

**FARMERS' SATISFACTION ON THE ADVISORY SERVICES OF  
DEPARTMENT OF AGRICULTURAL EXTENSION**

**MAHBUBA MOONMOON**



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

**JUNE, 2021**

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**BY**

**MAHBUBA MOONMOON**

**REGISTRATION NO: 18-09322**

A Dissertation

Submitted to the faculty of Agriculture  
Sher-e-Bangla Agricultural University, Dhaka  
in partial fulfillment of the requirements  
for the degree of

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**SEMESTER: JANUARY-JUNE 2021**

**Approved by**

.....  
**(Prof. Dr. Nazmun Naher)**  
**Member, Advisory committee**  
**Dept. of AFES, SAU**

.....  
**( Dr. Muhammed Shofi Ullah Mazumder)**  
**Professor**  
**Member, Advisory committee**  
**Dept. of AEIS, SAU**

.....  
**(Dr. Muhammad Humayun Kabir)**  
**Professor**  
**Member, Advisory committee**  
**Dept. of AEIS, SAU**

.....  
**(Dr. Md. Sekender Ali)**  
**Professor**  
**Chairman, Advisory committee**  
**Dept. of AEIS, SAU**



**DEPARTMENT OF AGRICULTURAL EXTENSION AND  
INFORMATION SYSTEM**

Sher-e-Bangla Agricultural University (SAU)

Sher-e-Bangla Nagar, Dhaka-1207

Tel + 02 44814039, e-mail: aeis. sau@gmail.com

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***CERTIFICATE***

This is to certify that Dissertation entitled “**FARMERS’ SATISFACTION ON THE ADVISORY SERVICES OF DEPARTMENT OF AGRICULTURAL EXTENSION**” 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 bonafide research work carried out by **Mahbuba Moonmoon, Registration no. 18-09322** 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 were availed of during the course of this investigation has duly been acknowledged.

.....  
**Prof. Dr. Md. Sekender Ali**

**Chairman, Advisory Committee**

**Department of Agricultural Extension  
and Information System**

**SAU, Dhaka**

**Dated: January, 2022**

**Place: Dhaka, Bangladesh**

## DEDICATION

*This work is dedicated to  
my whole family  
for their love and support  
throughout my life.*

# DECLARATION

*It is hereby declared that except otherwise stated, this Dissertation is entirely the own work of the present researcher under the guidance and supervision of the Advisory Committee and has not been submitted in any form to any other University for any degree.*

*The Researcher*  
*January, 2022*

## **BIOGRAPHICAL SKETCH**

The researcher was born on 18<sup>th</sup> January 1974 at village-Tilokpur, Upazila-Lalpur, District-Natore, Bangladesh. She is from a reputed and well educated muslim family. She passed her S.S.C examination in 1988 and H.S.C in 1990 from Dhaka board obtaining first division in both. She obtained B. Sc. Ag. (Hons) degree in 1994 (held in 1998) from Bangladesh Agricultural Institute (Presently known as Sher-e- Bangla Agricultural University) and doing her M.Sc. in Agricultural Extension and Rural Development from Bangobondhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh.

She started her service career in Bangladesh civil service (Agricultural cadre) and joined in the Department of Agricultural Extension as an Agricultural Extension Officer (AEO) in 2003. After starting her career she worked in Bholahat Upazila, Chapai Nawabgonj, Singair upazila, Manikgonj as AEO. From 2006 to 2013 she worked in National Mushroom Development and Extension Centre, Savar, Dhaka as Mushroom Development Officer and then Mushroom specialist. During this period she worked specially in mushroom marketing, mushroom processing and preservation, making new recipes and participates in different fair to popularize mushroom in Bangladesh. She also took part in mushroom related publications and research. She worked as co-supervisor of three (03) students from Bangobondhu Sheikh Mujibur Rahman Agricultural University, Gazipur who were doing their research on mushroom extension. She visited Shanghai, china and India to take part in training program on edible mushroom production.

Since 2013 she served as production economist in Planning and evaluation wing of DAE for one (01) year and then was promoted as Additional Deputy Director (Fruits & Flowers) in 2014 and worked in Horticulture wing of DAE. From 2014 she gained knowledge on Horticultural Species, Rooftop Gardening and Urban Horticulture. As additional responsibility she served as Gender Focal Point of DAE from 2015 to 2018. She was awarded scholarship in 2018 from National Agricultural Technology Program-Phase II Project, Project Implementation Unit, Bangladesh Agricultural Research Council for doing this work.

She is a regular talker in Bangladesh Betar on different agriculture related program. She is a life Member of Krishibid Institution of Bangladesh (KIB), Bangladesh Agricultural Extension Network (BAEN) and General Member of Sher-e Bangla Agricultural University Alumni Association (SAUAA).

In her family life she is married to Engineer Dewan Md. Fazlul Karim and blessed with a son Dewan Mohammed Tausif.

**The Researcher**

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A deep sense of heartfelt thanks, love and affection are also extended to her Mother, Husband, Brothers, Sisters and only son “Arco” for their enduring sacrifice and encouragement during the course of the study.

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**The Researcher**

## ABBREVIATIONS AND ACRONYMS

%	Percentage
AAS	Average Appropriateness Score
ACSI	American Customer Satisfaction Index
AEO	Agricultural Extension Officer
AES	Agricultural Extension and Advisory Service
AEIS	Agricultural Extension & Information System
AI	Appropriateness Index
AIS	Agricultural Information Services
APO	Asian Productivity Organization
approx.	Approximate
ASJ	Appropriateness Score given by the Judges
BADC	Bangladesh Agricultural Development Corporation
BBS	Bangladesh Bureau of Statistics
BFDC	Bangladesh Fisheries Development Corporation
BRDB	Bangladesh Rural Development Board
BSFIC	Bangladesh Sugar and Food Industries Corporation
CDB	Cotton Development Board
CD	Capacity Development
CI	Cropping Intensity
CSA	Climate Smart Agriculture
CV	Co-efficient of variance
CSI	Customer Satisfaction Index
DAE	Department of Agricultural extension
DAM	Department of Agricultural Marketing
df	Degree of freedom
DoF	Department of Fisheries
DLS	Department of Livestock Services
DYD	Department of Youth Development
e.g.	exempli gratia (for example)
<i>et al.</i>	et all (and other people)
<i>etc.</i>	et cetera (and the rest)
FAO	Food and Agriculture Organization
FFS	Farmer Field School
FG	Farmers Group
FIAC	Farmers' Information and Advice Centre
FINA	Farmers' Information Need Assessment
FO	Farmers Organization
FY	Fiscal Year
FYP	Five Year Plan
GAP	Good Agricultural Practice
GDP	Gross Domestic Product
GED	General Economics Division
GO	Government Organization

GoB	Government of Bangladesh
GMO	Genetically Modified Organism
HYV	High Yielding Variety
ICM	Integrated Crop Management
ICT	Information and Communication Technology
<i>i.e.</i>	id est (that is)
IFMC	Integrated Farm Management Component
IPM	Integrated Pest Management
MOA	Ministry of Agriculture
MOLF	Ministry of Livestock and Fisheries
MOLGDR&C	Ministry of Local Government Rural Development& Cooperative
MOI	Ministry of Industry
NAP	National Agriculture Policy
NAEP	National Agricultural Extension Policy
NARS	National Agricultural Research System
NAES	National Agricultural Extension System
NGO	Non Government Organization
NPO	National Productivity Organization
PDBF	Palli Daridra Bimochon Foundation
PKSF	Palli Karma Sahayak Foundation
PRA	Participatory Rural Appraisal
RRA	Rapid Rural Appraisal
SAAO	Sub Assistant Agriculture Officers
SAU	Sher-e-Bangla Agricultural University
SAFTA	South Asia Free trade Area
SD/ sd	Standard deviation
SDGs	Sustainable Development Goals
SERVQUAL	Service Quality
SFDF	Small Farmers Development Foundation
SI	Satisfaction Index
SSI	Standardized Satisfaction Index
SPSS	Statistical Package of Social Sciences
SRDI	Soil Resource Development Institute
BDT Tk./tk.	Bangladeshi Taka
UAO	Upazila Agriculture Officer
<i>Viz.</i>	videlicet (namely)
WTO	World Trade Organizations
$\beta$	Beta

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# **FARMERS' SATISFACTION ON THE ADVISORY SERVICES OF DEPARTMENT OF AGRICULTURAL EXTENSION**

**Mahbuba Moonmoon**

## **ABSTRACT**

Agricultural advisory services have a tremendous potential to improve agricultural productivity and increase farmers' income through transfer and facilitation of knowledge, skills and technologies. Assessing farmers' satisfaction on agricultural advisory services is essential for developing agricultural extension programs that comply with farmers' needs. This study sought to assess farmers' satisfaction on the advisory services of Department of Agricultural Extension (DAE), to describe the selected predictors of the farmers related to their satisfaction, to explore the contribution of the selected predictors of the farmers to their satisfaction on DAE advisory services to identify the areas for improvement. To measure farmers' satisfaction a scale was developed based on 35 items of satisfaction (25 on Technical services and 10 on Functional services of DAE). Data were collected from randomly selected 358 farmers from eight (8) upazillas of four (4) regions (Dhaka, Khulna, Sylhet and Rajshahi) of Bangladesh by using a pre-tested interview schedule during the period of 1<sup>st</sup> August, 2021 to 30<sup>th</sup> November, 2021. Descriptive statistics and step wise multiple regression, path analysis were used to analyze the data obtained. Findings indicated that majority (79.1%) of the farmers had medium satisfaction on overall satisfaction of the advisory services of DAE. Farmers also had medium satisfaction on both technical (74.6%) and functional (82.7%) services of DAE. Out of 35 items of satisfaction farmers were highly satisfied on five (05) items, moderately satisfied on 24 items and low satisfied on six (06) items. Step wise multiple regression analysis indicated that farmers' extension contact, innovativeness, farming experience and education had significant contribution to their satisfaction on the advisory services of DAE. The standardized regression co-efficient of these four (4) variables formed the equation and were significant. It might be assumed that whatever contribution was there, it was due to these four (04) variables that combinedly explained 28.1 percent of the total variation. Path analysis indicated that out of these four (04) contributory predictors of the farmers extension contact (0.933) had the highest total indirect effect followed by innovativeness (0.821), education (0.214) and farming experience (0.09) on farmers' satisfaction on advisory services of DAE. The indirect effects of each of these four (04) variables were channeled through other three variables. Attempt was taken to seek suggestions from the farmers to improve their satisfaction on DAE Advisory services. DAE need to address the low and moderate satisfied items to increase the satisfaction of the farmers as suggested by them.

# CHAPTER 1

## INTRODUCTION

### 1.1 Background of the Study

The economy of most of the developing countries is largely dependent on agriculture. Agricultural-extension services are globally introduced as an institutional input for modernizing agriculture and promoting rural development. Agricultural-extension is defined as “the services offer technical advices on agriculture to farmers, and also supplies them with the necessary inputs and services to support their agricultural production. It provides information to farmers and passes new ideas developed by agricultural research stations.” (FAO, 2020). As time goes by, the term “agricultural extension services,” while still commonly employed, has been gradually replaced by the term “agricultural advisory services.” Some researchers even extend the concept more broadly to “rural advisory services” to emphasize the facilitation beyond technological transfer and to include other sources of livelihood than agriculture only (Faure *et al.* 2012; Kassem, 2015).

The economy of Bangladesh is primarily dependent on agriculture. About 84 percent of the total population live in rural areas and are directly or indirectly engaged in a wide range of agricultural activities. Performance of agriculture sector depends upon its ability to cope with the contemporary challenges like rising population, changing demand pattern of food and agricultural product, climate change, resource scarcity and many more uncertainties.

There is a need on assessing the performance and impact of extension systems and understanding the factors and specific components of an agricultural advisory service. For this, Birner *et al.* (2009) develops a framework to identify the frame conditions that need to be considered when deciding on advisory service of any public agricultural extension organization, which mainly depend on three main components: (i) the governance structure, including financing mechanisms and relationships between partners; (ii) the method by which advice is provided; and (iii) the capacities of advisory service providers (the organizations providing advice) including their management approach and the predictors of advisors. The advisory system influences the performance of both service providers and farm households. The farm households play a central role in the analytical framework as their interaction with the advisory services is critical to both performance and impact (Faure *et al.* 2012).

The major portions of agricultural services are looked after by public agricultural extension organizations. The end user of the extension services provided by the public organizations is the farmers. Farmers need reliable, timely and relevant information for farming. In addition, the delivery mode of the information must be in the manner they prefer and understand. Farmers in the delivery of extension program desire quality benefits from the outcome of extension services. Buadi *et al.* (2013) found, the quality attributes include (i) relevance of the service for the operations of the farmer, (ii) availability of the service for possible use by the farmer, (iii) the adequacy of the level of the service, (iv) timeliness in the provision of the service, and (v) efficiency in the monitoring and evaluation of the service by the provider aimed at establishing the reliability and consistency of the service.

Success of any agricultural extension program depends largely on optimum selection of services by farmers. Farmers will participate in any extension

programs when they meet their preferences, needs and expectations. In other words, their participation in agricultural extension programs is probably equal with their satisfaction regarding them.

In Bangladesh, the Department of Agricultural Extension (DAE) is the largest public advisory service providing organization. The objective of this organization is to satisfy the farmers' information and knowledge needs. But like other developing countries DAE also faces many challenges like; low budgetary allocation, under staffing and a tendency of extension services to treat all farmers identically regardless of their particular contexts and needs, which limits the performance of extension programs. So, there are ongoing debates on the farmers' satisfaction or not with the advisory services of DAE.

## **1.2 Statement of the Problem**

In defining the present research problems on assessing farmers' satisfaction with the advisory services of DAE, the researcher collected brief information on the present status of agriculture, governance and policy environment of DAE, Organizational and Management Capacities and Cultures, implemented program relevance, quality, delivery methods, access to farmers, markets and community aspects .

### ***Basic facts on Agriculture***

Bangladesh is a lower middle-income country with a population of 161 million people (World Bank, 2016b). About 48 percent of its population is directly employed in agriculture, and 70 percent depend on agriculture in some way for their livelihood (Ali, 2016). Nearly half of those employed in the agriculture sector are below the upper national poverty line (IFPRI, 2016). On food security, the Economist Intelligence Unit ranked Bangladesh as 95 out of 113 countries in 2016. Bangladesh has nearly eight million hectares of arable land, which is 61 percent of total land. However, this land is declining at a rate of one percent per

annum (Planning Commission, 2012). Small and marginal farms comprise 86 percent of all farms. About 53 percent of farm households have less than half an acre of land. In 2020, 60 percent of agricultural production value came from crops, and the rest from fishery, livestock and forestry.

### ***Governance Structures and Policy Environment***

This portion links between the national policy and implementation through agricultural advisory services, governance structures, organizational policies, and advisory service program management.

Department of Agricultural Extension (DAE) set out the National Agricultural Extension Policy (NAEP) and the mission NAEP is to provide efficient, effective, coordinated, decentralized, demand-responsive and integrated extension services to help farmers in Bangladesh access and utilize better know-how, improve productivity, optimize profitability and ensure sustainability, thereby ensuring the wellbeing of their families. It contains a variety of modern and practical measures, including use of ICTs for linking marketing and production systems and establishing digitized databases and management and information systems (MIS) down to the *upazila* (sub district) level, better coordination among public and private sector actors, increased farmer-responsiveness, increased women's participation, etc.

But, there was no separate funding for the NAEP. Ownership from staff of the various government extension bodies was limited due to lack of consultation with all stakeholders in drafting of the policy and the need for a coordination mechanism between the various bodies (Karim *et al.* 2009).

For the operationalization DAE employs 14,092 field-level extension agents, one Sub Assistant Agriculture Officer (SAAO) responsible for 900-2,000 farm families. Lamontagne-Godwin *et al.*, (2017) found that a 'good quality' extension service is described as one with a high number of extension agents per farmer or a

high number of visits or contacts between farmer and agent. In Bangladesh, a case study done by Katalyst (2014) reported that DAE's manpower and resource are insufficient for providing full coverage in their jurisdiction and poor farmer access to extension staff.

### ***Organizational and Management Capacities and Cultures***

DAE's front level extension staff typically holds diploma from Agricultural Training Institutions and also gets in-service trainings with a focus on cropping systems (Swanson, 2011). Projects often provide special training to extension agents. It seemed that the formal education and training that the extension agents had received contributed only part of their preparation for developing their competencies and professionalism in extension work. The everyday work contexts play an important role in developing extension agents' professionalism.

Agricultural extension organization used linear model of technology transfer which is done face-to-face, through an extension officer visiting a farmer, a group of farmers or conducting farmer field schools (Stringfellow *et al.* 1997). These Extension systems and delivery methods have been constantly viewed as ineffective in responding to the demands and technological challenges of various types of clients and in reaching the rural poor (Birner *et al.* 2009). However, the high cost associated with face-to-face extension constrain effective delivery of the service to the farmers, who are often widely distributed (FAO, 2014).

DAE extension support mostly focuses on crops for food security, with a lack of support on agribusiness, quality, nutrition and supply chain topics. Because the technology dissemination model is top down and most of the activities are project based which is imposed by donor organizations rather than a consideration of local needs (Miah, 2015). That makes DAE performance disappointing and creates dissatisfaction. So, there is a major gap on assessing performance and understanding the factors that affect advisory services.



The purpose of this study was to have answers to the following research questions:

- ❖ What extent farmers' are of satisfy to the advisory services of DAE?
- ❖ What were the predictors influence satisfactions of the farmers on the advisory services of DAE?
- ❖ What were the salient features of the selected predictors of the farmers related to their satisfaction on the advisory services of DAE?
- ❖ What were the contributions of the selected predictors of the farmers to their satisfaction on the advisory services of DAE?
- ❖ What would be the suggestions to improve the advisory services of DAE?

### **1.3 Objectives of the Study**

The following specific objectives were set forth in order to give proper direction to the study

- ❖ To assess the extent of farmers' satisfaction on the selected advisory services of DAE
- ❖ To describe the predictors related to farmers' satisfaction on the selected advisory services of DAE
- ❖ To explore the contribution of the selected predictors of the farmers to their satisfaction on the advisory services of DAE
- ❖ To find out the suggestions to improve the advisory services of DAE as perceived by the farmers

### **1.4 Justification of the Study**

Assessing farmers' satisfaction on the advisory services is essential for developing extension programs that comply with farmers' needs. In an organization satisfaction assessment is essential for both internal and external reasons (Anderson, 1994). Internally, measuring satisfaction will help to monitor performance, allocate resources and compensate employees. Externally, it will

provide information to farmers, investors, policy makers and even taxpayers. So, the proposed model identifies the different predictors that influences advisory services of DAE, after the assessment by the farmers the researcher try to identify the dimensions which services need to be improved and which one farmers value most. By knowing this researcher would made suggestions to improve the services that would satisfy the customers. This study will again serve as a grounded basis for future scholarly work on service quality. Hence, the model can support the planning of investments in agricultural advisory services and can be used to guide the establishment of monitoring and evaluation systems of DAE. If the farmers are not satisfied with the agricultural extension services provided by DAE, the huge resources, investment and survival of the organization may be questionable. Undoubtedly, farmer satisfaction can predict farmers' loyalty to extension program. Azikiwe *et al.* (2013) found that, enhancing farmers' loyalty and confidence, extension feedback is becoming increasingly paramount. Customers' satisfaction, or as in this study, farmers' satisfaction, remains an essential domain that must be afforded proper attention and action. Based on the number of farmer satisfaction surveys that have been conducted across the globe, it is evident extension service providers have seen this as an important topic that needs attention (Birner *et. al.* 2009). Surprisingly little published research have investigated farmers' satisfaction and, to our knowledge, this issue has not been adequately addressed in Bangladesh. In light of these facts, the aim of this study is to measure farmers' satisfaction with Advisory Services of DAE in Bangladesh.

### **1.5 Assumptions of the Study**

An assumption is the supposition that an apparent fact or principle is true in the light of the available evidence (Goode, 1945). The researcher has the following assumptions in mind while undertaking this study:

- The responses furnished by the respondents were reliable. They expressed the truth about their opinion and interest.

- The researcher who acted as interviewer was adjusted to social and environmental conditions of the study area. Hence, the data collected by her from the respondents were free from bias.
- The respondents included in the sample for this study were competent enough to furnish proper responses to the queries included in the interview schedule.
- Views and options furnished by the farmers regarding their satisfaction on advisory services of DAE were free from the views and options of others.
- Farmers included in the sample were selected from the population of the study as the representative part of the population.
- The data for the study were valid and reliable.

### **1.6 Scope of the Study**

The agriculture of Bangladesh is one of the main forces to take the country towards its goal of establishing Bangladesh globally as a middle income country by 2021 and a developed and prosperous country by 2041. DAE is prepared and dedicated to support the farmers of Bangladesh, but our country faces challenges such as reducing availability of cultivable land, adverse effect of climate change, increased international competition and growing demand of food grains as a result of growing population. On the other hand, opportunities have risen in form of demand in nutritious and safe food, advancement of agricultural and communication technology and international trade, increased income of people in agriculture through agribusiness. The changing scenarios, to address challenges and harness the opportunities, this study will help to find out performance of extension systems in achieving a sustainable-development agenda which depends upon the quality of the provided advisory services.

More specifically, the study should ensure the following:

- a) Highlight items of satisfaction which farmers perceived as high, moderate and low satisfied and suggestion can be drawn based on their experience on DAE interventions for agricultural development in Bangladesh.
- b) Determine how new innovations and farmers preferred information source perform based on extension services offered.
- c) Provide better insights into the possible contribution that the extension services could realistically play role in increasing production & productivity, achieve food and nutritional security and improve rural livelihood.
- d) Evaluate the role of DAE in stimulating agricultural development.

### **1.7 Limitations of the Study**

Considering the time, money and other necessary resources available to the researcher and to make the study manageable and meaningful, it became necessary to impose certain limitations as noted below:

- Populations for the present study were kept confined within the heads of the farmers farm families as because they were the major decision makers in the satisfaction decision on advisory services of DAE.
- Predictors of farmers are many and varied but only 15 were selected for investigation in this study as stated in the objectives. This was done to complete the study within limited resources.
- The study was confined mainly to farmers' satisfaction on advisory services of DAE.
- Facts and figures were collected by the investigator applied to the present situation in the selected areas.
- Data for the study were collected from only the farmers from eight (8) Upazilas of four (4) selected regions of Bangladesh.

- Most of these studies explicitly or implicitly assess the performance or impact of extension services; however, measurement has been the major challenge. Since agricultural extension has changed in recent times from providing new technologies to more of a facilitation role, these changes pose major challenges for satisfaction assessment.

## **1.8 Definition of Important Terms**

### **Satisfaction**

Satisfaction is a person's feelings of pleasure or disappointment resulting from comparing a product's perceived performance (or outcome) in relation to his or her expectations (Kotler, 2003).

### **Customer Satisfaction**

Customer satisfaction is a matter of attitude towards or evaluation of product or service quality. It can be defined as: "a mental or emotional reaction that results as a response to the experience of interaction with the service" (Rust and Oliver, 1994). It can also be regarded as "the extent to which one realizes the effectiveness of the received product or service in fulfilling his needs. Accordingly, customer satisfaction is a personal feeling or evaluation, which explains the difficulty of satisfying all individuals or estimating satisfaction among a group of individuals" (James *et al.* 2012).

### **Agricultural advisory services**

Agricultural advisory services are defined as "the entire set of organizations that facilitate and support people engaged in agricultural activities to solve problems and to obtain information, skills, and technologies to improve their livelihoods and well-being" (Davis *et al.* 2020). Over time, the term "agricultural extension", while still commonly used, is gradually being replaced by the term "agricultural advisory services". Some scholars extended the concept even more broadly to "rural advisory services" to focus on the facilitation and brokerage role beyond

technology transfer, and to include sources of livelihood other than agriculture (Kassem *et al.* 2021).

### **Service quality**

Service quality is commonly defined as the extent to which a service meets customers' needs or expectations (Asubonteng *et al.* 1996). Service quality can thus be defined as the difference between customer expectations of service and perceived service. If expectations are greater than performance, then perceived quality is less than satisfactory and hence customer dissatisfaction occurs (Parasuraman *et al.* 1988).

### **GRONROOS Model of service quality**

Gronroos (1982) argues that perceived service quality is essentially dependent on two variables: expected service and perceived service. Here, the consumer expectation occupies the central point in the evaluation of performance.

