop price on household income were perceived as the three most relevant sources of risk. Stabilizing household income by growing different crops, storing feed/seed reserves and spreading sales were the most effective risk management strategies. Factor analysis identified market risk, production risk and human risk as major risk factors whereas diversification, financial strategy, and off-farm employment were perceived as the most effective risk management strategies. Farm and farmer characteristics were found to be significantly associated with risk perceptions and risk management strategies. Risk perceptions significantly increase the risk management strategy adopted by the smallholder rural farmers.

The variable risk bearing ability too many extend is associated with the integration of farmers' risk perceptions and management strategies in the development of agricultural policies for the small and marginal farmers. Flaten *et. al.*(2005) argued that the assessment of farmers' perceptions and how they respond to risk are very important because this can describe the decision making behaviour of farmers when faced with risky situations. Similarly, Hardaker *et. al.(* 2004) states that 'the welfare of the farm family and the survival of farm business may depend on how well farming risks are managed'.

5.16 Training exposure

The observed range of training exposure score of the farmers was 22-195 days with the mean, standard deviation and co-efficient of variation were 45.33, 12.68 and 27.97 percent respectively. Based on the computed training exposure, the farmers were classified into three categories as low, medium and high training exposure (Table 5.17).

Table 5.17 Distribution of the respondent farmers according to their training exposure

Categories	Number	Percent	Mean	SD	CV
Low (< mean $\pm$1sd) i.e. up to 32	64	18.6	45.33	12.68	27.97 %
Medium (mean $\pm$1sd)) i.e. up to 58	270	78.2			
High (> mean $\pm$1sd)) i.e. > 58	11	3.2			
Total	**345**	**100**			

Data contained into the Table 5.17 indicated that the majority (78.2 percent) of the respondent farmer had medium training exposure as compared to 18.6 percent and 3.2 percent had low and high training exposure respectively.

However, training exposure had a positive relationship with effectiveness of farmer to farmer training ($r = 0.312^{**}$).

According to Suffyan koroma and J.R. Deep Ford (2006), farmer training is seen as crucial to rural development. It should be tailored to farmers' specific needs, and be part of broader training programmes aimed at all rural occupations. In this regard, farmer-to-farmer training approaches are also attracting interest. Like most people, farmers remember and make effective use only of information that is beneficial to them. Training that does not deal with their problems nor provides guidance on how they could improve their livelihoods, is training wasted. The best way to convince farmers – who are traditionally cautious about change – to adopt new concepts and technologies is to let other farmers explain the new ideas to them.

5.17 Sincerity status in FFS

Sincerity in FFS of respondent farmers was found to range from 9 to 15 against the possible range of 5-15 with mean, standard deviation and co-efficient of variation 12.13, 1.23, and 10.14 percent respectively. As per sincerity in FFS scores of the farmers, they were classified into three categories namely low, medium and high sincerity in FFS (Table 5.18). In fact, sincerity matters in every aspect of activities in this world and also in the years after.

Table 5.18 Distribution of the respondent farmers according to their sincerity in FFS

Categories	Number	Percent	Mean	SD	CV
Low (9-10)	26	7.5	12.13	1.23	10.14%
Medium (11-12)	199	57.5			
High (13-15)	120	34.8			
Total	**345**	**100**			

Data shown in Table 5.18 indicated that the highest proportion (57.5 percent) of the respondent farmers had medium level of sincerity in FFS followed by 34.8 percent of high level of sincerity and only 7.5 percent of low level of sincerity in FFS.

It also reveals that overwhelming majority (92.5 percent) of the farmers had medium to high level of sincerity in FFS. It was because of FFS system of training, sequential opportunities of learning and interesting method of participatory learning in FFS. However, sincerity in FFS of the respondent farmers was positive significantly related with their opinion on effectiveness of farmer to farmer training ($r = 0.126^{*}$).

CHAPTER 6

CONTRIBUTION AND EFFECT OF SELECTED CHARACTERISTICS OF THE FARMERS TO THEIR PERCEIVED EFFECTIVENESS OF FARMER TO FARMER TRAINING

The purpose of this Chapter is to examine the contribution and effect of selected characteristics of the farmers to their perceived effectiveness of Farmer to Farmer Training (FFT). Effectiveness is a multivariate phenomenon involving interaction of many factors. For this study 17 characteristics of the farmers were selected as the independent variables.

In order to find out the contribution of 17 selected characteristics (independent variables) of the farmers to their perceived effectiveness of FFT (dependent variable), the relationships among the variables were determined first by conducting Pearson Product Moment Correlation test. The result of correlation matrix containing inter-correlation among the variables is shown in Appendix-XVII. However, the results of correlation co-efficient of each of the selected characteristics of the respondent farmers with their perceived effectiveness of FFT are shown in Table 6.1.

Table 6.1 Results of correlation co-efficient of each of the selected characteristics of the respondent farmer with their perceived effectiveness of FFT

Dependent Variables	Farmers characteristics (Independent Variables)	Co-efficient of Correlation (r)
Effectiveness of FFT	Age	0.032^{NS}
	Education	0.172**
	Family size	0.008 ^{NS}
	Net cropped area	0.133*
	Cropping intensity	0.158**
	Cultivated homestead area	0.007 ^{NS}
	Agricultural annual income	0.239**
	Agricultural commercialization	0.167**
	Agricultural diversification	0.214*
	Agricultural experience	0.115*
	Leadership trait	0.136*
	Extension contact	0.182**
	Decision making ability	0.107*
	Aspiration	0.362**
	Risk bearing ability	0.161**
	Training exposure	0.312**
	Sincerity status in FFS	0.126*

^{NS}Not significant, *Significant at 0.05 Level, **Significant at 0.01 Level

Results of correlation co-efficient contained in Table 6.1 revealed that out of 17 selected characteristics of the respondent farmers, 14 characteristics had significant relationship with their perceived effectiveness of FFT. These characteristics were: education, net cropped area, cropping intensity, agricultural annual income, agricultural commercialization, agricultural diversification , agricultural experience, leadership trait, extension contact, decision making ability, aspiration, risk bearing ability, training exposure and sincerity status in FFS.

6.1 Contribution of the selected characteristics of the farmers to their perceived effectiveness of farmer to farmer training

The independent variables in isolation would not give a comprehensive picture of the contribution of independent variables to the effectiveness of farmer to farmer training (Y). The different characteristics of respondent farmers may interact together to make a combined contribution to the farmer to farmer training. Keeping this fact in view, linear multiple regression analysis was used to assess the contribution of the independent variables to the effectiveness of farmer to farmer training.

Full model regression analyses were initially run by involving the following sets of independent variables with effectiveness of FFT (Y) as the dependent variables:

Set – I: All the selected 17 variables i.e. age (X_1), education (X_2), family size (X_3), net cropped area(X_4), agricultural diversification (X_5), cultivated homestead areas (X_6), agricultural annual income (X_7), agricultural commercialization (X_8), crop diversity (X_9), agricultural experience (X_{10}), leadership trait (X_{11}), extension contact (X_{12}), decision making ability (X_{13}), aspiration (X_{14}), risk bearing ability (X_{15}), training exposure (X_{16}), and sincerity status in FFS(X_{17}).

Set – II: Significant 14 variable by Pearson Product Moment correlation i.e. education (X_2), net cropped area(X_4), cropping intensity(X_5), agricultural annual income (X_7), agricultural commercialization (X_8), agricultural diversification (X_9), agricultural experience (X_{10}), leadership trait (X_{11}), extension contact (X_{12}), decision making ability (X_{13}), aspiration (X_{14}), risk bearing ability (X_{15}), training exposure (X_{16}), and sincerity status in FFS (X_{17}).

It was observed that the full model regression results of both the two sets were misleading due to the existence of interrelationship among the independent variables. It was evident from correlation matrix showing the interrelationships among the independent variables and existence of contradiction in the sign of correlation co-efficient and regression co-efficient.

Droper and Smith (1981) suggested running stepwise multiple regression analysis to insert variable in turn until the regression equation is satisfactory. Therefore, in order to avoid misleading results due to the problem of multi-collinearity and to determine the best explanatory variables, the method of step-wise multiple regressions was employed by involving the above mentioned two sets of independent variable with the effectiveness of farmer to farmer training. The objective of the step-wise multiple regression models were to find out the contribution of the variables, which were significant only. The two sets of step wise multiple regression analyses yielded same results which are shown in Table 6.2.

Table 6.2 Summary of stepwise multiple regression analysis showing the contribution of the significant variables to the effectiveness of FFT

Variables entered	Standardized partial 'b' coefficient	Value of 't' (with probability level)	Adjusted R^2	Increase in R^2	Variation explained in percent
Aspiration (X_{14})	0.322	6.897 (0.000)	0.129	0.129	12.9
Training exposure (X_{16})	0.256	5.413 (0.000)	0.205	0.076	7.6
Agricultural diversification (X_9)	0.214	4.625(0.000)	0.250	0.045	4.5
Sincerity status in FFS (X_{17})	0.128	2.744 (0.006)	0.263	0.013	1.3
Agricultural experience (X_{10})	0.115	2.477(0.014)	0.275	0.012	1.2
Decision making ability (X_{13})	0.096	2.075 (0.039)	0.282	0.007	0.7
		Total		**0.282**	**28.2**

Multiple R = 0.543
R-square = 0.295
Adjusted R - square = 0.282
F-ratio = 23.551 at 0.000 level of significance

The remain variables i.e., age (X_1), education (X_2), family size (X_3), net cropped area(X_4), cropping intensity (X_5), cultivated homestead areas (X_6), agricultural annual income (X_7), agricultural commercialization (X_8), leadership trait (X_{11}), extension contact (X_{12}) and risk bearing ability (X_{15}) were not entered into the regression equation.

Data presented in Table 6.2 indicated that the multiple R, R^2 and adjusted R^2 in the step-wise multiple regression analysis were 0.543, 0.295 and 0.282 respectively, and the corresponding F- ratio of 23.551 was significant at 0.000 level. The regression equation so obtained is presented below:

$$Y = - 44.182 +0.322X_{14} +0.256X_{16} +0.214X_9 +0.128X_{17} +0.115X_{10} + 0.096X_{13}$$

The step wise multiple regression analysis indicated that the whole model of 17 variables explained 28.2 percent of the total variation in effectiveness of the farmer to farmer training perceived by the respondents. But since the standardized regression co-efficient of 6 variables formed the equation and were significant, it might be assumed that whatever combination was there, it was due to these 6 variables.

Results of stepwise multiple regression analysis again indicated that aspiration (X_{14}) of the farmers was the most important characteristic which strongly and positively influenced their perception on effectiveness of FFT. Training exposure (X_{16}) and agricultural diversification (X_9) of the farmers had remarkable positive influence upon their perceived effectiveness of FFT. Sincerity status in FFS (X_{17}), Agricultural experience (X_{10}) and decision making ability (X_{13}) of the respondent farmers had somewhat positive influence upon their perceived effectiveness of FFT. Since the rest variables or characteristics of the farmers did not enter into the regression model, it was inferred that these characteristics either had multi-co linearity problem or had minimum contribution to the total explained variation of 28.2 percent.

On the basis of stepwise regression analysis, contributions of significant 6 independent variables to effectiveness of Farmer to Farmer Training (FFT) as the dependent variable are presented below in order of importance.

Aspiration (X_{14})

It was found from correlation matrix (Appendix-XVII) that farmers having higher aspiration tended to be characterized by younger in age, higher education, high family size, having more cropping intensity of his/her land, higher leadership trait, higher extension contact. The co-efficient of correlation also showed significant positive relationship between aspiration (X_{14}) of the respondent farmers and their perceived effectiveness of FFT.

Step-wise multiple regression analysis indicated that aspiration of the farmers had strongly significant and positive influence on their perceived effectiveness of FFT. Aspiration of the respondent farmers was found to be the most important positive contributor to their perceived effectiveness of FFT.

Farmers having higher aspiration usually try to explore income sources and they want to involve themselves into diversified income generating activities. IFMC of DAE provided participatory and season-long Farmer to Farmer Training (FFT) to the farmers with whole farm approach. Motivation and group dynamics was also in-built in the curriculum of IFMC FFS along with various aspects of agricultural as well as social issues. As a result, the training could help the participants to be inspired. These might be the reasons that aspiration of the farmers had the positive influence on their perceived effectiveness of FFT.

Hamidi *et. al.* (2004) found that aspiration had significant positive relationship, highest contribution and positive and substantial direct effect on adoption of integrated pest management practices. Aurangozeb (2002) revealed that aspiration had significant positive relationship with adoption of integrated homestead farming technologies. But, Sardar (2002), Hossain *et. al.* (2003) and Ali (2008) found no relationship of aspiration with application of innovations.

Training exposure (X_{16})

Correlation matrix (Appendix-XVII) revealed that farmers who having more training exposure tended to be characterized by more net cropped area, higher cropping intensity of his/her land with more cultivated homestead area, higher agricultural income, commercialization and experience, higher extension contact, leadership, decision making ability, and risk bearing ability. However, there existed a positive relationship between training exposure of the farmers and their perceived effectiveness of FFT.

Step wise multiple regression analysis indicated that training exposure of the farmers had a strongly significant and positive influence on their perceived effectiveness of FFT and it was found to be the second important contributor.

The purpose of training program is to impart knowledge of a system or process to someone new to that process. Individuals who have exposure on something similar or different previously are enlightened with some ideas and they stand one step ahead than those of zero-knowledge baseline. So, it is quite logical that the farmers having more training exposure would stand ahead to adopt new innovations in a larger scale. This might be the reason for the existence of positive contribution of training exposure to the effectiveness of FFT.

Ali (2008), Hamidi *et. al.* (2004) and Asaduzzaman (2002) found that training exposure had significant positive relationship with adoption of innovations. But, Islam (2002) and Alam (2004) found no relationship between training exposure and practising of agricultural innovations.

Agricultural diversification (X_9)

Correlation matrix (Appendix-XVII) revealed that farmers having high agricultural diversification were characterized by higher education, larger family size, higher net cropped area with homestead cultivation area, larger agricultural income, higher commercialization, leadership, and extension contact. However, correlation analysis indicated a positive relationship between farmers' agricultural diversification and their perceived effectiveness of FFT.

Step-wise multiple regression analysis indicated that agricultural diversification of the respondent farmers had remarkable significant and positive influence on their perceived effectiveness of FFT and it was found to be the third important contributor.

It is believed that agricultural diversification is a self-insuring strategy by farmers to protect against risk. Training on IFM integrates a resources available and technological option which leads farmers towards diversifications of crops in order to shift from traditional subsistence farming to more remunerative cropping enterprises (Hazra, 2001). Season-long hands-on training also enhances management skill and broadens specialized knowledge. So, evidence of this study suggests that there is significant positive relationship between crop diversification and perceived effectiveness of FFT. So, it is quite logical that the farmers having more agricultural diversification would like to practice the agricultural innovation in a larger scale. This might be the reason for agricultural diversification had the positive contribution to effectiveness of FFT.

Farm diversification is not a new phenomenon, however, such ‘pluriactivity’ has always been a feature of the farm sector (Hill, 1982; McInerney *et. al.*, 1989). Gerard McElw (2005) articulated that effective diversification does not specifically depend on the farms external environment and the threats and opportunities which that environment offers; to diversify farmers need to be externally aware and have the capability and capacity to diversify. Diversification should improve the economic viability of the farm businesses and reduce dependence on the production of primary subsidized agricultural commodities. Many of the attempts to construct sustainable rural livelihoods involve a shift away from agriculture's traditional 'core' activities by means of a diversification with new on- farm activities or 'conversion' to quality modes of production. The latest figures produced by the Centre for Rural Research located at the University of Exeter UK (2003) indicate that nearly 60 percent of all agricultural holdings in the UK have at least one form of diversified activity. Paradoxically, the Centre for Rural Research study (ibid) suggested that tenanted farms are more likely to diversify than wholly owned farms. Thus the suggestion is that tenant farmers in the UK as a whole are more likely to engage in diversification activities than those farmers who own their own farms/land. Further research is needed to generalize the issue of diversification and sustainable livelihood for rural farming community in developing countries.

Sincerity status in FFS (X_{17})

Correlation analysis indicated a positive relationship between farmers' sincerity in FFS and their perceived effectiveness of FFT (Appendix-XVII). Step-wise multiple regression analysis indicated that sincerity in FFS of the farmers was an important contributor and had significant and positive influence on their perceived effectiveness of FFT.

Step-wise multiple regression analysis indicated that sincerity of the farmers in FFS had somewhat significant and positive influence on their perceived effectiveness of FFT and it was found to be the fourth important contributor.

There is a saying that it is not the strategy but the sincerity that makes a difference. Sincerity is important because it helps build trust in training program. People, who are perceived as being sincere in their deeds, generally have an advantage of getting others to believe in them and trust ideas and plans they want to implement. Sincerity is stored in emotional intelligence and it is the key to honest communication. Therefore, sincere person can take more information from training. If sincerity disappears, trainees become deprived of the logical sequences of training progression. Sincerity of trainee farmers as well as farmer facilitators is reflected in season-long IFM FFS through their regular attendance, going down to the field for practical actions, sharing experiences and regular field visit and timely implementation of the decisions taken in field. So, it is quite logical that the sincere farmers would like to apply the IFM technologies in a larger scale. These might be the reasons for sincerity in FFS had the positive contribution to effectiveness of FFT.

Agricultural experience (X_{10})

It was found from correlation matrix (Appendix-XVII) that farmers having higher agricultural experience tended to be characterized by older age, lower education, and higher training exposure. It is quite logical that older farmers are experienced in agricultural practices though they have lower education. On the other hand, training makes them more perfect to do their agricultural practices. The co-efficient of correlation also showed significant positive relationship between agricultural experience of the respondent farmers and their perceived effectiveness of FFT.

Step-wise multiple regression analysis indicated that agricultural experience of the farmers had significant and positive influence on their perceived effectiveness of FFT and it was found to be the fifth important contributor to effectiveness of FFT.

Experienced person could understand the merits and demerits of anything easily in a short time. By the motivational issues containing in the FFT of IFM FFS, the farmers could improve their agricultural knowledge. Therefore, farmers having high agricultural experience could easily apply the selected agricultural innovation which were the content of FFT of IFMC. This might be the reason for agricultural experience of the farmers had the positive influence on their perceived effectiveness of FFT.

Decision making ability (X_{13})

It was found from correlation matrix (Appendix-XVII) that farmers having higher decision making ability tended to be characterized by higher agricultural income and commercialization; higher extension contact, risk bearing ability and training exposure. It is quite logical that farmers having higher decision making ability can take higher risk, can contact with extension agents, as a result their agricultural income and commercialization are higher. The co-efficient of correlation also showed significant positive relationship between decision making ability of the respondent farmers and their perceived effectiveness of FFT.

Step-wise multiple regression analysis indicated that decision making ability of the farmers had significant and positive influence on their perceived effectiveness of FFT and it was found to be the sixth important contributor to effectiveness of FFT.

One of the main principles of FFS is to make farmers expert in their field decisions through practicing ‘how and why’ in the ecosystems of crop fields. They regularly practice agro-ecosystem analysis (AESA) and farm management analysis (FMA) mainly for taking correct decisions in the field as well as other spheres of practical life. They also share experiences and even practice some simple experimentation in their crop field in quest of the right decisions. So, it is evident to have positive contribution of FFS farmers' decision making ability to their perceived effectiveness of FFT.

Ali (2008) and Reza (2004) revealed that decision making ability of the respondents had significant positive relationship with their adoption of innovations. But Ali (2004) found no significant relationship of decision making ability with practicing of innovation.

6.2 Direct and Indirect Effects of the Selected Characteristics of the Farmers

In the present study Pearson Product Moment correlation test, full model linear multiple regression and stepwise multiple regression were conducted. It is not possible to find out the direct effects and indirect effects separately by these tests. But, in path analysis, it is possible to get direct effects and indirect effects separately.

Path coefficient is simply a standardized partial regression coefficient and as such measures the direct influence of one variable upon another and permits the separation of the correlation coefficient into components of direct and indirect effects (Dewey and Lu, 1959). This allows the reflection of direct effect of an independent variable and its indirect effect through other variables on the dependent variable (Sasmal and Chakrabarty, 1978).

Direct effect of an independent variable on the dependent variable is the standardized beta co-efficient (value of 'b' of regression analysis) of the respective independent variable. Whereas indirect effect of an independent variable through a channeled variable is measured by the following formula:

$e = \sum bxr$

Where, e = Total indirect effect of an independent variable

b = Direct effect of the Variable through which indirect effect is channeled

r = Correlation co-efficient between respective independent variable and variables through which indirect effect is channeled.

Path coefficient analysis was employed in order to obtain clear understanding of the direct and indirect effects of selected independent variables. Path analysis was done involving the significant variables of step-wise multiple regression analysis. Path coefficients showing the direct and indirect effects of significant 6 independent variables of step-wise multiple regression analysis on the farmers' perception on the effectiveness of FFS have been presented in Table 6.3. Analysis of data furnished in Table 6.3 indicated that among the independent variables, Aspiration (X_{14}) had the highest direct effect (0.322) in the positive direction followed by training exposure(X_{16}) and agricultural diversification (X_9) in the positive direction on farmers' perception on effectiveness of FFT and their direct effect were 0.256 and 0.214 respectively. Sincerity status in FFS (X_{17}), agricultural experience (X_{10}) and decision making ability (X_{13}) had direct effect in the positive direction on farmers' perception on effectiveness of FFT and their direct effect were 0.128, 0.115 and 0.096 respectively.

Here, it may be mentioned that without path co-efficient analysis it is not possible to know the indirect effects of an independent variable through other variables on the dependent variable. Therefore, emphasis has been given on the indirect effects which have been obtained from path co-efficient analysis (Table 6.3).

The variable agricultural diversification (X_9) had the highest (0.060) total indirect effect followed by training exposure (X_{16}), aspiration (X_{14}) and decision making ability (X_{13}). Sincerity status in FFS (X_{17}) and agricultural experience (X_{10}) had negligible total indirect effects on effectiveness of FFT.

Table 6.3 Path coefficients showing the direct and indirect effects of significant independent variables of stepwise multiple regression analysis on the effectiveness of farmer to farmer training in dissemination of farm information

Independent variables	Variables through which indirect effects are channeled	Indirect effects	Total indirect effect	Direct effect
Agricultural diversification (X_9)	Aspiration (X_{14})	0.029		
	Training exposure (X_{16})	0.027		
	Sincerity status in FFS (X_{17})	0.008		
	Agricultural experience (X_{10})	-0.005		
	Decision making ability (X_{13})	0.002	0.060	0.214
Training exposure(X_{16})	Aspiration (X_{14})	0.031	0.056	0.256
	Agricultural diversification (X_9)	0.022		
	Sincerity status in FFS (X_{17})	-0.020		
	Agricultural experience (X_{10})	0.013		
	Decision making ability (X_{13})	0.010		
Aspiration (X_{14})	Training exposure(X_{16})	0.024		
	Agricultural diversification (X_9)	0.019		
	Sincerity status in FFS (X_{17})	0.013		
	Agricultural experience (X_{10})	-0.009		
	Decision making ability (X_{13})	-0.006	0.041	0.322
Decision making ability (X_{13})	Aspiration (X_{14})	-0.021		
	Training exposure (X_{16})	0.027		
	Agricultural diversification (X_9)	0.003		
	Sincerity status in FFS (X_{17})	-0.008		
	Agricultural experience (X_{10})	0.010	0.012	0.096
Agricultural experience (X_{10})	Aspiration (X_{14})	-0.026		
	Training exposure (X_{16})	0.029		
	Agricultural diversification (X_9)	-0.009		
	Sincerity status in FFS (X_{17})	-0.003		0.115
	Decision making ability (X_{13})	0.009	0.001	
Sincerity status in FFS (X_{17})	Aspiration (X_{14})	0.033		
	Training exposure (X_{16})	-0.040		
	Agricultural diversification (X_9)	0.013		
	Agricultural experience (X_{10})	-0.002		
	Decision making ability (X_{13})	-0.006	-0.002	0.128

On the basis of path analysis, the independent variables having indirect effects on effectiveness of FFT have been presented and discussed below in descending order:

Agricultural diversification (X_9)

Path analysis showed that crop diversity (X_9) had the highest total indirect effect (0.060) and a positive direct effect of 0.214 (Table 6.3) on effectiveness of FFT. The indirect effect was channeled positively through aspiration (X_{14}), training exposure(X_{16}), sincerity status in FFS (X_{17}) and decision making ability (X_{13}) and slight negatively through agricultural experience (X_{10}).

It may be inferred that other variables remaining constant, agricultural diversification (X_9) was a determinant of the farmers' perception on the effectiveness of FFT.

Training exposure(X_{16})

Path analysis showed that training exposure (X_{16}) had the 2nd highest total indirect effect (0.056) and a positive direct effect of 0.256 (Table 6.3) on effectiveness of FFT. The indirect effect was positively channeled through aspiration (X_{14}), agricultural diversification (X_9), agricultural experience (X_{10}) and decision making ability (X_{13}) and slight negatively through sincerity status in FFS (X_{17}).

It may be inferred that other variables remaining constant, training exposure (X_{16}) had an influence on the Effectiveness of FFT.

Aspiration (X_{14})

Path analysis revealed that aspiration (X_{14}) had the 3rd total indirect effect (0.041) in descending order and a positive direct effect of 0.322 (Table 6.3) on the effectiveness of FFT. The indirect effect was positively channeled through training exposure (X_{16}), agricultural diversification (X_9) and sincerity status in FFS (X_{17}) and slight negatively through agricultural experience (X_{10}) and decision making ability (X_{13}).

It may be inferred that other variables remaining constant, aspiration (X_{14})had an influence on the Effectiveness of FFT.

Decision making ability (X_{13})

In terms of descending order, decision making ability (X_{13}) had the 4th total indirect effect (0.012) and a positive direct effect of 0.096 (Table 6.3) on the effectiveness of FFT. The indirect effect was positively channeled through training exposure (X_{16}), agricultural diversification (X_9) and agricultural experience (X_{10}) and slight negatively through aspiration (X_{14}) and sincerity status in FFS (X_{17}).

It may be inferred that other variables remaining constant, decision making ability (X_{13})had an influence on the Effectiveness of FFT.

Agricultural experience (X_{10})

Path analysis revealed that ecological agricultural experience (X_{10}) had very little total indirect effect (0.001) and a positive direct effect of 0.115 (Table 6.3) on the effectiveness of FFT. The indirect effect was positively channeled through training exposure (X_{16}) and decision making ability (X_{13}) and slight negatively through aspiration (X_{14}), agricultural diversification (X_9) and sincerity status in FFS (X_{17}).

It may be inferred that other variables remaining constant, agricultural experience (X_{10})had an influence on the Effectiveness of FFT.

Sincerity status in FFS (X_{17})

It was found from the path analysis that sincerity status in FFS (X_{17}) had a slight negative total indirect effect (-0.006) and a positive direct effect of 0.128 (Table 6.3) on the effectiveness of FFT. The indirect effect was positively channeled through aspiration (X_{14}) and agricultural diversification (X_9) and slight negatively through training exposure (X_{16}), agricultural experience (X_{10}) and decision making ability (X_{13}).

It may be inferred that other variables remaining constant, sincerity status in FFS (X_{17}) had an influence on the Effectiveness of FFT.

Preethi Palb (2015), in a study on perception, aspiration and participation of farm youth in agriculture revealed by the multiple linear regression analysis of independent variables that with participation level of farm youth, out of 20 independent variables, seven variables namely land holdings, economic motivation, innovative proneness, social participation, Cosmopoliteness, training received and farm scientist contact were significantly contributing to the participation of farm youth in agriculture. Further, ranking of variables based on their total indirect effects on perception revealed that education, land holdings and extension contact had highest indirect effect.