Gronroos' (1982) summary of service quality is based on the "what" and "how" questions. The first question concerns what the consumers receive as a result of interaction with service organisation. This is called the "**technical quality**" dimension.

The latter question seeks to address how consumers get a service. This is called "**functional quality**" and refers to the evaluation of the service process. According to the model, the technical quality dimension is represented by technical solutions, know-how, whereas aspects of the functional quality dimension decompose into attitudes and behavior, service mindless, appearance, accessibility and customer contact.

### **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 himself/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 himself/herself, his husband /her wife, children and other dependent members.

## **Farming experience**

Farming experiences of a respondent farmer referred to the length of the time (year) he/she involved in agricultural activities up to the time of interview. It is the total number of years a respondent (farmer) did agricultural farming particularly prior to data collection.

## **Net cropped area**

It represents the total area sown with crops. Area sowing 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 the important determinants 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-dependent because of the great importance of farm size in their adoption (Bonabana- Wabbi, 2002).

### **Cropping intensity**

Cropping intensity of a respondent referred to the ratio of total cropped area and net cropped area expressed in percentage.

### **Annual crop production Income**

Annual crop production income refers to the different crop products including field crops, vegetable/spices &condiments crops and fruits in a year. Annual crop production income was determined by the summation of unit price multiplied by total products of all the crops of the whole year.

### **Commercialization**

The term 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.

### **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.



### **Organizational participation**

Organizational participation referred to the degree to which an individual was involved with selected organizations as different types of membership like ordinary member, executive member and executive officer.

### **Willingness to seek advisory services**

The conventional extension system where extension agents visit individual farmers' fields, but another approach of carrying out extension services where farmers come to the extension agent for advice or to solve their problem is defined as farmers' willingness to seek advisory services.

Further, changing agriculture from mere subsistence farming to commercialized farming, the entry of people from industrial sector, non-professional agriculturalists, the educated elite, and others to take up agriculture has led to the demand of timely and technically sound advice with reliable market-oriented agricultural extension service. This situation paved the way for emergence of "Willingness to seek advisory services" or agricultural consultancies in the dissemination of the agricultural technology (Saravanan, 2001).

### **Extension contact**

Extension contact was expressed as the degree of contact of an individual with different information source (individual, group and mass) for varieties of purposes including sharing of ideas for agricultural activities.

### **Innovativeness**

The term innovativeness referred to the degree to which an individual is relatively earlier in adopting new ideas than the other members of a social system (Rogers, 2003).

### **Decision making ability**

Decision making ability of a respondent referred to the degree of ability for making decision on various aspects by him-self/her-self or by the help of other

family members or by 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.

### **Aspiration**

Merriam-Webster dictionary (2018) defined 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. In this study, it was determined as aspiration statements on life and development and extent of aspiration towards various issues like education, occupation, increase of own land, increase of field crop productivity, increase of income, increase of farming status, purchases of agricultural machineries, renovation/ construction of houses, purchases of recreational instruments, position in social organization, overall aspiration on life satisfaction etc.

## **CHAPTER 2**

### **REVIEW OF RELATED LITERATURE**

Agricultural advisory services are mostly known as “agricultural extension” which is serving the farmers. Many scholars have conducted studies on various aspects related to agricultural extension. This chapter provides an overview of various aspects of agricultural advisory services as related to the purpose of this study. The literature review is based on farmers’ satisfaction on agricultural advisory services, how to measure service quality and relationship between advisory services and farmers’ satisfaction.

#### **2.1 Agricultural Advisory Services in Bangladesh**

Agricultural advisory services are defined as “the entire set of organizations that facilitate and support people engaged in agricultural activities to solve problems and to obtain information, skills, and technologies to improve their livelihoods and well-being” (Davis *et al.* 2020). Research evidence has shown advisory service influences farmer learning in such a way that it make positive change in farming practices and application of technologies involving awareness, knowledge acquisition and retention, knowledge evaluation, knowledge use and adaptation, and knowledge sharing which results adoption, productivity, and economic returns for farmers (Kansiime *et al.* 2019).

A large number of public and private extension advisory service providing organizations are working in Bangladesh for disseminating agricultural innovations to the farmers. However, a significant proportion of farmers of Bangladesh remain untouched from the development initiatives, as well as some are not getting appropriate service, adequate support and information for

mitigating their constraints in agriculture and rural livelihood. Main functions, strength and weakness of Agricultural Advisory Service providing organizations are mentioned in Table 2.1.

**Table 2.1 Main functions, strength and weakness of extension service providers of Bangladesh**

Sl. No.	Organizations	Main Functions	Strength	Weaknesses
<b>Public Extension Providers</b>				
1.	Department of Agricultural Extension (DAE)  Ministry of Agriculture (MOA)	Carrying out extension services for eco-friendly, safe, climate resilient, sustainable productive good agricultural practices; and ensuring food security and commercial agriculture for socio-economic development of Bangladesh	Having 496 upazila offices with above 12000 grass-root level workforce for crop sector extension services	One SAAO for supervising 900-2000 farm families
2.	Department of Livestock (DLS)  Ministry of Livestock and Fisheries (MOLF)	Carrying out extension services including treatment, breeding and vaccination for livestock sector all over Bangladesh	Country wide presence of livestock extension services with 496 upazila level offices	Grass-root level workers cannot reach all farmers
3.	Department of Fisheries(DOF)  Ministry of Livestock and Fisheries (MOLF)	Carrying out fisheries extension services for disseminating improved aquaculture technologies, facilitating alternative income generating activities and sustainable utilization of fisheries resources to ensure food security	Country wide presence of fisheries extension services with 496 upazila level offices	Grass-root level workers cannot supervise all beneficiaries
4.	Agricultural Information Services (AIS)  Ministry of Agriculture (MOA)	Focal point of MOA for transferring agricultural technology through mass media and SMS based information service with the help of a mobile	Training guides, news-letters, radio & TV programs, films etc. on agricultural aspects are	Only 23 officials at national and 3 regional offices without any field Force

Sl. No.	Organizations	Main Functions	Strength	Weaknesses
		operator 'Banglalink' and UNDP	arranged by AIS for disseminating agricultural information	
5.	Bangladesh Agricultural Development Corporation (BADC) Ministry of Agriculture (MOA)	Development of Agriculture through supply of inputs and dissemination of technologies among the Farmers	Having 6800 workforce including 1700 Officers and 5100 staffs	Lack of workforce and offices at all Upazilas
6.	Bangladesh Fisheries Development Corporation (BFDC)  Ministry of Fisheries and Livestock	Harvesting fisheries resources; developing marketing facilities; establishing fish harbors, landing and distribution centers, ice plants and processing plants; and supplying safe and quality fish in the domestic market	Having 7 fish landing and wholesale fish market, 15 ice plant, 4 fish processing plant and 12 cold storages	Have only 12 working unit in the country with deficiency in workforce
7.	Cotton Development Board (CDB)  Ministry of Agriculture (MOA)	Carrying out extension services including research, seed production, marketing and small scale credit facilities for cotton cultivation in Bangladesh	Moderate number of workforce at 13 Zonal Level	Only 179 unit and sub-unit offices in Bangladesh with deficiency in workforce
8.	Soil Resource Development Institute (SRDI)  Ministry of Agriculture (MOA)	Appropriate land & soil management for sustainable and environmentally friendly Agriculture	Having 6 Regional Offices, 15 Regional Laboratories, 21 District Offices, 2 research centers, 10 Mobile Soil Testing Laboratories (MSTL) for providing on farm soil testing facilities including balanced fertilizer recommendations to the Farmers	Have only 21 district offices out of 64 districts of Bangladesh with deficiency in workforce

Sl. No.	Organizations	Main Functions	Strength	Weaknesses
9.	National Productivity Organization (NPO)  Ministry of Industry (MOI)	Focal point of Asian Productivity Organization (APO)	Applying productivity increasing strategies in 20 Asian countries including Bangladesh	Only 67 Officials at national level with no field force
10.	Bangladesh Sugar and Food Industries Corporation (BSFIC) Ministry of Industry (MOI)	Carrying out extension activities for Sugar crop cultivation in Sugar- mill areas of Bangladesh and producing sugar	Presence of workforce in Sugar- mill areas of Bangladesh	Absence of workforce in non-sugar- mill areas of Bangladesh
11.	Department of Agricultural Marketing (DAM)  Ministry of Agriculture (MOA)	Contributing on national economy by developing agricultural marketing management from farmers to Consumers	Working for improving agricultural commodity supply chain	Having only 26 Officials with absence of necessary workforce in all over Bangladesh
12.	Bangladesh Rural Development Board (BRDB)  Ministry of Local Government Rural Development & Cooperative (MOLGDR&C)	Organizing farmers into village cooperative groups for providing support facilities aimed at increasing farm productivity and income	Presence of workforce in 496 upazillas of all over Bangladesh with 3 large training centers	Lack of agricultural graduates for extension and advisory service in rural areas
13.	Palli Karma Sahayak Foundation (PKSF)	Enhancing capacity and providing financial and institutional support to partner organizations (PO) for implementing sustainable programs for reduction of poverty through creating productive employment opportunities for the moderate and ultra poor, small and marginal farmers and micro-entrepreneurs	Acts as an apex development organization with 111 partner organizations established by the Government of Bangladesh (GoB) for sustainable poverty reduction through employment generation	Enriched only 150 unions of 143 upazillas of Bangladesh

Sl. No.	Organizations	Main Functions	Strength	Weaknesses
14.	Palli Daridra Bimochon Foundation (PDBF)  MOLGDR&C	Alleviating poverty and promote the socio- economic development of the poor and the disadvantaged	Presence of activities in 352 upazillas under 52 districts of Bangladesh	Small number of agricultural graduates for extension and advisory service in rural areas
15.	Small Farmers Development Foundation (SFDF)  MOLGDR&C	Helping landless, marginal and small farmer families to enable them for gaining access to resources for them productive self- employment, encourage them in undertaking activities of income generation and poverty alleviation and for enhancing their quality of life.	Working in 120 upazillas of 23 districts of Bangladesh	Small number of agricultural graduates for extension and advisory service in rural areas
16.	Department of Youth Development (DYD)  Ministry of Youths and Sports (MOYS)	Skill Development Training in 74 trades including one long-term (2.5 months) and 12 short term (one month) agricultural training in 54 youth training centers in Bangladesh	Presence of administrative personnel in 486 upazillas under 64 districts of Bangladesh	Trainers are generally hired from other organizations

Source: Ali (2016)

## 2.2 Department of Agricultural Extension (DAE) as an AAS Providing Organization

Department of Agricultural Extension (DAE) is the largest crop based agricultural advisory service provider in Bangladesh. For implementing the extension activities throughout the country DAE activities are implemented by National Agricultural Extension Policy (NAEP) and National agriculture policy (NAP). The key points of NAEP and NAP are discussed below:

### ***National Agricultural Extension Policy (NAEP)***

The goal of the National Agricultural Extension Policy is to: “Encourage the various partners and agencies within the National Agricultural Extension System (NAES) to provide efficient and effective coordinated services which complement and reinforce each other, in an effort to increase the efficiency and productivity of agriculture in Bangladesh for ensuring food security and business development”.

Wide range of people directly and indirectly involved in agricultural growth will be benefited from NAEP. The primary beneficiaries of the policy are: all categories of farmers, especially the small and marginal farmers comprising about 86% of the farming community through Farmers’ Group and their federations (Farmers’ Organization-FO) at union, upazila, district and national level.

The NAEP is built on following nine (9) key principles as reported by Ali (2016a):

- Increasing production (horizontal and vertical) and productivity as a whole
- Cost effective efficient decentralized demand responsive extension services
- Targeting and mobilizing farmers’ group (FG) and their federations (FO)
- Bottom-up planning and implementation
- Coordinated and integrated extension services through NAES
- Development of agri-business and contract farming for export promotion
- Adoption to climate change and development of specialized extension service for climatically distressed areas
- Women Involvement
- Digitalized agricultural extension services (e-agriculture)

### ***National Agriculture Policy (NAP)***

The overall objective of the National Agriculture Policy is to make the nation self-sufficient in food through increasing production of all crops including cereals and ensure a dependable food security system for all. The specific objectives of the National Agriculture Policy are:



- To ensure a profitable and sustainable agricultural production system and raise the purchasing power by increasing real income of the farmers;
- To preserve and develop land productivity;
- To reduce excessive dependence on any single crop to minimize the risk;
- To increase production and supplies of more nutritious food crops and thereby ensuring food security and improving nutritional status;
- To preserve existing bio-diversity of different crops;
- To take up programs for the introduction, utilization and extension of bio-technology;
- To take necessary steps to ensure environmental protection as well as 'environment-friendly sustainable agriculture' through increased use of organic manure and strengthening of the Integrated Pest Management (IPM) program;
- To take appropriate steps to develop an efficient irrigation system and encourage farmers in providing supplementary irrigation during drought with a view to increasing cropping intensity and yield;
- To establish agriculture as a diversified and sustainable income generating sector through strengthening of 'Farming System' based agricultural production and agro-forestry programs;
- To take effective steps to ensure input supplies to the farmers at fair prices in a competitive market and remove difficulties at the farmers' level which have arisen out of the privatization of input distribution system;
- To develop marketing system to ensure fair prices of agricultural commodities;
- To introduce an appropriate institutional system of providing credit to ensure the availability of agricultural credit in time;
- To produce and supply of agricultural commodities as required by the industrial sector;

- To reduce imports of agricultural commodities and find out newer opportunities for increasing exports as well;
- To create opportunities for establishing agro-processing and agro-based industries;
- To protect interests of the small, marginal and tenant farmers;
- To update the agricultural system in the light of the Agreement on Agriculture under WTO, SAFTA and other international treaties by protecting the national interests; and
- To develop contingency management system to combat natural disasters.

### ***Crop Production Policy***

Although the intensification of food grain production, especially rice- based production system is apparently profitable from the farmers' point of view, this approach has appeared to be harmful in protecting the land productivity. At present, rice covers about 75 percent of the cultivated land in Bangladesh. Area coverage by other crops is as follows: pulses (4.64%), wheat (3.92%), oilseeds (3.77%), jute (3.71%), sugarcane (1.23%), potato (1.11%), fruits (0.84%) and vegetables (1.39%) The production system dominated by a single crop (i.e. rice) is neither scientific nor acceptable from the economic point of view. It is, therefore, necessary to increase the cultivation and production of other crops. However, considering the increasing demand for food grains and with a view to ensuring food security, production of rice will continue to get priority in the food grain production programs. In order to increase rice production, supportive programs will be taken to rise per hectare yield through the use of modern technology and improved cultural practices along with the increased use of HYV seeds.

In Bangladesh, only 4.14 percent of net cultivable land remains as current fallow, which means that there is hardly any scope for increasing cultivable land. Currently, cropping intensity is around 185 percent. Thus, the only possible option

for increasing agricultural production is to increase both the cropping intensity and yields simultaneously. In this respect, policies adopted by the government are:

- To take supportive programs for inter-cropping in a field instead of single cropping; and
- To take appropriate measures in reducing the gap between potential yield and farmers' realized yield of different crops to raise the present level of production significantly.

Crop diversification is one of the major components of crop production policy. For the overall development of crop sector, special emphasis will be given to crop diversification program under the crop production policy. The government policies in this respect are as follows:

Area under wheat has meanwhile reached at 0.8 million hectare. Given the potential for expanding wheat acreage, efforts will continue to encourage farmers to grow more wheat.

The production of maize has shown prospective results in last two years. Maize has also gained popularity as human food side by side with the poultry feed. Public sector procurement of maize has been introduced like rice and wheat in order to encourage farmers in maize cultivation. The efforts for increasing area and production of maize will be strengthened.

- The program for increasing area and production of other crops, e.g., potato, pulses, oil seeds, vegetables, fruits and spices will gradually be extended under the crop diversification program.
- Production of different cash crops including jute, cotton will be increased and efforts will be made to expand their multiple uses.
- Special development programs will be taken with a view to increasing production of potential crops suitable for the coastal areas and the hill tracts.

As a matter of fact, increased crop production depends on good quality seeds, efficient irrigation management, use of balanced fertilizers and availability of credit in time. In accordance with the free market economy, the important task of agricultural input distribution has largely been shifted to the private sector. Despite its beneficial effects in general, the privatization process has given rise to considerable inefficiency in some cases, such as, marketing and distribution of minor irrigation equipments and fertilizers. It is alleged that the privatization process has also been accompanied by non-availability, price rise, smuggling and quality degradation of fertilizers. Under this situation the government will seek:

- To establish and consolidate the distribution system for irrigation equipment's, fertilizers, seeds and credit in the light of farmers' need; and
- To ensure responsibility and accountability of the private sector through strengthening of the relevant legal framework and its enforcement.

The production of crops, especially *aman* crop is heavily damaged every year due to the inadequate soil moisture regime prevailing in drought affected areas. To combat this situation government has adopted the following policies:

- Supplementary irrigation will be ensured in severe and extremely severe drought affected areas.
- Location specific (including hill tracts) suitable crops will be identified with respect to technological and economic parameters and appropriate strategies will be pursued for cultivating those crops.
- Measures will be taken to minimize post-harvest losses by introducing appropriate technologies.

### **2.3 Role of Agricultural Extension in Developing Countries**

Agricultural extension is becoming increasingly important in countries which depend heavily on agriculture of the majority of their population (Oladele, 2005). He added that this requires an effective agricultural extension system that links effectively with research and works very closely with farmers. Wambura *et al.* (2012) mentioned that the factors that push the advancement of agricultural

extension in developing countries were: (a) threat of famine, which forces governments to take measures to improve food production; (b) social unrest among rural people has made it politically imperative to give assistance in bettering their levels of living; (c) newly independent countries have found that agricultural modernization is a first step toward economic development and freedom from economic dependence on more powerful and advanced nations; and (d) a recognition that rural people, who constitute the majority of the population in most countries, have a right to equity for an advanced and better life. These factors provide the necessity to understand the needs of the farmers and develop means that will facilitate their participation and adoption of new and approved practices. A study by Asfaw *et al.* (2012) revealed that non-adopters are more likely to be constrained by less contact with extension agents.

The main role of extension is to empower farmers and enable them to identify and analyze their agricultural problems and be able to make the right decisions Kimaro *et al.* (2010). Jain (2010) pointed out that the central task of extension is to assist rural families to be able to help themselves through application of science to their daily life of farming and home-making and that it uses communication of valuable information, which helps people make sound decisions. Given the importance of the agricultural sector of any developing country, where the main source of food and industrial raw materials comes from agriculture, there is a great need to improve the performance of the extension sector so as to increase productivity and improve peoples' well-being and national income.

The extension program content may comprise a particular crop or all crops, livestock, forestry, or fisheries, singly or in some combination. The coverage may include a variety subject matter such as crop production, marketing, economic and management aspects, and family and youth development programs (SeEVERS & Graham, 2012). The clientele addressed may be all men and women, adults, and young farmers (Gaaya, 1994).

Historically, public extension has been an important source for agricultural information in rural areas (Gautam, 2000). Also, extension plays a big role in improving production efficiency by promoting technological changes among farmers. There is a need to develop a new vision of agricultural extension and view it as the core in serving the public for food security given the increased external forces such as globalization (Jain, 2010). Economic development is based mainly on production, marketing, and micro-enterprise development of poor rural people (Qamar & Rivera, 2003). This suggests why extension is very important, as there is a great need to help rural farmers cope with the prevailing situation in the world, in terms of technology as well as market demands. In addition, strengthening agricultural extension without understanding farmers' needs and their views on extension will not help. This is because, for extension programs to succeed, farmers must participate effectively in and understand the significance of the programs. In this way, they will easily adopt the information delivered and, hence, improve productivity and income (Karbasiuun, *et al.* 2007). There are many development potentials for the agricultural sector, but the agricultural education system "has not kept pace with the changing conditions of society" (Oladele, 2005).

The growth of rural development activities leads to the expansion of technology transfer, input supply and coordination, and credit delivery or supervision (Purcell & Anderson, 1997). Gautam (2000) stated that the design of the institutional structure should focus on the ability to empower farmers. The system should find means of giving farmers the ability to state their views regarding extension programs.

Gautam (2000) pointed out that the indicator for a successful extension program is the farmers' awareness and adoption of the technological components delivered through extension, as this provides the framework for assessing potential

economic impact. Mvuna (2010), also argued that “extension services are crucial in enabling producers to realize the increased production and productivity in accessing information for marketing and the other support services essential for agricultural development towards poverty reduction and overall development”.

#### **2.4 Farmers’ satisfaction on agricultural advisory services**

Literature confirms the crucial interaction between farmers and advisory service provider in forming the notion of satisfaction. Ganpat *et al.* (2014) stated that customer satisfaction is a result from direct interaction with the service provider. The theory of customer satisfaction leadership presents the notion of “contact surface” (Ihalainen, 2011). Contact surface is the intersection point of a provider and customers, which is explained, with examples in the field of agricultural extension, to include:

**Personnel contacts:** Extension communications with farmers

**Product contacts:** Information on technology and agriculture inputs.

**Support system contacts:** Assistance to access support and incentives.

**Ambience contacts:** Kind treatment and the access to extension office.

Few published studies have been undertaken to assess farmers’ satisfaction with the quality of agricultural-extension services despite that the survival of the public extension system depends on farmers’ satisfaction with its activities. To identify factors associated with farmers’ satisfaction with extension services are the main objectives of my study. For this purpose, some published research works are reviewed, a list of this research work, their methodological dimensions and main findings are shown in Table 2.2

**Table 2.2 Research work regarding farmers' satisfaction on advisory service**

<b>Sl. No.</b>	<b>Research Title</b>	<b>Author and year</b>	<b>Dimensions used in the methodology</b>	<b>Main findings</b>
1	Factors influencing	(Kassem <i>et al.</i> 2021)	Farmers assessed the quality of extension	The accessibility of services was ranked first with regard to

Sl. No.	Research Title	Author and year	Dimensions used in the methodology	Main findings
	farmers' satisfaction with the quality of agricultural extension services		services by five main indicators: (1) availability, (2) accessibility, (3) diversity, (4) Relevance, and (5) effectiveness.	satisfaction, while diversity of services was the lowest-ranked quality attribute. Results also revealed that factors significantly influencing farmers' satisfaction included farm size, diversity of farming activities, annual income, and participation in extension services.
2	Investigating Iranian farmers' satisfaction with agricultural extension programs using the American Customer Satisfaction Index	(Yazdanpanah & Feyzabad, 2017)	American Customer Satisfaction Index has three parts: perceived quality, customer expectations, and perceived value which directly determine a person's satisfaction	Structural equation modeling analysis revealed that perceived quality and perceived value significantly predicted farmers' overall satisfaction.
3	Farmers' Satisfaction with the Public Agricultural Extension Services in Tripura State of North-East India	(Debnath <i>et al.</i> 2016)	Relevancy, quality, usefulness and customer (clientele) service satisfaction of the extension services	The findings of the investigation indicated that a majority of the clientele had expressed medium level of relevancy, quality, usefulness and customer (clientele) service satisfaction of the extension services provided by the Department of Agriculture.
4	Farmers' perceptions of the quality of extension services provided by non-governmental organizations' in two municipalities in the Central Region of Ghana	(Buadi <i>et al.</i> 2013)	Farmers assessed six main services provided by NGOs, namely information support, input supply, training, technology transfer, credit and monitoring and evaluation of extension activities.	Farmers generally perceived the services to be relevant to their operations. However, they had mixed opinions concerning the services with respect to their adequacy, availability and their timeliness of supply. Monitoring and evaluation of extension activities by NGOs was generally acceptable.
5	Agricultural Extension in Balochistan, Pakistan: Date Palm Farmers'	(Mumtaz & Gopal, 2014)	Determining date farmers' access to and satisfaction with Agricultural extension services.	The results of logistic regression analysis identified five variables out of six which significantly influence date farmers' access to extension