CHAPTER 7

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Summary

7.1.1 Introduction

The farmers behind the plough are the champions in fighting hunger and malnutrition of millions. Agriculture remains the largest employer in Bangladesh. The performance of agricultural sector has immense impact on macro-economic situation like food and nutrition security, income growth, poverty alleviation, employment generation, judicious use of agricultural resources, sustainable development and environmental and ecological management improvement with the best integration agricultural components.

It is more than the necessity to arrange extension activities for landless, marginal and small farmers to boost up their skills as well as production. Improved, demand driven, integrated and decentralized extension systems has been developed through Farmer Field School (FFS) to support poor, marginal and small farmers' household through enhanced, integrated and sustainable agricultural activities for increasing productivity, profitability and ensuring food security through their farm and off farm management. Keeping sustainability perspective of principles and practices of integrated, holistic approaches, community mobilization which included Farmer to Farmer Training(FFT) and establishment of farmers' organization came in to view. Farmer to Farmer Training - a new option or alternative for disseminating technologies apart from Departmental Trainers (DT), came into being through intervention of many foreign funded and government funded projects and program like DAE-DANIDA Strengthening Plant Protection Services (SPPS), DANIDA funded Agricultural Sector Program Support (ASPS) and Agricultural Growth and Employment Program (AGEP).

About 2000 Farmer Trainers (FTs) have been developed who are in a position to conduct FFS for farmer to farmer extension. This system of training and FFS for farmer to farmer extension has proven to be very successful to strengthen farmers' capacity to grow/manage sub sectors of agriculture like fish, crop, household garden, poultry, livestock, fisheries etc.

Bangladesh has achieved a lot in the agricultural sectors, still significant proportion of farmers are not getting adequate support and information for addressing the challenges they face in farming. In Bangladesh, agencies responsible for agriculture, livestock and fisheries extension services face resource limitations, both in manpower and finances.

Upazila (sub-district) level Officers and their field staff are often unable to meet principal information needs of the majority of farmers within their jurisdiction. As the largest extension organization, Department of Agricultural Extension (DAE) has expert human resources for extension and advisory services for the farmers even at village level. But they are overloaded with responsibilities as such they cannot cover all farm families for which they are assigned. Field level extension staff and farm families ratio are also very high (1:1500-2000) which impede the supervision of the farming activities. In livestock and fisheries sector, there are very less numbers of front level workers at Union or village level. Farmers' access to information sources like public and NGO services is still very limited.

Government extension service has a countrywide coverage to provide extension service to all categories of farmers. Lamentably, their service provision seems to be more concentrated on large farmers rather than small and marginal farmers. On the other hand, NGOs credited for creating space for small and women farmers. But their institutional capacity for handling sophisticated extensive service is very limited. Nevertheless, their coverage of extension service is limited based on location and number of clients and more importantly based on micro financial credit functions. Private extension service is suffering severely from skilled manpower shortage and often criticized for high concentration in maximizing profits. At present farmers use a diversity of information sources originated mainly from public, private and NGO sectors. However, the extension service providers have not been able to satisfactorily address the information and knowledge needs of the small and marginal farmers. In addition, the farmers are often exploited by input dealers and manufacturers who sell spurious seeds and adulterated fertilizers and pesticides. The extension professionals need more and more practical, need based training to address the emerging challenges faced by farmers in Bangladesh.

Some studies were undertaken in Bangladesh only on Integrated Pest Management Farmer Field School (IPM FFS) run by Departmental Trainers. These studies were: Comparative Analysis between FFS and non-FFS farmers on Knowledge, Skill and Attitude towards IPM; Factors Influencing Adapting IPM Practices at Community Level, Factors Influencing Adoption of IPM by Vegetable Farmers; IPM Club for Fostering Farmers Empowerment in Rice Production; Cost effectiveness of Integrated Pest Management Extension Method: An example for Bangladesh, Applied Economic Perspectives and policy etc. But no study is undertaken so far on FFS run by farmers i.e. Farmer to Farmer Training (FFT) and Effectiveness of FFT not yet measured through any in-depth research study. On the other hand, few studies on farmer to farmer trainer were found in some African countries and other places like Kenya, Uganda, Nigeria and Peru. Some of the studies were: Disseminating Improved Practice: Are Volunteer Farmer Trainers Effective?; Farmer Trainers: An Emerging Disseminating Pathways; Volunteer Farmer Trainer: Improving Smallholder Farmers' Access to Information for a Stronger Dairy Sector; Farmers Teaching Farmers: Challenges and Opportunities of Using Volunteer farmers in Technology dissemination; Assessment of the Effectiveness of Lake Chad Research Institute “Adapted Village Scheme”in Dissemination of Improved Farm Technology in Borno state, Nigeria; Assessment of Technical Efficiency of Farmer Teachers in the Uptake and dissemination of Push Pull Technology in Western Kenya; Assessing the Effectiveness of the Volunteer Farmer Trainer Approach in dissemination of Livestock Feed Technologies in Kenya; Effectiveness of the Farmer to Farmer Extension Model in Increasing Technology Uptake in Masaka and Tororo Districts of Uganda; Operationalizing Participatory Research and Farmer to Farmer Extension: the *Kamayog* in Peru; Farmer Field School: Effectiveness for Soil and Crop Management Technology in Kenya. But most of these research studies were either based on single technology or issue. No embedded findings on sort of composite technologies as interwoven into integrated farm management were found in any literatures reviewed.

Farmer to Farmer Training in tune with the objectives, is a kind of performing rehearsal of training and transferring appropriate technologies to farmers. The government is mandated to providing efficient and effective need based extension services to farmers to enable them to optimize their use of resources to augment self-sufficiency in food production and to improve their nutritional status. For this,there is an increasing need for strengthening agricultural extension services to ensure production system on a sustainable basis. Appropriate institutional arrangement needs to be established, so that research and extension can interact efficiently with each other and with farmers to address the critical needs of the production practices at the farm level.

As among many principles and priorities, the government recognizes agricultural extension as a service delivery system which will assist farmers through appropriate technical and farm management advice and information, new technology, improved farming methods and technologies aimed at increasing production efficiency and income. Extension services will be provided to all categories of farmers; landless, marginal, small, medium and large with special emphasis on women and youths.The government will decentralize extension activity at the grass root level to deliver efficient and coordinated services. The government will make a shift from top down, hierarchical approach by bottom-up participatory approach in which farmers' research and extension will serve as peers. The government will recognize and adapt approach that emerge locally through growing understanding of the nature of technological change, learning and adaption to prevailing situation. To deal with the above issues with a newly emerged farmer to farmer training through FFS, the study was undertaken.

7.1.2 Objectives of the study

i. To determine and describe the extent of effectiveness of Farmer to Farmer Training (FFT) as perceived by the farmers based on their knowledge, skill, attitude and practice regarding the content of Integrated Farm Management Farmer Field School (IFM FFS) guideline;
ii. To determine and describe the characteristics profile of the farmers;

iii. To explore the contribution of the selected characteristics of the farmers to their effectiveness of FFT as perceived by them;
iv. To explore relationships among knowledge, attitude, skill and practice of the farmers regarding IFM FFS guideline;
v. To make a comparison of FFT effectiveness as perceived by the FFS trained and non-trained farmers;
vi. To qualitatively assess the effectiveness of FFT as perceived by the farmer respondents as well as departmental extension personnel.

7.1.3 Methodology

Six Upazilas from six districts namely Babuganj Upazila of Barisal district, Homna Upazila of Comilla district, Batiaghata Upazila of Khulna district, Sreebardi Upazila of Sherpur district, Chapainawabganj Sadar Upazila of Chapainawabganj district and Chirirbandar Upazila of Dinajpur district were considered as locale of the study. Farmers who received training from Integrated Farm Management Farmer Field School (IFMFFS) of the six selected Upazilas were considered as the population of the study. A total of 345 farmers were selected from the study area as the sample of the study. To compare the effectiveness of FFT, data also collected from a total of 51 non-trained farmers from the study areas where no FFS was established. Data were collected from the respondent farmers by face to face interview with the help of a pre-tested interview schedule during September 2016 to October of 2017.

The Effectiveness of Farmer to Farmer Training (FFT) in disseminating information constituted the dependent variable of the study. Four dimensions like knowledge, attitude, skill and application of the farmers were considered to measure the effectiveness of FFT in disseminating information. Seventeen selected characteristics of the farmers were considered as independent variables of the study and these were age, education, family size, net cropped area, cropping intensity, cultivated homestead areas, agricultural income, agricultural commercialization, agricultural diversification annual, agricultural experience, leadership trait, extension contact, decision making ability, aspiration, risk bearing ability, training exposure, and sincerity status in FFS.

Descriptive statistics like possible and observed range, frequency and percentage distribution, mean, standard deviation, coefficient of variance and rank order were used. Pearson Product Moment correlation test was initially done. Full model regression analyzing was also done. Due to misleading results from multi-collinearity, stepwise multiple regression analysis was used to find out the contribution of the independent variables to the dependent variable. Finally, path analysis was done to find out the direct and indirect effects of the independent variables on the dependent variables. To compare the effectiveness of FFT as perceived by the Trained and Non-trained farmers, simple t-test was used. In all statistical test 0.05 level of probability was used as the basis to reject or accept the null hypotheses.

The findings of the research were tested with the following null hypothesis:
"There was no contribution of the selected characteristics of the farmers to the effectiveness of farmer to farmer training".

"There was no difference of effectiveness of FFT as perceived by trained and non-trained farmers".

7.1.4 Findings

7.1.4.1 Effectiveness of Farmer to Farmer Training (FFT)

Effectiveness of Farmer to Farmer Training (FFT) was measured on the basis of the perception of the FFS trained farmers on four (4) dimensions like Knowledge, Skill, Attitude and Practice (KSAP) regarding the content of Integrated Farm Management Farmer Field School (IFM FFS) guideline. Effectiveness of FFT as perceived by an individual FFS trained farmer was measured by adding the scores obtained by him/her against all the four dimensions.

Knowledge: Overwhelming majority (85.8 percent) of the farmers had medium to high knowledge on agricultural practices.

Skill: About two-thirds (64.6 percent) of the farmers had medium to high skill on agricultural practices.

Attitude: Overwhelming majority (95.9 percent) of the farmers had favorable attitude towards agricultural innovations.

Practice: Above half (55.4 percent) of the farmers had medium to high agricultural practices based on the knowledge, skill and attitude gained on agricultural technologies from FFT through FFS.

Overall effectiveness of FFT: Findings indicated that 36.8 percent of the farmers perceived as low effectiveness of FFT, while 29.9 percent perceived medium effectiveness and rest one-thirds (33.3 percent) of the respondent perceived high effectiveness of the FFT. However, about two-thirds (63.2 percent) of the respondent FFS trained farmers perceived that the FFT through FFS of IFMC under DAE was medium to high effective.

7.1.4.2 Inter-relationships among knowledge, attitude, skill and practice

Each of the four dimensions (knowledge, skill, attitude and practice) of the farmers had significant positive relationship with the overall effectiveness of FFT as perceived by them. Again each of the dimensions had significant positive relationship with each dimension.

7.1.4.3 FFT effectiveness as perceived by the trained and non-trained farmers

Findings of the independent sample t-test revealed that there was statistically highly significant ($t = 6.53$ at 394 df) difference of effectiveness of FFT as perceived by the trained and non-trained farmers. Trained farmers perceived higher effectiveness of FFT than non-trained farmers.

7.1.4.4 Selected characteristics of the farmers

Age: Majority (44.90 percent) of the farmers were in middle-aged compared to 43.80 percent young and 11.30 percent old.

Education: Highest proportion (61.2 percent) of the farmers had secondary level of education, followed by 22.9 percent primary level while 14.2 percent above secondary level of education, and rest 1.7 percent respondents were illiterate. It means that about cent percent (98.3 percent) the respondents were literate with primary to above secondary level of education.

Family size: Above half (51percent) of the farmers had small family size followed by 46.4 percent medium and only about 2.6 percent had large family size. It means that nearly cent percent (97.4 percent) of the respondent farmers had small to medium family size.

Net cropped area: Highest proportion (75.7 percent) of the respondents were small farmers while 13 percent and 11.3 percent medium and marginal farmers respectively on the basis of net cropped area.

Cropping intensity: Three-fourths (75.1 percent) of the farmers' land had medium cropping intensity compared to 11.0 percent and 13.9 percent farmers' land had low and high cropping intensity respectively. It means that overwhelming majority (89 percent) of the land of the respondent farmers had medium to high cropping intensity.

Cultivated homestead area: Overwhelming majority (92.5 percent) of the farmers fell in to the category of low cultivated homestead area compared to 2.0 percent and 5.5percent respondent farmers had no and medium cultivated homestead area.

Agricultural annual income: Above three-fourths (76.0 percent) of the respondent farmers belong to the medium agricultural annual income category followed by high agricultural income (13.3 percent) and low agricultural annual income (10.7 percent).

Agricultural commercialization: Above half (52.1 percent) of the farmers belong to medium commercialization group compared to 35.7 percent and 12.2 percent low and high commercialization group respectively.

Agricultural diversification: Overwhelming majority (80.6 percent) of the farmers belonged to medium level of agricultural diversification group while 10.7 percent and 8.7 percent were in low and high agricultural diversification group respectively.

Agricultural Experience: Highest proportion (53.6 percent) of the farmers belonged to low agricultural experience category compared to 38.90 percent had medium experience and only 7.5 percent represented the high agricultural experiences group. It means that overwhelming majority (92.5 percent) of the farmers were in low to medium agricultural experiences category.

Leadership trait: Overwhelming majority (91.6 percent) of the respondent farmers had low leadership as compared to 7.5 percent medium leadership and only an insignificant proportion (0.9 percent) had high leadership.

Extension contact: Majority (60.6 percent) of the respondents had medium level of extension contact while 24.6 percent and 13.0 percent had low and high level of extension contact respectively.

Decision making ability: Majority (62.9 percent) of the respondent had medium level of decision making ability while 12.8 percent and 24.3 percent had low and high level of decision making ability respectively.

Aspiration: About half (49.9) of the respondents had medium level of aspiration as compared to 42.6 percent high and 7.5 percent low aspiration.

Risk bearing ability: Majority (69.3 percent) of the respondent farmers had medium risk bearing ability as compared to 4.6 percent and 26.1 percent had low and high risk bearing ability respectively.

Training exposure: Majority (78.2 percent) of the respondent farmers had medium training exposure as compared to 18.6 percent and 3.2 percent had low and high training exposure respectively.

Sincerity status in FFS: Highest proportion (57.5 percent) of the respondent farmers had medium level of sincerity in FFS followed by 34.8 percent percent of high level of sincerity and only 7.5 percent of low level of sincerity in FFS. It also reveals that overwhelming majority (92.5 percent) of the farmers had medium to high level of sincerity in FFS.

7.1.4.5 Contribution of the selected characteristics the farmers to their perceived effectiveness of farmer to farmer training

Step wise multiple regression analysis indicated that the whole model of 17 variables explained 28.2 percent of the total variation in effectiveness of the farmer to farmer training as perceived by the respondents. But since the standardized regression co-efficient of 6 variables formed the equation and were significant, it might be assumed that whatever combination was there, it was due to these 6 variables.

Results of stepwise multiple regression analysis again indicated that aspiration (X_{14}) of the farmers was the most important characteristic which strongly and positively influenced their perception on effectiveness of FFT. Training exposure (X_{16}) and agricultural diversification (X_9) of the farmers had remarkable positive influence upon their perceived effectiveness of FFT. Sincerity status in FFS (X_{17}), agricultural experience (X_{10}) and decision making ability (X_{13}) of the respondent farmers had somewhat positive influence upon their perceived effectiveness of FFT. Since the rest variables or characteristics of the farmers did not enter into the regression model, it was inferred that these characteristics either had multi-collinearity problem or had minimum contribution to the total explained variation of 28.2 percent.

7.1.4.6 Direct and Indirect Effects of the Selected Characteristics of the Farmers

Path analysis indicated that among the independent variables, Aspiration (X_{14}) had the highest direct effect (0.322) in the positive direction followed by training exposure(X_{16}) and agricultural diversification (X_9) in the positive direction on farmers' perception on effectiveness of FFT and their direct effect were 0.256 and 0.214 respectively. Sincerity status in FFS (X_{17}), agricultural experience (X_{10}) and decision making ability (X_{13}) had direct effect in the positive direction on farmers' perception on effectiveness of FFT and their direct effect were 0.128, 0.115 and 0.096 respectively.

The variable agricultural diversification (X_9) had the highest (0.060) total indirect effect followed by training exposure (X_{16}), aspiration (X_{14}) and decision making ability (X_{13}). Sincerity status in FFS (X_{17}) and agricultural experience (X_{10}) had negligible total indirect effects on effectiveness of FFT.

7.2 Conclusions

On the basis of the findings, discussion and logical interpretation, the following conclusions were drawn:

- About two-thirds (**63.2** percent) of the respondent FFS trained farmers perceived that the FFT through FFS of IFMC under DAE was medium to high effective, but the rest **36.8** percent of the farmers perceived as low effectiveness of FFT. These facts led to the conclusion that FFT of IFMC through FFS was very effective, but there is scope to make it more effective for disseminating agricultural information to the farmers.

- Each of the four dimensions like Knowledge, skill, attitude, and practice regarding FFT of the farmers had significant positive relationship with the overall effectiveness of FFT as perceived by them. Again each of the dimensions had significant positive relationship with each dimension. Overwhelming majority (**85.8** percent) of the farmers had medium to high knowledge on agricultural practices, about two-thirds (**64.6** percent) of them had medium to high skill on agricultural practices, overwhelming majority (**95.9** percent) had favorable attitude towards agricultural innovations and above half (**55.4** percent) of them had medium to high agricultural practices based on the knowledge, skill and attitude gained on agricultural technologies from FFT through FFS. Therefore, it was concluded that the farmers gained knowledge and skill on agricultural practices, as a result they form a favorable attitude towards agricultural innovation and they finally started agricultural practices as per IFMFFS guideline. But still there is scope to increase the knowledge, skill, attitude and practice of the farmers by improving the quality of the FFT.

- There was statistically significant difference of effectiveness of FFT as perceived by the trained and non-trained farmers. Trained farmers perceived higher effectiveness of FFT than non-trained farmers. Therefore, it was concluded that there is scope to establish new FFS for the new areas of Bangladesh for disseminating need based agricultural information to mass farmers.

- Aspiration of the farmers was the most important characteristic which strongly and positively influenced their perception on effectiveness of FFT. About half (**49.9**) of the respondents had medium level of aspiration as compared to **42.6** percent high and **7.5** percent low aspiration. Path analysis showed that aspiration of the farmers had positive indirect effect through other variables. Therefore, it was concluded that the higher aspiration of the farmers would be helpful to form favorable perception on the effectiveness of FFT.

- Training exposure of the farmers had remarkable positive influence on their perceived effectiveness of FFT. Majority (**78.2** percent) of the respondent farmer had medium training exposure as compared to **18.6** percent and **3.2** percent had low and high training exposure respectively. The Path Analysis showed that training exposure of the farmers had positive indirect effect through other variables. This means that the respondent who received more training obviously gained more knowledge and skill, formed favorable attitude and practiced agricultural innovations as per IFM FFS guideline. Therefore, it was concluded that the training exposure of the farmers was helpful for making their positive perception on the effectiveness of FFT.

- Agricultural diversification of the farmers had remarkable positive influence upon their perceived effectiveness of FFT. Overwhelming majority (**80.6** percent) of the farmers belonged to medium level of crop diversity group while **10.7** percent and **8.7** percent were in low and high crop diversity group respectively. Path analysis showed that agricultural diversification of the farmers had positive indirect effect through other variables. Therefore, it was concluded that trained farmers already increased their crop diversity in a large scale and there is scope to increase the agricultural diversification of the rest farmers.

- Sincerity in FFS of the respondent farmers had positive influence upon their perceived effectiveness of FFT. It was quite logical that sincere farmers had more attention to the training. As a results, they perceived more effectiveness of the FFT. Therefore, it was concluded that there is scope to increase the sincerity status of the farmers to make FFT more effective.

- Agricultural experience of the respondent farmers had positive influence on their perceived effectiveness of FFT. Highest proportion (**53.6** percent) of the farmers belonged to low agricultural experience category compared to **38.90** percent had medium experience and only **7.5** percent represented the high agricultural experiences group. It means that overwhelming majority (**92.5** percent) of the farmers were in low to medium agricultural experiences category. Actually, the farmers having high agricultural experience were more likely to gain more agricultural knowledge and skill and adopt agricultural practices to a higher extent. Similarly, experienced farmer could understand the merits and demerits of different agricultural innovations discussed in FFT easily in a short time. Therefore, it was concluded that agricultural experience of the farmers was helpful for make favorable perception on the effectiveness of FFT.

- Decision making ability of the respondent farmers had positive influence upon their perceived effectiveness of FFT. Majority (**62.9** percent) of the respondent had medium level of decision making ability while **12.8** percent and **24.3** percent had low and high level of decision making ability respectively. It is quite logical that the farmers having more decision making ability could adopt agricultural innovation in a larger scale. Therefore, it was concluded that decision making ability of the farmers was helpful for their favorable perception on the effectiveness of FFT.

- From qualitative assessment it was found that about 74 percent of departmental trainers (DT) opined that FFS run by farmer facilitators ranked as good; about 50 percent of DTs were in favor of farmer facilitators based on their level of facilitation skill as moderately skilled to skilled; and the attitude of more than 80 percent of DTs towards farmer facilitators appeared as moderate to highly favorable. These findings justify the effectiveness of FFT as perceived by FFS farmers. Therefore, it may be recommended that spaces for FF and thereby FFT should be provided in the present system of extension service delivery for complementing sustainable agricultural extension / advisory services.

7.3 Recommendations

7.3.1 Recommendations for policy implication

On the basis of findings and conclusions of the study, the following recommendations are made:

- About two-third of the FFS trained farmers perceived FFT of IFMC through FFS as medium to high effective and rest one-third perceived as low effective. Therefore, it may be recommended that attempt should be taken to make FFT as more effective by providing refresher training to the farmer facilitators for disseminating agricultural information to the farmers.

- Majority of the farmers had medium to high knowledge and skill on agricultural practices, favorable attitude towards agricultural innovations and practiced agricultural innovations as per IFM FFS guideline. Each of knowledge, skill, attitude and practice dimensions of effectiveness had significant interrelationship among them. It was, therefore, recommended that IFM FFS guideline should be revised on the basis of their needs so that farmers can gain more knowledge and skill on agricultural practices, as a result they can form a favorable attitude towards agricultural innovation and finally they can apply agricultural practices as per IFMFFS guideline in their field.

- Trained farmers perceived significantly higher effectiveness of FFT than non-trained farmers. Therefore, on the basis of the findings, it was recommended that new FFS should be established through FFT where FFS was not established earlier for disseminating proper agricultural information to mass farmers.

- Farmers having higher aspiration perceived more effectiveness of FFT. Therefore, it was recommended that attempt should be made to include more new topics of their interests in the IFM FFS guideline so that the farmers could be motivated to involve themselves in more income generating activities to make their aspiration at a higher level.

- Training exposure of the farmers had remarkable positive influence on their perceived effectiveness of FFT. Therefore, it was recommended that to increase the training exposure of the farmers to make their positive perception on the effectiveness of FFT, more training exposure including FFT should be made for increasing higher effectiveness.

- Agricultural diversification of the farmers had remarkable positive influence on their perceived effectiveness of FFT. Therefore, it was recommended that content of the FFT should be revised such a way so that the farmers can shift their farming from traditional farming with high value crop farming to increase the agricultural diversification in their field .

- Sincerity in FFS of the respondent farmers had positive influence on their perceived effectiveness of FFT. Therefore, it was recommended that attempt should be taken by motivational campaign to increase the sincerity of the farmers by increasing more attention to FFT, increased awareness, higher conviction and interests.

- Agricultural experience of the respondent farmers had positive influence on their perceived effectiveness of FFT. Therefore, it was recommended that attempt should be taken to include all categories of farmers, specially low and medium experienced farmers in FFT to increase their agricultural knowledge and skill, built favorable attitude towards agricultural innovations to involve them in agricultural practices.

- Decision making ability of the respondent farmers had positive influence on their perceived effectiveness of FFT. Therefore, it may be recommended that strategic plan and motivational session should be included in the IFM FFS guideline so that the farmers can increase their decision making ability especially on more how-to - information for agricultural farming.

- Majority of departmental trainers (80 percent) had favorable attitude towards farmer facilitators. They ranked FFS run by FF as good (about 74 percent) and facilitation skill of FF as moderately skilled to skilled (about 50 percent).Therefore, it may be recommended that spaces for FF and thereby FFT should be provided in the present system of extension service delivery for complementing sustainable agricultural extension / advisory services.

7.3.2 Recommendations for future study

On the basis of scope and limitations of the present study and the observations made by the researcher, the following recommendations have been made for further study:

- Factors of the farmers were many and varied, but in the present study only 17 factors on personal, economic, social and psychological aspects were taken into consideration. Obviously, there are other variables which cause variations in the perception of FFT. Further research should be conducted involving other variables.

- This study was conducted in selected six Upazillas of six districts of Bangladesh. It is recommended that such studies should be conducted in other areas of Bangladesh.

- There were many and vast subject-matter areas of agricultural training. But, in the present study, only FFT with IFM FFS guideline was considered. Further research is needed in connection with other agricultural training related to crop, livestock, fisheries, agro-forestry *etc.*

- Keeping the female FFS in view, a future study is recommended with more female respondents.

- This study was conducted only on the FFS component. But after FFS intervention, farmers organization and market linkage is also necessary. So, it is recommended that the future studies should be taken on those issues also.

7.4 Message from the study

After ultimate analysis of the findings, the researcher is convinced to make the following massages for the ultimate users:

Farmer to Farmer Training (FFT) through Farmer Field School (FFS) of Integrated Farm Management Component (IFMC) of the Department of Agricultural Extension (DAE) was effective for disseminating agricultural information to the farmers. To make it more effective, refresher training should be provided to the Farmer Facilitators, IFM FFS guideline should be revised as per current necessity, and new FFS should be established for FFT where FFS was not established earlier for disseminating proper agricultural information to mass farmers. Other Agricultural Extension Service Providers can use this updated Guideline to provide training to their beneficiaries. Working spaces should be allowed sustainably for farmer facilitators as the extended hands of the present extension system.