Sl. No.	Research Title	Author and year	Dimensions used in the methodology	Main findings
	Access and Satisfaction		frequency of annual visits, which was considered as an indicator of farmers' access to extension services,	services: household head's age, household head's literacy, number of date palm trees owned, mostly inherited date palm trees, and percentage of dead date palm trees. The overwhelming majority of farmers were dissatisfied with all three main types of extension services being provided by public extension officials
6	Farmers' Assessment of Extension Services in Ogun State, Nigeria	(Adesiji <i>et al.</i> 2010)	Use of Extension services are provided to farmers to increase their knowledge about farming activities were selected as dependent variables	The results revealed that more than half of the farmers (55%) fall within the age range of 40–59, most are female (66.7%), 70% have some level of formal education, and the majority (80%) had more than 10 years of experience with more than one farm location. A high percentage (90.0%) had frequent contact with extension agents, but less than half (49.2%) acknowledged extension services to be effective
7	Assessing Farmers' Satisfaction of Agronomic Services Received in Ghana Using the SERVQUAL Model- a Case Study of Kumasi Metropolis	(James <i>et al.</i> 2012)	SERVQUAL questionnaire	It was found out that the SERVQUAL model can be applied when assessing the quality of agronomic services. It was also found out that customers (farmers) or users of agrochemical inputs were highly not satisfied (overall weighted SERVQUAL score of -0.86) with the services received from the agrochemical input dealers within the Kumasi Metropolis
8	Farmers' Satisfaction with Agricultural Extension Service and Its Influencing Factors: A Case	(Elias <i>et al.</i> 2016)	Analysis was done by ordered logit model . dimensions were perceived economic return, regular extension contact, family size, off-farm income ,	The findings show that about 55 percentage of the interviewees were satisfied whereas 45 percentage of them were dissatisfied with the extension services, implying that the program still has a lot of room for improvement. The ordered

Sl. No.	Research Title	Author and year	Dimensions used in the methodology	Main findings
	Study in North West Ethiopia		limited technology choices, high price of inputs, inconvenient loan system and undefined boundary between the extension services and the local politics	logit model revealed that perceived economic return, regular extension contact, family size and off-farm income were driving factors for farmers' satisfaction. On the other hand, limited technology choices, high price of inputs, inconvenient loan system and undefined boundary between the extension services and the local politics were among the reasons given by dissatisfied farmers.
9	Farmers' Satisfaction with Extension Services in the Organization of Eastern Caribbean States	(Ganpat <i>et al.</i> 2014)	A farmers' satisfaction index was developed based on 26 statements on extension service in a Likert-type scale, and used as the dependent variable	Results showed that farmers' overall satisfaction with extension was moderate. Farmers' age, gender, education level, size of farm, number of parcels farmed, number of extension visits received, and whether farmers operated on a full time or part time basis significantly influenced farmers' level of satisfaction.
10	Quality of Extension Services: A Case Study of Farmers in Amathole	(Azikiwe Agholor <i>et al.</i> 2013)	The study described how assessments of quality of Extension services differ by gender and the outcomes of the experiences with Extension services	Farmers' gender was found to be linked with Extension service satisfaction and outcomes. However, females appear to have overall satisfaction with service delivery than males. The implication of this is that males are less likely to cultivate confidence and loyalty in extension services in Amatole district
11	Farmers' Assessment of the Farm Advisory Services of Public and Private Agricultural Extension in Hyderabad District, Sindh,	(Mirani & Memon, 2011)	This study assesses the performance of farm advisory services of agricultural extension and pesticide/fertilizer companies.	Finding of the study was the fact that farmers were not receiving new agricultural information from agricultural extension as most of the farmers were not visited. This entails the fact that farmers are not alone responsible for non-adoption of improved practices. Pesticide/fertilizer agents were viewed as effective in transfer-

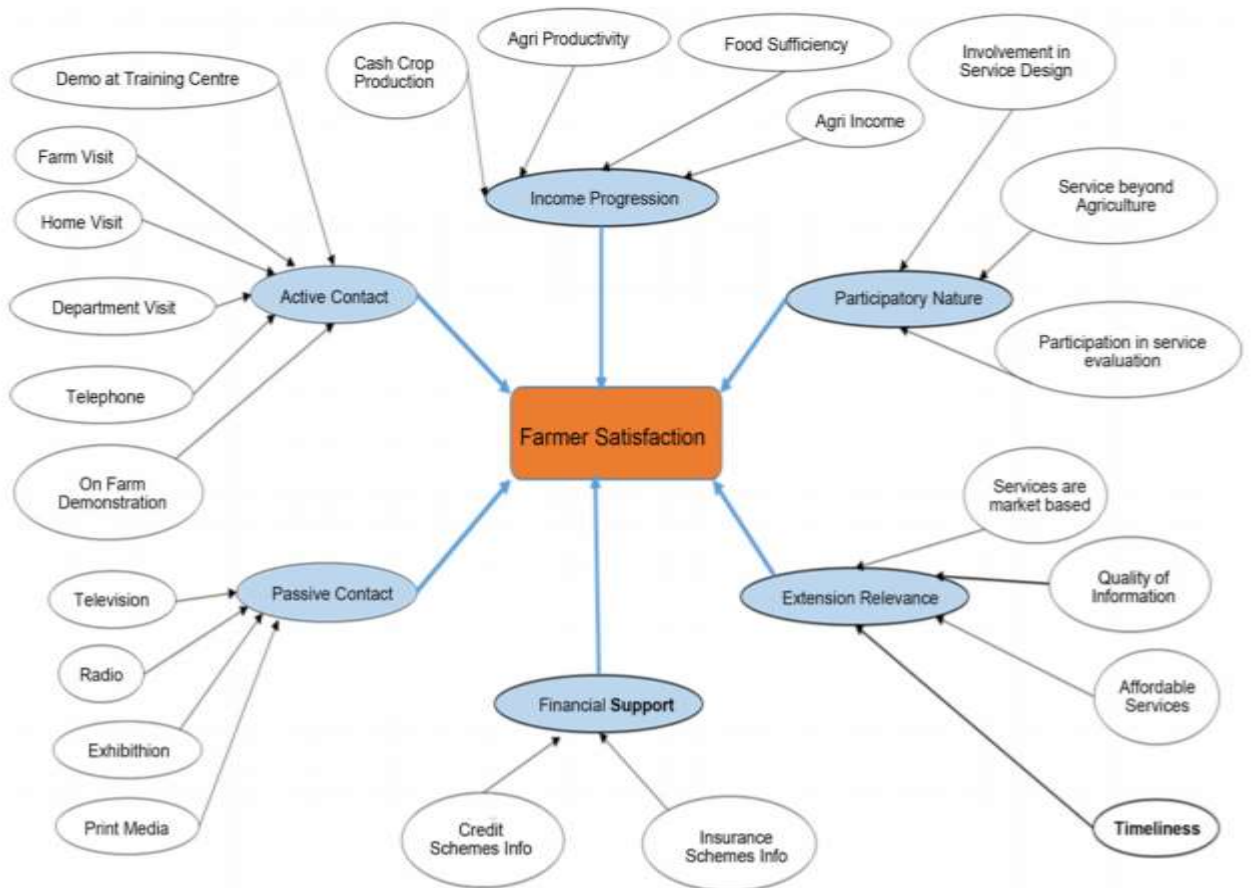
Sl. No.	Research Title	Author and year	Dimensions used in the methodology	Main findings
	Pakistan			ring messages, however, they were limited to their product sales since they have the task to achieve targets rather farmers' development.
12	Effectiveness of mobile agri-advisory service extension model: Evidence from Direct2Farm program in India	(Kansiime <i>et al.</i> 2019)	A cross-sectional survey of farmers registered on CABI's Direct2Farm (D2F) user database was undertaken using a combination of telephone interviews, household survey and focus group discussions covering six states in India	Results indicate that majority of farmers receive information from various sources, notably fellow farmers (73%) and government extension (58%). Mobile service was ranked 5th as a source of information out of seven identified.
13	Agricultural services on the demand and supply for improving agricultural productivity in Benin	(Sossou <i>et al.</i> 2021)	The main determinants of satisfaction with the agricultural services supply were gender, proportion of income from agriculture, contact with an agricultural advice agent, use of chemical fertilizer, use of motorized traction and access to improved seeds/planting materials/suckers	The results showed an overall satisfaction rate of 18.9%. These results reflect a low level of satisfaction of farmers in Benin.
14	U.S. Crop Farmers' Use of Market Advisory Services	(Isengildina <i>et al.</i> 2006)	MAS users' profiles in terms of their (1)Demographic predictors, (2) risk attitude, and (3) marketing behavior are presented.	The results indicated that MAS users can be differentiated based on their location and use of computers, though not on age and farm size. MAS users are shown to be significantly more risk seeking than non-users. Furthermore, MAS users apply significantly more forward-pricing techniques, but are no different from non-users in terms of marketing frequency.
15	Organizational	(Mail, 2019)	This paper examines	The paper confirms that

<b>Sl. No.</b>	<b>Research Title</b>	<b>Author and year</b>	<b>Dimensions used in the methodology</b>	<b>Main findings</b>
	capacities and management of agricultural extension services in Nigeria: current status		the organizational capacity and management of the Nigerian extension system.	capacity and management issues are critically important for well-functioning extension systems, and that there are many elements to get right, including continuing education, incentives, coordination, and operational budgets.
<b>16</b>	Effectiveness Indicators Of Public, Private, and NGOs' Agricultural Extension Programs In Karnataka State, India	(Saravanan, 2001)	Based on judges' relevancy ratings, an index has been developed made up of 21 indicators in input, process, and outcome level.	Research findings reflect that the NGOs and agricultural consultancies extension service programs ensures regular contact, adequate, and useful agricultural extension service, accountable, committed, and highly performing extension personnel, better organizational performance, and high clientele satisfaction.
<b>17</b>	Analyzing of Agricultural Wheat Farmers Behavior Related to Agricultural Advisory Services	(Ghiasy & Mirakzadeh, 2012)	The survey research was descriptive-survey research. The population consisted of farmers who were members and no-member of Agricultural Advisory Services Project.	The result of mean comparing showed that there isn't meaningful relationship between the attitude, tendency, intellectual norms and efficiency of advisors dimensions. Also the result showed that efficiency of advisors and attitude of farmers were the best predictors' of intention. The result of stepwise regression analysis showed that Attitude and Efficiency of advisors have explained 59 percent of dependent variable "factor affecting on farmers intension in participation at WSP".
<b>18</b>	Farmers' Satisfaction On Agricultural Development in Selected Areas Of Bangladesh	(Ahamed, 2018)  (Thesis submitted in Dept. of AEIS), SAU	The purposes of the study were to determine the extent of satisfaction on agricultural development in Bangladesh as perceived by the farmers and to find out the contribution of the selected	Overwhelming majority (86.6 percent) of the farmers had medium to high satisfaction on agricultural development in Bangladesh. Step-wise multiple regression analysis indicated that cosmopolitaness, agricultural experience, individual local contact and decision making ability of the farmers had significant positive

Sl. No.	Research Title	Author and year	Dimensions used in the methodology	Main findings
			predictors of the farmers to their satisfaction on agricultural development in selected areas of Bangladesh	contribution to their satisfaction on agricultural development. Problems faced by the farmers in agriculture had significant negative contribution to their satisfaction on agricultural development in Bangladesh.

## 2.5 Influencing Factors of Farmers' Satisfaction on Advisory Services

In fact, providing a comprehensive image of farmers' satisfaction with agricultural-extension services requires highlighting the factors influencing it. In this context, previous studies tested various factors that may influence satisfaction, the frequency of extension contact and participating in extension activities, the use of multiple communication methods, and the perceived quality attributes of information (Yazdanpanah & Feyzabad, 2017; Ganpat *et al.*, 2014; Elias *et al.*, 2015; Adesiji *et al.*, 2010).



**Fig-2.1 Eilas *et. al* (2015) construct of farmer Satisfaction and advisory service**

According to Cohen and Lemma (2011), the approach to extension service delivery until now remains top-down, with accountability mainly flowing upward. However, it is important to engage beneficiaries in different activities especially in planning and evaluation of the extension program. Hence data were collected regarding the participatory nature of the extension program based on farmers' perception about their participation in planning, evaluation of extension activities and whether the service is whole family service or not. Communication is a major component of agricultural extension and extension agents to utilize various methods to deliver messages to their clientele. Extension educators should choose different methods of information delivery to maximize program efficiency, effectiveness and client satisfaction (Jones *et al.* 2010).

## **2.6 Relationship between farmers' predictors and their satisfaction on agricultural advisory services**

It is accepted that the perception of quality of a service may depend on the socio-economic predictors of users (Anaman and Lellyett, 1996) and service provision may need to be tailored to different users based on their socio-economic predictors. Regarding socioeconomic attributes, we discuss in detail how personal and farm factors (age, education, farming experience, diversity of farming activities, farm size, annual income, credit access, off-farm income, and participation in extension services) may affect farmers' satisfaction with agricultural advisory services.

### ***Age and Satisfaction***

The role of age and farming experience as determinants for farmers' satisfaction is ambiguous. Terry and Israel (2004), found that younger farmers are less satisfied with services provided by extension than older farmers are which can be related to their farming experience. On the other hand, younger farmers are often viewed as more flexible and more willing to engage in a new or innovative activity due to fear of risk, whereas older farmers may be more risk-averse to implement innovations on their farm (Elias *et al.* 2013).

### ***Education and Satisfaction***

Education increases the individual's resources and capacity to achieve goals. Furthermore, it enhances their awareness of alternatives and the rewards expected from the implemented activities. As noted by (Aphunu *et al.* 2008), being literate is necessary to maximize the benefit from extension messages. In other words, the better the educational status of farmers is, the more wisely they utilize extension services (Eric *et al.* 2014). Moreover, (Ao *et al.* 2017) and (Ganpat *et al.* 2014) found that the higher the farmers' education level is, the greater their likelihood of satisfaction in extension services. Hence, we propose that education level positively influences farmers' satisfaction.

### ***Farm size and Satisfaction***

Farm size is the quantity of land acquired by a farmer at one time. The data show that 13.2% of the respondents acquire 1.0 hectare of land or less, 15.8% 1.1–2.0 hectares, 14.8% 2.1–3.0 hectares, 12.5% 3.1–4.0 hectares, and 42.2% more than 4.0 hectares. Thus, most of the farmers are small-scale farmers (farm size less than 5 hectares). Obstacles to larger farms may be lack of credit sources and limited credit (Adesiji *et al.* 2014) In developing countries, resource-poor and illiterate small-scale farmers have reaped meager benefits from extension compared to relatively resource-rich and educated large-scale farmers (Rogers 2003; Qamar 2005; Swanson and Rajalahti 2010; Agbarevo and Benjamin 2013).

### ***Farming Experience and Satisfaction***

Adesiji *et al.*, (2014) found that farming experience, as measured by years of practice in farming activities, is a vital factor. The results show that 20% of the farmers have 1–10 years of farming experience, 55.8% have 11–30 years, 12.5% have 31–40 years, and 11.7% have over 40 years' experience. Thus, the majority of the farmers (80%) have more than 10 years of farming experience, which may affect their level of knowledge about the services offered by extension agents. Experience is an indicator of knowledge and practical skills. Furthermore, Elias *et al.* (2015) found that farmers' experience of the extension positively influences their satisfaction due to their acquaintance with exposure.

### ***Diversity of production and Satisfaction***

One of the key determinants to satisfaction is diversity in production. In this context, Kassem *et al.* (2019) revealed that an increase of types of agricultural activities managed by farmers increase a probability of satisfaction with extension services. In fact, farmers who pursued different farming activities (animal production, crops, food-processing enterprises, vegetables, fruits, crops, etc.) are more motivated to seek extension services to reduce agricultural risks (Morris *et*



*al.* 2017). In line with this reasoning, we propose that diversity in production positively influences farmers' satisfaction with extension services

### ***Economic Return and Satisfaction***

Economic returns, which are measured in terms of gained benefits after receiving extension services, such as net income, agricultural productivity, and food self-sufficiency, positively influence farmers' satisfaction (Anang, 2016). A better financial situation helps farmers through the alleviation of capital constraints, and thus enables farmers to make timely purchases of inputs that they cannot afford with their own resources (Diirro, 2013). Damisa *et al.* (2008) also found economic factors influence farmers' satisfaction. Therefore, economic benefits are viewed as one of the most important investments that a service provider makes to provide opportunities for farmers to financially succeed and gain a sustainable competitive advantage (Yazdanpanah *et al.* 2013). Thus, I propose that the variables of annual income, production and commercialization positively influence farmers' satisfaction with extension services.

Apart from personal and farm attributes, economic benefits gained from the service are major determinants for satisfaction. Among these outcomes perceived economic return is a major component. Benefits should be viewed as one of the most important investments a service provider makes to optimize users' performance, provide opportunities for them to succeed financially and gain sustainable competitive advantage. Therefore, the perceived economic return which was measured in terms of benefits gained after receiving extension service such as agricultural productivity, agricultural income, food self-sufficiency, able to produce cash crops and able to do cost benefit analysis influence positively farmers' satisfaction.

### ***Extension Communication and Satisfaction***

The use of various communication methods has a positive and significant relationship with farmers' attitudes towards extension services (Faramarzi & Langerodi, 2013; Kassem, 2013). In this regard, Ganpat *et al.* (2014) argued that the frequency of extension contact on a regular basis helps farmers to learn about and discuss in detail new innovations that positively influence their satisfaction due to their acquaintance with them through exposure and their decision to adopt. Therefore, extension workers should choose different extension methods to maximize program efficiency, effectiveness (Yazdanpanah *et al.* 2013), and client satisfaction (Jones *et al.* 2010). Mumtaz & Gopal (2014) Frequency of contact, or access to extension services, determines performance output in terms of yield, knowledge gained, and quick adoption of innovations by farmers or satisfaction. Elias *et al.* (2015) concluded that different communication means are necessary to maintain participation and farmers' satisfaction, which can influence the sustainability of the extension program.

### ***Participation in Extension activities and Satisfaction***

According to Kassem *et al.* (2021) participation in extension activities positively influences farmers' satisfaction.

### ***Training exposure and Satisfaction***

Mumtaz & Gopal (2014) found that the provision of training and other services on an occasional basis may suffice to stimulate the adoption of innovation, since farmers are receiving at least some instruction in the use of new technologies. Home management training may improve the nutritional diet of farm families. Respondents who have not yet received training via extension should be contacted by extension agents.

### ***Decision making ability and Satisfaction***

Taleghani (2016) found that farmers' participation in decision-making processes had positive effect on increasing their cooperation and commitment which in turn

enhanced their satisfaction. The result indicated that, although economic variables are main factor in decision making but effectiveness of activity, time and necessity efforts for activity and social- cultural factors have most important role than economic variables in farmer decisions. He viewed that farmers’ decision making process was conducted with a set of complex behavior including imaginations, beliefs, knowledge, norms and experiences in specific situation.

## 2.7 Indicators of measuring farmers’ satisfaction and agricultural advisory services

### 2.7.1 Factors related to measure the performance of advisory services

Selection of indicators of performance is a challenge. Measures and empirical analysis of performance of extension service are scarce in the literatures. Some are listed in Table 2.3

**Table 2.3 Literature related to performance analysis of advisory services**

Sl. No	Article titles	Sources	Main findings
1	Capacity Development for Extension and Advisory Services in Bangladesh	Ali (2016), AESA Working Paper– 03	The purpose of this paper is to identify the present status of Capacity Development (CD) for Extension and Advisory Service (AES) providers in Bangladesh.
2	A Framework for Analyzing Pluralistic Agricultural Advisory Services worldwide	Briner <i>et al.</i> (2006), IFPRI discussion paper	The analytical framework developed in the paper were the major predictors of agricultural advisory services on which policy decisions have to be made: (1) governance structures, (2) capacity, management and organization, and (3) Advisory methods.
3	Bangladesh : Desk Study of Extension and Advisory Services	DLEC (2017) USAID report	This report reviews existing documentation on EAS in Bangladesh to recommend areas for potential investment by government, donors, nongovernmental organizations and the private sector, and serve as an input into the design of an on-the-ground engagement under DLEC.
4	Evaluation of agricultural extension model sites approach in Iran	Salehi <i>et al.</i> 2021	Evaluation provides effective feedback for development plans and programs. In this respect, it is of utmost importance to ensure that the outputs of agricultural extension and

Sl. No	Article titles	Sources	Main findings
			education projects are compatible with the ones expected.
5	Achieving best-fit configurations through advisory subsystems in AKIS: case studies of advisory service provisioning for diverse types of farmers in Norway	Klerkx <i>et al.</i> 2017	In light of the discussion on ‘best-fit’ in pluralistic advisory systems, this article aims to present and discuss challenges for advisory services in serving various types of farmers when they seek and acquire farm business advice.
6	Factors Affecting Performance of Agricultural Extension: Evidence from Democratic Republic of Congo (DRC)	Ragasa <i>et al.</i> 2015	Results show that despite having one of the highest extension agent-to-farmer ratio and a pluralistic extension system, DRC fails to deliver knowledge and technologies to rural areas due to lack of coordination, no unified and clear policy and mandate, lack of funding, aging and low competencies of agents, and lack of mobility and interactions of agents with key actors.
7	New Challenges in Agricultural Advisory Services from a Research Perspective: A Literature Review, Synthesis and Research Agenda	Faure <i>et al.</i> 2012	The results show that the ongoing scientific debates are shaped by the diversity of disciplines, methods, topics and schools of thought. The scientific community largely has focused on five main themes: (1) the institutional environment of agricultural advisory services; (2) the structures necessary for the operation of an advisory system; (3) the actors providing advisory services and the skills deployed in advisory activities; (4) the approaches, methods, tools and content of advisory activities; and (5) the assessment and impacts of advisory

Reviewing the above literatures, it was found that different analytic frameworks proposed to assess advisory service providers’ performances by defining criteria based on effectiveness (achievement of objectives), efficiency (results obtained compared to resources invested), quality of services provided, and the like.

The satisfaction of farmer on advisory services provided by DAE on farms/farmer or households may be analyzed. Analyzing the service providing organization, the scientific community largely has focused on five main themes: (1) the institutional environment of agricultural advisory services; (2) the structures necessary for the

operation of an advisory system; (3) the actors providing advisory services and the skills deployed in advisory activities; (4) the approaches, methods, tools and content of advisory activities; and (5) the assessment and impacts of advisory (Faure *et al.* 2012).

Buadi *et al.* (2013) found, the quality attributes include (1) relevance of the service for the operations of the farmer, (2) availability of the service for possible use by the farmer, (3) the adequacy of the level of the service, (4) timeliness in the provision of the service, and (5) efficiency in the monitoring and evaluation of the service by the provider aimed at establishing the reliability and consistency of the service.

### **2.7.2 Birner *et al.* (2009) best-fit framework**

Birner *et al.* (2009) develops a framework for the design and analysis of pluralistic agricultural advisory services (Figure 3.2) called best-fit framework includes certain predictors of advisory system: (1) governance structures, (2) capacity in terms of staff numbers and skills, (3) management of advisory organizations, and (4) advisory methods in terms of techniques and styles. The framework identifies four sets of frame conditions that need to be considered when deciding on these predictors: the policy environment, the capacity of potential service providers, the type of farming systems and the market access of farm households; and the nature of the local communities, including their ability to cooperate. The framework suggests an impact chain approach to analyze the performance and the impact of agricultural advisory services. The farm households play a central role in the analytical framework as their interaction with the advisory services is critical to both performance and impact.