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APPENDICES

Appendix I

A Poster on Impacts of IFM FFS run by FF

Appendix II

Intervention of Different Projects/Programme on FFS in Bangladesh

(Project/Organizations information worked with FFS approach in Bangladesh up to August 2018)

Project/Programme name	Agencies implementing FFS	Partner /donor	No. of FFS implemented	Farmer Trained	Trainer develop		Main crop/ farm component
					GoB /NGOs	Farmer Facilitator (FF)	
FAO-UNDP IPM FFS programme. Dec 1995	Department of Agricultural extension	UNDP	3804	79100	513	640	Rice, Vegetable
FAO-EC-CDB Regional Cotton IPM programme May 2001	Cotton Development	EC-FAO	200	5000	100	-	Cotton
Strengthening Plant Protection Services Project (phase-I), July-1997	Department of Agricultural Extension	DANIDA	2189	54415	582	39	Rice and vegetables
Strengthening Plant Protection Services Project (phase-II), September/2002	Department of Agricultural Extension	DANIDA	4617	115425	407	250	Rice and vegetables
Smallholder Agricultural Improvement Project (SAIP), July 2000-2007	Department of Agricultural Extension	IFAD	48	1200	24		
Command Area Development Project-October 1997	Department of Agricultural Extension	Asian Development Bank	300	9000	135	-	Rice
CARE No pest May 1995	CARE Bangladesh	-	1483	30640	108	-	Rice
CARE Inter fish-July 1993	CARE Bangladesh	USAID	3608	71460	142		
IPM Project AID Comilla June-1999	Aid Comilla	DANIDA	126	3780	18		
FAO's Inter country Vegetables IPM Programme	Department of Agricultural Extension	FAO					
FAO's Food Security project		FAO					
Agricultural Extension	Department of	DANIDA and GoB	11770	588500	850	2947	Rice, Homestead

Project/Program name	Agencies implementing FFS	Partner /donor	No. of FFS implemented	Farmer Trained	Trainer develop		Main crop/ farm component
					GoB /NGOs	Farmer Facilitator (FF)	
Component Extension (AEC) Project, Oct. 2006	Agricultural Extension						vegetables
Regional Fisheries and Livestock Component (RFLDC-Barisal), July 2007	Department of Livestock	DANIDA and GoB	6900	34500	24	1280	Homestead garden livestock fisheries
Regional Fisheries and Livestock Component (RFLDC-Noahali), July 2007	Department of Livestock	DANIDA and GoB	5800	290000	27	629	Homestead garden livestock fisheries
FAO's Emergency Cyclone Rehabilitation and Recovery project (ECRRP)							
FAO's Community IPM Programme							
Khulna-Jessore Drainage Rehabilitation Project (KJDRP)							
North Crop Diversification Project July-2001	Department of Agricultural Extension	ADB	1211	30275	120		Rice
IPM project-Phase-I July 2006	Department of Agricultural Extension	GoB	4600	115000	200	1150	Rice, Brinjal, Cucurvits
IPM project-Phase-II July 2010	Department of Agricultural Extension	GoB	4235	105875	200	200	Rice, Brinjal, Cucurvits, Bean, Mango, Guava, Litchi, Papaya, Banana
Disaster and Climate Risk Management in Agriculture	Department of Agricultural Extension	UK aid, EU, Aust. Aid UNDP	156	3900	1017		Pulse, Oilseed, Rice

Project/Program name	Agencies implementing FFS	Partner /donor	No. of FFS implemented	Farmer Trained	Trainer develop		Main crop/ farm component
					GoB /NGOs	Farmer Facilitator (FF)	
(DCRMA) Project-CFS							
Integrated Agricultural Productivity project (IAPP)-FLFS	Department of Agricultural Extension	World Bank	-	--	-	-	-
Safe crop Production through IPM approach project July 2014	Department of Agricultural Extension	GoB	6700	167500	301	300	Rice, Brinjal, Cucurvits, Bean, Mango, Guava, Litchi, Papaya, Banana
Integrated Farm Management Component (IFMC) July 2014	Department of Agricultural Extension	Danida and GoB	17100	855000	212	240	Rice, high value vegetables Brinjal, Bottle gourd, poultry, Goat, Cattle, Homestead vegetable and fruit and Fish
Agriculture and Food Security Project (AFSPII) July 2015	Hill District Council, Chittagong Hill Tract	DANIDA	1800	43700	32	479	Rice, cattle, goat, chiken pig, Homestead vegetable and fruit, spices, high value fruits
Transfer of technologies for Agriculture production under Blue Gold Program July 2015	Department of Agricultural Extension	Kingdom of Netherlands and GoB	933	46500	100	150	Rice, watermelon , suflower, Sesame and Mung bean
Blue Gold Program –TA component July 2015	Bangladesh Water Development Board	Kingdom of Netherlands	794	39700	22	76	Poultry, Cattle, fish and homestead vegetabless
Total:			**78326**	**3000970**	**5110**	**8380**	

Appendix III

A Print Media Coverage on FFT in Bangladesh

চাষাবাদ

ঢাকা, শনিবার, ১২ পৌষ ১৪১৬, ২৬ ডিসেম্বর ২০০৯
E-mail : chasha_bad@yahoo.com

নয়া দিগন্ত ৯

কৃষকই কৃষকদের প্রশিক্ষক
গ্রামে গ্রামে কৃষিশিক্ষার প্রসার

● মৃত্যুঞ্জয় রায়

"কিছু না জাইনে, কিছু না শিইখে কিরষিকাজ করার দিন এহন শ্যাষ। কিরষিকাজে এহন লাভপাতি হলি কৃষকদের সে বিষয়ে টেরেনিং নিতি হবি। যারা নিয়মকানুন মাইনে ফসল ফলাবি, তারা বেশি ফলন পাবি, চাষের খরচাও কমবি। তাই তো আমি নিজে টেরেনিং নেয়ার পর অন্যদেরও সিসব কথা বুঝাই, গিরামে গিরামে ঘুইরে অন্য কিরষকদের নিয়ে ইশকুল খুইলে প্রশিক্ষণ দিই। যহন দেহি আমার কথামতো চাষ কইরে ফসলে মাঠ ভইরে ফেলিছে, তহন আনন্দে আমার বুকডাও ভইরে যায়। আর টেরেনিংয়ের সুমায় উরা আমারে স্যার ডাকলি ডবল আনন্দ লাগে'- কৃষক প্রশিক্ষক আব্দুর রহিম বিশ্বাস কথাগুলো বলে যেন ত্রিগুণ আনন্দে হেসে উঠলেন।

রহিমের বাড়ি ঝিনাইদহের কালীগঞ্জ উপজেলার দুর্গাপুর ইউনিয়নের সুন্দরপুর গ্রামে। দশম শ্রেণী পর্যন্ত লেখাপড়া করেছেন। কৃষিকাজ করেই তার জীবিকা চলে। নিজের ৭০ শতক জমি ও বর্গা নেয়া ১ একর ৩০ শতক জমিতে তিনি ধান, কলা, বেগুন, টমেটো, মরিচ ইত্যাদি চাষ করতেন। কিন্তু আশানুরূপ ফলন ও লাভ পেতেন না। প্রায়ই ক্ষেতে নানারকম পোকামাকড় লেগে থাকত। রোজ দু-একবার ক্ষেতে কীটনাশক ছিটাতেন। ফলন যা হতো পোকা ঠেকাতে তার চেয়ে কখনো কখনো খরচ বেশি হয়ে যেত। তাছাড়া কীটনাশক দেয়ার জন্য তার নিজেরও রাতে ভালো ঘুম হতো না। মাঝে মাঝে বমি হতো, পেটে ব্যথা করত। দিন দিনই শরীর খারাপ হয়ে যেত।

প্রায় ৮-৯ বছর আগে এক দিন গ্রামে তার দেখা হলো কৃষি অফিসের ব্লক সুপারভাইজার শফিদুল ইসলামের সাথে। তিনি জানালেন, গ্রামে সবজি চাষের ওপর প্রশিক্ষণ দেয়ার জন্য একটি আইপিএম কৃষক মাঠ স্কুল খোলা হবে। আব্দুর রহিম যেহেতু সবজি চাষ করেন, ইচ্ছে করলে তিনিও সে স্কুলে প্রশিক্ষণ নিতে পারেন। সেখানে বিনা বিষে কী করে সবজির পোকামাকড় নিয়ন্ত্রণ করা যায় সেসব কায়দা শেখানো হবে। আবদুর রহিম তো মনে মনে এমনটাই চাইছিলেন। তাই আর এক মুহূর্ত দেরি না করে ২০০০ সালের অক্টোবরে আইপিএম স্কুলে ভর্তি হয়ে গেলেন। নিজের ১০ শতক জমির অর্ধেক পরিমাণ জমিতে আগের মতো কীটনাশক ও সার দিয়ে বেগুন চাষ করলেন। আর অর্ধেক জমিতে বেগুন চাষ করলেন প্রশিক্ষণের নিয়ম মতো কোনো কীটনাশক না দিয়ে। বেগুনের পোকামাকড় নিয়ন্ত্রণের জন্য তিনি নিমপাতার রস, মেহগনি বীজের গুঁড়া, মেহগনি ফলের রস, আতার পাতা, রয়নার ছাল, ঢোলকলমির পাতা ইত্যাদি থেকে জৈব কীটনাশক তৈরি করে ক্ষেতে প্রয়োগ করেন। পরীক্ষামূলক সে চাষের ফলে দেখা যায়, কীটনাশক দেয়া খেত থেকে তোলা প্রতি ৪০ কেজি বেগুনের মধ্যে ১০ থেকে ১২ কেজি পোকা বেগুন থাকত। অন্য দিকে জৈব কীটনাশক ব্যবহার করা ক্ষেত থেকে তোলা ৪০ কেজি বেগুনের মধ্যে পোকা ধরা বেগুন থাকত বড়জোর ৫ কেজি। অন্য দিকে রাসায়নিক সার দেয়ার ফলে বেগুনের ফলন কিছুটা বেড়েছিল সত্য, তবে দীর্ঘদিন সে ক্ষেত থেকে বেগুন সংগ্রহ করা যায়নি। পক্ষান্তরে জৈব সার প্রয়োগ করা ক্ষেতের বেগুন তুলেছেন তিনি প্রায় দ্বিগুণ সময় ধরে। এতে মোট ফলন কম হয়নি। প্রশিক্ষণকালীন সময়ে এসব পরীক্ষা-নিরীক্ষা করে সুফল পেয়ে তার আগ্রহ অনেক বেড়ে যায়। ফলে ধীরে ধীরে তিনি জৈব পদ্ধতির সবজি চাষের দিকে ঝুঁকে পড়েন। বাড়িতে তিনি আবর্জনা পচিয়ে পর্যাপ্ত জৈব সার তৈরি করে জমিতে দেয়া শুরু করেন এবং বিভিন্ন গাছগাছড়া দিয়ে কীটনাশক তৈরি করে সেসব পোকামাকড় নিয়ন্ত্রণের জন্য স্প্রে করেন। প্রশিক্ষণ নেয়ার পর থেকে প্রতি মৌসুমে তিনি প্রায় ৫০ থেকে ৬০ শতক জমিতে নিয়মিতভাবে সবজি চাষ করে আসছেন। কখনোই কোনো সবজিতে তিনি আর রাসায়নিক সার ও কীটনাশক দেন না। আগে প্রতিবছরই তার বেগুন ক্ষেতে ঢলে পড়া রোগে অনেক গাছ মরে যেত। এখন তিনি প্রশিক্ষণের মাধ্যমে বনবেগুনের সাথে বেগুনের জোড় কলম করা শিখে সেসব কলমের গাছ রোপণ করে রোগের আক্রমণ থেকেও রেহাই পেয়েছেন। তার অভিজ্ঞতা হলো, কলমের গাছে ঢলে পড়া, তুলসে পড়া, গোড়াপচা ইত্যাদি রোগ কম হয়। যত্ন নিলে ওসব গাছ থেকে প্রায় দু'বছর বেগুন তোলা যায়। উপরন্তু এ শিক্ষার মাধ্যমে তিনি বাড়তি আয়ের পথও খুঁজে পেয়েছেন। প্রতিবছর বেগুনের জোড়কলম করে এলাকায় সেসব কলম বিক্রি করে তিনি প্রায় ৪০ থেকে ৫০ হাজার টাকা আয় করেন বলে জানান। প্রতিটি বেগুনের জোড়কলম বিক্রি হয় দেড় টাকা দরে। এ ছাড়া তিনি উন্নত জাতের বিভিন্ন সবজির চারা উৎপাদন করেও বেশ আয় করেন।

এভাবেই চলছিল বেশ। আবদুর রহিমের কাছে জৈব নিয়মে সবজি চাষের পরামর্শ নেয়ার জন্য মাঝে মাঝে লোকও আসে। তাই আবদুর রহিম ভাবলেন, তিনি আর কতটুকু জানেন। যেনতেনভাবে পরামর্শ না দিয়ে আরো ভালোভাবে সব জেনে পরামর্শ দেয়া উচিত। তা ছাড়া কেউ তার কাছে এলেই যে শুধু তাকে পরামর্শ দিতে হবে, তা কেন? তিনি বরং অন্য সবজি চাষিদের ডেকে ডেকে এ বিষয়ে প্রশিক্ষণ দিয়ে বিনা বিষে সবজি চাষে উদ্বুদ্ধ করবেন। তাই তিনি কিভাবে এটা করা যায় সে বিষয়ে পরামর্শ ও সহযোগিতার জন্য কালীগঞ্জ উপজেলা কৃষি অফিসে যান। এই অফিস থেকেই অবশেষে তার সুযোগ আসে কৃষক প্রশিক্ষক হওয়ার। ডিএই-ডানিডা এসপিপিএস প্রকল্প কর্তৃক মনোনীত হয়ে তিনি ২০০৪ সালে দু'সপ্তাহের কৃষক প্রশিক্ষক প্রশিক্ষণ কোর্সে চাঁপাইনবাবগঞ্জে অংশগ্রহণ করেন। প্রশিক্ষণ থেকে ফিরে এসে দ্বিগুণ উৎসাহে লেগে পড়েন কৃষকদের প্রশিক্ষণ দেয়ার কাজে। গ্রামে গ্রামে গড়ে তোলেন আইপিএম কৃষক মাঠ স্কুল। প্রতিটি স্কুলে ২৫ জন কৃষক-কিষানীকে প্রশিক্ষণ দিয়ে বিষমুক্ত সবজি চাষে উৎসাহী ও দক্ষ করে তোলেন। এভাবে তিনি তার এলাকায় কৃষি সম্প্রসারণ অধিদপ্তর ও এটিসি প্রকল্পের সহায়তায় একে একে সিংদহ পূর্বপাড়া, আলাইপুর পূর্বপাড়া, ডুমুরতলা, কমলাপুর, বেজপাড়া, নিয়ামতপুর প্রভৃতি গ্রামে ৯টি কৃষক মাঠ স্কুল সম্পন্ন করেছেন এবং এখনো সে ধারা অব্যাহত রেখেছেন। পরবর্তীকালে তিনি ডিএই-ডানিডা এগ্রিকালচারাল এক্সটেনশন কম্পোনেন্ট থেকে ধান ফসলের আইসিএম বা সমন্বিত ফসল ব্যবস্থাপনার ওপর প্রশিক্ষণ গ্রহণ করেন। ফলে তিনি এখন আর শুধু সবজি নয়, ধান ফসলের ওপরও স্কুল চালাচ্ছেন। এবারও বোরো মৌসুমে বড়ভাটপাড়া, শেখপাড়া, সুন্দরপুর গ্রামে তিনটি ধান ফসলের ওপর আইসিএম কৃষক মাঠ স্কুল চালানোর সিদ্ধান্ত নিয়েছেন। তাকে এ কাজে সহায়তা করে যাচ্ছেন আর একজন কৃষক প্রশিক্ষক লক্ষণ কুমার বিশ্বাস। তবে নেশাটা তার সবজি চাষেই বেশি। তাই তো নিজের এবং পড়শিদের প্রত্যেকের বাড়ির আঙিনাতেও তিনি জৈব পদ্ধতিতে চাষ করা সবজি বাগান গড়ে তুলেছেন। তাদের প্রত্যেকের বাড়িতে এখন খামারজাত জৈব সার তৈরির ব্যবস্থা রয়েছে। সেখানেই থেমে না থেকে এখন তিনি ফুল চাষের দিকেও ঝুঁকে পড়েছেন। এ মৌসুমে তিনি প্রায় ২০ শতক জমিতে গাঁদা ফুলের চাষ করেছেন। তবে যাই-ই চাষ করেন না কেন, কোনো ফসলেই তিনি আর এখন কোনো বিষ ও রাসায়নিক সার দেন না। এতে ফলন একটু কম হলেও বালাইনাশক ও সারের খরচ লাগে না। তাই লাভ কম হয় না।

এলাকায় তার দেখাদেখি এখন অনেকেই আধুনিক পদ্ধতিতে ফসল চাষ করছেন ও কেউ কেউ চাষের প্রশিক্ষণ নিতে স্কুলে আসছেন। স্কুল শেষে প্রশিক্ষিত কৃষক-কিষানীদের নিয়ে চাষি সংগঠন গড়ে তুলেছেন। সেখানে তাদের কৃষি শিক্ষার ধারাকে অব্যাহত রাখতে এখন নিয়মিত কৃষি পাঠচক্রের পরিকল্পনা করছেন। সব মিলিয়ে আবদুর রহিম প্রায় ৯ বছরের সাধনায় ধীরে ধীরে তার এলাকার গ্রামে গ্রামে কৃষি শিক্ষা প্রসারে এক অনন্য দৃষ্টান্ত রেখে চলেছেন। এ বিষয়ে তার অনুভূতি হলো শুধু জৈব সার দিয়ে চাষ করলে ক্ষেতে পোকামাকড় অনেক কম লাগে, সবজি খেতেও ভালো লাগে। বিশ্বের অনেক দেশে জৈব সবজির দাম বেশি, কিন্তু এ দেশে তেমন কোনো ব্যবস্থা নেই। এটা নিশ্চিত করতে পারলে জৈব পদ্ধতিতে সবজি চাষে অনেকেই এগিয়ে আসতেন, তাতে মাটি ও পরিবেশও ভালো থাকত। কৃষক প্রশিক্ষক হতে পেরে তিনি এখন দারুণ খুশি। এর সুবাদে তিনি এলাকার কৃষক সমাজে কৃষি শিক্ষার আলো ছড়াতে বেশি করে কাজ করার সুযোগ পাচ্ছেন। ফলে নিজে ভালো ফসল ফলিয়ে অন্যকে তা দেখিয়ে উদ্বুদ্ধ করার চেষ্টা করছেন। এখন অন্যকে পরামর্শ ও প্রশিক্ষণ দিয়েই তার দিনের বেশির ভাগ সময় কেটে যায়।

Appendix IV

An Initial Approach of FFS Sustainability in Bangladesh

SUSTAINABILITY OF FFS

Introduction:

Farmers are the ultimate targets who are supposed to be continued practicing IPM based farming systems. For this reason we are establishing FFS throughout different thanas under the IPM project. When extension people are coming back from the FFS after finishing 15 sessions in a season, some times farmers are not practicing the same. Therefore ultimate goal of the IPM is not achieving. So there should be new thinking/ ideas in this regards.

Objective: -

1) To make participants involved in finding ways for sustainability of FFS.
2) To identify the problems regarding sustainability of FFS.
3) To make a model for sustaining the FFS.

Times: - 2 hours.

Materials:

Manila paper, marker, paper tape

Procedure: -

1) Go to the session hall.
2) Make sitting arrangement for the sub groups.
3) Do group works.
4) Present the same & discuss.

Discussion questions:

1. Identify the problems regarding sustainability of FFS?
2. How to overcome the problems?
3. Make a model on sustainability of FFS.

Problems regarding sustainability of FFS:

1. Improper site selection.
2. Improper farmers selection.
3. Starting of FFS not at due time.
4. No significant difference between IPM and non IPM practice.
5. No follow up activity.
6. Insincerity of extension personnel.
7. Social problem.
8. Affinity to traditional practices.
9. Lack of political commitment.
10. Farmers are not organized.
11. Lack of communication network.
12. Other members of the farmers family are not involved in agricultural activity, specially female members.

How to overcome the problems:

1. FFS should be start at proper time.
2. Proper farmer and site selection.
3. At fast a general meeting with the farmers should be organized 1 ½ - 2 months before starting season. In this meeting preliminary idea about the FFS should be given to the farmers. Preliminary farmer and site selection should be done.

4. Second meeting should be organized at least 15 day's before starting season to finalize farmers and site selection.
5. All trials should be setup properly.
6. Farmers need based session plan should be prepared.
7. Curriculum of 15 weeks should be fixed after common discussion with the farmers.
8. One way lecture of facilitators should be completed avoided.
9. Farmers active participation should be ensured.
10. More filed work to grow confidence.
11. Emphasis on NFE.
12. IPM club establishment.
13. Follow up activities should be ensured.

A Symbolic Model for sustainability of FFS:

In the follow up activities a symbolic model for sustainability of FFS as described bellow can be developed.

1st season

1st week	12 – 13 week	15 week
Normal program	Discussion about action plant for next season.	Action plant for 2nd season developed.

Action plan for 2nd season

25

1st season farmers

5 – (DT & AESA)
5 – (DF & AESA)
5 – (FT & AESA)
5 – (VT & AESA)
5 – (IZ & AESA)

1. Every small group of 5 members (form 25 farmers of 1st season) will do individual activities such as DT, DF, VT, FT, etc.
2. Each group will be assigned with same field activities.
3. AESA will be the common practices for each small groups
4. Thana IPM team will visit and monitor the small group time to time.
5. Arrange a technical seminar end of the 2nd season
6. 25 FFS farmers, the neighboring farmers, research station personnel, extension personnel will attend the seminar. The seminar is likely to be presided by local public representative.
7. All findings should be discussed in the seminar. All the participants will give there opinion and share experiences.
8. The best farmers should be rewarded. After the technical seminar a planing meeting should be conducted to developed an action plan for 3rd season

Action plan for 3rd season

25

2nd season farmers

5 – (+ 10 to 15 new farmers)
5 – (+ 10 to 15 new farmers)
5 – (+ 10 to 15 new farmers)
5 – (+ 10 to 15 new farmers)
5 – (+ 10 to 15 new farmers)

1. Five sub groups of farmer facilitators should build up by taking one member from each sub groups of 2nd season.
2. 10 to 15 new farmers will be attached with the each group.

Appendix V

First FT- ToT on Community IPM in Bangladesh

Government of the People's Republic of Bangladesh
Department of Agricultural Extension

DAE-UNDP/FAO Integrated Pest Management (IPM) Project
(BGD/95/003)

Project Office
Middle Building, 6th Floor
Khamarbari, Dhaka - 1215
BANGLADESH

Tel: (880-2) 9120863, 9120864, 9120867
E-Mail: ipm95003@citechco.net

June 24, 1999

TO WHOM IT MAY CONCERN

This is to certify that ***Mr. Quazi Afzal Hossain***, AEO, Shakhipur, Tangail, attended the Facilitators' workshop on Training of Trainers for Farmers (FT-TOT) in Community IPM organized by the project from May 22-27, 1999, at the Cotton Development Board Training Centre, Sreepur, Gazipur. This was the first workshop of its kind in Bangladesh and he contributed significantly in the development of the curriculum of FT-TOT.

24/6/99
(E. H. Khandker)
National Project Director

IPM FOR HIGHER PROFITS, BETTER ENVIRONMENT AND HEALTH

Appendix VI

An Appraisal of DANIDA Supported IFMC

ROYAL DANISH EMBASSY
Dhaka

মহাপরিচালকের দপ্তর	
পরিচালকঃ	অতীব জরুরী
সরেজমিন/খাদ্য শস্য/প্রশিক্ষণ/পিপি/সিসিডিইং	অবিলম্বে / জরুরী ব্যবস্থা নিন
অতিঃ পরিঃ (প্র. ও পা.) / (প. ও মু.) উইং	সত্বর/প্রয়োজনীয় ব্যবস্থা নিন
পিডি / পিসিডি / এনপিডি ঃ	নিরীক্ষণ ও আলাপ করুন
নির্বাহী প্রকৌশলী, পি আই ইউ	
ভারপ্রাপ্ত কর্মকর্তা, নিয়ন্ত্রণ কক্ষ	
প্রটোকল অফিসার / পি.এ.	
ডাইরী নং	
তারিখ-	মহাপরিচালক, ডিএই

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Enclosure
Appraisal Report

File
104.Bang.805-300

13 May 2012

Appraisal of Danida supported Agricultural Growth and Employment Programme (2013-2018)

Dear Sir,

Denmark will support the Agricultural Growth and Employment Programme (AGEP) at the end of the current agricultural programme in December 2012. The duration of the AGEP will be from mid-2013 to mid-2018 and the total Danish contribution to the programme will be DKK 330 million, equivalent to around US Dollar 65 million.

AGEP will be in line with the priorities of the Government of Bangladesh as set out in the Country Investment Plan (CIP) and the Sixth Five Year Plan.

The AGEP will focus on agricultural production as well as on agro-processing and agro-business development. AGEP will have two components, an Integrated Farm Management Component (IFMC) and an Agro-business Development Component (ABDC).

The appraisal of the AGEP took place from 23 April to 7 May 2012. It was a joint Bangladesh-Denmark appraisal and the Ministry of Agriculture participated.

Please find attached the draft Appraisal Report. It will be highly appreciated if the comments of GOB on the Appraisal Report are received no later than Thursday 24th May.

Yours sincerely

Svend Olling
Ambassador

Distribution:
1) The Member, Agriculture, Water Resources and Rural Institutions Division, Planning Commission
2) The Secretary, Economic Relations Division
3) The Secretary, Ministry of Agriculture
4) Joint Secretary (Nordic), Economic Relations Division
5) The Director General, Department of Agricultural Extension

Appendix VII

A Partial Information of IFMC Programme

Project Information

14. Background, Objectives, priority, rationale, linkage, targets and outputs/outcomes of the project including findings of feasibility study/survey, if any

14.1 Background

Agriculture is an important sector of the economy of Bangladesh and one of the main drivers of economic growth. The current contribution of this sector to GDP at constant prices is around 20 percent with a decreasing trend over the last few years. However, there is significant indirect contribution of the sector to the overall growth of GDP. Particularly, the growth of service sectors such as wholesale and retail trade, hotel and restaurants, transport and communication, are strongly supported by the agriculture sector. Besides, about 44 percent of the total labor force of the country is engaged in agricultural activities (MES, 2009, BBS) and more than five percent of total export earnings are from agricultural products (Economic Review, 2011).

The GOB is committed to achieve self sufficiency in food by 2013 (Bangladesh Economic Review, 2011) and give highest importance to the agriculture and rural development sectors in this context. More specifically, the GOB drives all its efforts for development of the agricultural sector to meet the targets set in the Sixth Five Year Plan (SFYP) which aims to achieve the objectives of the Perspective Plan for Vision 2021, Poverty Reduction Strategy Paper (PRSP) and Millennium Development Goals (MDG). It has undertaken various initiatives to support small and marginal farmers who constitute around 44 percent of the total households in the country. It has considered soil heath management, balanced use of fertilizer, use of organic fertilizer, availability of production technology based on the demand of the different areas, crop diversification, extent of irrigation facilities, access to credit, etc. as important factors of increasing productivity in this sector. Side by side of the crop agriculture, GOB also gives emphasis on increasing productivity in fishery and livestock sector to ensure supply of protein which is deemed to improve nutritional status of the people in poor households and as a method to diversify the agricultural production.

Danida has a long history of development cooperation with Bangladesh. Since independence, Danida has supported development of various sectors, including strong support to the agricultural sector. During 2001-2006, Danida supported 1st phase of the Agriculture Sector Program Support (ASPS I) which had 13 components and was implemented by different departments, ministries and NGOs. This support continued during 2006-2012 for 2nd phase of ASPS with three major components: The Agricultural Extension Component (AEC), Regional Fisheries and Livestock Development Component (RFLDC) and Rural Roads and Market Access Component (RRMAC) which are implementing by the Ministry of Agriculture, Ministry of Fisheries and Livestock and Ministry of Local Government, Rural Development and Cooperatives respectively.

In annual consultation between the GOB and Denmark in 2011, it was agreed that Danida will support a new program ‘Agriculture Growth and Employment Program (AGEP)’ which is designed in alignment with the Vision 2021, which aims at transforming the Bangladeshi socio-economic environment from a low income economy to the first stages of a middle income economy. Specifically, AGEP will provide a substantial contribution to promoting economic growth through creation of employment and raising income of the small and marginal farm households.