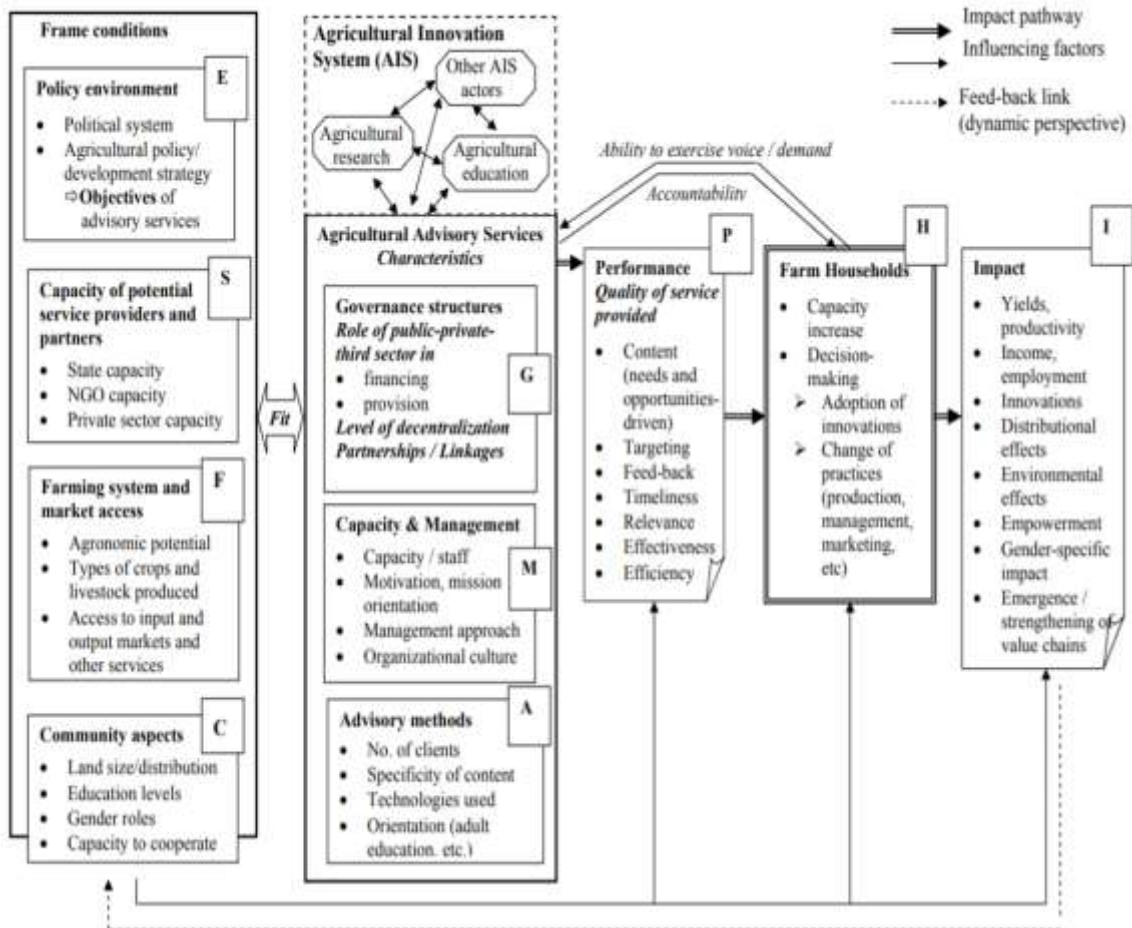


Figure 2.2 Framework for analyzing agricultural advisory service (Briner *et al.* 2009)

## 2.8 Models of measuring farmers' satisfaction

Measuring farmers' satisfaction reflects the impact of extension services and the extent of the mental image, which affects trust building between farmers and agricultural-extension providers in future activities (Kassem *et al.* 2020). Therefore, satisfied farmers are more willing to participate in extension services and tell others about the good service they received (Golrang *et al.* 2012).

There are two principal interpretations of satisfaction within the literature of satisfaction as a process and satisfaction as an outcome (Parker and Mathews, 2001). Early concepts of satisfaction research have typically defined satisfaction

as a post choice evaluative judgment concerning a specific purchase decision (Oliver and DeSarbo, 1988). The most widely accepted model, in which satisfaction is a function of disconfirmation, which in turn is a function of both expectations and performance. The disconfirmation paradigm in process theory provides the grounding for the vast majority of satisfaction studies and encompasses four constructs; expectations, performance, disconfirmation and satisfaction (Caruana *et al.* 2000). This model suggests that the effects of expectations are primarily through disconfirmation, but they also have an effect through perceived performance, as many studies have found a direct effect of perceived performance on satisfaction (Spreng and Page, 2001).

The second interpretation reflects customer's overall evaluation of the performance of an offering to date. This overall satisfaction has a strong positive effect on customer loyalty intentions across a wide range of product and service categories (Gustafsson, 2005).

Measuring customer satisfaction could be very difficult because it is an attempt to measure human feelings. Because of this reason some researcher develop specific service level questions for clients relating to variables such as responsiveness, reliability, timeliness, accessibility and fairness as a Model for measuring customer satisfaction (Table 2.4).

**Table 2.4 Models of Customer Satisfaction with their Dimensions**

Customer Satisfaction Model	Developed by	Dimensions of the Model
The American Customer Satisfaction Index	Fornell <i>et. al</i> (1996) University of Michigan	The American Customer Satisfaction Index <ul style="list-style-type: none"> <li>• Service quality</li> <li>• Expectations</li> <li>• Satisfaction</li> <li>• Complaints</li> <li>• Citizen trust</li> </ul>
Common Measurement Tool (CMT)	Citizen-Centered Service Network Canadian Centre for Management Development (1998)	<b>Common Measurement Tool (CMT)</b> The internal and external variables of the service delivery process that impacts on client satisfaction should be measured are: <ul style="list-style-type: none"> <li>• Client expectations</li> <li>• Perceptions of service experience</li> <li>• Level of importance</li> <li>• Level of satisfaction</li> <li>• Priorities for improvement</li> </ul>
NBRI Customer Satisfaction Model	The National Business Research Institute (NBRI) 2009	Dimensions that one can use in measuring customer satisfaction <ul style="list-style-type: none"> <li>• Quality of service</li> <li>• Innocently</li> <li>• Speed of service</li> <li>• Pricing</li> <li>• Complaints or problems</li> <li>• Trust in your employees</li> <li>• The closeness of the relationship with contacts in your firm</li> <li>• Other types of services needed</li> <li>• Your positioning in clients' minds</li> </ul>

## 2.8 Models of measuring service quality

Service is something a customer cannot see but could only experience (Zeithaml *et al.* 1992). The main question in understanding service quality is how customer realizes quality. What are the quality aspects that satisfy him?

Lewis and Booms (1983) pioneered service quality research by defining service quality as a “measure of how well the service level delivered matches the customer’s expectations”. This was further advanced by Parasuraman *et al.* (1985), who conceptualized service quality as the gap between consumers’ expectations and perceptions of the actual service performance.



Service quality measurement involves a comparison of expected with perceived performance. It is a measure of how well a delivered service matches the customer expectations. In other words, service quality is a measure of customers' satisfaction regarding a particular service received. Also, the delivery of service quality means conformance to customer expectations on the basis of consistency (Lewis and Booms, 1983).

Lotfy and Adeeb (2016) in their paper stated that a service can refer to: production, performance, output, presentation or process. It varies from one field to another based on service predictors, which include: intangibility, heterogeneity, inseparability, and perishability.

**Intangibility** refers to the lack of physical aspects to touch, taste or hear before buying the service.

**Heterogeneity** means the variability in all phases of service provision based on various individual behaviors, whether it is service provider or customer.

**Perishability** is the fact that services are bought and consumed simultaneously, and hence they cannot be stored for future use.

**Inseparability** is that services are consumed at the moment of buying and that the customer participates in the process of producing the service.

In case of Advisory service, the perception of service quality is a main determinant of farmer satisfaction (Grigoroudis & Siskos, 2010). Service quality is a concept that has caused considerable interest and debate in literature because of the difficulties in both defining and measuring it (Wisniewski, 2001). There are a number of different 'definitions' as to what is meant by service quality. Service quality is commonly defined as the extent to which a service meets customers' needs or expectations (Asubonteng *et al.* 1996). Service quality can thus be defined as the difference between customer expectations of service and perceived service. If expectations are greater than performance, then perceived quality is less

than satisfactory and hence customer dissatisfaction occurs (Parasuraman *et al.* 1985), which is called SERVQUEL Model (Table 2.5).

**Table 2.5 Service Quality Models with their Dimensions**

<b>Model</b>	<b>Dimension</b>
Gronroos' (1984) model of technical and functional quality	<p>Gronroos' (1984) model distinguished between two aspects of service quality, as follows:</p> <p><b>1. Technical quality</b>, which involves the delivery of service. It is measured subjectively by the customer.</p> <p><b>2. Functional quality</b>, the state in which service is provided. It is concerned with the personal perception of interaction between buyer and seller, including:</p> <ul style="list-style-type: none"> <li>- Staff attitudes and behavior</li> <li>- Access to service provider (being approachable and kind treatment)</li> <li>- Access to service.</li> <li>- Personal appearance and personality of staff.</li> <li>- Relations with staff. - Interaction between staff and customers.</li> </ul>
SERVQUAL model (service gap model) Parasuraman <i>et al.</i> , 1985	<p>Five dimensions of SERVQUEL Model</p> <p><b>Tangibility:</b> physical facilities, equipment, and appearance of personnel</p> <p><b>Reliability:</b> ability to perform the promised service dependably and accurately</p> <p><b>Responsiveness:</b> willingness to help customers and provide prompt service</p> <p><b>Assurance:</b> knowledge and courtesy of employees and their ability to inspire trust and Confidence</p> <p><b>Empathy:</b> caring individualized attention the firm provides to its customers</p>
Cronin and Taylor (1992) SERVPERF). The term "performance-only measures"	<p>Cronin and Taylor (1992) were the first to offer a theoretical justification for discarding the expectations portion of SERVQUAL in favor of just the performance measures included in the scale (i.e., what they termed SERVPERF). The term "performance-only measures" has thus come to refer to service quality measures that are based only on consumers' perceptions of the performance of a service provider, as opposed to the difference (or gap) between the consumers' performance perceptions and their performance expectations.</p>

## **2.9 Drawing conceptual frame work for the study “farmers’ satisfaction on agricultural advisory services**

Research activities addressing the relationship between farmer satisfaction and organizational performance related agricultural advisory service are scarce. Majority of the studies analyzing the performance of a specific area like, access to extension service, performance of plant protection clinic, performance of adoption of specific technology, performance of extension agents and farmers' satisfaction on various development issues imposed by government. Some researcher found a number of factors served as the basis for customer satisfaction with public services including information provision, professionalism and staff attitudes, as well as timeliness and delivery.

No published studies have been undertaken to assess farmers’ satisfaction with the quality of agricultural-extension services in Bangladesh context despite that the survival of any public extension service providing organization depends on farmers’ satisfaction with its activities. Thus, the objectives of this study were to identify farmers’ satisfaction on advisory services of DAE, assess the quality of the provided extension services, and determine factors associated with farmers’ satisfaction on advisory services. The results of the present study can contribute to filling the gap and improving advisory services of DAE in accordance with real needs, farmer capabilities and farming systems in the study area.

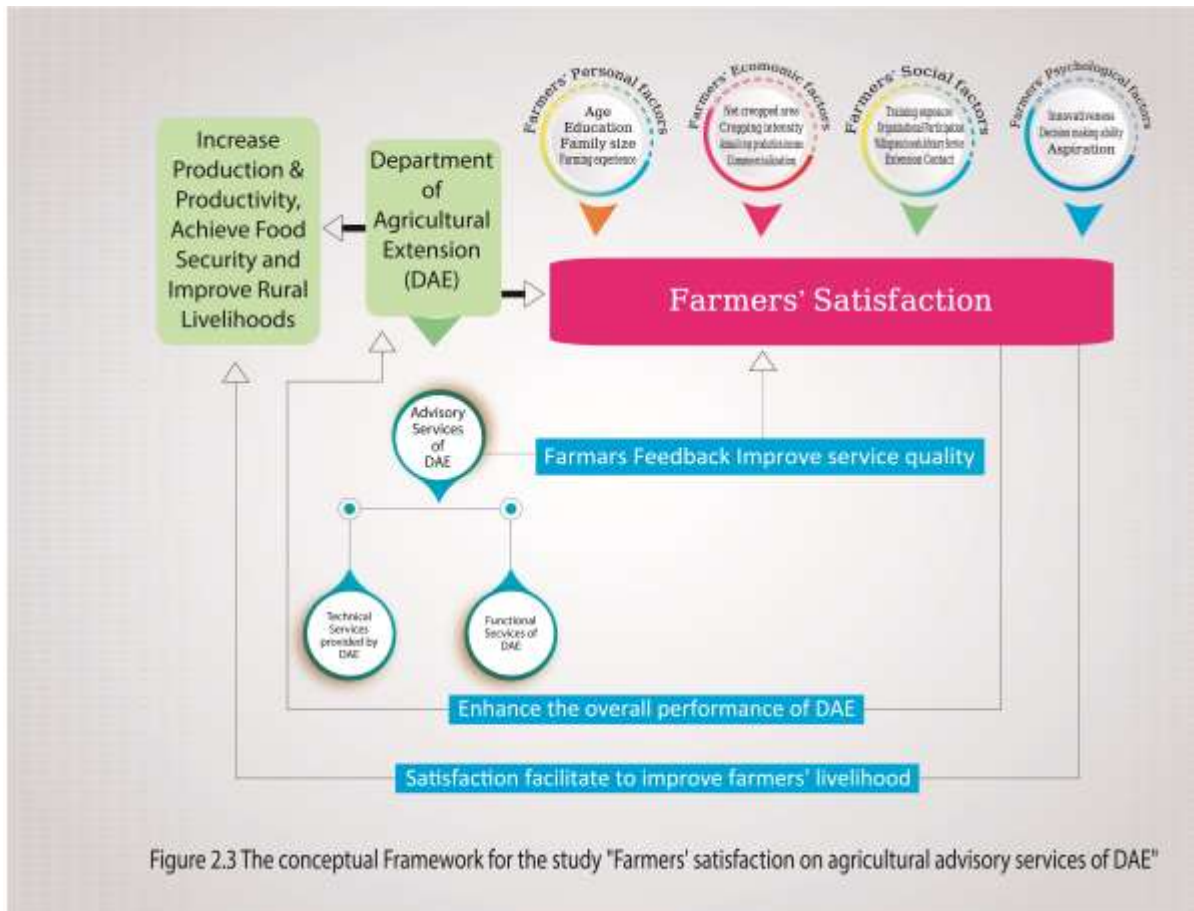
In Bangladesh context, evaluation of advisory service providers’ performance are not carried out by researchers but by experts as part of the evaluation of specific projects or programs funded by specific donors. Such studies focus on one type of service provider who benefits from external support or on one type of problem, which is addressed for one targeted social group. For example, DLEC (March 2017), *Bangladesh: Desk study of Extension and Advisory Services*. Developing Local Extension Capacity Project (DLEC) analyzed extension and advisory service of Bangladesh. This studies mainly based on secondary source: a review of documents, reports and previous work.

In the context of developing country like Bangladesh, literature on the determinants of farmers' satisfaction or dissatisfaction is hard to find, but the previous researches of different countries on farmers' satisfaction with various issues determine the factors which influence satisfaction and dissatisfaction of farmers. Attempts may be taken to know how the factors of farmers (personal, economic, social, psychological predictors) influence their satisfaction on AAS in Bangladesh aspect.

**Technical service quality** of DAE involves the services provided by DAE and **functional service quality** of DAE is concerned with the farmers' perception of relation between farmer and extension service, including:

- Extension agents' attitudes and behavior
- Access to service provider (being approachable and kind treatment)
- Access to service
- Personal appearance and personality of staff
- Relations with staff
- Interaction between extension agent and farmers

In view of the prime theme of the study, the researcher constructed a conceptual framework which is self-explanatory and is presented in the following page by Figure 2.3



**Fig 2.3 The Conceptual Framework for the Study on “Farmers’ Satisfaction on the Advisory Services of DAE”.**

## **CHAPTER 3**

### **METHODOLOGY**

Methodology is accepted as a set of theoretical ideas that justify the use of particular method or methods (Midgley, 2000). The purpose of this chapter is to describe the methods and materials of the study regarding objectives and also spells out the methods used to test hypotheses. The preceding chapter (Chapter two) discussed the related literatures to the study. The literature provided basis for the research methodology of this study. The survey research design and its applicability in the study are discussed in this chapter. Furthermore, population, sampling, measurement of variables, research instruments, data collection, hypotheses and statistical procedures are discussed in this chapter.

#### **3.1 Study Area and research design**

The Department of Agricultural Extension (DAE) has the responsibility of providing information on appropriate technologies to the farmers as a form of advisory services that motivating the farmers to adopt improved technologies to increase their production and thereby improve their livelihood. For measuring farmers' satisfaction on the advisory services of DAE a proper representation of the whole Bangladesh as well as all categories of farmers need to be selected. For this reason, a multi-stage sampling procedure was used to select the Agricultural region, Upazila, Block and farmers. In the first stage, four (04) Agricultural regions out of 14 were selected purposively for satisfying the following criteria; the representativeness of different agro-ecological zone, economic, social and

cultural norms to the overall Bangladesh and where extension program have been implemented for a relatively longer period of time. The selected regions were Dhaka, Khulna, Sylhet and Rajshahi. Again 8 Upazilas were selected randomly by taking two from each selected region. Thus, Batiaghata and Dumuria Upazila from Khulna region; Companigonj and Sylhet sadar Upazila from Sylhet region; Charghat and Bhagha Upazila from Rajshahi region and Singair and Savar Upazila from Dhaka region were selected randomly as the locale of the study. Eight (8) blocks were then randomly selected by taking one (1) from each Upazila. The total summarized process presented in Table 3.1

**Table 3.1 Sampling unit, sampling methods of the research design**

Sampling Unit	Sampling method used	No. of unit
Stage-1: Agricultural regions	Purposive sampling method	Four (4) out of 14
Stage-2 : Upazilas	Simple Random sampling	Eight (8) by taking two (2) from each region
Stage-3: Blocks	Simple Random sampling	Eight (8) by taking one (1) from each Upazila
Stage -4: Farmers	Proportionate Random sampling	As per the population of each Block

### 3.1.1 Basic facts about the study area

Some basic facts about the study area like agro-ecological zone, area, and total cultivable land, number of household, population, literacy rate, main occupation, main crops, main cropping pattern and food crops availability status are presented in Table 3.2 and Table 3.3 as collected from the respective upazila agricultural office (At a glance agricultural activities of the study Upazila 2019-20) and BBS (2019). Map of the study areas (Upazilas) is shown in Figure 3.1

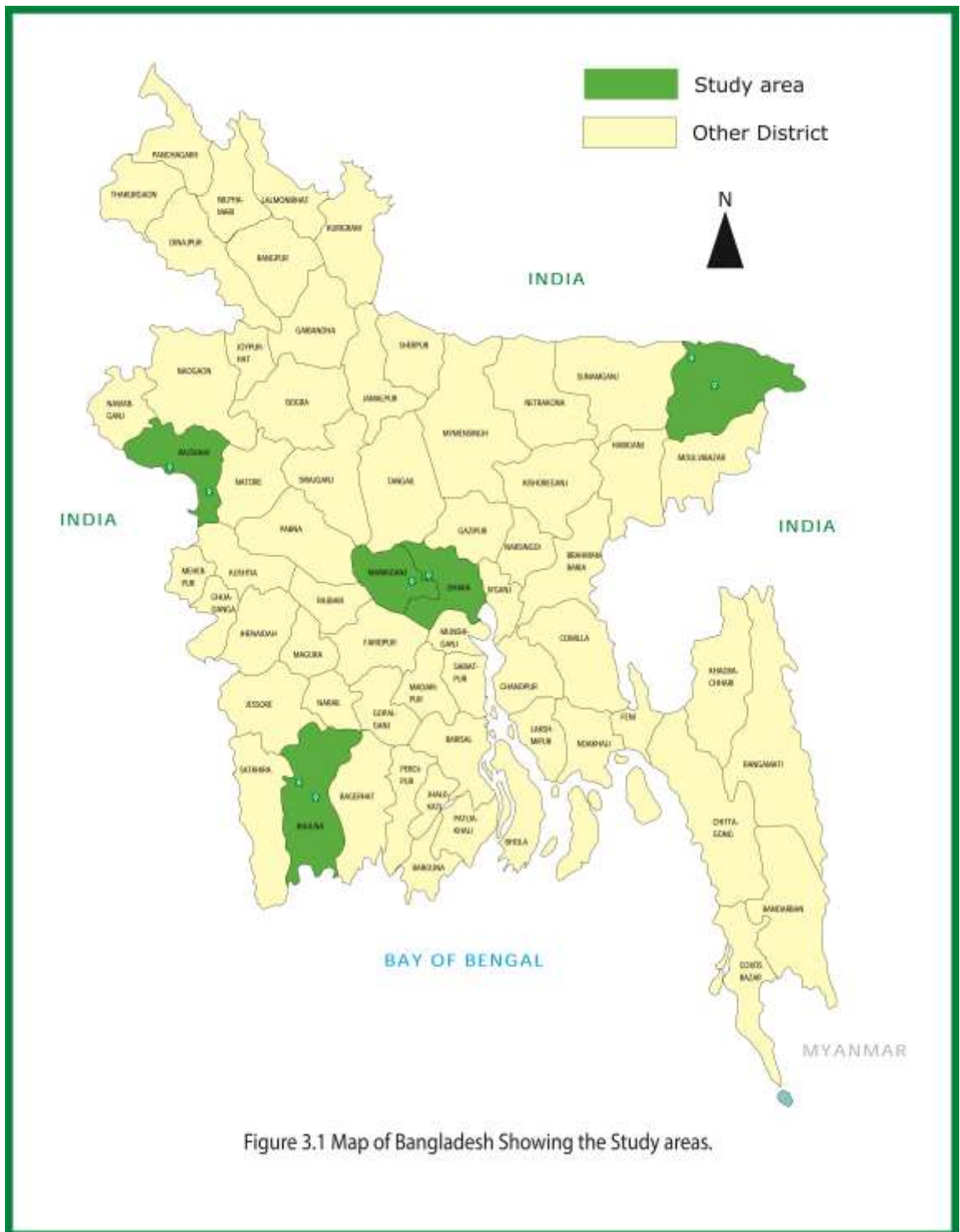


Figure 3.1 Map of Bangladesh Showing the Study areas.

Figure: 3.1 Map of Bangladesh Showing the Study Areas



**Table 3.2 Agro-ecological zone, total area, total cultivable land, number of household, Population and literacy rate of the study area**

Upazila	Agro-ecological Zone (AEZ)	Area (Sq. Km)	Total cultivable land (ha)	Household ('000')	Population ('000')	Literacy rate
Singair	AEZ-8 AEZ-9 AEZ-11 AEZ-12	217.38 sq km	16245	50308	248.615	34.71%
Savar	AEZ-8 AEZ-28	280.12 sq km	16746	66,956	587.041	58.2%
Bhagha	AEZ-10 AEZ-11	184.25 sq km	15829	30398	169.527	41.83%
Charghat	AEZ-11	164.52 sq km	16458	51783	183.921	45.7%
Sylhet Sadar upazila	AEZ-20 AEZ-21 AEZ-22 AEZ-29	323.17 sq km	16097	22106	493.784	59.14%
Companigonj	AEZ-21	278.55 sq km	18710	24810	113.784	22.74%
Botiaghata	AEZ-13	248.32 sq km	19.811	33620	140.574	54.90 %
Dumuria	AEZ-11 AEZ-12 AEZ-13 AEZ-14	454.23 sq km	30.860	64250	279.862	48.66%

**Table 3.3 Study areas main occupation, main crops, main fruits, main cropping pattern and food crops availability status**

Upazila	Main occupation	Main cropping pattern	Cropping intensity	Special crops	Food crops availability statu( Mt.)
Singair	Agriculture 56.84%, Wage laborer 2.55%, industry 0.98%, commerce 14.15%, transport and communication 2.17%, service 8.39%, construction 0.96%, religious service 0.19%, rent and remittance 5.20% and others 8.57%.	Mustard- Boro- B. aman (32.25% area)	487.85%	Vegetable and papaya	(+)2365

Upazila	Main occupation	Main cropping pattern	Cropping intensity	Special crops	Food crops availability statu( Mt.)
Savar	Agriculture 20.46%, non-agricultural laborer 3.09%, industry 2.82%, commerce 20.55%, transport and communication 5.75%, service 28.74%, construction 2.84%, religious service 0.18%, rent and remittance 2.67% and others 12.90%.	Boro-Fallow-T. Aman (22.61% of the total cropped )	178%	High value crops like baby corn, capsicum, mushroom, flower	(-)1330
Bhagha	Agriculture 63.57%, non-agricultural laborer 5.47%, industry 1.14%, commerce 17%, transport and communication 2.05%, service 3.36%, construction 0.53%, religious service 0.13%, rent and remittance 0.11% and others 6.64%.	Sugarcane+pulse - sugarcane-sugarcane (27.80%) Mango+spices-mango-mango(14.53%)	220.19%	Mango, Tarmaric, Sugarcane, Ground nut	(+) 22300
Charghat	Agriculture 55.05%, non-agricultural labourer 3.96%, industry 0.59%, commerce 18.0%, transport and communication 6.11%, service 6.80%, construction 1.92%, religious service' 0.11%, rent and remittance 0.29% and others 7.17%.	Boro-Fallow-T. Aman ( 22.83%)	240%	Paddy, wheat, sugarcane, potato, turmeric, jute, khayer (catechu)	(+) 32380
Sylhet Sadar upazila	Agriculture 16.44%, non-agricultural laborer 5.31%, industry 1.61%, commerce 24.45%, transport and communication 5.91%, service 17.14%, construction 3.00%, religious service 0.32%, rent and remittance 6.38% and others 19.44%.	Boro-fallow-fallow (23.07% of total cropped area)	180%	Nursery & orange, malta and other citrus fruit	(-)12765.4

Upazila	Main occupation	Main cropping pattern	Cropping intensity	Special crops	Food crops availability statu( Mt.)
Companigonj	Agriculture 60.81%, non-agricultural laborer 12.81%, industry 0.57%, commerce 15.01%, transport and communication 0.86%, service 1.71%, construction 0.36%, religious service 0.27%, rent and remittance 1.18% and others 6.42%.	Boro-Fallow-Fallow (39.40%)	138%	Orange, pineapple, lemon, satkora, betel nut.	(-)13222
Botiaghata	Agriculture 57.45%, non-agricultural laborer 8.72%, commerce 13.21%, transport and communication 4.63%, service 6.45%, construction 1.69%, religious service 0.22%, rent and remittance 0.16% and others 7.47%.	Fallow-fallow-T. aman (58.97%) Boro-fallow-T. aman (18.16%)	132%	Water melon Chui jhal	(+) 32380
Dumuria	Agriculture 65.43%, non-agricultural laborer 3.08%, commerce 14.05%, transport and communication 5.51%, service 5.54%, construction 0.88%, religious service 0.16%, rent and remittance 0.10% and others 5.25%.	Vegetable-vegetable-vegetable (60%)	210.0 %	Vegetable and water melon production on the bank of gher ( fish culture pond)	(+) 51848.86

### 3.2 Population

Bless and Higson-Smith (1995) defines the target population as a set of elements that the researcher focuses upon and which the results obtained by testing the sample should be generalized. Allison *et al.* (1996) describes a population as the larger collection of all the subjects that one wishes to apply one's conclusion. According to direct observation of the researcher and secondary data on the study area most of the farmers mainly use public extension services that i.e, the Department of Agricultural Extension (DAE). The target population for this study was concerned with the farmers of Bangladesh being engaged in agriculture.