The AGEP consists of three components – (1) Integrated Farm Management Component (IFMC), (2) Agriculture and Food Security Project (AFSP) in Chittagong Hill Tracts and (3) Agro Business Development Component (ABDC). The IFMC will be implemented by the DAE while AFSP will be implemented by UNDP in collaboration with the Ministry of Chittagong Hill Tracts Affairs (MOCHTA) and ABDC will be implemented by Katalyst, funded through a joint donor basket fund.

14.2 Objectives

Development Objective:

Pro-poor, inclusive and sustainable growth and employment creation

Immediate Objective:

Increased agricultural production among female and male members of landless, marginal and small farming households

The specific objectives of the Component are:

Female and male farmers have been empowered and increased number of total farm activities and diversification adopting IFM FFS promoted technologies and management practices

Female and male farmers have been empowered in FO formation and linked to service providers, market actors and micro-finance organizations to increase farm profitability

National meeting/seminar on farmer-centered extension approaches has been strengthened

c) Conceptual Framework of IFMC

In addition to the internal linkages of the outputs described above, the IFMC has been designed with inherent implementation logic, reflected in the log frame matrix presented at the outset of this document. The internal logic of interventions is visualized in the Results Chain diagram overleaf.

The Results Chain shows how the various outputs lead to achievements of development goals (higher level impact) through specific component objectives (outcomes) and immediate objectives (lower level impact or purpose).

Arrows illustrate the direct causalities – or the result links - and those arrows constitute the essence of the underlying strategy and logic behind the IFMC interventions and expected achievement of objectives. Dotted arrows illustrate indirect causality. The monitoring and evaluation system, described in section 2.13, will ensure that not only the quantity and quality of interventions is monitored (e.g.

whether FFS participants are able to absorb the training), but it will also measure and document the anticipated effects at various levels of the objectives hierarchy.

If the IFMC is successful (i.e. effective) in its activities of carrying out participatory FFS - and in empowering the female and male participants - it will lead to

Increased **empowerment** in terms of practical, social, and economic **skills** of farmers (if participants are able to absorb the field training and thus increase their knowledge levels), which will lead to
Changed **farming practises** (if the farmers are able to apply their increased skills in terms of adopting new or improved technologies and farm management practises), which will lead to
Increased agricultural **diversification**, and/or increased land and labor**productivity**, and/or increased **production**, which will lead to
Increased **nutrition** (if households eat more protein due to increased and/or diversified production for own consumption),
Increased **marketing** of products (if increased excess production after own consumption is/can be marketed), which will lead to
Increased **income**(if the increased production being marketed has been economically profitable), and
Employment creation (if the net effect of the changed farming practises results in farmers working more time (unpaid), or substituting former unproductive time (unpaid), or if new farm labor is hired in (paid)).

Since empowerment of both female and male farmers is a crucial factor of success, the Results Chain diagram shows (by orange call-outs) where in the process the results of empowerment – of both women and men - is going to be seen. Empowerment is inherent to the FFS approach, and is crucial to the impacts of interventions.

It has therefore been spelled out in the Results Chain diagram as well as in the Specific Objectives, and will be monitored both externally (impact evaluation and potentially also specific empowerment research activities) as well as internally (process monitoring).

An understanding of the reasoning behind the interventions of the IFMC is central, and the Result Chain will be a part of the capacity development efforts of field staff and FF, especially the officers involved in collecting and analyzing Monitoring and Evaluation (M&E) information.

Specific objective 3, National meeting/seminar, will address planning, sharing of information and learning and quality improvement on farmer centred-extension approaches and commercialization of agriculture. These meetings/seminars will be attended by a range of higher level government officers, decision makers from NGO and private agencies implementing extension activities and relevant development partners. The meetings/seminars will contribute to the integration of successful FFS and FO approaches in implementation of extension as well as influencing policy and thus impact on the enabling environment for IFMC. This objective will also provide an opportunity for coordination as well as sharing lessons learnt among the components of AGEP through separate meetings/seminars and joint field visits.

d) Strategies

In particular, the IFMC is designed within the framework of the New Agricultural Extension Policy (NAEP) of 1996. NAEP emphasized that there are many agencies providing extension support to farmers, including government agencies, NGOs, commercial traders and input suppliers (manufacturers, wholesalers and retailers) operating in the rural areas. The goal of NAEP is to encourage the various partners and agencies within the national agricultural extension system to provide efficient and effective services which complement and reinforce each other, in order to increase the efficiency and productivity of agriculture. In policy terms, IFMC is fully aligned with GOB strategies as outlined in the SFYP, PRSP, Country Investment Plan, National Agriculture Policy, New Agricultural Extension Policy, Nation Integrated Pest Management Policy, National Seed Policy, National Fisheries Policy, National Livestock Development Policy and National Poultry Development Policy.

The FFS evaluation of extension interventions in ASPS II conducted in 2011 found that FFS is a cost-effective approach to agricultural extension with the potential to have significant impact on the livelihood of poor rural households. The evaluation showed that the average annual income within households that has participated in an FFS has increased significantly more than in control village households, providing a clear indication that FFS investments generate growth in income at the household level. The evaluation also showed that there is a strong production diversification effect from FFS. The evaluation recommended that development interventions aiming at stimulating growth and employment within the agricultural sector should target small-scale farmers as well as hard-core poor and marginalized farmers as core FFS members. Thus, the IFMC builds upon the positive results of ASPS II and continues to follow the FFS learning approach.

It is essential that small farmers organize themselves if they are to maximize household benefits from increases in production and diversification. Therefore, to ensure that the farmers trained and organized during the implementation of IFM FFS get the full benefit of the resulting increases in productivity IFMC includes support to capacity development of Farmer's organizations and linking them to markets and service providers. Beyond increased production other outcomes of the FFS process are also maximized if farmers become more organized. For example the strong link to local DAE extension agents built during the period of the FFS is more likely to be maintained by an organized group than by individual farmers. Farmer empowerment; economic, social and personal is also a result of the FFS process and the impact of this empowerment will be maximized by assisting farmers to organize into Farmers Organizations, where they have opportunities to develop and make use of leadership skills and to engage in lobbying for farmers interests. The support to FOs in IFMC is justified on three major grounds. Firstly, in order to reach the scale of production that is needed to make small scale farmers attractive to buyers and agro-processors it is essential that farmers are organized and able to produce and bulk large quantities of quality agricultural produce. Secondly, organization of farmers is a vital step in building a civil society based on democratic principles in which female and male farmers can raise their voices, participate in public dialogue and express their needs and wishes and by this means getting their share in social and economic development. Thirdly organized farmers can continue to make use of and build on the linkages established during the implementation of FFS, including access to extension services through DAE. An added spin off is that the combination of marketing and extension linkages can help to channel limited extension resources where they are likely to have most impact – where groups of organized small farmers are in use of specific extension advice and support as they move into the market with recently introduced crops and technologies.

The FFS evaluation showed that the FFS methodology, being a demand led, farmer centered participatory approach is an effective way to reach positive results. Several other approaches to provision of extension services are also practiced in Bangladesh, some of which have similar characteristics and others following different extension methodologies. For the extension service system to provide the most effective services to farmers and thereby reaching the overall goals of the NAEP and to improve the living conditions of landless, marginal and small farmers it is necessary to strengthen dialogue among all players in the national extension system on how to most effectively provide extension services. Experience has also shown that there is much to be gained from better communication, information sharing and cooperation among all extension projects carried out in Bangladesh.

The strategy to reach the immediate objective of the IFMC consists of the following elements:

The strategies to address gender:

The IFMC will address gender by mainstreaming, which is considering and incorporating gender issues into all levels of IFMC, including objectives, outputs, activities, inputs, implementation arrangements, indicators, targets and monitoring and evaluation. This is fully in line with the strategy of the GOB, including the SFYP, for addressing gender issues in general and for the agricultural sector in particular:

Recognition of the rural householdas the basic unit of production and the importance of women to the agricultural sector as female farmers.

Entitlement of women to equal access to agricultural services, including training, advice, inputs, credit and marketing, on equal terms with male farmers.

Special measures should be taken to increase women's participation in all aspects of the sector as their access cannot be considered equal at this time.

Special efforts to conduct training programs with special interest for women to encourage their interest and improve their skills.

Mainstreaming requires efforts at all levels of the component:
This will be addressed through assigning specific gender monitoring and implementation responsibilities within the IFMC management arrangement at national and regional level, through **Gender Focal Points**, and by including gender related responsibilities in all job descriptions. The focal points will also be responsible for gender awareness & sensitization training and for sexual harassment issues. The gender focal points are not by default the responsibility of a female staff member. The ultimate responsibility and accountability for implementation of the gender strategy lies with the Project Director.

Specific strategies for gender inclusion in the component include:
Whenever applicable gender related targets and quota will be set and imposed.
The Program development objective and the IFMC immediate objective and specific objectives include special attention to gender aspects. They concern farmers, farmer facilitators, DAE field extension staff, component staff at regional and national level; they consider activities at village, Upazila, district, regional and national; they cover activities related to human capacity development (training), advice & support, marketing, and monitoring & evaluation, and theyinvolve:
People: selection of participants, trainers, staff
Training: content and implementation
Income: control over generated income and related household and family issues
Groups and farmer organisation: membership, development of leadership
Monitoring and evaluation.

The specific aspects of the above 5 fields of attention, which can be summarized as follows:

People: Equal opportunities for women and men at all levels to be involved:

At farm household level: addressing both men and women. With special efforts to encourage active participation of women and inclusion of female headed households

At Farmer Facilitator level: equal involvement of men and women through mixed teams with shared responsibilities. With special attention to the selection process and encouragement of female FF to participate and develop their skills

At Upazila and higher level: target equal involvement of women through:

include all suitable women available at Upazila level, encourage and convince the hesitant onesactively look for high potential female candidates for Regional positions.

Training: Equal opportunities for women and men to attend:

FFS level:

content relevant and attractive for all members of the householdtopics to have income generating potential for men and especially womencomplexity of content and facilitation methods adjusted to the learning capacity and experience of the participants, without losing out on the essence of the FFS approach. Household members will attend different, sometimes separate, modules, but modules on social issues, family matters, empowerment, gender equality etc are compulsory for all and offered combined.

FF and DAE staff level:

training facilities enabling women to attend, including child care if needed

presence of at least one women in the training team

gender awareness part and parcel of the training curriculum: in theory, but especially in practice

development of personal gender action plan for facilitators, trainers and other involved staff

Income: control over household and personal income

Women and men having shared responsibilities for, and control over, household income and family expenditures

Women have the right to control the income generated through their efforts.

Groups and Farmer Organizations:

Equal membership opportunities for women and men and access to services: stipulated in bylaws. Being attractive for female members by offering support, services and activities addressing their needs.Encouragement of female members to take on leadership positions; support this by developing their leadership skills.

Monitoring and evaluation:

Include gender specific indicators at all levels

Whenever potentially relevant, collect and record gender disaggregated data

Assurance that during data collection women are included, if necessary separate from men. Inclusion of evaluation methodologies specifically designed to assess gender empowerment development in agriculture. Adjust components activities immediately if negative impact on women is reported.

Specifically for the IFM FFS the gender strategy includes:

The IFMC will be implemented with a strong focus on quality, which will be maintained throughout implementation. The focus on quality is also reflected through placing capacity development of FFs high on the agenda as the quality of FFS directly depends on this. Another principle to secure quality is to pilot and fine-tune all new ideas and methods, including the IFM concept and curriculum, before scaling-up.

The strength of the FFS approach is that it is not limited to technology transfer. It is equally important that the FFS encourages sharing of information amongst the farmers and stimulates the groups of farmers to consciously analyse and learn from experience. The experimental learning cycle is the key to farmer education and empowerment. Therefore capacity development of FFs will have its main emphasis on facilitation skills.

The empowerment impact of the FFS approach includes economic empowerment, personal empowerment and social empowerment:

Economic empowerment is obtained through improved production management skills and access to markets.

Personal empowerment includes increased confidence, respect, awareness of rights and responsibilities and development of communication skills.

Social empowerment is particularly obtained through the emphasis on group work and group formation and includes leadership development, abilities to deal with community issues and the ability to formulate and pursue needs through contacts with institutions at higher level.

The concept of IFM FFS recognises that the livelihood of marginal and small farmers is diversified in order to offset risk so that the FFS should combine crops, including all types of homestead production and high value crops into a single framework. Emphasis in the FFS is also on micro-enterprises around the homestead that will ensure greater involvement of women.

An important focus in the IFMC is on diversification into high value agricultural produce. The curriculum in the IFM FFS will be widened to include higher value commodities selected by the farmers on the basis of local comparative advantage. The high value commodities will include produce specifically relevant for female farmers
In the IFMC, the FFS approach will be widened to stress whole farm production planning including production for the market thus encouraging farmers to seek to market their surplus production, however limited.

The strategies for support to FOs are:
The overall strategy for the support to FOs aims to improve farmers' incomes through improved access to markets and services, improving efficiency and moving farmers up the value chain. It builds on the outcomes of the IFM FFSs outcome and aims to support the organization of farmers for improved access to input and output markets and to services including financial and extension services as well as for the empowerment of farmers as individuals and as a group. The output will focus effort on a limited group of FOs working through small district teams and developing capacity in DAE for support to FOs. The FOs targeted for support will be those assessed to have potential to develop a role in providing services to farmer members,

particularly in the marketing of produce. The instruments and channels used, though building on experience have not been tested elsewhere and thus there will be an element of piloting and adjusting the strategy and instruments.

Formation: Following the end of IFM FFS implementation in a particular village the IFM participants will in many cases form Farmer Clubs. Some groups will naturally choose to dissolve at the end of the formal FFS due to lack of incentive to organise (for example lack of marketing opportunities) or lack of appropriate leadership. Of those FFSs that do form clubs, only a proportion will see the benefits of joining with other clubs or groups to establish FOs. Thus IFMC support will be targeted to establishment and strengthening of only a selected number of FOs identified as having potential in terms of market opportunities. This will ensure that sufficient human and financial resources are available in IFMC to support development of the selected FOs, enabling them to grow and organise to a level at which a critical mass of produce can be channelled to market chains at terms which are advantageous to farmers. Those Farmers Clubs that do not join together to form FOs will not receive further support after the end of the FFS. The choice has been made to focus substantial support on a smaller number of FOs; an average of three per Upazila. IFMC will encourage Farmer Clubs and producer groups emerging from the IFM FFS process to join together to form FOs, and encourage FOs to take on new Farmer Clubs as members.

Existing FOs: FO support will target not only new FOs emerging from the IFMC FFS activities, but also existing FOs including those that have started with support from earlier Danida supported programs, particularly ASPS I and II. This will allow FO support to commence from the start of IFMC implementation, rather than waiting for the establishment of new FOs which would take considerable time.

FO selection criteria: FOs will be targeted for capacity development and linkage to markets based on two sets of criteria; the capacity of the FO to develop based on leadership, level of organization, group cohesion and size, as well as unmet market opportunities such as recent diversification of agricultural production and access to and demand in local, regional or export markets. Initial selection will be done by DAE

Upazila level staff in consultation with field level staff. Final selection will be done in consultation with IFMC FO support staff.

Roll out: FO support activities will not start in all Upazilas from the first year of IFMC implementation. Initially support will be focused in certain areas based on the initial assessment of FOs, and where organizations suitable for support are located. In Upazilas not covered under ASPSII there may not be suitable candidates for support until the second or third year of implementation.

Categories of FOs: Different categories of FOs will emerge during implementation with some geographical regions having a higher level of farmer organization as a result of earlier interventions, for example the work of ASPS II RFLDC component in Noakhali and Barisal regions, or because of greater marketing opportunities, for example proximity to large markets / urban centres. As the FOs targeted for support will be identified by small district teams with support from the regional offices it will be possible to tailor-make support to the needs in a particular geographic area. The development of different strategies for different categories of FO will emerge from the piloting activities of this support, and will be the role of the team working with FO support, under the leadership of the IFMC management.

Piloting: The FO support will build on experience from earlier Danida programs; however the tools and channels of support will differ significantly from earlier support and will therefore include an element of piloting and testing of approaches. The approach will be adjusted and fine tuned and IFMC will exchange and learn lessons from other programs carrying out similar activities. Regular meetings to evaluate and review support to FOs will be organized from the national level to learn from the experiences, challenges and successes at district level. Based on these review meetings the strategies and criteria for support will be adjusted.

FO role in the value chain: The role of FOs in the value chain will be to move farmers up the value chain thus increasing farmers' share of the final price. The exact role will depend on the specific needs and opportunities facing individual FOs. However a gradual process of capacity development will follow three phases:

Bulking: The process of bulking produce from the small quantities produced by individual farmers as well as the organizing of input supplies offer obvious opportunities in many situations and has been an area of successful FO activity in the past. FOs can also play a role in linking farmer members to financial services and in channelling extension services to farmers introducing new agricultural production opportunities or technologies based on market demand.

Grading and packaging: FOs can also play a role in linking farmers to buyers for production of pre-agreed quantities and qualities of products, including simple value addition activities such as grading and packaging.

Contracting: Once linkages have been established buyers can contact FO leaders and negotiate formal or informal contracts for supply of particular products or FO leaders can look for favourable markets for their produce. Actual examples include production of various seed crops for private seed companies, supply of prawn, supply of specified quantity and quality of oilseed and pulse crops to fill export orders and supply of vegetable crops required at a particular time.

Support packages: The support packages offered to FOs will include **training** in leadership, organizational management, in the development of business plans and in financial management. Training will usually be organized regionally and carried out by IFMC staff or external facilitators where specific expertise is required. Training will focus on FO leaders and, (based on experience in the role of FFs in FOs of ASPS II), selected focal persons who will attend training sessions and who can provide services to FO members and other farmers. **Mentoring and follow up visits** will be based on an agreed capacity development plan, developed for each FO by the IFMC staff, relevant DAE officers and the leaders and members of the FO. Mentoring will involve IFMC staff and trained DAE officers visiting and advising FOs, for example assisting in the setting up of financial management systems or attending annual or planning meetings. Thirdly, development of **linkage** to markets, service providers and financial institutions will be part of the package of support. National, regional and district members of the FO support team will identify opportunities for linking FOs to services and supports of all kinds, looking for opportunities beyond local area.

Linkage instruments: Instruments for linking FOs to market opportunities will include **facilitating meetings and cooperation** between FOs and local Business Membership Organisations, (organizations of small traders and businessmen, as established under the Improving Local Government Services Program), to the Hortex Foundation and to private businesses, business associations and programs involved in marketing of agricultural produce. **Regional or district commodity meetings/platforms** to bring together value chain actors in sectors where there are emerging opportunities, (for example livestock feed including maize producers, large scale poultry farmers, transporters and financiers), will be organised on a case by case basis, where such a platform is likely to improve market chain conditions, address bottlenecks and improve or provide opportunities for FOs.

Rights-based approach: The formation and strengthening process of FOs will be guided by the principles of a rights based approach, in which the FOs also will be encouraged to address wider social and other issues of importance for the well being of both female and male farmers. Both membership and leadership positions for women will be actively encouraged. Female membership will be encouraged by including services specifically relevant for female members.

Income generating activities: To enable FOs to financially sustain themselves they will undertake income generating activities for example by playing a role in the marketing process from which they will have an opportunity to obtain an income through a fee or commission. It will be part of the strategy to encourage income generating activities that benefit a large number of members, such as product bulking or market linkage, rather than activities which focus activities on a small group who meet regularly; such as savings and loan activities.

Technical Assistance (TA) team: To ensure sufficient capacity within IFMC for support to establishment and strengthening of FOs and in consideration of the workload, experience and profile of DAE staff, hired national technical assistance with a mixture of strong social mobilization, institutional strengthening, human resource development, business and financial skills will be responsible for implementation of support to FOs and for developing the capacity of DAE.

DAE and other related organisations capacity development: The role of the Regional and District IFMC staff involved in FO support will go beyond direct support to the FOs and include a strong focus on developing the capacity of Upazila and block level DAE staff. While IFMC staff will be working closely and directly with FOs it is essential that for the sustainability of the support and for the opportunity to spread the support to other FOs, that capacity be developed within DAE. The development of capacity in DAE for the support to FOs is in principle the IFMC exit strategy in the long term. The choice of Upazila and field level DAE staff to be trained will be based on the location of FOs requiring support as it will not be possible to train all relevant DAE staff.

Role of DAE officers: The role of DAE Upazila level staff will be to assist in identifying FOs that meet the criteria for support under IFMC. Sub Assistant Agriculture Officers (SAAO) in the block in which the identified FOs is located will receive training from the IFMC staff and will initially accompany IFMC staff on visits to the FO. The SAAO will gradually take on the role of mentoring the FO in areas of organizational development and market related issues.

The strategies for national meeting/seminar on farmer-centered extension approaches are:

The national meeting/seminar on farmer centred extension approaches will be led by DAE. Through structured discussions among all major extension providers, including but not limited to government organizations, larger NGOs, development partners and private sector companies, a common understanding of different approaches as well as of activities being implemented by the players in the national agricultural extension system will be made.

The aims of the national meeting/seminar are two fold: As an exit strategy for Danida assistance there should be a wider application of the successful extension approaches developed through many years of project support. Further, it should be used as a platform for wider exchange of information, ideas, best practises and possible joint cooperation between different players, including existing and future projects. The other components of AGEP can use this platform for sharing lessons learned from their interventions and dissemination of information on technologies and best practices and specific FFS learning and quality issues can be discussed amongst the components.

14.3 Rationale

Although the poverty reduction strategy of SFYP emphasizes the effort to shift large numbers of workers engaged in low productive employment in agriculture and informal services to the higher productivity manufacturing and organized services of the economy, it has also emphasized the importance of enhancing the income-earning opportunities of workers remaining in agriculture by raising land productivity and increasing diversification of agricultural production both in crop and non-crop agriculture (fishery, livestock, poultry, etc.) in the context of commercialization to raise farm income. In sustaining economic growth, SFYP considers pro-poor, environmentally sustainable and climate change adaptable approaches in the development process. IFMC is in line with this second objective.

Moreover, IFMC will focus on a number of key areas that have been listed from the lessons learnt of major donor supported projects of the MOA, particularly implemented by DAE.

14.4 Targets

Geographical Coverage: IFMC will be implemented nationwide covering 373 out of a total of 475 upazilas in the 61 districts of the seven divisions in the country. Of these 373 upazilas, 38 are district sadars which will be excluded in 3rd year of the project. These 38 district sadars have 177 Farmer Facilitators whose involvement in implementation of FFS is essential to achieve the targets of FFS. IFMC will give its highest efforts to complete FFS implementation in these 38 upazilas in first two years of the project. It may be noted that the development of Farmer Facilitators requires about one year.

All these 373 upazilas are selected based on two basic considerations: (1) poverty and (2) susceptibility to the effects of climate change and natural calamities. The national poverty map and climate change affected area map are used to identify the upazilas. IFMC does not include 25 upazilas under Chittagong Hill Tracts (CHT) because Danida has supported a separate project titled “Agriculture and Food Security Project (AFSP)” in CHT. The other upazilas which are not included in IFMC are comparatively well off and covered by other projects.

Beneficiaries: The target beneficiaries for the IFMC are the households, including male and female members, of the landless, marginal and small farmer households cultivating 0.0 – 2.5 acres of land.Throughout IFMC there will be concerted efforts to maintain the focus on the poorer households and functional female headed households (where woman manages household production system and makes all decisions in respect of income and expenditure) will especially be encouraged to participate. Support to small but profitable household production will ensure relevance for poor, landless and female farmers and provide employment opportunities for hardcore poor.

FFS sites: The selection of venues for FFS sites within the Upazila will be carried out at Upazila level. The size of Upazilas vary greatly but on average there are 6 to 8 unions in an Upazila, though the number may be as high as 17 or 18. On average there are three blocks in a Union and one SAAO is responsible for the agricultural activities of the block. S/he works under the direct supervision of the Upazila Agricultural Officer (UAO). The number of farm families in a block varies from 1500-2000 and from amongst these the participants of FFS will be selected.

Before the start of an FFS season the Upazila will agree with the regional IFMC office on the number of IFM FFS to be implemented in that season based on availability of FFs and trained Upazila staff. The union/block/village in which each FFS will be implemented will be selected by the UAO/Agricultural Extension Officer (AEO) in consultation with the SAAOs and FFs in the Upazila. Allocation of FFS will be based on other programs and projects in the various blocks (i.e. to strengthen synergies and avoid duplication) and on the relevance of the crop for which the FFS is to be established in the case of rice and high value crops. If there are pockets of poverty in the Upazila / Union these should be considered, or if there are areas particularly vulnerable to climate change or other natural calamities. Also if there are areas of the Upazila populated by groups who generally have less access to services including extension such as minority groups these should be considered.

FFS Participants: Once the Union/block is selected then the concerned SAAO together with the FFs in that block will select the farmers (beneficiaries) of the FFS through a process based on the criteria for participation i.e. poor and landless farmers cultivating 0 to 2.5 acres of land, though in the case of landless farmers there should as a minimum be a homestead area which offers opportunities for household vegetable gardens and small livestock. The SAAO and the FF will organize a general meeting in a village of that block involving interested farmers. In the meeting they explain the objectives of FFS, the criteria for participation and also the entire process of an FFS and those are willing to participate, based on the selection criteria, the farm families (male and female) including female headed household, are selected/self selected and a verbal contract is made with them. During the initial meetings some may drop out and others join in a process of self selection. Experience in AEC has shown that this flexibility at the start results in very few drop outs later in the process.

Once the beneficiaries are selected they will decide on the FFS day and time for their convenience and considering the needs of female and male participants, avoiding market day and Friday. The FFs will establish FFS in their union or adjacent union to ensure that they are acceptable to the farmers and that travel distance is not excessive. The FFs should be involved in the entire process i.e. selection of union/block/village and also the farm families for FFS.

Farmer Organizations: Support to FOs will target the farmer groups, which emerge as a result of the FFS intervention; that is post-FFS groups. The IFMC will also target other relevant farmers groups and associations particularly those that have emerged from earlier Danida programs, including the ASPS I and II. The target group will be the same as that for FFS however as the support to FOs is limited to a smaller number there will also be focus on targeting FOs with market opportunities rather than blanket support.

14.5 Linkage

Linkages between IFMC outputs, the Agri-business Development Component, Agriculture and Food Security Component and other projects:

The outputs of the IFMC are closely interlinked. Formation and strengthening of FOs is a direct result of the IFM FFS activities. The needs of FOs in terms of fulfilling their objectives include that member farmers have obtained information on high value agricultural products as well as on producing for the market, which in turn puts demands on the FFS curriculum and capacity development activities.

The national meeting/seminar on farmer centred participatory extension approaches will take its point of departure in the FFS approach but will have a wider perspective in terms of farmer-centered extension approaches. The establishment of a national platform for exchange of experiences will enable the IFMC to benefit from and share lessons learned and practises of other components of AGEP as well as other projects of DAE and other extension actors in the country.

IFMC will maintain close collaboration with other donors contributing to the improvement of the extension services in its targeted areas and in Bangladesh as a whole. There are a number of donor-funded agriculture and rural development programs planned and ongoing in the country including in the North West and North and Southern Part of Bangladesh where IFMC will be operating in almost all districts. Ongoing programs include the WB funded National Agricultural Technology Project (NATP), IDB funded Greater Rangpur Agricultural and Rural Development Project, ADB funded Second Crop Diversification Program and IFAD funded Micro-finance for Marginal and Small Farmers Project in the North West are particularly relevant for coordination as all of them are working for development of FOs.

Coordination is particularly relevant to avoid duplication of targeted villages/Upazilas, but also for mutual exchange of information and experiences with potential for movement toward mainstreaming of a common approach. Most of these projects promote the use of specialist producer groups and the organization of input and marketing services through FO, in some cases utilizing the FCs established under

ASPS II as the basis of these organizations. Thus, and in line with the policy of the DAE that the FOs should not be associated with particular projects, the IFMC will not focus on those Upazilas already included in these projects as far as FO development is concerned to avoid duplication of efforts in support to FOs. This will apply especially to the 120 Upazilas covered by the NATP, which have been selected on the basis of higher levels of agricultural development and are thus considered to offer opportunities for produce bulking and market linkages.

There will be a close linkage between the IFMC and the Private Sector Agribusiness Development Component largely through the development, capacity development and linking of FOs. Experience shows that the ability of market actors to reach down to small-scale producers is limited without enlisting the advantages of FOs in organizing farmers to provide the necessary critical mass of produce. Business oriented and well functioning FOs are therefore required for increasing the impact of the Katalyst program. The success of this link requires emphasis on the creation of producer groups from one or several FFS during the sessions on farmer organization that form part of the FFS process.

IFMC will also maintain a close linkage with Agriculture and Food Security Project (AFSP) in CHT with the objective of capacity development through sharing knowledge and experiences and transferring useful technologies. In addition to that there might be joint efforts for training of the Master Facilitators of AFSP and exchange field visits in the FFS and the Farmer Organizations of IFMC and AFSP.

14.6 Impacts/Outcomes/Outputs of the IFMC:

a) Major Impacts

Increase Income

The farmers will learn improved[1] production methodologies and technologies from IFM FFS and use them in their agricultural enterprises (The term ‘enterprises’ refers to the production of a particular agricultural product for consumption and/or sale by the target households and includes field crops, as well as household agricultural production). Hence, the production of the enterprises is expected increased due to introduction of new and improved methodologies and technologies. Higher production of the enterprises will lead to increase income of the households. Apart from that income from agricultural enterprises might increase due to reduction of production cost. For example, the use of Integrated Pest Management (IPM) methodologies for management of pest in field crops, generally save cost of pesticides.

IFMC will encourage FFS farmers to organize into groups and support them to work together in marketing of produce and purchasing of inputs, which will further enhance their incomes. Because of the group marketing farmers will be able to market their products in the Union and Upazila markets or directly to the agro-processors at higher price than the retailers and wholesalers who move around the village to buy small quantity farmer’s produce at low price.

The untrained (not participated in FFS) neighboring farmers are also expected to raise their income through the interventions of IFMC. They will be exposed to the technologies through field days and practice some of these technologies following the FFS farmers or advice of the FF. They will also be encouraged to join or form an FO and participate in income generating programs of the organization.

Improve Food Security and Nutritional Status

There will be a contribution to increasing production of rice, vegetables, fish and meat of the landless, marginal and small farmers who are in general vulnerable in respect of food security. Through the organization of FFS members into groups and organizations, farmers will get opportunities to be involved in income generating activities leading to higher income and resultant improvement in food security. Moreover, in the development of new technologies for inclusion in the IFM FFS curricula IFMC will work with research organizations to address salinity, effects of climate change, drought, natural calamities and other factors, which affect the food security of the target group.

The IFM FFS includes several sessions on nutrition in order to increase farmers' knowledge on the importance of nutrition and ways to maximize the nutritional benefit of household production. The curriculum includes modules on rice, homestead production that will provide access to a range of nutritious food and thus ensure a carried diet for the household members. The focus of IFM on space utilization within the household ensure the production of a range of different fruits and vegetables, which combined with training and awareness of nutrition issues will contribute in improvement of household nutrition and will benefit women, men and children in the target households.

Increase of Full-time Equivalent Paid and Non-paid Employment

IFMC targets a wider variety and number of total farm activities in the household of participating farmers. This means that the farmers trained in FFS are expected to increase not only their production of existing enterprises, but also the number of total farm activities. For example, rice farmer will increase their production of HVC, homestead fruit and vegetable garden after participating in FFS.

It is expected that along with vertical and lateral spread of the total farm activities there will be an increase in economically active time spent by the household members. In some cases hired labor may be required if total farm activities or unit of farm activities are increased more than the available household manpower. Thus IFMC will reduce underemployment or create non-paid employment opportunity for the household members and paid employment for hired labor.

Besides, IFMC will build the capacity of FOs through training of farmer leaders so that they can maintain linkage with extension service providers of DAE and other organizations to access extension and other services. The farmer leaders are also expected to establish linkage with market actors (i.e., merchant associations, processing industries, middlemen, etc.) and micro-finance services and involve their organizations in different business activities like bulking, grading and packaging of the surplus produces of the farmers for marketing, undertake contract to produce special crops i.e., seed for processing industries, vegetables and fruits for food and beverage industries, aromatic rice, organic vegetables and fruits for export, etc. The combined effect of these different ventures of the FOs have some potential in creating non-paid and paid employment opportunities for the members of the landless, marginal and small farm households.

Increase Agricultural Production

IFMC will implement IFM FFS to develop skills of the farmers in using modern agriculture technologies. The technologies targeted will be user friendly, responsive to the environment and social context and affordable for use by the farmers. It is expected that the farmers will use these technologies and change farming practices including diversification in total farm activities as well as increased production in every unit of farm components. In addition, female and poor farmers will be empowered through the FFS process that will lead them to be involved in more productive activities. In addition, there will be spill over effects of the FFS technologies to neighboring farmers. This will enable a significant increase in crop and homestead production in the farm households. IFMC targets 8% points higher production of rice, 15% points higher production of high value crops and 50% points higher production of homestead vegetables than the farmers not trained in IFM FFS.

b) Major Outcomes

Increase Total Farm Productivity

Through IFM FFS farmers will develop skills in a range of new and alternative IFM technologies related to rice and other enterprises and get an opportunity to evaluate new technologies in their own environment and to assess which technologies are relevant and appropriate for adoption by them. Rather than a top down approach the

IFMC will facilitate informed choice of the farmers in adopting any technology which they find will increase their farm productivity and welfare. Particularly, it will promote use of good seed, balanced use of chemical fertilizer, Urea Super Granule, IPM, increased household production and a variety of high value crops based on the needs of ecological zones. It is assumed that 80% of the IFM FFS trained farmers will adopt at least 5 of the IFM FFS promoted technologies or farm management practices. Using these technologies farmers will change their farming practices leading to increase productivity of land and labor and increasing production.

Increase Diversification

Use of technologies promoted through IFM FFS will increase diversification in total farm activities and increase diversification within the various, existing farm components. For example, a household having few acres of field crops starts raising homestead vegetables, fruits and other enterprises being trained in IFM FFS. This means that the household has diversified their total farm activities adding two more farm components. Similarly, a rice farmer can diversify production adding new crop varieties like aromatic rice and high value crops, etc. Further, under the support to FOs there is scope for further diversification as farmers are linked to marketing opportunities through the FOs. FOs linking farmers to buyers and other market actors will in some cases lead to contractual agreement for producing specific products. IFMC targets 80% of the IFM FFS trained households to increase total farm activities by adding at least one farm component and increase the diversity within farm components by adding at least one more crop or enterprise.

Enhance Empowerment

In IFMC empowerment issues focus on all small farmers but with particular attention to female and poor farmers. All activities of IFMC are sensitive to the female and poor farmers. It is anticipated, based on experience in previous programs and the FFS evaluation, that after participation in IFM FFS as well as in the farmer’s organization both female and the poor farmers will develop confidence to speak in public. They will take some of the leadership positions in the FOs and maintain linkage to extension services, marketing and financial services. In the household, female farmers are expected strengthen their level of control of household income, particularly for income generated by household activities traditionally carried out by women, including homestead vegetable, fruits and other household enterprises. It is expected that as female and poor farmers are increasingly empowered they will be more motivated to participate in farming activities of all sorts, more able to use their time productively and more able to assist in household decision making thus contributing to improved farming practice and diversification of production. This in turn will result, on an aggregated scale, to increased growth and employment creation. IFMC targets that 80% of the FFS trained female and male farmers will be comfortable and able to speak in public, 30% of the female members of FOs take positions in the executive committee and that there will be a 50% increase in female control over income from homestead garden and other enterprises.

c) Main Outputs and Activities

Output 1.1: IFM FFS Curricula for menu of IFM modules including high-value farm activities with high female interest/demand developed along with supporting training packages

The IFM FFS curricula will be developed following a regional approach, which will ensure that the curriculum is adapted to local conditions including market opportunities and challenges arising as a result of climate change. The curriculum will include a menu of modules from which farmers can choose according to their need, interest and priority. For implementation and monitoring of the IFM FFS, a number of training programs will be needed for trainers and facilitators and these too will require curricula development.

For some IFM FFS modules and supportive training, training material have been developed in earlier programs, nationally as well as in neighboring countries. Where this is the case the development of curricula will consist of reviewing and updating such materials. Where no material exists, new training materials, including detailed lesson plans and lesson sheets, will be developed. All curricula and training materials, including background materials for trainers, will be reviewed and improved through a continuous learning process and will thus not be printed in large quantities, but will be adjusted and updated regularly and printed as needed.

The content of the IFM FFS curriculum, with some modification will bring together all existing FFS curricula on crop, household garden, nutrition and other enterprises with adding emphasis on whole farm production planning and on production for the market. The IFM curricula encourages farmers to look at all farm resources with the aim of increasing the collective benefits for both female and male household members and guide them towards making informed choices on the best way to utilize these resources. The IFM curricula will offer field oriented practical training and technologies while encouraging simple experimentation and learning through observation. The learning methodology and the facilitation style aims to develop confidence and lead to the empowerment of male and female farmers.

The FFS curriculum will also include a module related to social issues, gender equality and family matters, compulsory for all FFS participants.

Activity 1.1.1 Identify high-value crop, livestock and fish enterprises for new curricula development with focus on diversification and high female participation

The curricula development exercise starts with the identification of modules to be included in the IFM FFS menu. Focus will be given on those enterprises, which will ensure opportunities for increased production and income, diversification and large scale female participation. IFMC aims to be a demand-led program. It will not be possible to offer an unlimited number of options, but rather a menu from which IFM FFS participants can choose based on their interest. Similarly the enterprises that offer benefits in terms of increased incomes and the enterprises that have potential to raise incomes through diversification of production will be emphasized for selection. The selection of the enterprises will be carried out through bottom up needs assessment exercises followed by workshops and consultation meetings with the relevant experts and beneficiaries in each of the six regions within the operational area of IFMC.

Activity 1.1.2 Develop and regularly update curricula for IFM FFS menu modules as well as other related training with necessary gender focus and adaptation to different ecological areas through workshops and drafting teams

Drafting of IFM curricula will include both the overall structure of the IFM curriculum; bringing together the various technical modules into a whole farm learning exercise, as well as the development of the detailed content of the modules and learning sessions. Where possible and relevant existing modules and learning sessions will be reviewed and modified for use in IFM FFS. Details on facilitation methodologies including the use of participatory methods and the use of tools of analysis traditionally used in FFS, i.e. Agro-ecosystem Analysis or Farm Management Analysis will be included in the supporting material for modules and learning sessions. Existing modules on nutrition will be updated taking into consideration other on-going nutritional project(s) in the country and included in the menu of modules. A basic principle will be followed in preparation of all training modules and materials that they will have relevant pictures and the text as such that the farmers can read and understand them easily.

Several workshops will be conducted to develop the new curricula or revise and modify existing curricula. It will be a continuous process. At the end of each Review and Planning workshop the feedback on the curricula will be collected from the facilitators and revised based on the local needs. Similarly, the results of targeted research under activity 1.1.4 will be included in the revised curricula. As necessary drafting teams will be identified to continue and complete the work started during workshops. If found necessary an Advisory group or peer review process will be introduced. However, prior to the start of IFMC a lengthy IFM curriculum development process, including piloting will be carried out.

Activity 1.1.3 Field testing and piloting of the draft curricula for IFM menu of modules with participation of both female and male target group

For new curriculum, there is a need to adapt to the context (economic condition, environment, ecology). Therefore field testing of the curricula will be carried out in several places to establish their suitability for and make any necessary improvements and changes. The curriculum with modules and learning sessions will be finalized based on the results of piloting of few FFS in different regions. The final curricula and modules will be maintained in soft copy and multiplied as and when required for distribution.

Activity 1.1.4 Support to Research organizations for adaptive research targeting IFM FFS curriculum development

Based on needs and issues emerging from the curriculum development process and during the IFM FFS implementation, IFMC will contract relevant research organizations under the National Agricultural Research Systems to carry out adaptive research on that specific issues/ topics that can improve the quality and relevance of the IFM FFS and other related curricula, not as general support to research or research institutions. Wherever possible adaptive research activities will be contracted for a limited period in such a way that field testing will to be carried out in cooperation with FFS graduates in clubs and FOs. Outcomes from this activity will link back to gradual improvements in the curricula under activity 1.1.2. This activity will be managed centrally by the IFMC management to ensure that issues of specific and strategic importance to the IFM FFS are the focus in the research cooperation.

Output 1.2: Capacity of FF and related GOB field level staff developed for implementation, monitoring and backstopping of IFM FFS with special attention to female participation

There will be training courses for facilitators who will be responsible for implementation, monitoring and backstopping of the IFM FFS. Because of the relative scarcity of female facilitators within the GOB structures, particularly in DAE, IFMC will pay special attention to the inclusion and capacity development of female facilitators, wherever possible. FFs will act as facilitators for FFS and GOB field level officers will be responsible for monitoring and backstopping the FFS. Facilitators are key to the quality of a FFS.

This training is expected implemented in existing DAE training facilities, i.e. Horticulture Centers of respective regions. IFMC will provide support to these training centers for upgrading their capacity (accommodation, catering, etc.) to include the required number of trainees and facilitators with necessary training amenities, especially teaching aids. The upgrading will especially cater for the need of female participants as these are inadequate in most centers.

Activity 1.2.1 Orientation and training of Master Facilitators (MFs), Subject Matter Specialists (SMSs) and others in skills and knowledge for implementation of IFM activities

MFs, SMSs and other related officers of IFMC will receive necessary training and orientation on IFM-FFS based on the curriculum developed under output 1. As MFs will come from different technical and non-technical backgrounds, they will need to have basic knowledge on facilitation, monitoring and backstopping of the IFM FFS and strong experience from a wide range of institutional, social mobilization, gender and technical issues of the various modules represented within the IFM curriculum. The basic orientation and training of MFs will be provided by the core team of IFMC just after recruitment and then repeated through refresher courses as soon as the curriculum is updated and when necessary.

Activity 1.2.2 Select female and male Farmer Facilitators and organize Training of Trainers/Season Long Learning (SLL), refresher courses and specialist training

Initially the FFs will be drawn from the existing pool of Farmer Trainers and Local Facilitators trained under ASPS II, where applicable and suitable. Further FFs will be selected from amongst Integrated Crop Management (ICM) FFS/ IFM FFS participants, who will then receive a short Training of Trainers (TOT) followed by SLL, mentoring and follow up as developed under activity 1.2.1. FFs will be selected by SAAOs and Upazila level officers of DAE in collaboration with MFs from the existing ICM clubs and where possible more females will be selected. During implementation of FFS, FFs will work in pair and high priority will be given on male and female participation in the pair. IFMC will develop special initiatives to attract potential female FFs. The TOT and SLL will be conducted by the Upazila/Union level officers of DAE other related organizations with assistance of MFs and resource persons. Such training will be conducted at a number of venues and separately in more than one District at a time to allow for context specific modifications in the curriculum. The officers from DLS and DOF will be invited to take some sessions in the training.

In addition to the TOT and SLL, all FFs will receive refresher training as well as specialist training several times during the first three years of implementation to learn the new issues included in the updated version of the curriculum, modules and implementation modalities of FFS. These refresher trainings are compulsory for all FFs. Female FFs will be especially encouraged to attend and facilities will be offered to enable their participation (e.g. child care).

Activity 1.2.3 Training of trainer/SLL and orientation of Upazila and Union level officers of DAE and other related organizations in implementation of IFM FFS

In most areas, IFMC will draw on existing FFs for implementation of IFM FFS. However in some new Upazilas (not included in ASPS II) it will be necessary to train 2-4 officers of DAE (AEOs, Sub-assistant Plant Protection Officers (SAPPO) and SAAOs) and other related organizations through TOT who will implement the first round of IFM FFS from where FFs suitable for training can be identified. In this process priority will be given to include more female officers. This initiative will give the opportunity for the trained officers of DAE and other related organizations to gain experience in implementing IFM FFS first hand, and thus ensure that they are able to give better quality back stopping and monitoring to the FFS. Orientation training will be focused on those areas where officers of DAE and other related organizations have been trained in FFS approach during ASPS II.

Activity 1.2.4 Study tours/short courses for female and male IFMC staff and relevant GOB officers on different aspects of FFS development

In addition to orientation and training at the local level, there will also be capacity development initiatives for IFMC staff and the relevant GOB officers (DAE-14, MOA-7, Planning Commission (Crop Wing)-7, IMED-2, Programming Division-2, ERD-2 and GED-1) directly related to implementation of IFMC activities through study tours and short courses within Bangladesh and in relevant countries of the region (eg. Vietnum, Combodia, LAO PDR, Srilanka, Thailand, Malayasia, Indonesia, Phillipines, Nepal, India, etc.). This support will also be extended for the farmers, farmer facilitators and higher level officers of the related organizations directly related to IFMC. Such capacity development initiatives are expected to contribute to new learning as well as new initiatives and improvements in IFM FFS curricula and implementation and should have a specific learning objective. Special efforts will be undertaken to include more female staff and officers in the courses and study tours. Any restricting issues should be appropriately dealt with. All training and study tours should include **at least** 2 women. All study tours should be approved by EOD and the Planning Commission will be informed about it. Beside these, there will be also support for higher studies under programme support managed by EOD.

Activity 1.2.5: Organize coordination meetings at district and upazilas levels

Successful implementation of FFS as well as FOs needs strong coordination between the IFMC staff and the district upazila level officers of DAE and other related organizations. To facilitate this coordination IFMC will provide support to organize monthly coordination meetings at the upazila and bi-monthly coordination meeting at the district levels to discuss relevant issues on FFS and FO development. The regional and district level staff of IFMC will participate in these meetings along with the participants from DAE and other related organizations. FFS facilitators will participate in upaliza level coordination meeting. There will be a minute from these meetings and a copy of these minutes will be sent to IFMC headquarter.

Activity 1.2.6: Support for Physical Renovation of the Training Centers

All training courses outlined under output 1.2 are expected to be carried out at DAE Horticulture Training Centers. For each of the 6 regions an appropriate Horticulture Training Center will be identified (e.g Kallyanpur, Chapai Nawabganj; Burirhat, Rangpur; Jamalpur; Daulatpur, Khulna; Rahmatpur, Barisal and Panchgasiya, Feni) and where necessary the facilities will be upgraded to a level so that they are adequate for the required training of male and female farmers and officers including their accommodation. Special consideration will be given to the needs of female staff and FFs.

Output 1.3: IFM FFS organized and conducted with targeted farmers and in targeted locations

The activities under Output 1.3 reflect the entire implementation process of IFM FFS, the main activity of IFMC. There will be review and planning workshops prior to every crop season to plan IFM FFS with participation of the FFS facilitators and monitors in each region. The UAOs will be responsible for the implementation of FFS in their areas.

Activity 1.3.1: Selection of IFM FFS sites and Implementation of IFM FFS according to the curriculum

Within the geographic areas of IFMC specific sites for IFM FFS will be identified on a regular and ongoing basis. FFs will be responsible for selection of the specific sites for the IFM FFS and for selection of potential FFS participants with guidance from the Upazila IFM team (AEO/Additional Agricultural Officer, SAPPO, and SAAOs). Households will be represented by one male and one female in most cases. However, in the case of female headed households two females may represent the household. The selection of FFS site and participant will depend on the economic opportunities (like free space in homestead) available in the households of the target group, where farmers will use their skills and technologies learned from FFS. However, IFMC emphasizes as much as possible homogeneous participants for FFS so as to facilitate a focused FFS curriculum and modules. Where groups have previously been trained through a FFS they will be eligible for inclusion in IFM FFS as long as the modules selected do not replicate those from the earlier FFS. The selection of modules within each IFM FFS will be flexible and demand-led to reflect the specific needs and interests of the individual group. During the selection process, including village meetings, contributions of both men and women should be assured: if needed women should be specifically invited to attend and express their opinions and needs in a separate session.

Once the site and potential participants have been identified the IFM FFS implementation will start, and within the first few meetings the actual participants will be selected through a process of guided self-selection. These participants will then select modules from the menu and their specific curriculum will be agreed with the pair of FFs responsible for running the IFM FFS. Each FFS will include a module on social issues such as gender equality which will be compulsory for, and attended by, all participants in combined meetings and will be spread over the full FFS intervention period. This activity also includes technical and organizational backstopping activities from Upazila offices and regional officer's. Motivational tours to Farmer Clubs and FOs and some general information activities through mass media will also be included.

For attending IFM FFS the participants will receive a little support to buy some production inputs like seed, fertilizer, improved feed and vaccinations for livestock, etc. so that they can use the technologies they learnt from FFS. All these inputs will be supplied through the Farmers Organization (FO) which will be developed by the participation of the FFS farmers. They FO will also help the farmers in marketing their produces.

Activity 1.3.2 Organize seasonal or annual workshops to review and plan for IFM FFS

Seasonal review and planning workshops for FFs will be held at regional level bi-annually. These workshops will ensure bottom up planning of IFM FFS. Female and male FFs of a team will equally participate; if not together than at least in turns. During the workshops the FFs will put in requests and a justification for new FFS's to be allocated to their areas. FFS will be allocated according to the IFMC strategy and budget. Review and planning workshops will also provide an opportunity to review performance of IFM FFS including the performance of individual FF's, while giving a venue for discussion of challenges and constraints, including issues concerning the IFM FFS curriculum and problem encountered for running the FFS. FFS plans along with issues raised for resolution will be channeled back to the IFMC management, which after review by the core team will take initiative for necessary adjustments where necessary (FFS implementation modalities, curriculum and modules). Some of these issues may be put up as research issues to be addressed under activity 1.1.4.

Activity 1.3.3 Monitoring and Backstopping of IFM FFS

This activity involves independent monitoring by local Upazila level GOB officers to ensure the technical integrity of the IFM FFS. Monitoring will be conducted by those officers who have been trained in the IFM FFS approach as outlined in Activity 1.2.3. Key measurable indicators will be identified and monitoring forms will be developed accordingly for the monitors. After monitoring FFSs, the monitor will provide on the spot mentoring to the FFs as well as communicate their monitoring data to the regional office. The regional team of IFMC will review all the data provided by the Monitoring Officers and take initiative to discuss at the district and Upazila level coordination meetings for the issues to be resolved locally and forward the issues to IFMC management which require involvement of the core team. The regional team of IFMC will also carry out monitoring and backstopping on all IFM FFSs implemented in their region, as well as on the quality and frequency of backstopping performed from the Upazila level.

Activity 1.3.4 Information services to FFS facilitators and participants through mass media & ICT

There will be some supports from IFMC to the ICT and mass media initiatives for providing information services to the IFMC management, Farmer Facilitators (FFs) and the participants of the FFS as follow-up of training and capacity development. Under ICT there will be supports for database development on the training programmes, its facilitators and participants and profile of the farmers organizations and their activities including web based information services. On the other hand, support to mass media will be extended in wider perspective on the special issues like climate change, disaster management, market information and new agricultural technologies.

Output 2.1: Curriculum for FO leaders and DAE Upazila and field staff have been designed, reviewed and revised

The support to FOs will include capacity development by the IFMC team at two levels: firstly DAE staff who will take on the role of supporting the development of FOs, and secondly that of the FOs which will be assisted to build their organizations in terms of leadership and capacity to serve their members in access to markets and services. Based on training needs assessments (TNA) of the two groups appropriate curricula will be developed.

Activity 2.1.1 Develop and regularly update curricula for DAE staff, FO leaders and FO focal persons through workshops and drafting teams

A curriculum for the training of DAE Upazila level officers and SAAO's will be developed building on the experience of NATP which follows a similar model and where a social mobilization training module for capacity development of Common Interest Groups is being implemented. Under IFMC SAAOs engaged in FO support will be trained in the principles of Organizational development and business skills such as in the basics of group marketing, agri-business planning and management and negotiation skills. Training will also include skills development in facilitation and mentoring.

For FO leaders and focal persons a TNA will be carried out and a curriculum developed including issues such as organizational development, marketing, financial management and planning and management of agri-business. Through one or several workshops and making use of existing curricula adapted to meet the training requirements identified by the TNA a curriculum will be developed and finalized by a drafting team.

Output 2.2: Capacity development of officers of DAE and other organizations related to the implementation of support for the development of FOs

Capacity development of officers of DAE and other organizations related to the implementation of the component is required to gradually build up their knowledge and skills and to allow exchange of ideas and lesson learning.

Activity 2.2.1 Training of officers of DAE and other related organizations to support the development of FOs

Upazila and block level staff of DAE and other related organizations in those areas where FOs have been selected for support will be trained according to the curriculum developed in activity 2.1.2. The choice of Upazila and union level staff to be trained will be based on the location of FOs requiring support as it will not be possible to train all staff of DAE and related organizations. The curriculum will be updated regularly during the first two to three years of IFMC implementation.

Activity 2.2.2 Regular refresher trainings for officers of DAE and other organizations related to implantation of the component in support the development of FOs

Due to the piloting nature of the support to FOs in IFMC there will be need to regularly adjust the training curricula and offer refresher trainings to the officers of DAE and related organizations involved in supporting FOs.

Output 2.3: FOs with female and male members established with efficient agri-business plan and linked to service providers, market actors and micro-finance services

Once FOs have been identified the support packages which can be offered will include training in organizational management and agri-business concepts. Also mentoring and follow up visits will be an important part of the support package, based on an individual plan of Capacity development for each FO. These plans will be developed by the IFMC staff with the concerned DAE officers, including the attached SAAO, and the leaders and members of the FO. Development of linkage to markets, service providers and financial institutions will be part of the package of support. National, regional and district members of the FO support team will identify opportunities for linking FOs to services and support, based not only on the needs of the FOs but also looking for opportunities beyond the normal scope of the FOs.

Activity 2.3.1 Assess producer groups/ farmers clubs with potential to graduate into higher level FOs

FOs, both existing and emerging from the IFM FFS implementation under IFMC will be assessed for their capacity to develop into market actors and organizations providing useful services to farmers. The assessment will be based on leadership, level of organization, group cohesion and size, as well as unmet market opportunities such as recent diversification of rice, vegetables, fruit and other enterprises and demand in local, regional or export markets.

Criteria for the inclusion of new and existing groups in the capacity development process of the IFMC will be developed, and based on these criteria producer groups/Farmers Clubs will be supported to develop as higher level FOs. The actual selection of FOs will be carried out at Upazila level under guidance from IFMC officers. It is estimated that about 1062 FOs (an average of three per Upazila) will be identified for support.

Activity 2.3.2 Training of FO leaders and focal persons

Training of farmer leaders will include training in leadership, organization management, in the development of agri-business plans and in financial management as well as skills in terms of marketing and negotiation based on the TNA and curriculum process described in activity 2.1.1. Training will in most cases be organized regionally and may be carried out by IFMC staff or external facilitators where specific expertise not available in IFMC is required. Training will focus on FO leaders, but also on Focal Persons selected by the FO. Based on experience of the role played by FFs in FOs of ASPS II the FOs will be asked to select one or two focal persons who will attend training and who can provide services to FO members and other farmers. These focal persons should be able and willing to play a community mobilization role.

Activity 2.3.3 Mentoring and follow up visits

Mentoring and follow up visits will be an important part of the support package. This will follow up on training and will involve IFMC staff and trained DAE officers visiting and advising FO members and leadership, for example assisting in the setting up of financial management systems or attending annual or planning meetings of the FO.