However farmers of selected eight (8) Blocks under selected eight (8) Upazillas of selected four (4) Regions were considered as the population of the study as mentioned in section 3.1 under this chapter. Eight lists of farmers were collected from the Sub-Assistant Agriculture Officer (SAAO) of the respective Blocks of the respective Upazila Agriculture Office. Proportionate random sampling method was used to select the sample respondents from the population of each of the selected Blocks. A total of 5227 famers from the eight Blocks constituted the population of the study.

### **3.3 Sample and sampling procedure**

The sample size was chosen considering a number of factors including the purpose of the study, population size, the risk of selecting a bad sample and the allowable sampling error. From 5227 farmers, 358 farmers were determined as the sample size of the study by using ‘Sample Size Calculator’ developed by Creative Research System (1984) by taking 95% confidence level and 5 as confidence interval.

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 was used by Hossain, Q.A. (2018) as suggested by Kranti Associates Ltd (2016), with slight modification was used for the purpose.

$$LS= (DS+d\%)$$

Where,

LS = Large sample

DS= Desired sample

d %= Reserve percentage (here 5% of the desired sample)

Therefore, large sample= (358+5%) = 376

Thus, 358 farmers were the desired sample size and rest 18 was kept in reserved list. The total population, sample size and reserved lists size are shown in Table 3.4.

**Table 3.4 Sampling unit of the study area with their population, sample size and reserve list**

Region	Upazila	Block	Population size	Sample size	Reserve list
Khulna Region	Botiaghata	Fultola Block	892	61	03
	Dumuria	Tipna Block	921	63	03
Sylhet Region	Sylhet Sadar upazila	Hatkhola Block	746	51	03
	Companigonj	Rajnarar Block	312	21	01
Rajshahi Region	Bhagha	Chandipur Block	822	56	03
	Charghat	Pouroshova Block	872	60	03
Dhaka Region	Singair	Kaliakoir Block	336	23	01
	Savar	Aminbazar block	326	22	01
<b>Total</b>			<b>5227</b>	<b>358</b>	<b>18</b>

### 3.4 Instruments for Data Collection

An interview schedule (in Bengali language) containing direct questions and some scales was used for data collection from the selected respondents. English version of the interview schedule has been shown in Appendix-I of this Dissertation. The interview schedule was prepared in line with the measurement procedures for different variables. The researcher intensively searched literatures, scientific articles that were accessible through Google, Google Scholar, CAB and web of science database. Requests were derived from using the key word ‘farmers’ satisfaction’, and ‘advisory service’. Academic output like digital theses archive of Bangladesh, SAU student theses, institutional reports, working documents were considered for better understanding on Agricultural advisory services and present scenario of Bangladesh Agricultural extension Advisory service. Several meetings

of the advisory committee of the concerned researcher were arranged to draft the pre-test interview schedule. The draft schedule was pre-tested among 24 farmers to test its suitability. Necessary corrections, modifications, additions, deletions and adjustments were made on the basis of pre-test experience. A meeting of advisory committee of the concerned researcher was arranged to finalize the interview schedule as the data collecting instrument before going for final data collection.

### **3.5 Variables of the Study**

The variables of the study had been selected after a thorough searching of literatures and discussions with the advisory committee members, and relevant experts. There were two types of variables in any relationship study, viz. independent variables and dependent variable. An independent variable is the presumed cause of the dependent variable, the presumed effect (Kerlinger, 1973). Fifteen (15) selected predictors of the farmers were considered as independent variables of the study and these were age, education, family size, farming experience, net cropped area, cropping intensity, annual crop production income, commercialization, training exposure, organizational participation, willingness to seek advisory services, extension contact, innovativeness, decision making ability and aspiration. Farmers' satisfaction on the advisory services of DAE constituted the dependent variable of the study. The variables of the study were operationalized through direct questions, developing relevant scales by the researcher and adopting scales developed by others as shown in Table 3.5. Detailed measuring procedures of the variables are presented in the next sub-sections.

**Table 3.5 Summarized operationalization of the variables of the study with measuring unit**

	<b>Variables</b>	<b>Measuring Unit</b>	<b>Operationalization</b>
<b>Independent variables</b>			
Personal Predictors	Age	Actal years	Direct question
	Education	Schooling Year(s)	Direct question
	Family size	Number of family members	Direct question
	Farming experience	Experience in year(s)	Direct question
Economical Predictors	Net cropped area	Hectare	Scale developed by Hossain (2018)
	Annual cropping intensity	Percentage	Scale developed by Ali (2008) used for this study
	Annual crop production income	Scores (000 taka)	Scale developed for this study
	Commercialization	Percentage	Scale developed by Hossain (2018) used in this used
Institutional predictors	Training exposure	Scores (days)	Scale developed for this study Based on Hossain (2018)
	Willingness to seek advisory services	Scores	Scale developed for this study with a slight modification of Ghiasi <i>et al.</i> (2017)
	Organizational participation	Scores	Scale developed with slight modification of Ahmed (2018) for this study
	Extension contact	Scores	Scale developed for this study with a slight modification of Hossain (2018)
Psychological predictors	Innovativeness	Scores	Scale developed for this study with a slight modification of Khatun (2007)
	Decision making ability	Scores	Scale developed for this study with slight modification of Ali (2008)
	Aspiration	Scores	Scale developed for this study with slight modification of Ali (2008)
<b>Dependent Variable</b>			
Farmers' Satisfaction on the Advisory Services of DAE	Technical quality of advisory services	Scores	Scale developed for this study with a modification of Gronroos model
	Functional quality of advisory services	Scores	Scale developed for this study with a slight modification of parasuraman model of SERVQUEL

### **3.5.1 Personal predictors**

#### **3.5.1.1 Age**

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

#### **3.5.1.2 Education**

Educational qualification refers to the number of successful 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. 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.

#### **3.5.1.3 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.

#### **3.5.1.4 Farming experience**

Farming 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 respondent (farmer) did agricultural farming particularly prior to data collection.



### **3.5.2 Economic Predictors**

#### **3.5.2.1 Net cropped area**

Net cropped area of a respondent farmer referred by the area in hectare on which respondent's family carried out farming operation. It was measured by the sum of single, double and triple cropped area.

#### **3.5.2.2 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 re-sown'. The total cropped area as percentage of net sown area, gives a measure of land use efficiency, which really means the efficiency of cropping.

Cropping Intensity (CI) of the cultivated land of a farmer was measured in percentage by using the following formula as used by Ali (2008):

$$\text{Cropping intensity (\%)} = (\text{Total cropped area} \div \text{Net cropped area}) \times 100$$

Where,

$$\text{Net cropped area} = \text{Single cropped area (SCA)} + \text{Double cropped area (DCA)} + \text{Triple cropped area (TCA)}$$

$$\text{Total cropped area} = \text{SCA} \times 1 + \text{DCA} \times 2 + \text{TCA} \times 3$$

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.

#### **3.5.2.3 Annual crop production Income**

Annual crop production income refers to the different crop products including field crops, vegetable/spices & condiments crops and fruits in a year. Annual crop production income was determined by the summation of unit price multiplied by total products of all the crops of the whole year. One (1) score assigned for 1000 taka income.

### **3.5.2.4 Commercialization**

The term 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.

Commercialization of a respondent referred to the ratio of total sold price and total agricultural income of the respondent in a year. As developed by Karim and Mahboob(1974) and used by Ali (2008), the following formula was used in computing the commercialization score of a farmer:

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

It was expressed in percentage. Relevant market price was used in determining the commercialization score of an individual. Commercialization score could range from 0 to 100, while 0 indicating no commercialization and 100 indicating very high commercialization.

## **3. 5.3 Institutional Predictors**

### **3.5.3.1 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.

### **3.5.3.2 Organizational participation**

Organizational participation of respondents was measured on the basis of the nature of 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. Duration (No. of years) of participation is multiplied with the assigned score of the nature of participation. Level of organizational participation of a respondent was finally measured by adding the scores obtained by him/her from all the eight (8) types of organization.

### **3.5.3.3 Willingness to seek advisory services**

Agricultural extension delivery in most developing countries is confronted with numerous challenges like fragmented land, low economic return from agriculture, low literacy rate etc. that hamper effective service delivery but now agriculture is transformed towards commercial agriculture, precision agriculture etc. that is why some farmers do not want to depend on government service even are willing to pay for getting advisory service. Ghiasi *et al.* (2017) found that willingness to use the Plant Clinics services in IRAN and found that among four group most of the farmers have good willingness to use plant clinic. So this study tries to find out the level of farmers willingness to seek advisory service. The scoring system was done in the following manner for three (3) selected items of advisory services:

<b>Level of willingness to seek advisory services</b>	<b>Assigned score</b>
Not at all willing for getting advisory services	0
Motivated by SAAO	1
Motivated By Ideal farmer/ neighbor/ agro input retailer	2
Self-motivated	3
Willing to pay for getting advisory service	4

In the present study researcher selected three (03) items namely i) Adoption of new technology, ii) Information for problem solving, and iii) Establishment and maintain commercial farming. Score of willingness to seek advisory services of a respondent was measured by adding scores of three (3) items. Thus the possible range of willingness to seek advisory services of the farmers was 0-12, where “0” indicated no willingness and “12” indicated highest willingness to seek advisory services.

#### **3.5.3.4 Extension contact**

Extension contact was expressed as the degree of contact of an individual with different information source (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. A total of 17 agricultural information sources of individual, group and mass contact were considered for the study. Each of these information source 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 these alternatives responses as 4, 3, 2, 1, and 0. Logical frequencies of contact were considered for each of alternative responses of each of 17 information source as shown in the interview schedule. Finally, extension contact of a respondent was measured by summing up all the scores obtained by him/her from the entire 17 information source. Finally, the possible score of extension contact of the respondents was ranged from 0 to 68, where ‘0’ indicated no extension contact and ‘68’ indicated highest extension contact.

#### **3.5.4 Psychological predictors**

##### **3.5.4.1 Innovativeness**

The term innovativeness referred to the degree to which an individual is relatively earlier in adopting new ideas than the other members of a social system (Rogers, 1983). Innovativeness of a respondent was measured on the basis of use of 14 selected improved agricultural practices. Score was assigned on the basis of length of time a respondent was using the specific practice. The scoring was done in the following manner:

<b>Nature of innovativeness</b>	<b>Assigned score</b>
Never used	0
Used after 3 years of hearing	1
Used within 2- 3 years of hearing	2
Used within 1- 2 years of hearing	3
Used within 1 years of hearing	4

Finally, the innovativeness score of a respondent was obtained by adding the score for all 14 items. Thus, innovativeness score of a respondent could range 0 to 56, where 0 indicated no innovativeness and 56 indicated highest innovativeness.

#### **3.5.4.2 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. 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.

Decision making ability of a respondent was measured by using a 4 point rating scale. Each respondent was asked to indicate the extent of his/her decision making ability in each of the nine selected items by checking any one of the responses viz. 'able to make self-decision', 'able to make decisions with the family members', 'able to make decisions with outsiders of the family' and “able to make decision with the help of SAAO”. The weights were assigned to these alternative responses as 4, 3, 2 and 1 respectively. Finally, decision making ability of a respondent was computed by summing up all scores obtained by him/her from all the seven (9) items of decision. Thus, decision making ability scores of the respondents could

range from 9 to 36, where ‘9’ indicated lowest decision making ability and ‘36’ indicated highest decision making ability.

### **3.5.4.3 Aspiration**

Merriam-Webster dictionary (2018) defined 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. In this study, it was determined as aspiration statements on life and development and extent of aspiration towards various issues like education, occupation, increase of own land, increase of field crop productivity, increase of income, increase of farming status, purchases of agricultural machineries, renovation/ construction of houses, purchases of recreational instruments, position in social organization, overall aspiration on life satisfaction etc.

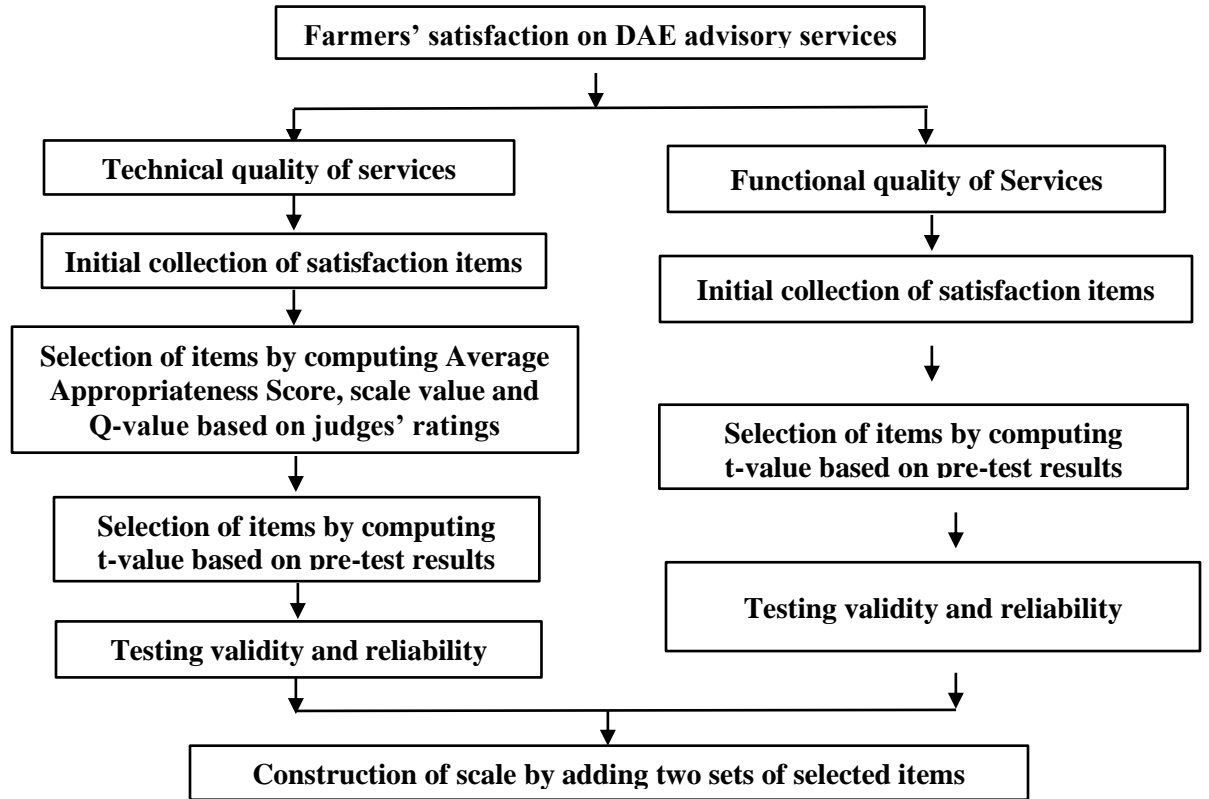
Muthaya (1971) developed 12-item ‘Aspiration ratings for the present and future’. Sagar (1983) constructed a 13-item aspiration scale in his study by picking up 12 items from Muthaya’s scale. However, the researcher in the present study constructed a 12-item aspiration with some modification from the scale of Ali (2008). To have clear responses from the farmers, the items (statements) were provided with 5-point response categories weighted from 0 to 4 indicating low to high level of aspiration. Level of aspiration score of a respondent was determined by adding the score for his responses to all the items in the scale. Therefore, total score of a respondent could range from 0 - 48, while 0 indicating no aspiration and “48” very high level of aspiration.

## **3. 6 Measurement of Farmers’ Satisfaction on the Advisory Services of DAE**

Farmers’ satisfaction on the advisory services of DAE was considered as the dependent variable of the study. Measuring farmers’ satisfaction reflects the impact of extension services and the extent of the formed mental image, which affects trust building between farmers and agricultural-extension providers in

future activities (Kassem *et. al.*, 2021). Farmers need reliable, timely and relevant information for farming. In addition, the delivery mode of the information must be in the manner they prefer and understand. Farmers in the delivery of extension program desire quality benefits from the outcome of extension services. The extension officers are accountable for farmers' level of satisfaction, quality and relevance of educational learning programs. According to Parasuraman *et. al.* (1988), when service quality is perceived as high, then it will invariably lead to growth in customer satisfaction. Various researchers accepted this idea recognized that "customer satisfaction is based upon the level of quality service that is provided by the service providers" Saravanan (2007). Wilson *et. al.* (2008) revealed that the bases of customer satisfaction is a function of service quality, price, personal and situational factors. In this study, the services quality is determined by two aspects as described by Gronroos, (1982) model of measuring service quality: (i) technical quality, which is measured subjectively by the customer; and (ii) functional quality, which is concerned with personal perception and attitudes between customer and seller. Lotfy & Adeb, (2016) used this model in measuring farmers' satisfaction with the services of Agricultural Service Providers in Minya and Beni Suf Governorates.

In the present study the researcher used the above model with slight modification by considering two types of service quality such as i) technical service quality (advice related services provided by DAE for farmers) and ii) functional service quality (services of DAE including: staff attitudes and behavior, access to service provider, access to service, personal appearance and personality of staff, and relations with staff). From collection of items to final selection of items, the steps and procedures followed by Ali (2008) was used in the present study with slight modification to construct the scale for measuring farmers' satisfaction on the advisory services of DAE as shown in Diagram 3.1. The process of constructing the scale is published as a full length research article in the Bangladesh Journal of Extension Education (Moonmoon, *et al.* 2020).



**Diagram 3.2 Summarized operational steps involved in construction of scale to measure farmers' satisfaction on DAE advisory services**

### **3.6.1 Technical Quality of DAE Advisory Services**

#### ***Initial Collection of Satisfaction Items***

Initially 52 items of satisfaction on technical quality of DAE services representing the nine (9) dimensions of National Agricultural Extension Policy (NAEP) were collected after thorough consultation with the agricultural scientists and extension experts of Bangladesh and from review of available related literatures of home and abroad.

#### ***Selection of Items by computing AAS, Scale value and Q-value based on Judges' Ratings***

Initially collected 52 items together with the 9-point continuum against each item were given to 30 Judges selected from different related organizations (academicians, researchers and extension practitioners) to make their judgment on



the appropriateness and relevancy of the items in connection with satisfaction of the farmers on technical advisory services of DAE. The Judges were requested to rate the items with the scale of 1-9 (1 for least appropriate and 9 for most appropriate). From the 30 Judges, 26 replied. So, the responses of 26 Judges were retained for selection of items for the satisfaction scale.

**Calculation of Average Appropriateness Score (AAS):** Based on the rating of 26 Judges Average Appropriateness Score (AAS) of each of the item was measured with the following formula:

$$AAS = \frac{\sum Asj}{n}$$

Where,

AAS = Average Appropriateness Score

Asj= Appropriateness Score given by the individual Judge

n = Number of Judges (here, it is 26.)

Items having AAS of  $\geq 4.5$  ( $\geq$  half of the highest possible score of 9 or  $\geq 9/2$ ) were selected for the scale as shown with star mark (\*) in Table 3.6

**Calculation of scale values:** The scale values (S) for 52 items that were judged in equal-appearing intervals by 26 Judges were obtained by calculating their medians. The data for each item was arranged in the three rows as shown with an example of item no.1.

Item No.1	Sorting categories								
	1	2	3	4	5	6	7	8	9
Frequencies (f)	0	0	0	1	1	1	1	7	15
Proportions (p)	0	0	0	0.038	0.038	0.038	0.038	0.269	0.577
Cumulative proportions (cp)	0	0	0	0.038	0.077	0.115	0.153	0.423	1.00

The sorting categories 1, 2, 3, etc. were regarded as mid-point of class intervals of 0.5–1.5, 1.5 –2.5, 2.5 – 3.5 and so on.

In the first row, the frequency (f) of the item in each of the nine categories has been given. In the second row, the proportion of frequencies (p) has been

calculated. The proportion was obtained by dividing each frequency by n, i. e. the total number of Judges (26). In the third row, the cumulative proportions (cp), i. e. the proportion of judgments in a given category plus the sum of all the proportions below that category has been shown.

Since, the median of the distribution of judgments for each item was taken as the scale value of the items, the scale value was calculated from data arranged in the above manner by means of the formula given by Edwards (1969).

$$s = L + \frac{(0.5 - \sum pb)}{pw} \times i$$

Where,

S = The median or scale value of the item

L = The lower limit of the interval in which the median falls

$\sum pb$  = The sum of the proportions below the interval in which the median falls

pw = The proportion within the interval in which the median falls

i = The width of the interval and was assumed to be 1.0

Substituting the values of item no.1, in the above formula, the scale value was obtained as follows:

$$S = 8.5 + \frac{(0.5 - 0.423)}{0.577} \times 1 = 8.64$$

The Scale values (S) of all the 52 items were calculated by the above formula. The mean and standard deviation (SD) of the scale values of the items were 6.63 and 1.54 respectively. Items having scale value of  $\geq 5.09$  ( $\geq$  Mean - SD, i.e.  $\geq 6.63 - 1.54$ ) were selected for the scale as shown with star mark (\*) in Table 3.6.

**Calculation of Q-values:** In equal-appearing intervals it is not enough to have the scale values by computing the medians of Judges' responses. The ambiguity, uncertainty or disagreement amongst the Judges in sorting each item in a particular category had to be found out. This was done by computing the interquartile range, Q which was an index of dispersion of the item on the scale (Edwards, 1969).

The interquartile range contained the middle 50 percent of the judgments. To determine the Q-values, it was necessary to find out two other point measures, the 75<sup>th</sup> centile ( $C_{75}$ ) and the 25<sup>th</sup> centile ( $C_{25}$ ). An example of working out the values of those two centiles ( $C_{75}$  and  $C_{25}$ ) for item no.1 is shown below:

$$C_{75} = L + \frac{(0.75 - \sum pb)}{pw} \times i = 8.5 + \frac{(0.75 - 0.423)}{0.577} \times 1 = 9.07$$

$$C_{25} = L + \frac{(0.25 - \sum pb)}{pw} \times i = 7.5 + \frac{(0.25 - 0.153)}{0.269} \times 1 = 7.86$$

Where,

$L$  = The lower limit of the interval in which the centile concerned falls

$\sum pb$  = The sum of the proportions below the interval in which the centile concerned falls

$pw$  = The proportion within the interval in which the centile concerned falls

$i$  = The width of the interval and was assumed to be 1.0

The interquartile range  $Q$  was calculated by taking the difference between  $C_{75}$  and  $C_{25}$ . Thus, for the first item, the interquartile range  $Q$  was:

$$Q = C_{75} - C_{25} = 9.07 - 7.86 = 1.21$$

The Q-values of all the 52 items were calculated by the above method formula. The mean and standard deviation (SD) of the Q-values of the items were 2.79 and 0.82 respectively. Thurstone and Chave (1929) considered large Q-value primarily as an indication that an item was ambiguous. Therefore, items with large Q-values should be eliminated from the selection of items. So, items having large Q-values ( $> \text{Mean} + \text{SD}$ ) were eliminated. As such items having Q-value of  $\leq 3.61$  ( $\leq \text{Mean} + \text{SD}$ , i.e.  $\leq 2.79 + 0.82$ ) were selected for the scale as shown with star mark (\*) in Table 3.6.