SAAOs in the block in which the identified FOs is located will receive training from the IFMC staff and will initially accompany IFMC staff on visits to the FO. The

SAAO will gradually take on the role of mentoring the FO in areas of organizational development and market related issues working with the FO leaders and focal person to develop capacity according to a capacity development plan developed jointly with the IFMC staff, concerned DAE officers and FO leaders and members. FOs will be assisted to develop annual activity plans, business plans, and will in some cases be offered study tours to other successful FOs.

Activity 2.3.4 Support to FOs for linkage building, cooperation, registration, etc
Development of linkage to markets, service providers and financial institutions will be part of the package of support. National, regional and district members of the FO support team will identify opportunities for linking FOs to services and support of all kinds, based not only on the needs of the FOs but also looking for opportunities beyond the normal scope of the FOs, for example FOs may not be aware of new markets or changing market demand and so will not have enough information to demand support and linkages which might be beneficial to the FO. Linkages to service providers such as financial institutions and extension services including veterinary services will also be facilitated.

Instruments for linking FOs to financial services and market opportunities will include facilitating meetings and cooperation between FOs and Micro Finance Institutions, local, regional and international buyers and processors. Regional or district platforms to bring together value chain actors in sectors where there are emerging opportunities will be organized on a case by case basis, where such a platform is likely to improve market chain conditions, address bottlenecks and improve or provide opportunities for FOs.

Once linkages have been established FOs will be supported in the development of these contacts into business opportunities. Where necessary further linkages to service providers such as financial institution or technical services will be needed to take advantage of market opportunities. Support for registration and legal issues will also be considered.

Output 3.1: The scope of national meeting/seminar on farmer centered extension approaches has been established through consultation with stakeholders who subscribe to purpose and aim

Building on the recommendation of the FFS evaluation and on past experience this output aims to contribute to the ongoing process of strengthening extension services, making them more farmer-centered, participatory and based on experiential learning where possible.

Activity 3.1.1: Potential stakeholders will be identified and consulted through meetings for the design and function of the National Meeting/Seminar.

Output 3.2: The national meeting/seminar has been established and is operating

The national meeting/seminar will mainstream FFS principles into extension activities in Bangladesh, regardless of the terminology used by various projects and funding agencies. Whether a group extension methodology is termed an FFS or some other term is used, the same principles of participation, farmer empowerment and experimental learning should be applied, and top down supply led approaches should be avoided.

A systematic effort to strengthen linkages in the field of agricultural extension through close and frequent collaboration between all the actors, be they public sector, NGOs or private sector will ensure this process. Momentum will be added to the ongoing process and bringing more of the involved actors together. With DAE in the lead this platform will include other public sector extension providers, NGO extension providers as well as private sector actors and farmers own organizations that are involved in extension, enhancing opportunities for coordination and sharing of experiences and lessons learnt as well as developing best practices.

Due to the long-term and on-going nature of this output, it is necessary to have process indicators, rather than output indicators. This is not a simple one off activity but an effort to add momentum to a positive process that has been on-going for a number of years, and which is already starting to show results.

Activity 3.2.1: Create national platform for extension actors for coordination and exchange of lessons

With DAE taking the lead IFMC will initiate a National platform of extension actors. IFMC will provide budget and logistical support to the platform, which will meet two times per year. The platform will encourage actors to exchange experiences both from long term activities and from pilot activities, discuss ideas, consider opportunities for collaboration and ways to avoid duplication and find synergies in current and future projects and activities. Sharing outcomes of evaluations and studies of ongoing activities will also be encouraged through the platform.

An output of these meetings, over time will be the development of ‘Best practice guidelines’ for group extension methodologies in Bangladesh.

Activity 3.2.2: Joint activities including visits to field implementation and presentations on extension approaches

Building on the collaboration and exchange of idea in activity 3.2.1 this activity aims to strengthen collaboration in a practical way, through joint visits to extension activities of the various actors. Two field visits per year will be arranged to give opportunities to visit ongoing and pilot activities of particular interest to the Platform members.

Output 3.3: The national meeting/seminar is operating on farmer-centered extension approaches in CHT perspective

This output aims specifically to ensure collaboration between the two components of AGEP engaged in extension activities: AEC and AFSP, to maximize lesson learning and sharing and FFS quality enhancement and development.

Activity 3.3.1: National meetings/seminars

National meetings/seminars will take place four times per year, alternately in Dhaka and Rangamati to ensure collaboration and cross learning

Activity 3.3.2: Joint field visits

Joint field visits will take place twice per year, in association with meetings, once in mainland Bangladesh, once in CHT. This will ensure practical experiences are shared.

Activity 3.3.3: Joint capacity development of Master Facilitators

As a way to ensure collaboration on practical issues from the start of the program, experienced resource persons within IFMC will support the capacity development of MFs in AFSP. This will also help to build good relations between the two components.

14.7 Institutional and Implementation Arrangements

Component Steering Committee:

IFMC will have an inter-ministerial Component Steering Committee (CSC) at the Ministry of Agriculture. The CSC will be headed by the Secretary, Ministry of Agriculture with representatives from DAE, BARC, EOD, IMED, ERD and Crop Wing, Planning Commission, (see Annexure VI). The CSC will meet at least twice a year to oversee and provide guidance of implementation and overall coordination. It will also review progress and approve annual work plan and budget as well as progress reports.

Component Implementation Committee:

IFMC will have a Component Implementation Committee (CIC) at the headquarter of the Department of Agricultural Extension (DAE). The CIC will be headed by the Director General, DAE with representatives from the Field Service Wing, Food Crops Wing and Planning & Evaluation Wing of DAE, Planning Wing, MOA, Crops Wing, Planning Commission and IMED (see Annexure VII). The CIC will meet every quarter of the year to review achievements of IFMC.

Component Management Unit:

At DAE headquarter in Khamarbari, Dhaka IFMC will have a Component Management Unit (CMU) (see Annexure VIII) to facilitate, coordinate and supervise IFMC activities as well as liaison with EOD and other relevant stakeholders. In addition to that CMU will be responsible for preparing the inception report of the IFMC with detailed work plan (targets and budget), policy guidelines for implementation and monitoring and evaluation plan. The CMU will also be responsible for preparing training curriculum and modules, training of MFs and

SMSs, preparation of the annual work plans and budgets, annual procurement plans, allocation of FFS funds, revision of DPP, organization of CSC meeting, preparation of half yearly and annual progress reports, preparation of financial management manual, arranging internal audits, cooperation with other projects and department and supporting the regional and district level Component offices. The CMU is also responsible for implementation of the gender strategy at national level.

There will be a core team in the CMU which will consist of, on the GOB payroll a Project Director (PD), a Deputy Project Director (DPD) and two Assistant Project Directors (APDs) on the Danida payroll, a Senior Advisor (SA), an Institutional Development Advisor (IDA), three National Advisors and a Field Coordinator. One of the members of the core team will constitute the Gender Focal Point, in charge of gender awareness and sensitization training, monitoring and implementation and for sexual harassment issues at national level. There will be support from short-term national and international consultants as and when required for providing specific inputs for implementing and/or improving activities. The job description of these personnel is included in Annexure-II.

Regional Implementation Unit:

IFMC will have six Regional Implementation Units: in Mymensingh (covering Dhaka regions), Comilla (covering Sylhet and Chittagong region), Rajshahi, Rangpur, Barisal and Jessore. The Regional Implementation Units will be housed either in the office of the Additional Director (AD), DAE if possible or in hired houses if not possible. IFMC will provide necessary supports for repair and renovation of office building if Regional Implementation Unit is housed in the premises of AD, DAE office. The Regional Implementation Units will be operated under direct supervision of the CMU and be responsible for implementation of field activities in cooperation and coordination of the union, upazila, district and regional levels offices of DAE.

There will be a regional team at each Regional Implementation Unit. The regional team will consist of, on the GOB payroll, a Regional IFMC Coordinator and a SMS from DAE and on the Danida payroll, a Regional Technical Coordinator, two MFs, an M&E Officer, an Assistant Monitoring Officer, an Institutional Development Officer and an Accountant. The Regional IFMC Coordinator and the Regional Technical Coordinator will jointly be responsible for overall management of the regional team as well as implementation of the activities in the region, under the responsibility of the core team at the IFMC headquarter. In the regional team one of the members will also be in charge of gender mainstreaming: the regional Gender Focal Point. The detail job descriptions of the regional team members are given in the Annexure II.

The regional setup will play an important role in implementation due to its relative proximity to activities compared to the central level. There will also be differences between the selection of modules, and the high value crop modules on offer in the different regions, which will be best monitored at the regional level. The regional team will be responsible for capacity development of the GOB officers in the district, Upazila and Union on IFM FFS and assist them to plan, implement, monitor and backstop the IFM FFS. They will also be responsible for training of the FFs and organizing seasonal review and planning workshops and assist in inter-departmental coordination at the field level as well as support to FOs. They will also be responsible for the monitoring of a sample of FFSs to evaluate quality and standard of implementation and providing feedback to FFs and UAOs for necessary measures. The training courses, workshops, orientation programs, etc. will be held at six identified Horticulture Centres belonging to DAE. IFMC will contribute to the upgrading of centers during the first year of implementation and DAE will provide logistical support at the centers for IFMC activities.

District Implementation Unit:

IFMC will have 20 District Implementation Units, two to three units under each region. There will be a district team in each District Implementation Unit which will consist of a Community Development Officer (Community Mobilizer) and an Assistant Community Development Officer under Danida payroll. They will be responsible to the Institutional Development Officers and Accountants in the respective region. The district team will be engaged in the capacity development of FOs and developing the capacity of DAE Upazila and block level officers in FO support. Each district team will support the FOs in two to three districts according to the numbers of these organizations and their level of development. As each district team will cover 3 districts, the office should be in the most central of the 3 districts and from which road communications best cover the group of districts. The team will hire office space, be equipped with motorcycles and basic communications equipment and will establish a bank account. The location of these offices will be finalized in discussion with DAE based also on marketing opportunities and presence of active FOs. It may be that the level of support to the FOs in the Greater Noakhali region of Chittagong Division and in Barisal Division may be less than elsewhere given the existing levels of development of Community Based Organizations working at Union level and below under RFLDC. Pilot projects currently planned for 2012-13 under RFLDC may facilitate early graduation. From time to time, the district team may be supplemented by the Assistant Monitoring Officer responsible for monitoring of FOs. The detailed job descriptions of the district team members are given in Annexure II.

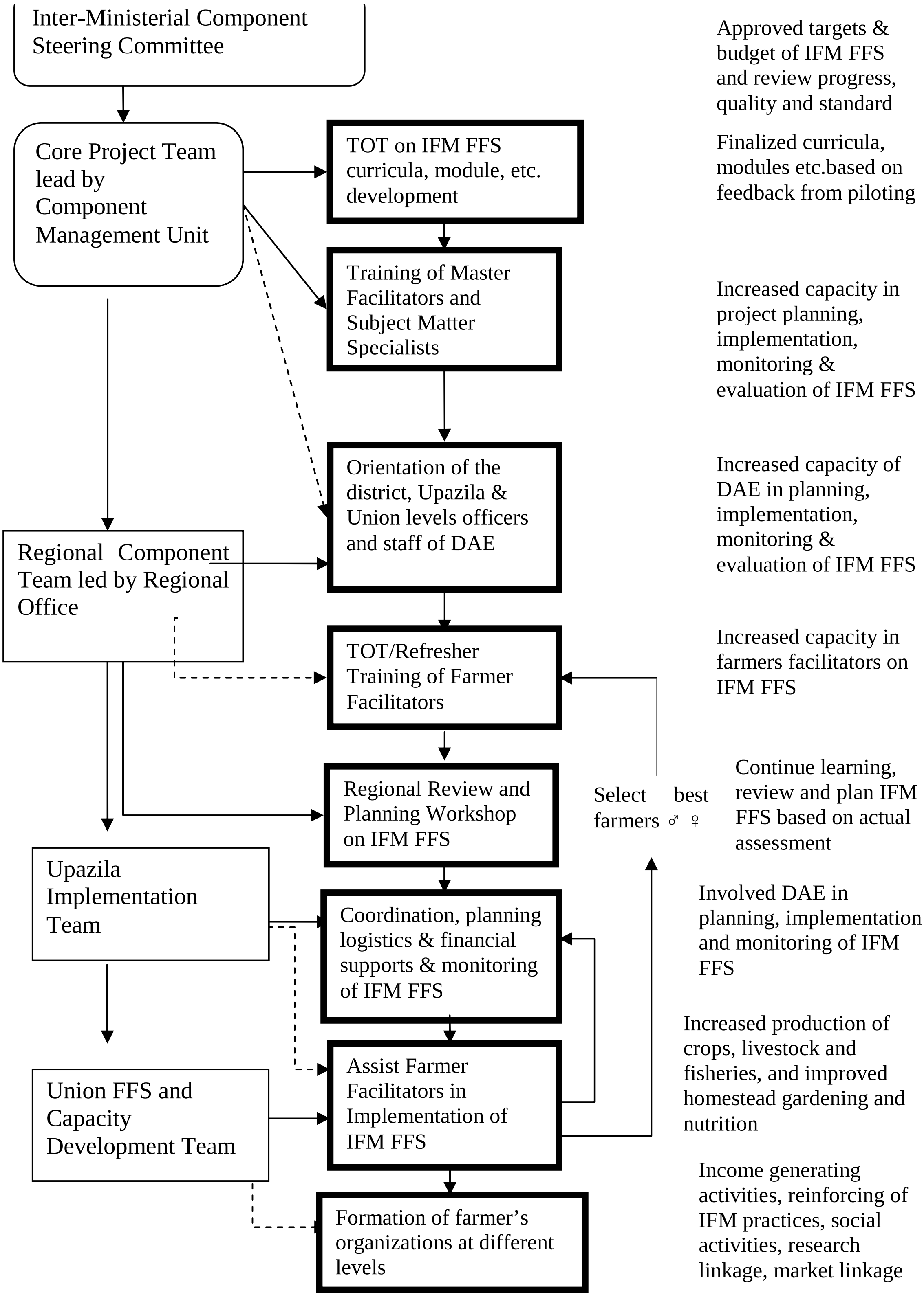
Upazila Agriculture Office:

The Upazila Agriculture Office will be the main place of implementing field activities of IFMC. The UAO will be responsible for financial management and coordination of the field activities and be liable for audit, submission of reports and related correspondence with the region and IFMC headquarter. There will be no IFMC staff at Upazila level but the regional IFMC team will be available for assistance of all activities of the Upazila.

There will be an IFM team in every Upazila, which will be consisted of the UAO as chair person and AAO/AEO and SAPPO as members. The IFM team will receive orientation on IFM FFS and be responsible for implementing all FFS activities including identification of FFs and providing monitoring and backstopping support to the FFs both in technical and management aspects. The IFM team will also assist in assessing the performance of FFs and identify further training and/or other development needs of the FFs. The IFM team will maintain close collaboration with the officers of DLS and DOF to get their services for IFM FFS as and when required.

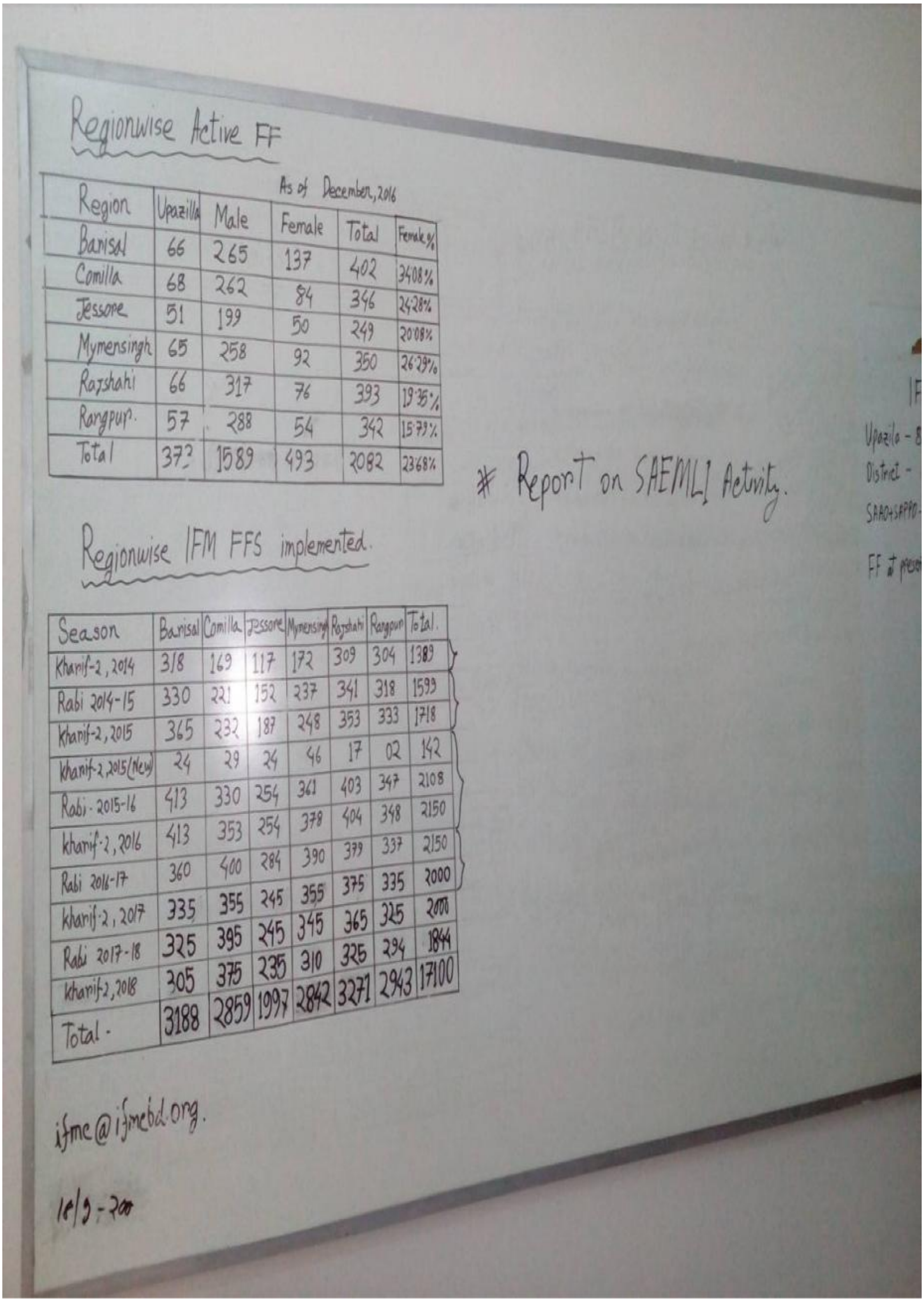
Besides, the IFM team will prepare the seasonal FFS plan in consultation with FFs and submit the plan at the regional review and planning meeting for discussions and approval. After approval of the FFS plan, the IFM team will sit with the concerned SAAOs and give them responsibility to assist the FFs in implementation of FFS as well as be involved in monitoring and backstopping at FFS. SAAOs will work hand in hand with the FFs until they gain confidence to implement IFM FFS independently. In some cases, for example where pilot activities are being carried out or where no FFs have yet been trained, SAAOs may implement FFS.

Figure 1: Schematic diagram of Core IFM FFS implementation



Appendix VIII

Status of FF and FFS under IFMC



Regionwise Active FF

As of December, 2016

Region	Upazilla	Male	Female	Total	Female %
Barisal	66	265	137	402	34.08%
Comilla	68	262	84	346	24.28%
Jessore	51	199	50	249	20.08%
Mymensingh	65	258	92	350	26.29%
Rajshahi	66	317	76	393	19.35%
Rangpur.	57	288	54	342	15.79%
Total	373	1589	493	2082	23.68%

Regionwise IFM FFS implemented.

Season	Barisal	Comilla	Jessore	Mymensingh	Rajshahi	Rangpur	Total.
Kharif-2, 2014	318	169	117	172	309	304	1389
Rabi 2014-15	330	221	152	237	341	318	1599
Kharif-2, 2015	365	232	187	248	353	333	1718
Kharif-2, 2015 (New)	24	29	24	46	17	02	142
Rabi - 2015-16	413	330	254	361	403	347	2108
Kharif-2, 2016	413	353	254	378	404	348	2150
Rabi 2016-17	360	400	284	390	379	337	2150
Kharif-2, 2017	335	355	245	355	375	335	2000
Rabi 2017-18	325	395	245	345	365	325	2000
Kharif-2, 2018	305	375	235	310	325	294	1844
Total -	3188	2859	1997	2842	3271	2943	17100

Appendix IX

The modules and sessions in IFM curriculum

Name of module and numbers of sessions	Name of Sessions
Preparatory -04	-Transect walk
	-Community resource mapping and community meeting
	-Household survey and Benchmark survey
	-Module based farmers selection
	-IFM exercise
	-Prioritize problems of different farm components
	-Group formation and month wise session plan preparation
Rice - 16	-Seed health and seed management
	-Soil health and fertility management
	-Trial plots set up and observation
	-AEZ and IPNS based fertilizer recommendation
	-Different growth stages of rice plan and management practices
	-AESA practices-(06 AESA)
	-Pest- insect, disease, weed and rat management
	-Food habit of natural enemies, augmentation and conservation of natural enemies
	-Bad effect of pesticides and risk reduction during pesticide use
	-Roughing, post harvest management of rice seed
	-Field day
Homestead garden -08	-Benefit and scope of fruit cultivation
	-sapling selection and planting
	-Problem identification of fruit trees and their management
	-Homestead space planning for vegetable and fruit cultivation
	-Vegetable production technologies
	-Trail set-up and FMA practice

Name of module and numbers of sessions	**Name of Sessions**
	-Land and seed bed preparation, sowing seed, transplanting of seedling -Organic and chemical fertilizer management, water management -Collection , sorting, identification of pest and disease samples of vegetables -Pest management in homestead vegetable and fruit trees using IPM concepts
Poultry – 06	-Poultry housing management -Broody hen management -Chick rearing and management -Poultry disease management - Trial set up and FMA practice
Small Ruminants - 05	-Cattle housing management -Management of milking cow and calf -Beef fattening - Fodder/Feed management for cattle -Disease management of cattle -Trail set up and FMA
Large Ruminants 06	-Goat housing management -Special care of pregnant of goat and kids -Feed management for goat -Disease management of goat -Trail set up and FMA
Aquaculture - 05	-Pond preparation -Selection of fish spices and fingerling release -Food and fertilizer management

Name of module and numbers of sessions	Name of Sessions
	-Trial set up and practice FMA -Control of water quality and disease - Risk and disaster management during fish cultivation -Fish harvesting and marketing
Nutrition - 04	-Food security and safe food -Food, nutrition, balance food, nutritional disorder and their remedies - Balanced food for different groups (infant, adolescent, pregnant, lactating etc.) Proper cooking, use vegetables from own garden
Farmers organizations and Social issues - 04	-Social issue: climate change, gender labor distribution, ,community irrigation system, collective purchase and selling agric-inputs/products -Formation of farmer organization

Appendix X

Interview Schedule

Department of Agricultural Extension and Information System
Sher-e-Bangla Agricultural University, Dhaka

Interview Schedule for Collecting Data for PhD Research on "**Effectiveness of Farmer to Farmer Training in Dissemination of Farm Information**"

Serial No.:

Respondent's Name: Gender: Male ( ) / Female ( )

Village: Union: Upazilla: District:

Please provide the following information. Your information will be kept restricted and will be used only for research purpose.

<table>
<tr><th>Sl No.</th><th>Questions</th><th colspan="3">Answer
(Please put tick mark or encircle or write where necessary)</th></tr>
<tr><td>01</td><td>Age (on the day of interview)</td><td colspan="3">................. Year (1 for 1 year)</td></tr>
<tr><td>02</td><td>Educational qualification</td><td colspan="3">a)Can not read or write(0)
b) Can not read or write but can sign only(0.5)
c) ....class passed(1 for 1 year of schooling)
d)Equivalent class ……….. pass(if out of general education)</td></tr>
<tr><td>03</td><td>Family size</td><td colspan="3">................. No.(1 for each member)</td></tr>
<tr><td rowspan="7">04</td><td rowspan="7">Net cropped area</td><td rowspan="2">Types of land</td><td colspan="2">Area</td></tr>
<tr><td>Decimal</td><td>Hectare</td></tr>
<tr><td>Single cropped(1)</td><td></td><td></td></tr>
<tr><td>Double cropped(2)</td><td></td><td></td></tr>
<tr><td>Tripled cropped(3)</td><td></td><td></td></tr>
<tr><td>Net cropped area (1+2+3)</td><td></td><td></td></tr>
<tr><td>Total cropped area (1×1+2×2+3×3)</td><td></td><td></td></tr>
<tr><td>05</td><td>Cropping intensity (%)</td><td colspan="3">(Total cropped area ÷ Net cropped area) ×100</td></tr>
<tr><td>06</td><td>Homestead Cultivated Area</td><td colspan="3">...........Decimal = ………. Hectare</td></tr>
</table>

<table>
<tr><td rowspan="2">07</td><td colspan="5">Income from agriculture (1 for one thousand taka)</td></tr>
<tr><td>Crop name</td><td>Total yield</td><td>Unit price</td><td>Total prices</td><td>Sold price</td></tr>
</table>

	Field crop:					
	Boro rice					
	Aman rice					
	Aus rice					
	Wheat					
	Maize					
	Potato					
	Jute					
	Other field crops(if any)					
	(a)Total income from field crops					
	Vegetables, spices and condiments:					
	Red amaranth					
	Kangkong					
	Indian spinach					
	Egg plant					
	Tomato					
	Country bean					
	Yardlong bean					
	Ash gourd					
	Sweet gourd					
	Bottle gourd					
	Sponge gourd					
	Ginger					
	Turmeric					
	Coriander					
	Pepper					
	White yam					
	Air potato					
	Taro					
	Alligator weed					
	Drumstick.					
	Other vegetables, spices and condiments(if any)					
	(b)Total income from vegetables, spices and condiments:					
	Fruit crops					
	Papaya					
	Banana					
	Mango					
	Lemon					
	Jujubee					
	Guava					
	Pomegranate					

	Other fruits (if any, please mention name)					
	(c)Total income from fruits:					
	Total income from agricultural crop sub-sectors(a+b+c):					
	Poultry birds					
	Hen/Layer					
	Cock					
	Duck					
	Pigeon					
	Other (if any, please mention name)					
	(d)Total income from poultry birds :					
	Small ruminants					
	Goat					
	Sheep					
	Other (if any, please mention name)					
	(e)Total income from small ruminants :					
	Big ruminants					
	Cow					
	Ox/Bull					
	Buffalo					
	Others (if any please specify)					
	(f)Total income from big ruminants :					
	Fisheries					
	Fish					
	Others(if any please specify)					
	(g)Total income from fisheries :					
	Total income from agricultural non-crop sub-sectors(d+e+f+g) :					
	Total income from agriculture (crop + non-crop sub-sectors):					
08	**Commercialization**	(Total prices of sold crop ÷ Prices of total yield) ×100 :				

09	**Agricultural diversification**				
	Type of crop	Level of diversity			
		More (> 4 species) (3)	Medium (3- 4 species) (2)	Less (1-2species) (1)	Not at all (0 species) (0)
	Cereal crop				
	Oil crops				
	Pulse crops				
	Spice crops				

	Vegetables				
	Fruits				
	Timber/wild tress				
	Fisheries				
	Domestic poultry and livestock (Hen, duck and cow, goats etc)				

10	**Agricultural experiences**	.... Years **(1 for 1 yr)**

11	**Leadership trait** (please put tick mark where necessary)				
	Organization	Level of involvement(year)			
		Not involved (0)	General member (1)	Executive member (2)	Executive Officer (3)
	Krishak Samabay Samity				
	Union Parishad				
	School committee				
	Youth organization				
	Political organization				
	NGO				
	Market committee				
	Mosque committee				
	Others (if any, please mention the name)				

12	**Extension contact** (please put tick mark where necessary)					
	Personal Level					
	Person	Regularly (4)	Often (3)	Moderately (2)	Seldom (1)	Never (0)
	Farmer trainer/Ideal farmer	3-4 days per week	3-4 days per fortnight	3-4 days per month	3-4 days per year	
	Agricultural input dealer	3-4 days per week	3-4 days per fortnight	3-4 days per month	3-4 days per year	
	Sub-Assistant Agriculture officer (SAAO)	1-2 days per week	1-2 days per fortnight	1-2 days per month	1-2 days per year	
	Livestock assistant/ Field worker	1-2 days per week	1-2 days per fortnight	1-2 days per month	1-2 days per year	
	Fishery assistant/ Field worker	1-2 days per week	1-2 days per fortnight	1-2 days per 6 months	1-2 days per year	
	NGO worker	1-2times per week	1-2 days per fortnight	1-2 days per 6 months	1-2 days per year	
	Upazila Fishery Officer(UFO)	1-2times per fortnight	1-2 days per month	1-2 days per 6 months	1-2 days per year	
	Veterinary Surgeon/ Upazila Livestock Officer	1-2times per fortnight	1-2 days per month	1-2 days per 6 months	1-2 days per year	
	Agriculture Extension Officer (AEO) / Upazila Agriculture Officer (UAO)	1-2times per fortnight	1-2 days per month	1-2 days per 6 months	1-2 days per year	
	Others (if any please name specifically and mention level of contact)					
	Group level					
	Agricultural fair	8 times in life	5-7 times in life	3-4 times in life	1-2 times in life	
	Agricultural discussion	8 times in life	5-7 times in life	3-4 times in life	1-2 times in life	
	Result demonstration	8 times in life	5-7 times in life	3-4 times in life	1-2 times in life	

	Method demonstration	8 times in life	5-7 times in life	3-4 times in life	1-2 times in life	
	Agricultural rally	8 times in life	5-7 times in life	3-4 times in life	1-2 times in life	
	Agricultural workshop	8 times in life	5-7 times in life	3-4 times in life	1-2 times in life	
	Motivational tour	8 times in life	5-7 times in life	3-4 times in life	1-2 times in life	
	Others (if any please name specifically and mention level of contact)					
	Mass level					
	Agricultural program in Radio	9 times or more per month	7-8 times per month	5-6 times per month	1-4 times per month	
	Agricultural program in Television	1time per week	1time per fortnight	1time per 1-3 months	1time per 4-6 months	
	Agricultural publications	> 1 time per month	1time per 1-2 months	1time per 3-4 months	1time per 5-6 months	
	Newspaper	> 1time per week	1time per week	1time per fortnight	1time per month	
	Others (if any, please , name specifically and mention level of contact)					

13	**Decision making ability** (please put tick mark where necessary) by summing up all the scores of all the responses of a respondent.			
	Subject	Extent of decision making		
		Able to make self decision (3)	Able to make decision with family members (2)	Able to make decision with outsiders of the family (1)
	Adoption of agricultural technology			
	Purchasing of agricultural inputs			
	Selling of agricultural products			

	Food selection for the family members			
	Education of children			
	Other family affairs			
	Involvement in social activities			

14	**Aspiration** (please put tick mark where necessary) by summing up all the scores of all the responses of a respondent.					
	Aspiration statements	Extent of aspiration				
		(0)	(1)	(2)	(3)	(4)
	What level you expect your sons to be educated?	No education ( )	Primary level ( )	Secondary level ( )	Higher secondary level ( )	Graduate or above level ( )
	What level you expect your daughters to be educated?	No education ( )	Primary level ( )	Secondary level ( )	Higher secondary level ( )	Graduate or above level ( )
	What level you expect your sons to reach in their occupation?	Own occupation ( )	Commercial agriculture ( )	Small business/ service ( )	Big business/ service ( )	Highly respectable service ( )
	What level you expect your daughters to reach in their occupation?	Own occupation ( )	Commercial agriculture ( )	Small business/ service ( )	Big business/ service ( )	Highly respectable service ( )
	What is your aspiration in respect to increase your own land by next three years?	None ( )	≤ 25% ( )	> 25% to 50 % ( )	>50% to 75% ( )	>75% ( )
	What is your aspiration in respect to increase your field crops by next three years?	None ( )	≤ 25% ( )	> 25% to 50 % ( )	>50% to 75% ( )	>75% ( )
	What is your aspiration in respect to increase your homestead garden by next three years?	None ( )	Vegetable. in 1 bed and 1 species of fruits ( )	Veg. in 2 beds and 2 species of fruits ( )	Veg. in 3 beds and 3 species of fruits ( )	Veg. in 4 beds and 4 species of fruits or above ( )

	What is your aspiration in respect to increase your poultry by next three years?	None ( )	Increase numbers 3-4 ( )	Increase numbers 5-6 ( )	Increase numbers 7-8 ( )	Increase numbers 9 and above ( )
	What is your aspiration in respect to increase your goat rearing by next three years?	None ( )	Increase numbers 2 ( )	Increase numbers 3 ( )	Increase numbers 4 ( )	Increase numbers 5 and above ( )
	What is your aspiration in respect to increase your cow rearing by next three years?	None ( )	Increase numbers 1 ( )	Increase numbers 2 ( )	Increase numbers 3 ( )	Increase numbers 4 and above ( )
	What is your aspiration in respect to increase your fisheries by next three years?	None ( )	Increase ponds 1-5 decimal ( )	Increase ponds 6-10 decimal ( )	Increase ponds 11-15 decimal ( )	Increase ponds 16- and above decimal ( )
	What is your aspiration in respect to increase your family nutritional status by next three years?	None ( )	Increase vegetables ( )	Increase veg. and fruits ( )	Increase veg., fruits and fishes	Increase veg., fruits , fishes and meat ( )
	What is your aspiration in respect to increase your agricultural machineries by next three years?	None ( )	Small equipments ( )	Thresher ( )	Shallow tube well ( )	Power tiller ( )
	What is your aspiration in respect to renovate /construct your house by next three years?	None ( )	Small renovation in existing house ( )	1 tin shed house ( )	1 semi paka house ( )	1 paka house ( )
	What is your aspiration with regards to purchase of recreational instruments by	None ( )	Radio ( )	Black and white television ( )	Color television ( )	Other dices including radio and television ( )

	next three years?					
	What is your aspiration with regards to purchase of communication devices by next three years?	None ( )	Normal mobile phone ( )	Smart mobile set ( )	Tabloid ( )	Laptop with internet ( )
	What is your aspiration with regards to undertake recreational/ study tour by next three years?	None ( )	1 time per year ( )	2 times per year ( )	3 times per year ( )	4 times and above per year ( )
	What is your aspiration in respect to increase your income by next three years?	None ( )	≤ 25% ( )	> 25% to 50 % ( )	>50% to 75% ( )	>75% ( )
	What level/ post you expect to acquire in your group or any higher coordination committee by next three years?	None ( )	Executive member in any primary organization ( )	Executive member in Village Coordination Committee ( )	Executive member in Union Coordination Committee ( )	Executive member above Union Coordination Committee ( )
	What is your overall ambition and satisfaction level to achieve by next three years?	None ( )	Little bit well off ( )	Well off in few cases ( )	Well of in most cases ( )	Well of in all cases ( )

15	**Risk bearing ability** (please put tick mark where necessary)) by summing up all the scores of all the responses of a respondent.					
	Statements	Strongly agree	Agree	Do not know	Disagree	Strongly disagree
(i) +	A farmer who is willing to take greater risk than the average farmers usually does better financially.	(4)	(3)	(2)	(1)	(0)
(ii) +	A farmer should grow more crops to avoid greater risk instead of growing one or two crops.	(4)	(3)	(2)	(1)	(0)
(iii) -	I think a farmer will be looser if he adopts new and uncertain technology.	(0)	(1)	(2)	(3)	(4)
(iv) -	It is better for a farmer to adopt new farming method after most others have used them with success.	(0)	(1)	(2)	(3)	(4)
(v) +	I want to adopt new farming method though it has risk and uncertainty.	(4)	(3)	(2)	(1)	(0)
(vi) -	It is good for a farmer to take risks when he knows the chances of his success is fairly high.	(0)	(1)	(2)	(3)	(4)
(vii) +	Trying a new method in farming by a farmer involves risk but it should be appreciated.	(4)	(3)	(2)	(1)	(0)
(viii) -	Farmers should be satisfied with what they have than taking risk.	(0)	(1)	(2)	(3)	(4)
(xi) +	A farmer must take risk if he wants to adopt good technology as there is risk in every sphere of life.	(4)	(3)	(2)	(1)	(0)
(x) +	A farmer should take risk if he wants to develop his economic status.	(4)	(3)	(2)	(1)	(0)
(xi) -	To take risk for the hope of greater benefit is a sign of foolishness.	(0)	(1)	(2)	(3)	(4)
(xii) +	"One can't prosper in life without taking risk"- I agree with this statement.	(4)	(3)	(2)	(1)	(0)

16	**Training exposure**		
	Name of training course	Conducting department	Duration (day)

17	**Sincerity in FFS**					
	Areas	Your degree of involvement				
		Regularly (3)	Occasional (2)	Rare (1)		
	Attendance in FFS					
	Taking part in day's activities actively					
	Sharing experiences					
	Field visit/ observation					
	Implementation in own fields					

18	**Information related to knowledge on different modules of IFM FFS**	
	18 (a)**Knowledge-Remembering.** (please put tick mark where necessary)	
	Question	Answer
	How many grams of urea needs to be dissolved in a litre of water to make the solution for seed separation?	□ 40 grams □ 80 grams □ 120 grams
	Which one is a beneficial insect of rice?	□ Ladybird □ Leaf folder □ Brown plant hopper
	Which one is the beneficial insect of country bean?	□ Aphid □ Hairy caterpillar □ Wasp
	Which type of fruit sapling is suitable for homestead gardening?	□ Sapling from stone □Grafted sapling □ Any type of healthy sapling
	Which one of those materials need to be feed to chicken of one day of age?	□ Broken rice □ Broken maize □ Lemon syrup
	Which material needs to be used to keep the poultry floor germ free?	□ lime/ash □ Chaff/husk □ Sawdust/ straw

	What is the interval of giving medicine to a goat for de-worming?	☐ Once per 3-4 months ☐ Once per 6-7 months ☐ Once per year
	How much spaces are needed for an adult goat?	☐ 10-12 square feet ☐ 13-15 square feet ☐ 16-18 square feet
	What is the proper age of a young cow for fattening program?	☐ cow of 2-3 years of age ☐ cow of 3-4 years of age ☐ cow of 4-5 years of age
	Which material can be used for the treatment of a cow with blot?	☐ Salt ☐ Chalk powder ☐ Ginger juice
	What is the ideal deepness of water in a pond for fish culture?	☐ 3-4 feet ☐ 5-7 feet ☐ 8-10 feet
	Which material needs to be added in the pond to produce natural foods for fishes?	☐ Salt ☐ Lime ☐ Cow dung
	As per function of the food, how many types of food are needed for human being?	☐ 3 types ☐ 4 types ☐ 6 types
	How much drinking water is needed daily for an adult being?	☐ 1-1.5 litres ☐ 2-2.5 litres ☐ 3-4.5 litres
	As per the discussion in FFS on the module of farmers organization and social issues what does weather mean?	☐ 10-15 years averages of weather status ☐ 20-30 years averages of weather status ☐ 30-40 years averages of weather
	Rules of farmers organization are described in	☐ Yearly plan ☐ By-laws ☐ Meeting resolution
	18 (b)**Knowledge-Understanding.** (please put tick mark where necessary)	
	What is meant by germination?	☐ Just opening of one end of the seed ☐ Developed as much showing

		potential to be a healthy plant □ Soaking seed for few days
	Which understanding has been developed through the discussion at FFS on plant nutrient in soil?	□ Amount of plant nutrients is unlimited □ Nutrients decrease gradually through crops □ To maintain the productivity, applying chemical fertilizers is enough
	What happened to soil when organic materials are used?	□ Soil softens and water holding capacity increases □ Increase soil salinity □ Increases soil toxicity
	What is your idea on management of Brinjal shoot and fruit borer?	□Chemical measure is more effective □ Integrated approach is more effective □ No measure is effective
	What is the necessity to make housing for poultry in a planned ways?	□ To accommodate more birds in a small space □ To accommodate few birds in a big space □ To accommodate few birds in a small space
	How incubation is ensured properly by a hen?	□ If hen can go out for food and sits again for incubation □ If food and water is made available in front of the hen □ Both
	When the good prices for a goat are ensured?	□ During eid, other festivals or picnic season □ Monsoon time □ Round the year
	What happened if castration is done to a young goat?	□ Growth becomes retarded □ Enhance growth □ Rearing practice becomes easier

	What would be the motive of a farmer if s/he goes for beef fattening for the occasion of animal sacrificing religious festival?	☐ Rearing for short time ☐ Rearing throughout the year ☐ Rearing for both tenure
	Beef fattening depends mainly on	☐ Breeds/ species/varieties ☐ Food management ☐ Both
	How do you grade the quality of protein of fishes among animal protein sources?	☐ High quality protein ☐ Low quality protein ☐ Same quality as of other animal sources of protein
	What are the impact of aquatic weeds in the pond?	☐ Good for fishes since it keeps water cool ☐ Not good since hold on the process of natural food processing ☐ Good for fishes since it protects them
	The period of 1000 days starting from pregnancy to two years after given birth is very vital. Why is it thought of?	☐ Development of body and brain become completed ☐ Future health depends on these days ☐ Both
	Which are good foods?	☐ Foods which are nutritious ☐ Foods which are tasty ☐ Both
	How the labour disparity between male and female occurrs?	☐ Naturally ☐ Socially ☐ Based on qualities
	What is important for farmers to stay organized ?	☐ Enforcement of law strongly ☐ Social awareness ☐ Political support
	18 (c)**Knowledge-application.** (please put tick mark where necessary)	
	Normally what depth of application of Urea Super Granules needs to be maintained in between 4 hills of rice plants?	☐ Nearly 3-4 inches deep ☐ Nearly 5-6 inches deep ☐ Nearly 1-2 inches deep
	What is to be done in the field with the leftover of rice plant after harvesting rice?	☐ Incorporate in soil ☐ Use as fuel ☐ Use as fodder
	To produce Farm Yard Manure, what is	☐ Keeping into the pit under shed

	essential to do?	☐ Keeping in open ditch ☐ Keeping open as heap
	How many times it is necessary to apply fertilizers for existing fruit trees in homestead?	☐ 1 time ☐ 2 times ☐ 3 times
	To ensure proper incubation, what sort of vessel is preferably used?	☐ Normal earthen pot ☐ Bamboo basket ☐ specially made *Hazol*
	To maintain bio-safety of a poultry farm, what needs to be done?	☐ Use decontamination agents in the house ☐ Vaccinate birds ☐ Both
	To ensure protect goat from cold, what measure is preferable?	☐ Spreading ashes and saw-dust on the floor ☐ Spreading jute mat on the floor ☐ Making stage/platform higher
	What food should preferably be supplied to goat kids just after having birth?	☐ Colostrums ☐ Gruel(thick broth) prepared of ground rice ☐ Boiled milk of other sources
	What type of insemination to a cow is preferably better?	☐ Through local bull ☐ Through Improved bull ☐ Through artificial insemination
	What measures need to be taken to protect cow from diseases?	☐ Vaccination ☐ Using de-worming tablet ☐ Both
	For mix culture of fishes, how many fingerlings are required for one decimal of areas.?	☐ 40-50 ☐ 50-100 ☐ 100-200
	How to harvest fishes from the pond?	☐ Harvesting all fishes at a time ☐ Partial harvesting ☐ Partial harvesting and re-release
	To prepare healthy food, cooking temperature (flame) and cooking time are crucial. What flame levels and cooking timing should be maintained?	☐ Cooking in high flame but short time ☐ Cooking in low flame but long time ☐ Cooking in low flame but short time
	To serve and distribute food among family members, what considerations should be taken?	☐ Age, functions and physical condition of members ☐ Age and functions of members ☐ Age of members

	To protect seedlings from adverse climatic conditions (like severe cold), what technique should be followed?	□ Covering seedbed with polyethylene sheet □ Applying potash fertilizers and fungicides □ Community seedbed along with techniques mentioned above
	To lessen irrigation costs, what measure should be followed by small farmers?	□ Sometimes wetting and sometimes heavy irrigation □ Bargaining for irrigation costs as a member of irrigation group □ Purchasing or renting an irrigation device as joint venture
	18 (d)**Knowledge-analysis.** (please put tick mark where necessary)	
	Why the productivity of crop field is decreasing day by day?	□ Due to round the year crop cultivation □ Due to climate change □ Due to more dependency on chemical fertilizers
	How beneficiary insects do good to crops?	□ By decreasing harmful insects □ Through pollination □ Both
	Inspite of repeated use of insecticides in vegetable crops , insect pests are not controlled. What is the reason?	□ Insect pests gaining resistance to insecticides □ Most of the insecticides in the market is adulterate □ Insecticides are used as low doses
	Fruit dropping occurs in cucurbitaceous vegetable crops due to pollination problem. What measures can be considered for homestead vegetable production to tackle the problem?	□ Hand pollination □ Not to spray insecticides □ Both
	In a conventional method, hatching rate of eggs are less and take more time. What is your opinion about this ?	□ Heat is not maintained properly when hen goes out for food □ Normally egg hatching rate of local breed is low □ It happens if more eggs are put in a hatching pan

	For laying eggs and incubation, a kind of quarrelsome hen is preferable .Why?	□ Quarrelsome hens are efficient in protecting chicken □ Quarrelsome hens lay more eggs □ Body temperature is high of quarrelsome hens
	There is a saying that goats eat all. What is the significance of this sort of saying?	□ Food management for goat is comparatively easier □ Food management for goat is comparatively complex □ Food expenses for goat is low
	To protect goats from worms what precautionary measure about food should be followed?	□ Not to feed grasses from adjacent ponds or ditches □ Feeding grasses from adjacent ponds or ditches should be encouraged □ No relation exists between places and grasses
	Which characteristic is to be thought of in selecting a cow for milk purpose?	□ Cow given birth once □ Cow given birth twice □ Cow given birth thrice
	The tenure of beef fattening would be	□ Long term □ Short term □ Both long and short terms
	'Lime resembles same as salt in curry'-what actually signifies the statement?	□ Lime is very essential for fish culture □ Small amount of lime is needed for fish culture □ Huge amount of limes is needed for fish culture
	What would be the considerations in determining number of fingerlings to be released in the fond?	□ The more the fingerlings, the more are the fishes □ Fingerlings should be released at a high rate since its mortality rate is high □ Determining rate of release depends on space, food and oxygen availability

	Considering the health aspect of the family members, which measure need to be taken in selecting, preparing and distributing food?	☐ Food habit of members ☐ Taste of food ☐ Ensuring whether all sorts of foods as per functions are available
	In spite of availability of nutritious food for family, members can remain deficit in nutrition-what is the main reason for it?	☐ Discriminatory distribution of foods among members ☐ Food habit of family members ☐ By-born
	Farmers hardly have any control over market prices of agricultural goods - why it happens so?	☐ There is no scope of fixing prices of produces in a free market economy ☐ Farmers are disorganized ☐ Since agricultural produces are perishable
	What accounts more to remove gender disparity?	☐ Women ☐ Men ☐ Both
	18 (e)**Knowledge-evaluation** (please put tick mark where necessary)	
	Please follow the 3 sums below: Bad seed+ fertilizer+water + management= Bad harvest Normal seed+ fertilizer+water + management= normal harvest Good seed+ fertilizer+water + management= Good harvest Here, which factor determines the bad, normal or good harvest?	☐ Seed ☐ Fertilizers ☐ water ☐ Management
	If some damages occurred in rice plants at early stages, what would be the consequences?	☐ Plants can compensate ☐ Damages at early stages can never be compensated ☐ Yield decreases due to damages at early stage
	What demerits originate if waste products of household are not maintained properly?	☐ Quality organic manure can not be produced ☐ Household become dirty ☐ All as above

	Which advantages are achieved if grafting saplings are used?	□ Qualities of mother plants are retained □ Earlier in fruit bearing □ All as above
	What benefit can be gained if the hen is placed for incubation on a *Hazol*?	□ Hen can get foods and water since there is an inbuilt system in a *Hazol* to have those. Thus there is hardly any body weight losses of the hen. So it can go for laying eggs quickly. □ The hen does not need to go out for food. So proper incubation is maintained which ensure minimum damages to eggs. □ All as above
	What may happen if poultry is not reared at any housing shade or in a confined area?	□ Falls prey of ferocious animal □ Disease infestation may occur from surrounding birds □ Both
	What problem may arise if any raised platform is not prepared in goat housing?	□ Goat can die due to cold □ House becomes dirty through stacking derbies □ All as above
	What benefit does it bring if the goatkid is castrated?	□ Goat becomes healthy and fatty quickly □ Meats become tasty □ Both
	Which type of cow is preferable for fattening purpose?	□ Hybrid □ Local breeds □ Improved breeds
	How can you determine a healthy cow?	□ If black areas under noses of a cow is always sweats as well as remains wet and the cow ruminates when at rest □ Keep a cautious eye on environment and look at anything comes forward □ All as above
	What actually happened if more fingerlings	□ Fish production increases

	than recommendation is released?	☐ Constraints arises for food, space and oxygen ☐ Fish production decreases
	Which method of fish harvesting is profitable?	☐ Partial harvest and re-release is profitable ☐ Partial harvest and not doing re-release is profitable ☐ Harvesting all at a time is profitable
	How do you judge good food?	☐ Foods which are tasty ☐ Foods which are nutritious ☐ Foods having both taste and nutrition
	What benefits does it bring if pregnant women have had the proper nutrition?	☐ Maternal health during pregnancy and health after giving birth will remain good ☐ Physical, mental and intelligence of the child will be developed ☐ All as above
	What benefit does it bring if adaptation techniques are known?	☐ Damages in terms of assets and lives due to climatic hazards can be minimized ☐ Production is not hampered ☐ All as above
	What problem does it produce if there exists gender disparity?	☐ Deterrent to development ☐ Oppression at family and social level increases ☐ All as above
	18 (f)**Knowledge-creation.** (please put tick mark where necessary) **(0-16)**	
	What benefits can be earned with the weeds accumulated through weeding?	☐ Can be deposited at dyke/ border ☐ Can be used as fodder ☐ Can be buried so as to making organic matter
	What sort of extra opportunity may it create if regular field visit is done?	☐ Removal of admixture ☐ Pest management ☐ Evaluation on any promising new

		plants can be done
	What clue does it reveal if there are presence of ants in country bean plants?	□ Ants suck sap from young parts of bean plants □ Ants make nest on bean plants □ Indicates the presence of aphids in bean plants
	What could be done to protect vegetable seedlings from insect infestation at household level?	□ Applying ashes □ Spaying insecticides □ Covering the seedbed with mosquito nets
	What arrangements need to be made if one wants to rear more poultry in her/his household?	□ Can be made low cost multilayered housing □ Increasing the numbers of birds in the existing house □ Birds can be reared at living room and outside
	It is believed that hens try to crack the egg shell with its beak if they are deficient in calcium. What measure can be taken to rectify this sort of habit of hens?	□ Birds can be fed with broken egg shell mixing with other foods □ Calcium tablet can be given □ feeding birds with vitamins
	Cold enhances pneumonia of goat. What would be the innovative remedy for it?	□ Spreading straws after making raised platform □ Covering the body of goats with old worm cloths □ Light up a bulb
	When all the goats along with pregnant ones come out from house , they do competition with each other for coming out first. This may cause serious problems to pregnant goat. What would be one's innovative tactic to help pregnant ones?	□ Making the door of goat's house bigger □ Taking position at the gate and allowing goats to come out one after another □ Keeping pregnant goats separated
	To repeal the midges and flies from its body, cows always move their tails. It spoils resting and losses energy. What could be done to tackle this problem?	□ Special type of mosquito nets can be set up □ Making smog in the house □ Using deterrent chemicals on the

		body of the cow
	If the cow lie down just immediate after milking, dust and germs can come to contact to the udder. What may be one's innovative solution to it?	□ Food should be supplied just after milking is done □ Calf should be allowed to feed keeping extra milk in the udder □ Tie the cow in a way that deter cow from lying down
	If one wants to make additional profits from fish culture, what initiative s/he should take?	□ Releasing fingerlings as recommended on the basis of different water levels □ Some indigenous species of small fishes should be allowed in the pond □ Partial harvesting and re- release of fingerlings
	When huge covering of algae decrease the amount of oxygen in water at night time, the fishes try to come to upper level of water to have oxygen. What step can be taken to check this?	□ Suspending application of food and fertilizers temporarily □ Supplying fresh tube well water in the pond □ Releasing some silver carp fishes as it feed on algae
	How the distribution and use of food for all members can be ensured sensibly in a family?	□ Taking food together □ By empowering women in the family □ By arranging alternative foods as per capability
	Food habit can cause detrimental effects on health of any members though there are available foods of different types. How nutritional status can be improved for all members with those available food items?	□ Imparting training for all members on food and nutrition □ Classifying foods on the basis of functions □ Making mixed foods for family members
	Though there are very small scope for farmers to control the market prices of produces still what approach can lessen the cost of production?	□ Agricultural mechanization □ Maintaining joint farms and income generating activities □ Through integration of family and

		social assets
	Apart from becoming expert in farm decision making through Agroecosystem Analysis(AESA) and Farm Management Analysis(FMA), which are the other areas of opportunity it also create to make farmers skilled?	□ Adaptation with climate change □ Developing skills on running organization □ Identifying friends and foes of famers and taking decisions accordingly through observation and analysis of social environment

19	**Information related to attitude on different modules of IFM FFS**					
	Attitude statements	Level of agreement (please put tick mark where necessary)				
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Rice module	Huge wastage of seeds occur if seed sorting is done (-)	(0)	(1)	(2)	(3)	(4)
	Some fertilizers are needed for rice as large amount and some are needed as small amount. But all types of fertilizers are equally important.(+)	(4)	(3)	(2)	(1)	(0)
	Rice production falls if Integrated Pest Management techniques is employed(-)	(0)	(1)	(2)	(3)	(4)
Homestead garden module	Insect infestation in household garden is uncontrollable without chemical insecticide. (-)	(0)	(1)	(2)	(3)	(4)
	Grafting sapling is good for household fruit cultivation(+)	(4)	(3)	(2)	(1)	(0)
	Vitality and productivity of a fruit tree is reduced if pruning is done. (-)	(0)	(1)	(2)	(3)	(4)
Poultry birds rearing	Eggs of local breed of poultry birds is more nutritious. (-)	(0)	(1)	(2)	(3)	(4)
	Income generation of women is ensured through poultry rearing.(+)	(4)	(3)	(2)	(1)	(0)
	Eggs become inedible just after putting for incubation(-)	(0)	(1)	(2)	(3)	(4)
Goat rearing	Due to quick production, goat rearing is more profitable.(+)	(4)	(3)	(2)	(1)	(0)
	Disease cant not be prevented through vaccination.(-)	(0)	(1)	(2)	(3)	(4)
	Goat rearing is profitable for small farmers.(+)	(4)	(3)	(2)	(1)	(0)
Cattle rearing	Beef fattening is allowed through chemical tablet, but dozes should be	(0)	(1)	(2)	(3)	(4)

	maintained strictly.(-)					
	As of care, a calf is not entitled to have UMS (+)	(4)	(3)	(2)	(1)	(0)
	Some diseases of cow are contagious to human being.(+)	(4)	(3)	(2)	(1)	(0)
Fish culture	More fingerlings need to be released since mortality rate of fingerlings is high.(-)	(0)	(1)	(2)	(3)	(4)
	To eradicate unexpected fishes, use of chemicals is encouraged.(-)	(0)	(1)	(2)	(3)	(4)
	To start fish culture, pond need to be prepared as land is prepared to transplant seedlings(+)	(4)	(3)	(2)	(1)	(0)
Nutrition	Nutritional deficiency owes more to the knowledge gaps than poverty(+)	(4)	(3)	(2)	(1)	(0)
	To maintain the regular demand of vitamin-C for the body, needs to intake some fruits and vegetables uncooked(+)	(4)	(3)	(2)	(1)	(0)
	Compensation to the earlier deficiency can be made after birth by maintaining foods.(-)	(0)	(1)	(2)	(3)	(4)
Farmers organization and social issues	Respect to women is not ensured as because their contribution are not recognized genuinely.(+)	(4)	(3)	(2)	(1)	(0)
	Fair prices of agricultural products is not ensured due to lack of strong farmers organization(+)	(4)	(3)	(2)	(1)	(0)
	When amount of deposits increased, breakdown in organization starts(-)	(0)	(1)	(2)	(3)	(4)