*Selection of satisfaction Items on the basis of AAS, Scale value and Q-values:*  
Based on Average Appropriateness Scores (AAS), Scale values and Q-values, out of 52 items 38 were selected for the scale as shown in Table 3.6.

### **3.6.1.1 Selection of Items (Technical quality) by computing t-value based on Pre-test results**

The selected 38 items of technical quality of services were analyzed on the basis of pre-test data obtained by administering on 24 farmers randomly selected from the representative part of the research population excluding the sample of the main study. Farmers were asked to indicate their level of satisfaction against each of these statements with four alternative responses as ‘highly satisfied’, ‘moderately satisfied’, ‘low satisfied’ and ‘not satisfied at all’ after assigning the scores of 3, 2, 1 and 0 respectively. Thus, the possible score of satisfaction on technical quality of services of the pretest sample farmers could range from 0-114, while 0 indicating not satisfied at all and 114 indicating highest satisfaction on the technical quality of services provided by DAE. In the pre-testing process, space was provided for criticism and suggestions to improve the items; this helped to ensure face validity of the instrument as well as to test the usefulness of the instrument, question clarity, language used, and consistency.

*Analysis of satisfaction Items as per Likert’s Technique of Summated Ratings:*  
Selected 38 items were analyzed by using Likert’s technique of summated ratings for final selection of items for measuring satisfaction on technical quality of advisory services.

Analysis of items consisted of the frequency distribution of scores based upon the responses to all items of the pretest. The top 25 percent of the respondents with the highest scores (High group) and the bottom 25 percent of the respondents with the lowest scores (Low group) were used as criterion groups to evaluate individual

item. The critical ratio (t-value) was calculated by using the following formula as suggested by Edwards (1957):

$$t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{S_H^2}{n_H} + \frac{S_L^2}{n_L}}}$$

Where,

$\bar{X}_H$  = The mean score on a given statement for the high group

$\bar{X}_L$  = The mean score on a given statement for the low group

$S_H^2$  = The variance of the distribution of responses of the high group to the statement

$S_L^2$  = The variance of the distribution of responses of the low group to the statement

$n_H$  = The number of subject in the high group

$n_L$  = The number of subject in the low group

As  $n_H = n_L = n$  (Number of subjects/respondents in each group) and the same percentages of the total number of subjects for the high and low groups were selected, the formula was reformed as:

$$t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{\sum(X_H - \bar{X}_H)^2 + \sum(X_L - \bar{X}_L)^2}{n(n-1)}}$$

Where,

$$\sum(X_H - \bar{X}_H)^2 = \sum X_H^2 - \frac{(\sum X_H)^2}{n}$$

And

$$\sum(X_L - \bar{X}_L)^2 = \sum X_L^2 - \frac{(\sum X_L)^2}{n}$$

$\sum X_H^2$  = Sum of the squares of the individual scores in high group

$\sum X_L^2$  = Sum of the squares of the individual scores in the low group

The value of ‘t’ was a measure of the extent to which a given items differentiates between the high and low groups. As suggested by Edwards (1957), there is a thumb rule of rejecting items with ‘t’ values <1.75. Usually, a t-value equal to or greater than 1.75 indicates that the average responses of the high and low groups to an item differ significantly. Finally, t-values of all the items were determined. The items having ‘t’ values  $\geq 1.75$  were finally selected, as such out of 38 items, 25 items of satisfaction on technical quality of services were selected for the final scale as shown in Table 3.6. with star mark (\*).

**Table 3.6 Average Appropriateness Score (AAS), Scale-values, Q-values and t-values of the items regarding Technical Quality of Services of DAE**

Sl. No.	Items	AAS	Scale value	Q-value	t-value	Selection Decision
<b>Increasing production and productivity as a whole</b>						
1	Introducing New, HYV, Hybrid, GMO and fortified variety to farmer	8.19*	8.64*	1.21*	1.86*	****
2	Transferring new and demand driven technology to farmer through formal training, demonstration, field visit, and other extension service	8.04*	8.36*	1.55*	1.86*	****
3	Encouraging farmers in using recommended doses of organic and inorganic fertilizers to maintain soil health and productivity	6.77*	7.13*	2.48*	2.12*	****
4	Providing appropriate solution (chemical, mechanical and biological control measure) against pest management and crop protection	7.35*	7.83*	1.75*	2.24*	****
5	DAE Helping farmers in buying and using agri-machinery through Government subsidy	8.12*	7.57*	1.65*	1.75*	****
6	Providing farmers technical support in harvesting and processing to reduce post-harvest loss	6.65*	7.51*	3.16*	3.16*	****
7	Helping farmers in quality seed production and storage	7.38*	7.72*	2.06*	2.00*	****
8	Encouraging farmers for the production of potentially cultivable crop (pulses, oilseed and species)	6.23*	6.51*	3.08*	2.44*	****
9	Introducing crop zoning based crop production system	3.96	3.26	4.08	–	
10	Providing technology to use each and every inch of land horizontally and vertically	4.31	4.10	3.13*	–	
11	Helping farmers in diversified and intensified crop cultivation	7.15*	7.50*	1.95*	5.00*	****
<b>Cost effective, efficient and decentralized extension services</b>						

Sl. No.	Items	AAS	Scale value	Q-value	t-value	Selection Decision
12	Helping farmers in conservation and utilization of their available resources for the betterment of their life	5.96*	6.54*	2.62*	4.24*	****
13	Regular monitoring to make agricultural inputs available to the farmers	7.77*	7.90*	1.80*	1.86*	****
14	Helping farmers in cost–benefit analysis to reduce production cost and increase income	7.85*	8.28*	1.95*	3.51*	****
15	Providing market information in buying and selling produce	4.38	4.51	2.79*	–	
16	Introducing environment friendly technology like Organic Agriculture, IPM, ICM, GAP	6.92*	7.51*	2.65*	3.51*	****
17	Adopting chemical free Agricultural Practices	4.31	4.17	3.42*	–	
<b>Targeting and mobilizing farmers group (FG)</b>						
18	Formation of farmers group like IPM club, FFS, CIG etc. for rapid knowledge transfer program	7.65*	8.13*	1.85*	2.71*	****
19	Encouraging Farmers to join in group meeting, discussions and other group activities	7.50*	8.17*	2.57*	2.00*	****
20	Regular monitoring of group activities for group dynamics	7.15*	6.64*	2.23*	1.00	
21	Promoting farmer`s decision making ability	4.42	4.51	2.50*	–	
22	Managing conflict if any	4.46	3.53	3.31*	–	
23	Coordination with farmers and agricultural research organization	4.46	5.00	4.24	–	
24	Encouraging and helping group members to gain confidence and increase their bargaining power and strengthening their collective voices	6.77*	7.00*	3.04*	1.20	
25	Help farmers in group registration, account opening etc.	6.27*	5.67*	2.75*	1.46	
<b>Bottom-up planning and implementation</b>						
26	Target fixation of the main crop production encourages farmers to achieve national food security	6.92*	8.10*	4.15	1.58	
27	Highlighting farmers` technology considering their culture and social values	7.15*	7.55*	3.05*	1.58	
28	Conduction of FINA, PRA, RRA, Problem census to identify and address the needs of farmers and develop need based technology	7.08*	7.70*	2.52*	3.16*	****
29	Appreciating farmers for commendable performances	6.92*	8.17*	2.93*	2.30*	****
<b>Coordinated and integrated extension services through NAES</b>						
30	Maintaining links and co-coordinating activities with other extension service providers like livestock, fisheries organizations and NGOs.	7.08*	7.83*	2.52*	0.00	

Sl. No.	Items	AAS	Scale value	Q-value	t-value	Selection Decision
31	Helping to have link with credit giving organization for credit support	4.46	4.75	2.24*	–	
32	Integrated service for overall farm management (IFMC)	4.42	4.51	3.00*	–	
33	Development and Strengthening “One-Stop Service Center (e.g. FIAC)	7.27*	6.17*	3.00*	2.91*	****
<b>Support to development of agri-business and market linkage</b>						
34	Providing support for commercialization of fruits and high value crops	6.81*	6.67*	3.49*	1.76*	****
35	Institutional strengthening	4.38	4.17	4.18	-	
36	Credit support for farming	4.46	4.75	5.01	-	
37	Technological support in value addition, marketing and export oriented skill	5.88*	7.34*	3.43*	3.80*	****
38	Make farm to factory linkage	4.50*	4.70	3.00*		
<b>Adoption to climate change and development of specialized extension service for climatically distressed areas</b>						
39	Early and post disaster loss assessment for quick rehabilitation	6.65*	7.17*	2.80*	2.91*	****
40	Use of adaptive techniques and climate smart agriculture for disaster and climate risk reduction in Agriculture	7.27*	7.84*	1.78*	1.46	
41	Providing early warning and helping in minimizing crop damage	7.38*	7.72*	1.77*	1.84*	****
42	Encouraging farmer to adopt technology (sorjan, floating agriculture, floating seed bed) to mitigate climate change effect	7.38*	7.95*	1.99*	1.12	
43	Providing training on things to do in crop cultivation in floods and flash floods, drought and salinity	7.58*	7.95*	1.99*	1.54	
44	Searching and sharing farmers’ ways of adaptation to climate change	4.42	4.30	4.46	-	
<b>Mainstreaming women in agriculture</b>						
45	Involving at least 25% women farmer in extension program	7.27*	8.26*	3.08*	2.86*	****
46	Introducing women friendly skill development programs like homestead gardening, livestock rearing, nutrition improvement	7.73*	8.51*	2.33*	2.91*	****
47	Highlighting disaster proneness of women and children and build awareness accordingly	4.50*	4.64	2.29*	–	
48	Involving women farmers in the executive positions in farmers’ organization	6.31*	6.93*	3.37*	1.58	
<b>Digitalized agricultural extension services (e-agriculture)</b>						
49	Introducing ICT mediated services like agri-related organizations’ websites, apps, blogs and social media	5.96*	6.26*	3.00*	2.12*	****



Sl. No.	Items	AAS	Scale value	Q-value	t-value	Selection Decision
50	Use of online Fertilizer recommendation Guide software	6.19*	7.03*	3.45*	1.39	
51	Making a phone call to SAAO, Krishi call centre 16123 and krishok bondhu sheba 3331 for problem solving	7.15*	7.01*	2.70*	1.48	
52	Use of agricultural apps like Balinashok prescriber, Krishoker Janala. etc.	6.65*	7.30*	2.70*	1.58	

\*selected by AAS/Scale-value/Q-value/t-value

\*\*\*\*Finally selected based on AAS, Scale-value, Q-value and t-value

### 3.6.1.2 Testing validity and reliability of technical services

Initially items representing the nine (9) dimensions of NAEP were collected after thorough consultation with relevant experts and available literatures. As per Judges' rating items of technical quality of advisory services having Average Appropriateness Score (AAS) of  $\geq 4.5$  ( $\geq$  half of the highest possible score of 9 i.e.  $\geq 9/2$ ), Scale value of  $\geq 5.09$  ( $\geq$  Mean – Standard Deviation i.e.  $\geq 6.63 - 1.54$ ) and Q-value of  $\leq 3.61$  ( $\leq$  Mean + Standard Deviation i.e.  $\leq 2.79 + 0.82$ ) were selected. Based on pre-test results, items having t-value of  $\geq 1.75$  were selected for the final scale. These procedures indicate that the content validity was built in the process of constructing the scale. Again, validity of satisfactions items of technical quality of services was measured by the relationships between the scores of individual items and composite scores of all the 25 items of technical quality of services of 24 farmers. The coefficient of correlations between the scores of individual items and the composite scores of 25 items of technical quality of advisory service were significant at 0.000 to 0.05 level with 22 degrees of freedom. On the basis of the procedure followed, it can be assumed that the scale had content validity.

Cronbach's alpha and Average Inter-item Correlation (AIC) of the items were determined. Cronbach's alpha value of  $\geq 0.7$  indicates strong reliability (George and Mallery, 2003) and AIC of  $\geq 0.15$  indicates higher order construct (Clark and Watson, 1995). It was found that the Cronbach's alpha of 25 items of technical of

services were 0.892 which was greater than 0.7. Again AIC of 25 items of technical quality of services were 0.264 which was greater than 0.15. Therefore, it can be said that the internal consistency reliability of the items was strong. It means that the scale constructed by using the above procedures was reliable. Again, the reliability of technical quality of satisfactions items was measured by split-half method. The items were administered to 24 farmers. All the 25 items were divided into two halves, one with 13 odd numbered items and other with 12 even numbered items. The coefficient of correlation between the two sets of scores of the farmers against the odd numbered items and even numbered items was computed and the value was found to be strongly significant (0.843) at 0.000 level with 22 degrees of freedom. The reliability co-efficient, thus obtained indicated that the 'internal consistency' of the items was quite high.

### **3.6.2 Functional quality of DAE advisory services**

#### ***Initial collection of satisfaction items***

Initially 16 items of satisfaction on functional quality of services of DAE were collected in the light of 5 dimensions of Parasuraman *et al.* (1985) after thorough consultation with the agricultural scientists and extension experts of Bangladesh and from review of available related literatures of home and abroad. The consultation helps in necessary corrections and modifications of the 16 items.

#### **3.6.2.1 Selection of items (functional quality) by computing t-value based on pre-test results**

The collected 16 items of functional quality of DAE advisory services were analyzed on the basis of pre-test data obtained by administering on 24 farmers randomly selected from the representative part of the research population excluding the sample of the main study. Farmers were asked to indicate their level of satisfaction against each of these statements with four alternative responses as 'highly satisfied', 'moderately satisfied', 'low satisfied' and 'not satisfied at all' after assigning the scores of 3, 2, 1 and 0 respectively. Thus, the possible score of

satisfaction on functional quality of services of the pretest sample farmers could range from 0-48, while 0 indicating not satisfied at all and 48 indicating highest satisfaction on the functional quality of services provided by DAE. In the pre-testing process, space was provided for criticism and suggestions to improve the items; this helped to ensure face validity of the instrument as well as to test the usefulness of the instrument, question clarity, language used, and consistency.

***Analysis of satisfaction Items as per Likert’s Technique of Summated Ratings***

Selected 16 items were analyzed by using Likert’s technique of summated ratings for final selection of items for measuring satisfaction on technical quality of advisory services. Similar procedure was followed to measure the t-values of the items of functional quality of advisory services as technical quality of advisory services of DAE. The items having ‘t’ values  $\geq 1.75$  were finally selected, as such out of 16 items, 10 items of satisfaction on functional quality of services were selected for the final scale as shown in Table 3.7 with star mark (\*).

**Table 3.7 “t-values” of the items regarding Functional Quality of Advisory Services of DAE**

Sl. No.	Item	t-value
1	DAE as a reliable organization that concern about farmers’ welfare and committed to do so	3.16*
2	Creating environment of trust and provide bias free services by DAE extension agents	3.16*
3	Sufficient farmer and extension agent ratio to serve farmers’ purposes	2.24*
4	Allocation of sufficient time by DAE extension agents for any farmer	2.71*
5	Helping farmers without expecting anything from them	0.86
6	Maintaining confidentiality in handling farmers’ problems	1.46
7	Providing timely training to the farmers which farmers can apply in their fields	0.88
8	Well preparedness of DAE agents during extension training program	2.08*
9	Empathizing of DAE agents with the farmers	0.42
10	Courteous, polite, and respectfulness of DAE agents to all categories of farmers	1.91*
11	Perfect knowledge and skill of DAE agents to perform tasks	2.24*
12	Easily accessible proximity of point (office visit/face to face contact/ phone) of DAE agents to provide advisory services	2.24*
13	Careful listening farmers’ views and speaking with understandable language to them	0.00
14	Availability of equipment and facilities of DAE to provide training or advisory services	2.86*
15	Useful and easily understandable information provided by DAE	2.00*
16	Working to understand farmers’ needs	0.71

### **3.6.2.2 Testing validity and reliability of functional services**

Initially items in the light of 5 dimensions of Parasuraman et al. (1985) collected after thorough consultation with relevant experts and available literatures. Afterwards, necessary corrections and modifications were done to increase understandability of the items in the context of Bangladesh. Based on pre-test results, items having t-value of  $\geq 1.75$  were selected for the final scale. These procedures indicate that the content validity was built in the process of constructing the scale. Again, validity of satisfactions items of functional quality of services was measured by the relationships between the scores of individual items and composite scores of all the 10 items of functional quality of services of 24 farmers. The coefficient of correlations between the scores of individual items and the composite scores of 10 items of functional quality of advisory services were significant at 0.000 to 0.05 level with 22 degrees of freedom. On the basis of the procedure followed, it can be assumed that the scale had content validity.

Cronbach's alpha and Average Inter-item Correlation (AIC) of the items were determined. Cronbach's alpha value of  $\geq 0.7$  indicates strong reliability (George and Mallery, 2003) and AIC of  $\geq 0.15$  indicates higher order construct (Clark and Watson, 1995). It was found that the Cronbach's alpha of 10 items of functional quality of services were 0.786 which was greater than 0.7. Again AIC of 10 items of functional quality of services were 0.320 which was greater than 0.15. Therefore, it can be said that the internal consistency reliability of the items was strong. It means that the scale constructed by using the above procedures was reliable. Again, the reliability of functional quality of satisfactions items was measured by split-half method. The items were administered to 24 farmers. All the 10 items were divided into two equal halves, one with 5 odd numbered items and other with 5 even numbered items. The coefficient of correlation between the two sets of scores of the farmers against the odd numbered items and even numbered items was computed and the value was found to be strongly significant (0.720) at

0.000 level with 22 degrees of freedom. The reliability co-efficient, thus obtained indicated that the 'internal consistency' of the items was quite high.

### **3.6.3 Scale to measure farmer satisfaction**

Based on the above mentioned procedures scale was constructed to measure farmers' satisfaction on the advisory services of DAE in Bangladesh by adding items of technical and functional quality of advisory services which can be seen in the question No. 16 of the interview schedule (Appendix-1)

Thus, a total of 35 items (25 for technical quality and 10 for functional quality) constituted the scale for measuring farmers' satisfaction on the advisory services of DAE. These items were administered to the respondent farmers by assigning scores as 3, 2, 1 and 0 for 'highly satisfied', 'moderately satisfied', 'low satisfied' and 'not satisfied at all' respectively. Three qualities attributes of agricultural-extension services: (a) availability, (b) relevancy, and (c) usefulness were used to measure the items as 'highly satisfied', 'moderately satisfied', 'low satisfied' and 'not satisfied at all'. When the respondents found a service available, relevant and useful, then he/she assigned score three (03) i.e. highly satisfied, when the respondents found any two quality attribute for a item they assigns score two (02) i.e. moderately satisfied, score one (01) any one and zero (0) for none of the quality attribute perceived by the respondents. Total satisfaction score of a respondent was obtained by adding all the scores against all the 35 items of the respondent. Thus, the satisfaction score of a respondent could range from 0 to 105, where, '0' indicated lowest level of satisfaction and '105' indicated highest level of satisfaction on the advisory services of DAE.

### **3.7 Determinations of satisfaction index (SI)**

To ascertain the comparison among the satisfaction items, Satisfaction index of each item of satisfaction scale was measured by adding the scores of all the respondents against that item by using the following formula:

$$SI = F_H \times 3 + F_M \times 2 + F_L \times 1 + F_N \times 0$$

Where,

SI = Satisfaction Index

$F_H$  = Frequency of farmers had high satisfaction

$F_M$  = Frequency of farmers had moderate satisfaction

$F_L$  = Frequency of farmers had low satisfaction

$F_N$  = Frequency of farmers had no satisfaction

Thus, SI of the satisfaction items could range from 0-1074. Where “0” indicated no satisfaction and “1074” indicated highest satisfaction.

**Standardized Satisfaction Index (SSI)** was measured for each satisfaction item by using the following formulae:

$$SSI = \frac{SI \text{ of the item}}{\text{highest possible SI}} \times 100$$

Thus the SSI of the items could range from 0-100, where “0” indicated no satisfaction and “100” indicated the highest satisfaction.

Rank order was made based on the descending order of SSI of the items. Average SSI of technical quality of services and functional quality of services were measured to compare between them.

### **3.8 Collection of data**

Data were collected during the period from 1<sup>st</sup> August – 30<sup>th</sup> November, 2021. To avoid response bias face-to-face personal interviews using structured interview schedules were performed. Both open and close ended questions were arranged in chronological order based on research objective(s) and were asked by researcher herself. Before going for an interview, it were been confirmed that (i) the asking questions were relevant, short, direct, clear and unambiguous; (ii) used language is precise and simple with a simple set of answer options; (iii) questionnaire having appropriate structure (number of questions per page, the survey logic and length)

through its validity and reliability test. Interviewer's fill-up the questioner and will make a note (while needed) against interviewees given oral responses during the interview period. To avoid any misunderstanding/ misleading information between interviewer(s) and interviewees, it was confirmed DAE representative (Sub-Assistant Agricultural Officer (SAAO)) presence in an advance on the spot during the interview period by prior schedule. Only those SAAOs were invited to present at interview spots whose were working over there at least last two years and familiar with each selected farmer. The riddles answer was majorly solved by taking help from SAAO. SAAO will preserve every farmer's updated data record as their regular official task. Therefore, their presences will help to minimize riddle responses. If they will feel any farmer is providing any riddle response while taking the interview by the researcher, they will help to make it correct by crosschecking with updated official data record sheet. Sometimes it was solved by spending enough time with the interviewees through establishing rapport and then repeating questions to them, and then farther will make a cross check the previously given answers. The researcher also will apply his professional expertise while conducting face-to-face interview. Additionally, he will take partial supports from local society leaders to minimize any unexpected environmental /social troubles/pitfalls (while needed).



Photo 3.1 The researcher interviewing the farmer at Sylhet Sadar Upazila



Photo 3.2 The researcher interviewing the farmer at Botiaghata Upazila





Photo 3.3 The researcher interviewing the farmer at Bhagha Upazila



Photo 3.4 Supervision of the research work at Singair Upazila by the Chairman of the Advisory committee and the Funding Authority (Director, NATP-Phase-2)

### **3.9 Statement of Hypotheses**

Hypothesis may be broadly divided into two categories, namely research hypothesis and null hypothesis.

#### **3.9.1 Research hypothesis**

The following research hypothesis was put forward to test contribution/effect of the selected predictors of the farmers to/on their satisfaction on the advisory services of DAE. The research hypothesis was: "Fifteen (15) selected predictors of the farmers have significant contribution and effect to/on their satisfaction on the advisory services of DAE ".

#### **3.9.2 Null hypothesis**

The aforesaid research hypothesis was converted into null hypothesis for testing the conceptual model of the study. The hypotheses formulated for testing the conceptual model of the study are presented below:

##### **Major Hypothesis is**

**H<sub>0</sub>:** "There is no contribution the selected predictors of the respondent farmers to/on their satisfaction on the advisory services of DAE."

**Personal predictors** include Age, Education, Family size and Farming experience of the farmers.

**Economic predictors** include Net cropped area, Cropping intensity, Annual crop production income, Commercialization of the farmers.

**Institutional predictors** include Training exposure, Organizational participation, Willingness to seek advisory services, Extension contact of the farmers.

**Psychological predictors** include Innovativeness, Decision making ability, Aspiration of the farmers.

### **3.10 Statistical Procedures Used**

After collecting the data from the respondents, these were compiled, tabulated and analyzed in accordance with the objectives of the study. Statistical measures such as number and percentage distribution, possible and observed range, mean, standard deviation and co-efficient of variation were used in describing the selected variables. Rank order was also used in some cases. Spearman rank order correlation test was initially done. Full model regression analysis was also done. Due to misleading results from multi-collinearity, stepwise multiple regressions 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 variable.

## CHAPTER 4

### RESULTS AND DISCUSSIONS

#### 4.1 Farmers' satisfaction on the advisory services of DAE

Literature confirms the crucial interaction between farmers and advisory service provider in forming the level of satisfaction. Some believe that farmer satisfaction is a result from direct interaction with the service provider. As direct service recipients, farmers can provide information about their personal subjective experiences, Ganpat *et al.* (2014).

This study followed Gronroos (1984) model of service quality which consist of two aspects : **i)** Technical quality of advisory service, which involves services offered by DAE, and **ii)** Functional quality of advisory service which is concerned with the personal perception of interaction between farmer (service receiver) and DAE (service provider).

The technical quality of advisory services consists of 25 items and functional quality of services consists of 10 items (presented in Annexure -1 question no. 16 A. and 16 B respectively). The possible range of technical quality of advisory services was 0-75 and possible range of functional quality of advisory services was 0-30. Thus the total of advisory services consists of 35 items and the possible range was 0-105. Salient features like range, mean and standard deviation (SD) of satisfaction and distribution of the farmers based on their perceived satisfaction on DAE advisory services are presented in Table 4.1.

**Table 4.1 Salient features and distribution of the farmers according to their extent of satisfaction on technical services, functional services and total of advisory service**

Dimensions of Advisory services	Categories	Range		Farmers		Mean	SD
		Possible	Observed	Number	Percent		
Satisfaction on Technical services	Low (<mean-sd, i.e < 37)	0-75	11-73	68	19.0	52.72	15.60
	Medium (mean±sd, i.e 37-68)			267	74.6		
	High (>mean+sd, ie > 68)			23	6.4		
	Total			358	100.0		
Satisfaction on Functional services	Low (<mean-sd, i.e, <16)	0-25	6-28	51	14.2	21.57	4.95
	Medium (mean±sd, i.e. 16-26)			296	82.7		
	High (>mean+sd, i.e.>26)			11	3.1		
	Total			358	100.0		
Overall Satisfaction on Advisory services	Low (<mean-sd, i.e, <54)	0-105	18-99	64	17.9	74.28	19.82
	Medium (mean±sd,i.e, 54-94)			283	79.1		
	High (mean+sd,i.e, >94)			11	3.1		
	Total			358	100.0		

#### **4.1.1 Satisfaction on technical quality of advisory services**

Findings indicated that satisfaction on technical quality of advisory services scores of the farmers ranged from 11 to 73 against the possible range of 0 to 75 with the mean of 52.72 and standard deviation of 15.6 .The farmers were classified into three categories on the basis of their satisfaction on technical services as shown in Table 4.1.

Majority (74.6 percent) of the farmers had medium satisfaction on technical quality of advisory services as compared to 19 percent had low and 6.4 percent had high satisfaction on technical quality of advisory services of DAE. The satisfaction on technical quality of advisory service depend on its' usefulness,

availability and relevancy with farmers' need. The mean value indicated that, majority of the farmers were perceived medium satisfaction, that means they found technical services offered by DAE either were available and relevant or available and useful or relevant and useful as perceived by the farmers. Farmers were not satisfied on many aspects of the technical services and coverage of all the services also not satisfactory to all categories of farmer that leads to moderate level of satisfaction. Kassem *et al.* (2021) revealed that farmers were moderately satisfied with services that were available, relevant, accessible, and effective in their operations. DAE needs to find out the way make the services available, relevant, accessible, and effective to all categories of farmer.

#### **4.1.2 Satisfaction on functional quality of advisory services**

Findings indicated that Satisfaction on functional quality of advisory services scores of the farmers ranged from 6 to 28 against the possible range of 0 to 30 with the mean 21.57, standard deviation of 4.95 and co-efficient of variation of 22.95%. The farmers were classified into three categories on the basis of their Satisfaction on functional quality of advisory services as shown in Table 4.1.

Majority (82.7 percent) of the farmers had medium satisfaction on functional quality of advisory services as compared to 14.2 percent had low and 3.1 percent had high satisfaction on functional services of DAE. This means that, although the usefulness, availability and relevancy of the extension service is very important to farmers and will help them make decisions, other aspects of quality such as tangibility, reliability, responsiveness, assurance, and empathy (Parasuraman *et al.* 1988) that means functional quality are also very important for farmers' satisfaction. This may be due to lack of extension personnel competency and professionalism. This finding was consistent with Debnath *et al.* (2016). DAE should emphasized that in order to improve the performance of agricultural extension personnel one of the way is by getting to know their competencies, skills and abilities then plan how it can be improved.

### **4.1.3 Overall satisfaction on advisory services**

Findings indicated that overall satisfaction on advisory services scores of the farmers ranged from 18 to 99 against the possible range of 0 to 105 with the mean 74.28 and standard deviation of 19.82. The farmers were classified into three categories on the basis of their perceived overall satisfaction on advisory services of DAE as shown in Table 4.1.

Majority (79.1 percent) of the farmers had medium satisfaction on the overall advisory services as compared to 17.9 had low and 3.1 percent had high satisfaction on overall advisory services of DAE.

The farmers acknowledged advisory services to be effective when both technical and functional quality of advisory services were found usefulness, available, relevant for them. The results support the conclusion that both technical and functional quality of the services that farmers receive has the greatest effect in raising their satisfaction. In other words, focusing on only a single aspect may reduce farmers' satisfaction. (Awatade *et al.* 2019; Debnath *et al.* 2016; Elias *et al.* 2016; Ganpat *et al.* 2014 and Adesiji *et al.* 2010) moderate satisfaction on farmers' overall satisfaction with extension advisory services.

The probable reason for their moderate satisfaction with the advisory services may be due to the lack of direct contact with farmers, lack of timely information supply and less use of ICT related communication media. The results are consistent with the work of Buadi *et al.* (2013), in which farmers were moderately satisfied with agricultural information. Emphasis should be taken by DAE on ICT based communication with farmer and regular monitoring of farmers activities and also selecting services considering farmers' need.

### **4.2 Ranking items of satisfaction on advisory services**

To ascertain the comparison among the satisfaction items, Satisfaction Index (SI) and Standardized satisfaction index (SSI) of each item of satisfaction scale was

measured by using the formula mentioned in chapter 3 of this dissertation. The ranking of the items associated with the technical quality of advisory services and functional quality of advisory services with reference to the satisfaction scores of the farmers is shown in Table 4.2.1 and 4.2.2 Rank orders of the items were made based on the descending order of SSI.

#### 4.2.1 Comparison among the item of satisfaction on technical quality of advisory services

The mean value of SSI for technical quality of advisory services was 70.29 and the standard deviation was 11.11. Items were classified into three categories as low satisfied ( $< \text{Mean} - \text{SD}$ , i.e.  $< 59.18$  as SSI), moderately satisfied ( $\text{Mean} \pm \text{SD}$ , i.e.  $59.18$  to  $81.4$  as SSI) and high satisfied ( $> \text{Mean} + \text{SD}$ , i.e.  $> 81.4$  as SSI) as shown in Table 4.2.1

**Table 4.2.1 Satisfaction Index (SI), Standardized satisfaction index (SSI), Rank order and extent of satisfaction of the item of technical quality of advisory services**

Sl. No	Item of satisfaction	No of Farmers					SI	SSI (%)	Rank order	Extent of satisfaction
		Highly Satisfied	Moderate Satisfied	Low Satisfied	Not at all satisfied	Total				
<b>A. Technical Quality of DAE Advisory Services</b>										
1.	Introducing New, HYV, Hybrid, GMO and fortified variety to farmer	287	37	34	0	358	969	90.22	1	Highly satisfied
2.	Transferring new and demand driven technology to farmer through formal training, demonstration, field visit, and other extension service	192	107	49	10	358	839	78.12	7	Moderately satisfied
3.	Encouraging farmers in testing soil and using recommended	161	92	100	5	358	767	71.42	13	Moderately satisfied



Sl. No	Item of satisfaction	No of Farmers					SI	SSI (%)	Rank order	Extent of satisfaction
		Highly Satisfied	Moderate Satisfied	Low Satisfied	Not at all satisfied	Total				
	doses of organic and inorganic fertilizers to maintain soil health and productivity									
4.	Providing appropriate solution (chemical, mechanical and biological control measure) against pest management and crop protection	259	67	32	0	358	943	87.80	2	Highly satisfied
5.	DAE Helping farmers in buying and using agri-machinery through Government subsidy	85	151	74	48	358	631	58.75	22	Low satisfied
6.	Providing farmers technical support in harvesting and processing to reduce post-harvest loss	180	76	94	8	358	786	73.18	11	moderately satisfied
7.	Helping farmers in quality seed production and storage	220	90	47	1	358	887	82.59	3	Highly satisfied
8.	Encouraging farmers for the production of potentially cultivable crop (pulses, oilseed and species)	101	144	99	14	358	690	64.25	18	Moderately satisfied
9.	Helping farmers in	177	92	69	20	358	784	73.00	12	Moderately satisfied

Sl. No	Item of satisfaction	No of Farmers					SI	SSI (%)	Rank order	Extent of satisfaction
		Highly Satisfied	Moderate Satisfied	Low Satisfied	Not at all satisfied	Total				
	diversified and intensified crop cultivation									
10.	Helping farmers in conservation and utilization of their available resources for the betterment of their life	163	82	70	43	358	723	67.32	15	Moderately satisfied
11.	Regular monitoring to make agricultural inputs available to the farmers	177	124	56	1	358	835	77.75	9	Moderately satisfied
12.	Helping farmers in cost-benefit analysis to reduce production cost and increase income	87	159	93	19	358	672	62.57	19	Moderately satisfied
13.	Introducing environment friendly technology like Organic Agriculture, IPM, ICM, GAP	204	82	68	4	358	844	78.58	6	Moderately satisfied
14.	Formation of farmers group like IPM club, FFS, CIG etc. for rapid knowledge transfer program	131	130	58	39	358	711	66.20	16	Moderately satisfied
15.	Encouraging Farmers to join in group meeting, discussions and other group activities	222	62	74	0	358	864	80.45	5	Moderately satisfied

Sl. No	Item of satisfaction	No of Farmers					SI	SSI (%)	Rank order	Extent of satisfaction
		Highly Satisfied	Moderate Satisfied	Low Satisfied	Not at all satisfied	Total				
16.	Conduction of FINA, PRA, RRA, Problem census to identify and address the needs of farmers and develop need based technology	128	110	57	63	358	661	61.55	20	Moderately satisfied
17.	Appreciating farmers for commendable performances	171	68	96	23	358	743	69.37	14	Moderately satisfied
18.	Maintaining links and co-coordinating activities with other extension service providers like livestock, fisheries organizations and NGOs.	119	125	97	17	358	704	65.55	17	Moderately satisfied
19.	Providing support for commercialization of fruits and high value crops	85	91	76	106	358	513	47.77	25	Low satisfied
20.	Technological support in value addition, marketing and export oriented skill	142	165	43	8	358	799	74.39	10	Moderately satisfied
21.	Early and post disaster loss assessment for quick rehabilitation	81	116	47	114	358	522	48.60	24	Low satisfied
22.	Providing early warning and helping in minimizing crop damage	178	136	30	14	358	836	77.84	8	Moderately satisfied

Sl. No	Item of satisfaction	No of Farmers					SI	SSI (%)	Rank order	Extent of satisfaction
		Highly Satisfied	Moderate Satisfied	Low Satisfied	Not at all satisfied	Total				
23.	Involving at least 25% women farmer in extension program	117	83	118	40	358	632	59.12	21	Low satisfied
24.	Introducing women friendly skill development programs like homestead gardening, livestock rearing, nutrition improvement	202	118	38	0	358	880	81.94	4	Highly satisfied
25.	Introducing ICT mediated services like agri-related organizations' websites, apps, blogs and social media	128	85	75	70	358	629	58.57	23	Low satisfied
	<b>Total</b>	<b>3997</b>	<b>2593</b>	<b>1695</b>	<b>665</b>		<b>18872</b>	<b>1757.17</b>		

Farmers were highly Satisfied on four (4), moderately satisfied on 16 items and low satisfied on five (5) items of technical quality of advisory services of DAE. Item wise brief descriptions are presented below:

***Introducing New, HYV, Hybrid, GMO and fortified variety to farmer***

Data in the Table 4.2.1 revealed that from the farmers' views the item of "Introducing New, HYV, Hybrid, GMO and fortified variety to farmer" had the highest Standardized Satisfaction Index (90.22) obtained the first rank for technical quality of advisory services. Farmer's main target is to increase production and productivity and in this case variety is an important factor. This might be the reason for the highest level of farmers' satisfaction on "Introducing New, HYV, Hybrid, GMO and fortified variety to farmer".

***Providing appropriate solution (chemical, mechanical and biological control measure) against pest management and crop protection)***

Data in the Table 4.2.1 revealed that “Providing appropriate solution (chemical, mechanical and biological control measure) against pest management and crop protection” had the second highest standardized satisfaction index (SSI) based on descending order of SSI among the items. The SSI score was 87.80%. It means on this item farmers were highly satisfied (Highly satisfied= > mean + sd, i.e, > 81.4). In agricultural ecosystems, pests, plant pathogens, and weeds pose a major challenge to crop productivity and global food security. So, effective pest management is essential for maintaining or increasing crop production and productivity. Farmers’ want close involvement of extension workers with farmers and the training of farmers in pest management is essential.

***Helping farmers in quality seed production and storage***

“Helping farmers in quality seed production and storage” had the third highest standardized satisfaction index (SSI) based on descending order of SSI among the items. The SSI score was 82.59%. It means on this item farmers were highly satisfied (Highly satisfied= > mean + sd, i.e, > 81.4). This might be seed is an important input for crop production and DAE provide advice on how to produce quality seed of rice, wheat, pulse, oilseed spices etc, doing rouging to remove odd variety, how to maintain proper moisture during storage and preservation, which might be the causes for this findings.

***Introducing women friendly skill development programs like homestead gardening, livestock rearing and nutrition improvement***

“Introducing women friendly skill development programs like homestead gardening, livestock rearing, and nutrition improvement” had the fourth highest standardized satisfaction index (SSI) based on descending order of SSI among the items. The SSI score was 81.94%. It means on this item farmers were highly satisfied (Highly satisfied= > mean + sd, i.e, > 81.4). This might be because of

women farmers make almost half of the agricultural workforce and international development programs implemented by DAE were gender focused, which might be the causes of this findings.

***Encouraging Farmers to join in group meeting, discussions and other group activities***

“Encouraging Farmers to join in group meeting, discussions and other group activities” had the fifth highest standardized satisfaction index (SSI) based on descending order of SSI among the items. The SSI of this item was 80.45 which means moderately satisfied as SSI. This might be because of DAE had implemented plans to promote the establishment of new farmers’ groups and also strengthen existing groups and extension personnel will work more with farmers in groups to increase extension-to-farmer interactions.

***Introducing environment friendly technology like Organic Agriculture, IPM, ICM, GAP***

“Introducing environment friendly technology like Organic Agriculture, IPM, ICM, GAP” had the sixth highest standardized satisfaction index (SSI) based on descending order of SSI among the items. The SSI of this item was 78.58 which means moderately satisfied as SSI. DAE had implemented a lot of environment friendly technology for the last three decades like IPM, ICM, GAP, organic agriculture etc, this is why now perching, and use of sex pheromone trap, fruit bagging and other method become popular, which might be the causes of this findings.

***Transferring new and demand driven technology to farmer through formal training, demonstration, field visit, and other extension service***

“Transferring new and demand driven technology to farmer through formal training, demonstration, field visit, and other extension service” had the seventh highest standardized satisfaction index (SSI) based on descending order of rank among the items. Efficient and Effective Dissemination of Technology is an important item, many technologies require a lengthy period, often of many years

from the time they become available to the time they are widely adopted. Therefore, a common problem for many individuals and organizations is how to speed up the rate of dissemination of a technology. Implementation modalities including the target groups are important in determining the dissemination and adoption of new technologies in the field, which might be the causes of these findings. The SSI score 78.12% which means the respondent were moderate satisfied on this item.

***Providing early warning and helping in minimizing crop damage***

“Providing early warning and helping in minimizing crop damage” had the eighth highest standardized satisfaction index (SSI) based on descending order of rank among the items. This may be due to Farmers of Bangladesh faces a lot of natural calamities and disasters and DAE on behalf of the Government provide early warning and help in minimizing crop damage. The SSI score 77.84% which means the respondent were moderate satisfied on this item.

***Regular monitoring to make agricultural inputs available to the farmers***

“Regular monitoring to make agricultural inputs available to the farmers” had the ninth highest standardized satisfaction index (SSI) based on descending order of rank among the items. With the introduction of HYV varieties through the various development programs implemented by the DAE coordinated effort were made to supply of quality seeds and other production inputs. Production, processing, preservation and distribution of quality seeds, fertilizer and other inputs, timely availability of this input make this item important and respondent were highly satisfied, which might be the causes for this findings. On this item the respondent were moderate satisfied as SSI score were 77.75%.

***Technological support in value addition, marketing and export oriented skill***

“Technological support in value addition, marketing and export oriented skill” had the tenth highest standardized satisfaction index (SSI) based on descending

order of rank among the items. The SSI score 74.39 which are above the average score of SSI that means the respondent were moderately satisfied on this item.

***Providing farmers technical support in harvesting and processing to reduce post-harvest loss***

“Providing farmer technical support in harvesting and processing to reduce post-harvest loss” had the eleventh highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 73.18 which are above the average score of SSI that means the respondent were moderately satisfied on this item.

***Helping farmers in diversified and intensified crop cultivation***

“Helping farmers in diversified and intensified crop cultivation” had the twelfth highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 73.00 which are above the average score of SSI that means the respondent were moderately satisfied on this item.

***Encouraging farmers in testing soil and using recommended doses of organic and inorganic fertilizers to maintain soil health and productivity***

“Encouraging farmers in testing soil and using recommended doses of organic and inorganic fertilizers to maintain soil health and productivity” had the thirteenth highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 71.42 which are above the average score of SSI that means the respondent were moderately satisfied on this item.

***Appreciating farmers for commendable performances***

“Appreciating farmers for commendable performances” had the fourteenth highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 69.37 which were below the average (moderately satisfied= mean SSI  $\pm$  sd of SSI, i.e,81.4- 59.18) score of SSI that means the respondent are satisfied.



***Helping farmers in conservation and utilization of their available resources for the betterment of their life***

“Helping farmers in conservation and utilization of their available resources for the betterment of their life” had the fifteenth highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 67.32 which were below the average (moderately satisfied= mean SSI  $\pm$  sd of SSI, i.e,81.4- 59.18) score of SSI that means the respondent were moderately satisfied on this item.

***Formation of farmers group like IPM club, FFS, CIG etc. for rapid knowledge transfer program***

“Formation of farmers group like IPM club, FFS, CIG etc. for rapid knowledge transfer program” had the sixteenth highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 66.20 which were below the average (moderately satisfied= mean SSI  $\pm$  sd of SSI, i.e,81.4- 59.18) score of SSI that means the respondent were moderately satisfied on this item.

***Maintaining links and co-coordinating activities with other extension service providers like livestock, fisheries organizations and NGOs.***

“Maintaining links and co-coordinating activities with other extension service providers like livestock, fisheries organizations and NGOs.” had the seventeenth highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 65.55 which were below the average (moderately satisfied= mean SSI  $\pm$  sd of SSI, i.e,81.4- 59.18) score of SSI that means the respondent were moderately satisfied on this item.

***Encouraging farmers for the production of potentially cultivable crop (pulses, oilseed and species)***

“Encouraging farmers for the production of potentially cultivable crop (pulses, oilseed and species)” had the eighteenth highest standardized satisfaction index

(SSI) based on descending order of rank among the items. The SSI score 64.25 which were below the average (moderately satisfied= mean SSI  $\pm$  sd of SSI, i.e,81.4- 59.18) score of SSI that means the respondent were moderately satisfied on this item.

***Helping farmers in cost–benefit analysis to reduce production cost and increase income***

“Helping farmers in cost–benefit analysis to reduce production cost and increase income” had the nineteenth highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 62.57 which were below the average (moderately satisfied= mean SSI  $\pm$  sd of SSI, i.e,81.4- 59.18) score of SSI that means the respondent were moderately satisfied on this item.

***Conduction of FINA, PRA, RRA, Problem census to identify and address the needs of farmers and develop need based technology***

“Conduction of FINA, PRA, RRA, Problem census to identify and address the needs of farmers and develop need based technology” had the twentieth highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 61.55 which were below the average (moderately satisfied= mean SSI  $\pm$  sd of SSI, i.e, 81.4- 59.18) score of SSI that means the respondent were moderately satisfied on this item.

***Involving at least 25% women farmer in extension program***

“Involving at least 25% women farmer in extension program” had the 21th highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 59.12 which were below the average score of SSI that means the respondent were (low satisfied= <mean-sd, i.e, <59.18) low satisfied.

***DAE Helping farmers in buying and using agri- machinery through Government subsidy***

“DAE helping farmers in buying and using agri- machinery through Government subsidy” had the 22th highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 58.75 which were below the average score of SSI that means the respondent were (low satisfied=  $< \text{mean-sd}$ , i.e,  $< 59.18$ ) low satisfied.

***Introducing ICT mediated services like agri-related organizations’ websites, apps, blogs and social media***

“Introducing ICT mediated services like agri-related organizations’ websites, apps, blogs and social media” had the 23th highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 58.70 which are below the average score of SSI that means the respondent were (low satisfied=  $< \text{mean-sd}$ , i.e,  $< 59.18$ ) low satisfied.

***Early and post disaster loss assessment for quick rehabilitation***

“Early and post disaster loss assessment for quick rehabilitation” had the 24th highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 48.60 which were below the average score of SSI that means the respondent were (low satisfied=  $< \text{mean-sd}$ , i.e,  $< 59.18$ ) low satisfied.

***Providing support for commercialization of fruits and high value crops***

“Providing support for commercialization of fruits and high value crops” had the 24th highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 47.77 which were below the average score of SSI that means the respondent were (low satisfied=  $< \text{mean-sd}$ , i.e,  $< 59.18$ ) low satisfied.

#### 4.2.2 Comparison among the items of satisfaction on the functional quality of advisory services

The ranking of the items associated with the functional quality of advisory services with reference to the satisfaction scores of the farmers was shown in Table 4.2.2 Rank orders of the items were made based on the descending order of SSI. The mean value of SSI for functional quality of advisory services is 71.90 and the standard deviation is 11.70.

Items were classified into three categories as low satisfied ( $< \text{Mean} - \text{SD}$ , i.e.  $< 60.2$  as SSI), moderately satisfied ( $\text{Mean} \pm \text{SD}$ , i.e.  $83.6 - 60.2$  as SSI) and high satisfied ( $> \text{Mean} + \text{SD}$ , i.e.  $> 83.6$  as SSI) as shown in Table 4.2.2

**Table 4.2.2 Satisfaction Index (SI), Standardized Satisfaction Index (SSI) Rank order, and extent of satisfaction of the item of functional quality of advisory services**

Sl. No	Item of satisfaction	No of Farmers					SI	SSI (%)	Rank order	Extent of Satisfaction
		Highly satisfied	Moderately satisfied	Low satisfied	Not at all satisfied	Total				
<b>B. Functional Quality of DAE Advisory Services</b>										
1.	DAE as a reliable organization that concern about farmers' welfare and committed to do so.	214	100	43	1	358	885	82.40	2	moderately satisfied
2.	Creating environment of trust and provide bias free services by DAE extension agents	196	108	52	2	358	856	79.70	3	moderately satisfied
3.	Sufficient farmer and extension agent ratio to serve farmers' purposes	30	192	107	29	358	572	54.10	10	Low satisfied
4.	Allocation of sufficient time by DAE extension agents for any farmer	97	178	75	8	358	722	67.23	6	moderately satisfied
5.	Well	170	150	38	0	358	848	78.96	4	moderate

Sl. No	Item of satisfaction	No of Farmers					SI	SSI (%)	Rank order	Extent of Satisfaction
		Highly satisfied	Moderately satisfied	Low satisfied	Not at all satisfied	Total				
	preparedness of DAE agents during extension training program									ly satisfied
6.	DAE agents are Courteous, polite, and respectfulness to all categories of farmers	281	70	6	1	358	989	92.09	1	highly satisfied
7.	Perfect knowledge and skill of DAE agents to perform tasks	79	166	87	26	358	656	61.08	9	moderately satisfied
8.	Easily accessible proximity of point (office visit/face to face contact/ phone) of DAE agents to provide advisory services	51	215	83	9	358	666	62.01	8	moderately satisfied
9.	Availability of equipment and facilities of DAE to provide training or advisory services	82	197	67	12	358	707	65.83	7	moderately satisfied
10.	Useful and easily understandable information provided by DAE	137	181	39	1	358	812	75.61	5	moderately satisfied
	<b>Total</b>	<b>1337</b>	<b>1557</b>	<b>597</b>	<b>89</b>		<b>7722</b>	<b>718.99</b>		

Farmers were highly satisfied on one (01) item, moderately satisfied on eight (8) items and low Satisfaction on one (01) item of functional quality of advisory services of DAE. Item wise brief descriptions are presented below:

***DAE agents are Courteous, polite, and respectfulness to all categories of farmers***

For functional quality of advisory services data in the Table 4.2.2 showed that “DAE agents are Courteous, polite, and respectfulness to all categories of farmers” had the highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 92.09 which are above the average score of SSI that means the respondent were (Highly satisfied=  $> \text{mean} + \text{sd}$ , i.e,  $> 83.6$ ) highly satisfied with this item.