20	**Information related to skill under different modules of IFM FFS**	Level of skill (please put tick mark where necessary)			
		High (3)	Medium (2)	Low (1)	No (0)
Rice module	Sorting of off type seeds to maintain quality of seeds				
	Calculating dozes of fertilizers on the basis of land and use				
	Applying USG				
	Decision to be implemented made on the basis of AESA				
Homestead garden module	Identifying pest and natural enemies of vegetable				
	Applying year-basis fertilizers to existing plants in homestead				
	Hand pollination in cucurbitaceous vegetables				
	Making grafting for sapling				

Poultry rearing	Preparing special housing for poultry				
	Making *Hazol* for incubation of eggs				
	Preparing balanced food for local poultry				
	Giving vaccination to poultry birds				
Goat rearing module	Preparing balanced food for goat				
	Becoming expert in giving vaccination to goat				
	Identifying the symptoms of goats infected by worms.				
	Identifying the symptoms of PPR diseased goat				
Cattle rearing	Selecting cow for fattening on the basis of recommended qualities				
	Preparing balanced food for cow				
	Preparing UMS				
	Identifying symptoms of foot and mouth diseased cow				
Fisheries module	Applying lime on the basis of time table				
	Releasing fingerlings in the pond on the basis of recommended proportion of different species				
	Selecting quality fingerlings				
	Preparing supplement foods for fishes				
Nutrition module	Cooking practices maintaining the nutritional status				
	Distributing foods as per age, functions and physical conditions of family members				
	Special nutritional arrangement for the most important 1000 days tenure starting from conceive to two years after birth				
	Feeding extra foods to adolescent girls/ boys in the family				
Farmers organizati-onand social issues	Determining adaptation techniques in agricultural sector due to climate change				
	Motivating members of farmers organization				
	Networking with different service providers				
	Transaction with banks				

21	**Information related to practices on different modules of IFM FFS**				
	Activities	Level of application (please			
		High (3)	Medium (2)	Low (1)	No (0)
Rice	Recommended age of rice seedlings as per season are maintained				

Module	Use of pesticides only after knowing the status of pests and defenders in the field				
	Harvesting and threshing separately in view of keeping rice seeds				
	Use of dried leaves of *Neem/ Nishinda* or Tobacco during seed storage				
Homestead garden	Making farm yard manure and use				
	Applying fertilizers twice as before and after monsoon for existing fruit trees of homestead				
	Bagging young fruits in the plants				
	Regular collection and destroying infested fruits, flowers, leaves etc				
Poultry module	Setting hen in a *Hazol* for incubation of eggs				
	Separation of chicken from hen after certain days of age				
	Regular vaccination of poultry birds				
	Feeding hen with homemade balanced foods				
Goat rearing	Regular vaccination of goat				
	Making special low cost housing for goat				
	Feeding goats with cereals prepared in home				
	Castration of goat kid				
Cattle rearing	Feeding cattle regularly with UMS				
	De-worming the cattle regularly				
	Starting beef fattening projecting the annual big festival(like animal sacrificing by Muslim community)				
	Artificial insemination to cows				
Fisheries module	Preparing supplement foods of fish				
	Maintaining the proportion of different species of fingerlings while adopting mix culture				
	Taking samples and weighing regularly to examine the growth rate of fish				
	Collecting of quality fingerlings from known sources				
Nutrition module	Cutting vegetables into bigger pieces and cooking for less time with high flame				
	Arranging extra foods for adolescent girls, pregnant mother and milking mother in a family				
	Avoiding cook rice, pulse and eggs				

	separately rather making mixed foods like hodgepodge				
	Processing of additional fruits and vegetables for off-season use				
Farmers organization and social issues	Purchasing farm machineries through joint venture				
	Preparing community seedbed				
	Marketing of agricultural produces collectively				
	Attending in farmers organization meetings and payment of subscription regularly				

Thank you for your Cooperation

The Interviewer

Appendix XI

A Request Letter to Judges for Determining Appropriateness of Effectiveness Scale

Office of the Chairman
Department of Agricultural Extension & Information System
Sher-e-Bangla Agricultural University, Dhaka -1207
Tel. +88 02 9144270-9

Ref: SAU/AEIS-16/ 138 Date : 22-06-2016

From

Prof. Dr. Md. Sekender Ali
Dept. of Agricultural Extension and Information System
Sher-E-Bangla Agricultural University, Dhaka

To
....
....
....

Subject : **Determining Appropriateness of Effectiveness Scale**

Dear Sir

This is in connection with the study of one of my PhD student, Quazi Afzal Hossain, Deputy Director (LR), DAE. He has undertaken a research study on " Effectiveness of farmer to farmer training through farmer field school approach in disseminating agricultural information " and developed a set of questionnaire in tune with the proposed study.

This study requires suggestions from Judges for selection of items for measuring effectiveness of farmer to farmer training covering **knowledge, attitude, skill** and **application** dimension of eight selected areas like **Rice, Homestead Garden, Poultry, Small Ruminant (Goat rearing), Big Ruminant (Livestock), Fish culture, Nutrition, and Farmers' Organization & Social Issues** adopted from IFM FFS. This would be very helpful to design and prepare research instrument for the study. In this regard, I have the pleasure to inform you that you have been selected as one of the Judges for selecting and rating of appropriateness of the items to each dimensions of each area. In order to enable you to offer your valuable suggestions, a set of questionnaire on effectiveness of farmer to farmer training have been enclosed.

Please return this material back at your earliest convenience after completing the work.

With personal regards

Sincerely yours

22/06/16

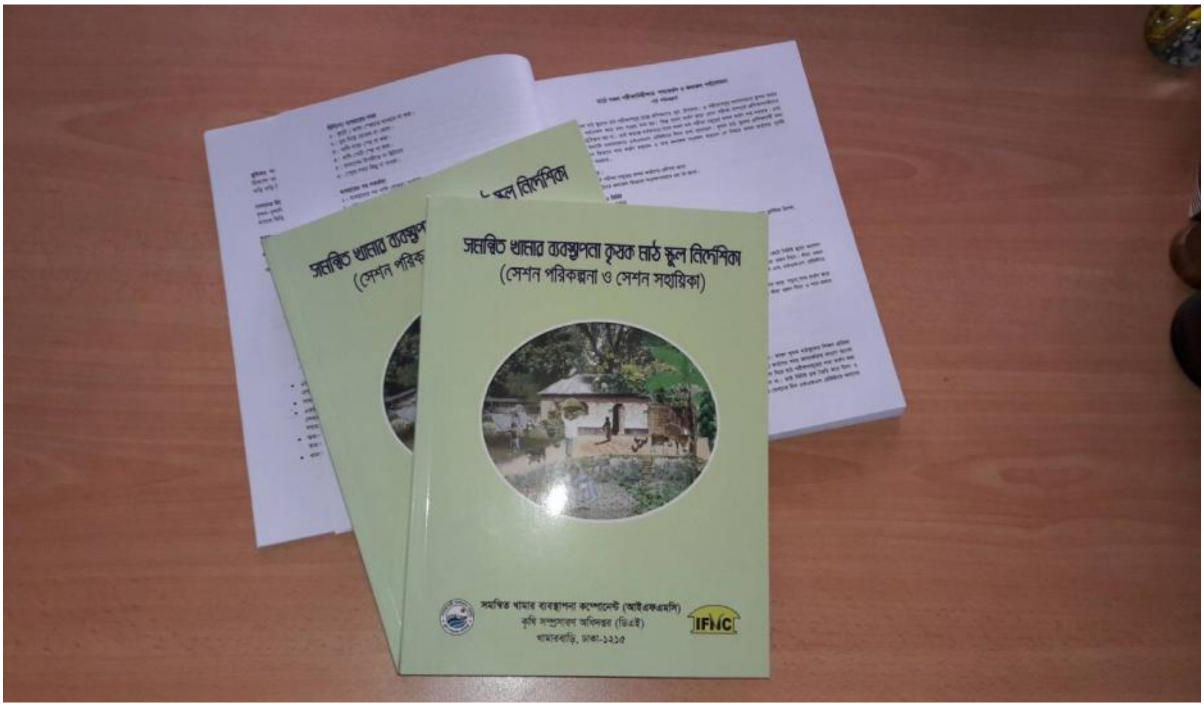
(Prof. Dr Md. Sekender Ali)

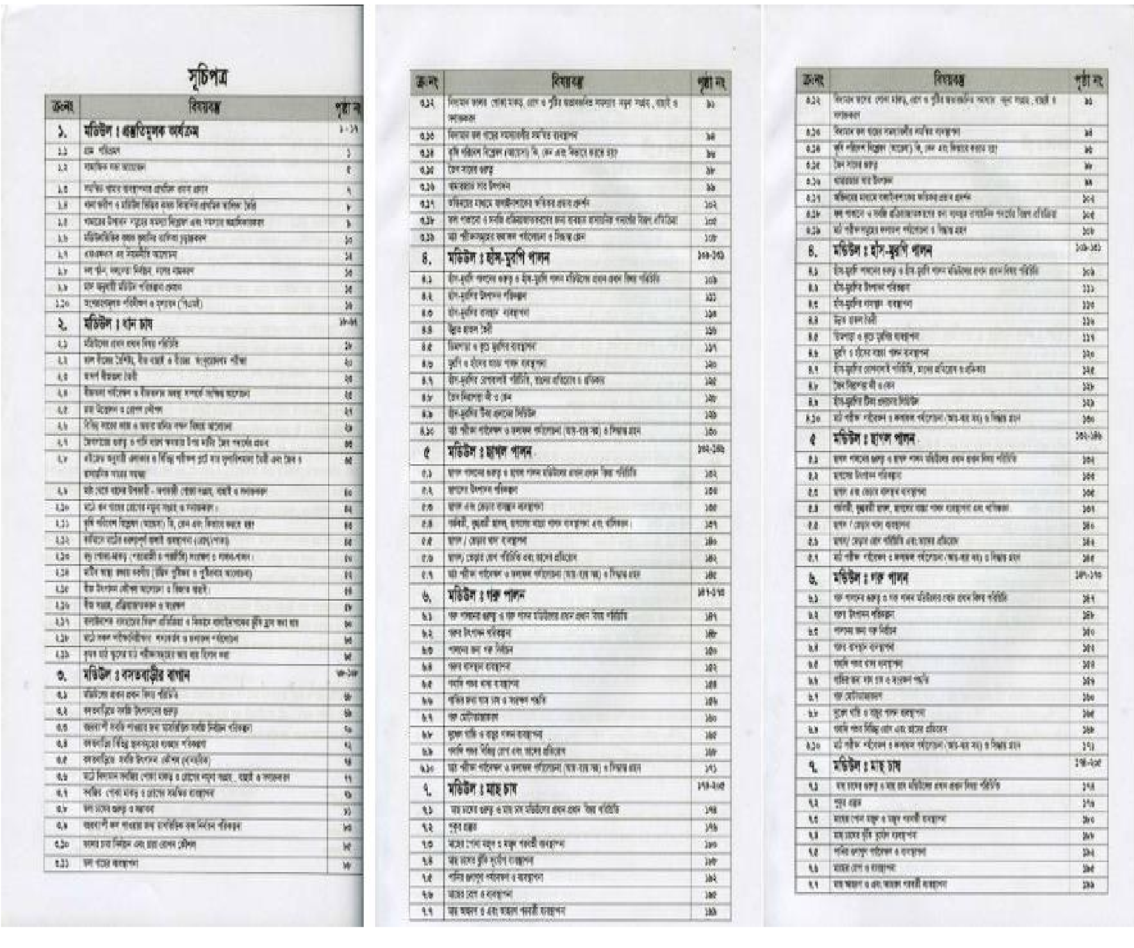
Enclosed : A set of questionnaire

Bokul F:\AEIS Work\AEIS\Letter to_Registrar

Appendix XII

Few Pages of IFMC Guidebook




সূচিপত্র

Appendix XIII

A request letter to the CMU from the Chairman of the Supervisory Committee

শেরেবাংলা কৃষি বিশ্ববিদ্যালয়
Sher-e-Bangla Agricultural University
Sher-e-Bangla Nagar, Dhaka- 1207, Bangladesh

From

Dr. Md. Sekender Ali

Chairman,
Supervisory Committee and Professor
Department of Agricultural Extension and Information System
Sher-e-Bangla Agricultural University,
Sher-e –Banglanagar, Dhaka-1215

To
Component Management Unit (CMU)
IFMC, AGEP, Khamarbari, Dhaka

Subject: **Data Collection for PhD Research Work**

I have the pleasure to introduce Quazi Afzal Hossain, Additional Deputy Director, DAE and Ex- Master Trainer, ICM, AEC (ASPS-II) who is now a PhD student of the Dept. of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Sher-e-Bangla nagar, Dhaka. He is conducting PhD Research on **Effectiveness of Farmer trainers in Disseminating Agricultural Information through Farmer Field School Approach.** In this connection, he needs to collect data from **Farmer Facilitators (FF), FFS Farmers and Departmental Trainers (DT)** working in your regions under AGEP project. The tentative schedule of data collection is attached herewith. Date(s) of the schedule may be rearranged if necessary at the time of action.

It will be appreciable if you kindly provide him all sort of necessary supports including introduction to Farmer Trainers/ FFS Farmers in your respective area.

Professor Dr. Md. Sekender Ali

Prof. Dr. Md. Sekender Ali
Dept. of Agril. Extension & Info System
Sher-e-Bangla Agricultural University
Sher-e-Bangla Nagar, Dhaka-1207

Enclosed:

- A time schedule of data collection

Telephone: 9144270-8, 01710982860, Fax: +880-2-8155800, E-mail: vcsau@dhaka.net

Appendix XIV

A request letter to the Regional Coordinators from the CMU

কৃষিই সমৃদ্ধি

Government of the People's Republic of Bangladesh
Department of Agricultural Extension
Integrated Farm Management Component (IFMC)
Agricultural Growth and Employment Prgoramme (AGEP)

COMPONENT OFFICE : Room-764, 6th Floor, Rear Building, Khamarbari, Farmgate, Dhaka-1215, Bangladesh
Phone: (880 2) 9121847, 8154654, 9130721, Fax: (880 2) 9131373, Email: ifmc@accesstel.net

Memo no.: IFMC-15/873 Date: 16/09/2015

Component Management Unit
IFMC, AGEP
Department of Agricultural Extension
Khamarbai, Dhaka-1215

To
Regional IFMC Coordinator
Regional IFMC Office
Barisal/Comilla/ Jessore/ Mymensingh / Rajshahi/ Rangpur

Subject: **Data Collection for PhD Research Work**

We have the pleasure to introduce Quazi Afzal Hossain, Additional Deputy Director, DAE and Ex-Master Trainer, ICM, AEC (ASPS-II) who is now a PhD student of the Dept. of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Sher-e-Bangla nagar, Dhaka. He is conducting PhD Research on **Effectiveness of Farmer trainers in Disseminating Agricultural Information through Farmer Field School Approach.** In this connection, he needs to collect data from **Farmer Facilitators (FF), FFS Farmers and Departmental Trainers (DT)** working in your regions under AGEP project. The tentative schedule of data collection is attached herewith. Date(s) of the schedule may be rearranged if necessary at the time of action.

It will be appreciable if you kindly provide him all sort of necessary supports including introduction to Farmer Trainers/ FFS Farmers in your respective area.

১৬/০৯/১৫
Md. Iqbal
Project Director

Rilla Norslund
Senior Adviser

Enclosed:

A time schedule of data collection

Appendix XV

List of DTs Interviewed

Attendent Sheet

ushroom Development Institute, Savar, Dhaka — Date : 7-8 May 2017

o.	Name	Designation and Organization	Mobile No	Signature 07.05.2017	Signature 08.05.2017
1					
2					
3	Dr. Sharmin Rahman	MF(L), IFMC Rajshahi	01783512190	Sharmin	Sharmin
4	Md. Azizul Hoque	SMS, IFMC Mymensingh	01714582896		
5	MD. ISA ZAKARIA	MF-L, IFMC Rangpur	01701-979574		
6	Md. Mizanur Rahman	MF-F IFMC, Jessore	01712-012472		
7	Mohammad Shafiullah	MF-F IFMC, Rajshahi	01716356474		
8	Md. Liaket Ali	MF(F) IFMC-Comilla	01763414164		
9	Md. Khorshed Alam	MF(L) IFMC-Mymensingh	01724-967571		
10	Akhil Ranjan Baswri	MF(L) IFMC, Barisal	01725687700		
11	Joyanta Roy	RTC, IFMC Rangpur	01746-956566		
12	Palas Kumar Chakraborty	MF(F) IFMC, Mymensingh	01716500931		
13	Kazal Kumar Basak	RTC, Mymensingh	01712990460	KBasak	KBasak
14	Md. Abdul Bari	RTC, Comilla	01712-854112		

Attendent Sheet

...ushroom Development Institute, Savar, Dhaka Date : 7-8 May 2017

...o.	Name	Designation and Organization	Mobile No	Signature 07.05.2017	Signature 08.05.2017
15	Mohammad Mosihur Rahman	RTC, Jessore	01711-384303		
16	Mohammad Atiqur Rahman Mazumder	SMS, Comilla	01712 834421		
17	Dr. Jagat Chand Malaker	SMS. Rajshahi	01716004400		
18	Md. Shamim Ashraf	SMS Rangpur.	01716877916		
19	Md Mostafizur Rahman.	MF-Livestock Jessore	01733071087		
20	Md. Rohan ul Kawser	MF-Fisheries Rangpur	01712 118346		
21	Md. Taufiqul Alam	RIC, Barisal	01778602670		
22	Md. Rabiul Hoque Mazumder	RIC, Comilla	01712-717526		
23	Nikhil Chandra Sen	RIC, Jessore	01724-377284		
24	Md Shahidullah	SMS Barisal.	01716099717		
25	Mohammad Ali Jinnah	RTC Rajshahi	01711483424		
26	Md. Habibul Haque	RIC Rajshahi	01711-123923		
27	Md. Yusuf Rana Mondol	RIC Rangpur	01712-202749		
28	Dr. J C Pandit	RIC Mymensingh	01558350645		

Attendent Sheet

Mushroom Development Institute, Savar, Dhaka

Date : 7-8 May 2017

No.	Name	Designation and Organization	Mobile No	Signature 07.05.2017	Signature 08.05.2017
29	Sheik Md. Rafiqul Islam	RJC, IFMC, Barisal Region	01920999111		
30	Anuj Kumar Biswas	SMS. IFMC Jessore Region	01715448455		
31	Md. Omar Faruq	MF(L), IFMC Comilla	01748-907398	Faruq	Faruq
32	Dr. Md. Abdun Noor	FC, IFMC Dhaka	01712-562931		
33	~~APD~~ Utpal Roy	APD(T&E) IFMC, Dhaka	01923964296		
34	Dr. Syed Rafiqul Amin	NA (T&E) IFMC, DAE	01731300387		
35	Dr. Md. Motaleb Hossain	APD (M&E) IFMC, Dhaka	01720-412494		
36	Mritunjoy Roy	DPD, DAE IFMC Dhaka	01718209107		
37					
38					
39					
40					

15/05/2017

Appendix XVI

Interview Schedule for DTs

Department of Agricultural Extension and Information System

Sher-e-Bangla Agricultural University, Dhaka

Interview Schedule(additional) for Collecting Data for PhD Research on "**Effectiveness of Farmer to Farmer Training in Dissemination of Farm Information"**

Serial No.:

Respondent's Name, Designation and Organization:

Gender: Male ( ) / Female ( )

Please provide the following information. Your information will be kept restricted and will be used only for research purpose.

Sl No.	Questions	Answer (Please put tick mark or encircle or write where necessary)
01	Age (on the day of interview)	.... Year **(1 for 1 year)**
02	Educational qualification	
03	Job Experiences(year)	
04	FFS experiences(year)	
05	FFS conduction	
	Number of FFS Established	
	Number of FFS monitored and backstopped	
	Number of FFTOT facilitation	
	Attended number of FFS review and planning workshop	
06	Please provide your opinion on the fundamentals of FFS and adult learning perceived by Farmer Facilitators	
	Fundamentals	**Percentage of FF who knows and follows in FFS**
	Principles of adult learning	
	Importance of participatory discussion in FFS	
	Importance of answering questions with leading questions (What is this?)	

<table>
<tr><td>Sl No .</td><td>Questions</td><td colspan="5">Answer
(Please put tick mark or encircle or write where necessary)</td></tr>
<tr><td></td><td>Importance of group dynamics</td><td colspan="5"></td></tr>
<tr><td></td><td>Differences between facilitator and trainer</td><td colspan="5"></td></tr>
<tr><td></td><td>Motivational capacity</td><td colspan="5"></td></tr>
<tr><td></td><td>Managing different type of people in FFS</td><td colspan="5"></td></tr>
<tr><td></td><td>Technical knowledge and its application in FFS</td><td colspan="5"></td></tr>
<tr><td></td><td>Adaptation techniques</td><td colspan="5"></td></tr>
<tr><td></td><td>Time management</td><td colspan="5"></td></tr>
<tr><td>07</td><td colspan="6">Your opinion on the level of skill of FF in running FFS(please put your opinion score)</td></tr>
<tr><td></td><td>Item</td><td>Very skilled (5)</td><td>Skilled (4)</td><td>Moderate (3)</td><td>Less skilled(2)</td><td>Not skilled (1)</td></tr>
<tr><td></td><td>Theoretical concept analytical skill</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Convincing trainees on the importance of the session</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Involving trainees in the discussion</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Using training materials</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Involving trainees in the field work</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Trial plot set-up</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Data collection and analyzing capacity</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Pest management</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Agroecosystem analysis</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Farm management analysis</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>08</td><td colspan="6">Grading of FFs' FFS monitored</td></tr>
<tr><td></td><td>Items</td><td>Excellent</td><td>Good</td><td>Satisfactory</td><td colspan="2">Need improvement</td></tr>
<tr><td></td><td>Farmer selection by FT</td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td></td><td>Presence of farmers in FFS</td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

Sl No.	Questions	Answer (Please put tick mark or encircle or write where necessary)				
	Sitting place and arrangement in FFS					
	Session planning and conduction					
	Setting trial plots					
	Attaining objectives through trial plots					
	AESA/FMA					
	Field decision making					
	Implementing field decision					
	Record keeping					
	Overall grade of FFS					
09	Attitude of DTs towards FTs					
	Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	Achieving positive changes in disseminating agricultural information is possible by FFs (+)					
	Use of FFs as alternatives to SAAOs is not possible (-)					
	FFs could be considered as the para-professional extension workforces (+)					
	Services of FFs would stopped if project interventions is stopped (-)					
	All sorts of agricultural technologies can be disseminated by FFs (+)					
	FFs have little roles in organizing community people (-)					
	FFs can play the catalytic roles in market system in bringing more profits for farmers (+)					
	In a true sense, FFs are one kind of middle men as in business (-)					
	Failure in accommodating FFs in the present extension systems of GO/NGO would be a loss of trained people (+)					
	FFs are not sustainable extension workforces at community level in disseminating information (-)					

Appendix XVII

Correlation Matrix

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	Y
X_1	-																	
X_2	-0.279^{**}	-																
X_3	0.065	-0.017	-															
X_4	-0.039	0.187^{**}	-0.080	-														
X_5	0.041	0.011	-0.027	0.109^{*}	-													
X_6	0.070	0.095	-0.104	0.700^{**}	-0.003	-												
X_7	0.054	0.218^{**}	-0.016	0.647^{**}	0.169^{**}	0.446^{**}	-											
X_8	0.017	0.113^{*}	-0.312^{**}	0.360^{**}	0.122^{*}	0.234^{**}	0.385^{**}	-										
X_9	-0.011	0.284^{**}	0.107^{*}	0.317^{**}	-0.049	0.151^{**}	0.538^{**}	0.244^{**}	-									
X_{10}	0.845^{**}	-0.344^{**}	0.082	-0.023	0.019	0.061	0.062	0.047	-0.042	-								
X_{11}	-0.047	0.188^{**}	0.081	0.029	0.096	-0.028	0.132^{*}	0.022	0.206^{**}	-0.051	-							
X_{12}	0.004	0.233^{**}	0.056	0.133^{*}	-0.040	0.018	0.286^{**}	0.091	0.396^{**}	-0.020	0.345^{**}	-						
X_{13}	-0.015	0.036	-0.039	0.093	0.078	-0.023	0.111^{*}	0.119^{*}	0.016	0.091	0.085	0.210^{**}	-					
X_{14}	-0.143^{**}	0.205^{**}	0.113^{*}	0.037	0.126^{*}	-0.049	0.089	0.012	0.089	-0.081	0.178^{**}	0.247^{**}	-0.066	-				
X_{15}	-0.024	0.003	0.035	0.074	0.317^{**}	0.008	0.142^{**}	0.084	0.040	0.071	0.134^{*}	-0.178^{**}	0.122^{*}	0.052	-			
X_{16}	0.075	0.086	-0.072	0.332^{**}	0.183^{**}	0.155^{**}	0.283^{**}	0.222^{**}	0.104	0.114^{*}	0.170^{**}	0.121^{*}	0.106^{*}	0.095	0.200^{**}	-		
X_{17}	0.023	0.023	0.060	-0.066	0.030	-0.055	0.009	-0.078	0.059	-0.021	0.080	0.045	-0.064	0.103	-0.030	-0.155^{**}	-	
Y	0.032	0.172^{**}	0.008	0.133^{*}	0.158^{**}	0.007	0.239^{**}	0.167^{**}	0.274^{**}	0.115^{*}	0.136^{*}	0.182^{**}	0.107^{*}	0.362^{**}	0.161^{**}	0.312^{**}	0.126^{*}	-

Legend

X_1	=	Age	X_7	=	Agricultural Income	X_{13}	=	Decision Making Ability
X_2	=	Education	X_8	=	Agricultural Commercialization	X_{14}	=	Aspiration
X_3	=	Family Size	X_9	=	Agricultural Diversification	X_{15}	=	Risk Bearing Ability
X_4	=	Net Cropped Area	X_{10}	=	Agricultural Experience	X_{16}	=	Training Exposure
X_5	=	Cropping Intensity	X_{11}	=	Leadership Trait	X_{17}	=	Sincerity in FFS
X_6	=	Cultivated Homestead Area	X_{12}	=	Extension Contact	Y	=	Effectiveness of FFT