***DAE as a reliable organization that concern about farmers’ welfare and committed to do so.***

For functional quality of advisory services data in the Table 4.2.2 showed that “DAE as a reliable organization that concern about farmers’ welfare and committed to do so” had the second highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 82.40 which are above the average score of SSI that means the respondent were (moderately satisfied=  $\text{mean SSI} \pm \text{sd}$  of SSI, i.e,  $83.6 - 60.2$ ), moderately satisfied with this item.

***Creating environment of trust and provide bias free services by DAE extension agents***

For functional quality of advisory services data in the Table 4.2.2 showed that “Creating environment of trust and provide bias free services by DAE extension agents” had the third highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 79.70 which are above the average score of SSI that means the respondent were (moderately satisfied=  $\text{mean SSI} \pm \text{sd}$  of SSI, i.e,  $83.6 - 60.2$ ), moderately satisfied with this item.

***Well preparedness of DAE agents during extension training program***

“Well preparedness of DAE agents during extension training program” had the fourth highest standardized satisfaction index (SSI) based on descending order of

rank among the items. The SSI score 78.96 which are above the average score of SSI that means the respondent were (moderately satisfied= mean SSI  $\pm$  sd of SSI, i.e, 83.6- 60.2),) moderately satisfied with this item.

***Useful and easily understandable information provided by DAE***

“Useful and easily understandable information provided by DAE” had the fifth highest standardized satisfaction index (SSI) based on descending order of SSI among the items. The SSI score 75.61 which are above the average score of SSI that means the respondent were (moderately satisfied= mean SSI  $\pm$  sd of SSI, i.e, 83.6- 60.2),) moderately satisfied with this item.

***Allocation of sufficient time by DAE extension agents for any farmer***

“Allocation of sufficient time by DAE extension agents for any farmer” had the sixth highest standardized satisfaction index (SSI) based on descending order of SSI among the items. The SSI score 67.23 which are above the average score of SSI that means the respondent were (moderately satisfied= mean SSI  $\pm$  sd of SSI, i.e, 83.6- 60.2),) moderately satisfied with this item.

***Availability of equipment and facilities of DAE to provide training or advisory services***

“Availability of equipment and facilities of DAE to provide training or advisory services” had the seventh highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 65.83 which are above the average score of SSI that means the respondent were (moderately satisfied= mean SSI  $\pm$  sd of SSI, i.e,83.6- 60.2),) moderately satisfied with this item.

***Easily accessible proximity of point (office visit/face to face contact/ phone) of DAE agents to provide advisory services***

“Easily accessible proximity of point (office visit/face to face contact/ phone) of DAE agents to provide advisory services” had the eighth highest standardized satisfaction index (SSI) based on descending order of rank among the items. The

SSI score 62.01 which are above the average score of SSI that means the respondent were (moderately satisfied= mean SSI  $\pm$ sd of SSI, i.e,83.6- 60.2),) moderately satisfied with this item.

***Perfect knowledge and skill of DAE agents to perform tasks***

“Perfect knowledge and skill of DAE agents to perform tasks” had the ninth highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 61.08 which are above the average score of SSI that means the respondent were (moderately satisfied= mean SSI  $\pm$ sd of SSI, i.e, 83.6- 60.2),) moderately satisfied with this item.

***Sufficient farmer and extension agent ratio to serve farmers’ purposes***

“Sufficient farmer and extension agent ratio to serve farmers’ purposes” had the tenth highest standardized satisfaction index (SSI) based on descending order of rank among the items. The SSI score 54.10 which are above the average score of SSI that means the respondent were (low satisfied=  $<$ mean-sd, i.e,  $<$ 60.2) low satisfied with this item. The reason behind this findings that, DAE front line worker were concentrating on wider geographical area when compared to private extension organizations or NGO. Hence, the extension personnel to farmer ratio was very high (One extension officer was available to facilitate the advisory service needs of farmers). Interestingly, agri-business firms and agricultural consultancies were concentrating on a very limited number of clientele. Similar result found by Saravanan *et al.* ( 2007)

**4.2.3 Comparison between technical quality and functional quality of advisory services of DAE**

An independent samples t-test was used to compare the mean of technical quality of advisory services and the functional quality of advisory services and the result shown in Table 4.3



**Table 4.3 Mean difference of technical quality of advisory services and the functional quality of advisory services**

	Name of the group	No of items in group	Mean of SSI	SD	<i>Value of “t” (sig. level )</i>
Advisory services	Technical quality of advisory services	25	70.29	11.10	-0.383 (0.704)
	Functional quality of advisory services	10	71.90	11.70	

Table 4.3 revealed that mean of SSI of functional quality of services was slightly higher than technical quality of services, but “t-value” indicated that there were no statistically significant differences between technical quality of advisory services and functional quality of advisory services of DAE.

### 4.3 Predictors profile of the farmers

Farmers are not a homogenous entity and have different demands for advisory services, and it is relevant and important for advisory services to consider this in configuring their supply (Jansen *et al.*, 2010; Klerkx *et al.* 2014; Aguilar *et al.* 2015). Regarding personal, economic, social and psychological attributes, it is necessary to discuss in detail how these factors (age, education, family size, farming experience, net cropped area, cropping intensity, annual crop production income, commercialization, training exposure, organizational participation, willingness to seek advisory services, extension contact, innovativeness, decision making ability and aspiration) may influence farmers' satisfaction with agricultural advisory services.

The purpose of this chapter is to describe the 15 selected predictors of the respondent farmers as indicated in the objectives of the study. Some of the salient features including measuring unit, possible range and observed range of these 15 selected predictors of the farmers have been presented in Table 4.4.

**Table 4.4 Measuring unit, possible range and observed range of the selected predictors of the respondent farmers**

Predictors	Measuring unit	Possible Range	Observed Range
<b>Personal</b>			
Age	Years	Unknown	19-70
Education	Schooling years	Unknown	0-15
Family Size	Number	Unknown	2-17
Farming experience	Years	Unknown	3-50
<b>Economic</b>			
Net cropped area	Hectare	Unknown	.14-5.50
Cropping intensity	Score (Percent)	Unknown	100-300
Annual crop production income	'000' Taka	Unknown	34-1616.40
commercialization	Score (Percent)	0-100	19.43-98.64
<b>Institutional</b>			
Training exposure	Score	Unknown	0-98
Organizational participation	Score	Unknown	0-30
Willingness to seek advisory services	Score	0-12	3-12
Extension contact	Score	0-68	7-62
<b>Psychological</b>			
Innovativeness	Score	0-56	6-50
Decision making ability	Score	9-36	10-36
Aspiration	Score	0-48	10-42

The 15 selected predictors of the farmers have been described in next four (4) sub-sections. Procedure followed in measuring the predictors have been described in Chapter 3. For describing the predictors of the farmers, they were classified into suitable categories according to each of the predictors. Category wise number and percentage distribution have been used to describe the predictors (Table 4.5 to 4.8).

### 4.3.1 Personal Predictors

A person may possess many personal predictors. Four personal predictors of the respondent farmers namely age, education, family size and farming experience were selected for the present study. Category wise number and percent distribution of these four selected personal predictors with mean and standard deviation (SD) have been presented in Table 4.5 and discussed below:

**Table 4.5 Salient Features and Distribution of the respondent farmers according to their personal predictors (N=358)**

Predictors	Categories	Number	Percent	Mean	SD
Age (years)	Young (up to 30)	13	3.6	<b>46.07</b>	<b>9.382</b>
	Middle-aged (31 to 50)	237	66.2		
	Old (above 50)	108	30.2		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		
Education (schooling years)	Illiterate (0)	12	3.4	<b>8.094</b>	<b>3.9498</b>
	Can sign only (0.5)	27	7.5		
	Primary (1 to 5)	64	17.9		
	Secondary (6 to 10)	179	50.0		
	Above secondary (11 to 12)	76	21.2		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		
Family size (number)	Small family (up to 4)	141	39.4	<b>5.28</b>	<b>1.93</b>
	Medium family (5 to 7)	181	50.6		
	Large family (above 7)	36	10.1		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		
Farming experience (years)	Low (> Mean - .5 Sd)	112	31.3	<b>22.65</b>	<b>8.252</b>
	Medium ( Mean± .5 Sd)	139	38.8		
	High(> Mean +.5 Sd)	107	29.9		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		

#### **4.3.1.1 Age**

Age of the respondent farmers was determined by the number of years from his/her birth to the time of interview. The age of the farmers ranged from 19 years to 70 years, the mean being 46.07 with standard deviation of 9.38. The respondents of the study area were classified into three categories on the basis of their age (years) as young, middle-aged and old (Table 4.5).

Data contained in the Table 4.5 indicated that the majority (66.2 percent) of the farmers were middle-aged compared to 3.6 percent being young and 30.2 percent old. Findings indicated that a large proportion (96.4 percent) of the farmers were middle-aged to old. Above results indicate that adult people are more involved in agricultural production more than young people. According to FAOSTAT (2006) 15 – 64 years of age are considered as the economic productive or active age. However, age of the respondent farmers was positively significant ( $r = 0.132^*$ , significant at 0.012 level) with their satisfaction on the advisory services of DAE. So, DAE needs to build positive feelings for the younger farmers who will be the future of farming.

#### **4.3.1.2 Education**

Schooling years of the farmers ranged from zero (0) to 12.0, the mean being 8.094 with the standard deviation of 3.95. The farmers were classified into five categories according to their level of education as illiterate, can sign only, primary education, secondary education and above secondary education (Table 4.5).

Data presented in the Table 4.5 expressed that half (50 percent) of the farmers had secondary of level education, while 21.2 percent and 17.9 percent had higher secondary level education and primary education respectively. Only 7.5 percent of the farmers could sign only and 3.4 percent were illiterate. Findings also revealed that overwhelming majority (89.1 percent) of the respondents had education from primary to above secondary level. These findings indicate that the respondents had

relatively higher level of education than the national average adult (15+) literacy rate of population which is 74.7 percent (BBS, 2019). This implies that level of educational attainment can increase the ability of a farmer to access and interpret relevant information about agricultural innovations, facilitate managerial skills which in turn lead to efficient use of agricultural inputs to enhance productivity. However, education of the respondent farmers was positively associated with their satisfaction on the advisory services of DAE ( $r = 0.180^{**}$ , significant at 0.001 level). This might be due to greater use of Information and Communication Technology (ICT). Now Bangladesh have well developed ICT infrastructure in Agriculture sector, and more educated farmers are more comfortable using this technology to access and use information retrieved that leads greater satisfaction.

Some researcher found that education level positively influences farmers' satisfaction because education increases the individual's resources and capacity to achieve goals. Aphunu *et al.*, (2008) noted that literacy is necessary to maximize the benefit from extension messages. In other words, the better the educational status of farmers is, the more wisely they utilize extension services (Eric *et al.*, 2014). Moreover, Ao *et al.*, (2017) and Ganpat *et al.*, (2014) found that the higher the farmers' education level is, the greater their likelihood of satisfaction on extension services. Oluwatayo, (2009) found out that education had significant and positive relationship with farmers' level of awareness to innovation, diffusion and adoption of innovation.

#### **4.3.1.3 Family size**

Family size of the farmers was found to range from 2 to 17 with mean and standard deviation of 5.28, and 1.93 respectively. According to family size of the farmers, they were classified into three categories as small family, medium family and large family (Table 4.5).

Data furnished in Table 4.5 indicated that more than half (50.6 percent) of the farmers had medium family size compared to 39.4 percent small family and 10.1 percent large family. Data also indicated that average family size (5.28) of the farmers were higher than the national average of 4.06 (BBS, 2016). A great majority (76 percent) of the farmers of the study area had medium and large families (60.7 percent). However, family size of the respondent farmers was not significantly related ( $r=0.051^{NS}$ ) with their satisfaction on advisory services of DAE.

This might be due to, majority of the farmers in Bangladesh have limited land holding and agriculture is the only occupation, which is a cause of low income. Involvement of family labor in small land holding produced low per capita economic output that didn't show any significant relationship with their satisfaction on advisory services of DAE. So, Advisory services provided by DAE need to focus on income generation for most of the family members.

#### **4.3.1.4 Farming experience**

It was found that farming experiences of the respondent farmers ranged from 3-50 years with mean and standard deviation of 22.65 and 8.25 respectively. On the basis of farming experiences, the respondent farmers were classified into three categories, such as, low, medium and high farming experiences (Table 5.2).

Data presented in Table 4.5 indicated that the highest proportion (43.9 percent) of the farmers belonged to low farming experience category compared to 23.5 percent had medium experience and 32.7 percent represented the high farming experiences group. However, the majority of the farmers (56.2%) have more than 15 years of farming experience, there existed a significant positive relationship ( $r = 0.297^{**}$  significant at .000) between agricultural experiences of the respondent farmers and their satisfaction on advisory services. This implies that an increase in years of farming experience would lead to an increase in satisfaction level and

vice versa. This is in line with expectation that a fair duration of farming experience could lead to a better understanding of newly introduced agricultural programs.

Adesiji *et al.* (2014) confirmed that farming experience may affect their level of knowledge about the services offered by extension agents and Experience is an indicator of knowledge and practical skills. Furthermore, Elias *et al.* (2015) found that farming experience positively influences their satisfaction on advisory services of DAE due to their acquaintance with exposure.

#### **4.3.2 Economic Predictors**

Damisa *et al.* (2008) also found that economic factors influence farmers' satisfaction. Therefore, economic benefits are viewed as one of the most important investments that a service provider makes to provide opportunities for farmers to financially succeed and gain a sustainable competitive advantage (Yazdanpanah *et al.*, 2013). An individual farmer may have many economic predictors. The present study deals with four (4) economic predictors of the farmers namely net cropped area, cropping intensity, annual crop production income and commercialization. Category wise number and percent distribution of these four (4) selected economical predictors with mean, and SD have been presented in Table 4.6 and discussed below:

**Table 4.6 Salient features and distribution of the respondent farmers according to their economic predictors (N-358)**

Predictors	Categories	Number	Percent	Mean	SD
Net cropped area (ha)	Marginal farmer (0.02-0.2 ha.)	8	2.2	<b>1.0044</b>	<b>0.696</b>
	Small farmer (0.2-1.0 ha.)	212	59.2		
	Medium farmer (1-3 ha.)	131	36.6		
	Large farmer(> 3.00 ha)	7	2.0		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		
Cropping intensity	Low cropping intensity (< mean-1sd, i.e. <153.4)	67	18.7	<b>205.64</b>	<b>52.25</b>
	Medium cropping intensity (mean±1sd, i.e.153.4 -257.9)	219	61.2		
	High cropping intensity (>mean +1sd, i.e.>257.9)	72	20.1		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		
Annual crop production income ('000' taka)	Low income (< mean-.5 sd, i.e. < 152.56)	123	34.4	<b>255.56</b>	<b>206.01</b>
	Medium income (mean± .5sd, i.e.152.56 -358.57)	162	45.3		
	High income (>mean +1sd, i.e.>358.58)	73	20.4		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		
Commercialization(%)	Low (up to 50)	35	9.8	<b>73.06</b>	<b>14.906</b>
	Medium (50.1 to 75)	135	37.7		
	High (above 75)	188	52.5		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		

#### 4.3.2.1 Net cropped area

Net cropped area of a respondent referred to the area on which his /her family carried out farming operation. Detailed procedure of measurement has been mentioned in Chapter 3 of this dissertation. Net cropped area of the respondents was found to range from 0.14 hectare to 5.50 hectares with an average of 1.0044 hectare with the standard deviation of 0.696. Depending on the net cropped area, the farmers were classified into four categories such as: marginal farmers, small



farmers, medium farmers and large farmers (Table 4.6) in accordance with the instruction given by DAE (1999).

Data furnished in Table 4.6 indicated that the highest proportion (59.2 percent) of the respondents were small farmers, while 2.2, 36.2 and 2.0 percent were marginal, medium and large farmers respectively. Many researchers found that in developing countries most of the farmers are small-scale farmers (farm size less than 5 hectares). Resource-poor and illiterate small-scale farmers have reaped meager benefits from extension services compared to relatively resource-rich and educated large-scale farmers (Elias *et al.* 2015; Adesiji *et al.* 2014; Agbarevo and Benjamin, 2013; Swanson and Rajalahti, 2010). Rashid *et al.* (2016) found that farmers' access to government extension service is strongly correlated with land size. However, In this study, Net cropped area of the respondent farmers had no significant relationship with their satisfaction on advisory services of DAE ( $r=.066^{NS}$ ).

This might be due to as majority of the farmer have small land holding and reaped less extension support, on the other hand extension agents are interested with large farmers because they are easily accessible, innovative in nature and more willing to take advisory services, so, in this study net cropped area had no significant relationship with their satisfaction on advisory services of DAE.

There is the opportunity for the reorganization of extension services of DAE, extension agents need to continue to work with the many small farmers, which increase satisfaction and supports national food security.

#### **4.3.2.2 Cropping intensity**

Procedure for measurement of cropping intensity of the respondent farmers is described in Chapter 3 of this dissertation. Cropping intensity of the respondents was found to range from 100% to 300% with an average of 205.64%, standard deviation of 52.25. Depending on the cropping intensity, the farmers were

classified into three categories, viz. low, medium and high cropping intensity (Table 4.6).

Data furnished in Table 4.6 indicated that 61.2 percent of the farmers land had medium cropping intensity compared to 18.7 percent and 20.1 percent farmers' land had low and high cropping intensity respectively. The average cropping intensity (205.64 percent) of the land of the respondent farmers was found higher than the national Cropping Intensity of 190 percent (BBS, 2020).

The findings again revealed that overwhelming majority (81.3 percent) of the land of the respondent farmers had medium to high cropping intensity these might be due to that small farmers were more involve in short duration vegetable cultivation that results higher cropping intensity. However, cropping intensity of the respondent farmers had no significant relationship with their satisfaction on the advisory services of DAE ( $r = 0.057^{NS}$ ). Similar result was revealed by Saravanan et al. (2016).

#### **4.3.2.3 Annual crop production income**

It was found that annual crop production income of the farmers ranged from Tk. 34 thousand to Tk. 1616.40 thousand with the mean of 255.56, standard deviation of 206.01. On the basis of annual crop production income, the respondent farmers were classified into three categories, such as, low annual crop production income, medium annual crop production income and high annual crop production income (Table 4.6).

Data presented in Table 4.6 showed the distribution of the farmers on the basis of their annual crop production income. It indicated that the highest proportion (45.3 percent) of the farmers belonged to medium annual crop production income, 34.4 percent belonged to low annual crop production income and 20.4 percent high income. However, annual crop production income of the respondent farmers had

no significant relationship with their satisfaction on the advisory services of DAE ( $r=0.035^{NS}$ ).

#### **4.3.2.4 Commercialization**

Commercialization of the farmers was found to range from 19.43 to 98.64 against the possible range of zero (0) to 100 with the mean and standard deviation of 73.06 and 14.906. On the basis of commercialization, the respondent farmers were classified into three categories as low commercialization, medium commercialization and high commercialization (Table 4.6).

Data presented in Table 4.6 show the distribution of the farmers on the basis of their commercialization. It indicated that highest proportion (52.5 percent) of the farmers belonged to high commercialization group compared to 9.8 and 37.7 percent low and medium commercialization group respectively. Thus, all most cent percent (90.2 percent) of the respondents had medium to high commercialization. This might be due to that benefits gained after receiving extension service. Increase of agricultural productivity, agricultural income, achieving food self-sufficiency, able to produce cash crops and able to do cost benefit analysis influence farmer to involve in commercial cultivation and develop entrepreneurship. As a result the commercialization score of the respondents might be higher. Anang (2016) found that effective extension service leads more commercialization. The present study found that commercialization had no significant relationship with farmers' satisfaction on the advisory services of DAE ( $r = 0.035^{NS}$ ).

#### **4.3.3 Institutional Predictors**

Most of the agricultural advisory services focus on adult farmers. Knowles (1980) outlined some character of adult learner that they are mature, independent, and self-directed; their readiness to learn is related to the developmental task of their

social role. In this study four (4) institutional predictors of the respondent farmers were selected. Their Category wise, number and percent distribution have been presented in Table 4.7 and discussed below:

**Table 4.7 Salient feature and distribution of the respondent farmers according to their Institutional predictors (N-358)**

Predictors	Categories	Number	Percent	Mean	SD
Training exposure (days)	Low training exposure (< mean - 0.5 sd i.e. upto 4)	153	42.7	<b>9.74</b>	<b>10.76</b>
	Medium training exposure (mean $\pm$ 0.5 sd i.e. 5 to 15)	90	25.1		
	High training exposure (> mean + 0.5 sd i.e. above 16)	115	32.1		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		
Organizational participation (scores)	Low org. participation (<mean- .5sd, i.e. 1.87)	117	32.7	<b>4.32</b>	<b>4.9</b>
	Medium org. participation (mean $\pm$ .5sd, i.e. 1.88-6.77)	166	46.4		
	High org. participation (>mean+ .5sd, i.e. 6.78)	75	20.9		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		
Willingness to seek advisory services (scores)	Low willingness (upto 3)	231	64.5	<b>5.15</b>	<b>3.07</b>
	Medium willingness (4-8)	105	29.3		
	High willingness (> 9)	22	6.1		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		
Extension contact (scores)	Low (7-15.75)	38	10.6	<b>25.38</b>	<b>9.62</b>
	Medium (15.753-35.008)	265	74.0		
	High( above 35.009)	55	15.4		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		

#### 4.3.3.1 Training exposure

Training exposure scores of the farmers ranged from 0 to 98 with the mean being 9.74, standard deviation of 10.76. Based on the training exposure scores, the farmers were classified into three categories as low training exposure (< mean -

0.5 sd i.e. upto 4), medium training exposure (mean  $\pm$  0.5 sd i.e. 5 to 15) and high training exposure ( $>$  mean + 0.5 sd i.e. above 16) which is shown in Table 4.7

Table 4.7 showed the distribution of the farmers according to their training exposure. The data indicated that majority (42.7 percent) of the respondents had low training exposure, while 25.1 and 32.1 percent had medium and high training exposure respectively. The data also revealed that above two third (67.8 percent) of the respondent farmers had low to medium training exposure. Access to training can also an important factor to build farmers' know-how as well as skill and in turn it might have positive influence for farmers' satisfaction. However, training exposure of the respondent farmers had a positive relationship with their satisfaction on advisory services of DAE( $r = 0.340^{**}$ , significant at 0.000 level).

Joshi *et al.* (2017) found that numbers of times training received was found correlated with education level of farmers & frequency of contact between the farmer and the extension workers. Trainings received was also found correlated with perceived enhancement of productivity, perceived income growth by farmers, need-based nature of services, participatory nature of services, frequency of credit, use of different communication methods along with access to required information on agri-inputs, latest techniques and credit schemes that may results higher satisfaction and DAE needs to concentrate on those item in designing training program,

#### **4.3.3.2 Organizational participation**

The observed organizational participation score of the respondents ranged from 0 to 30. The mean score was 4.32 with the standard deviation of 4.9. Based on the organizational participation scores, the farmers were classified into three categories as low organizational participation ( $<$ mean- .5sd, i.e. 1.87), medium

organizational participation (mean $\pm$  .5sd, i.e. 1.88-6.77) and high organizational participation ( $>$ mean+ .5sd, i.e. 6.78)) which is shown in Table 4.7

Data showed in Table 4.7 signified that overwhelming majority (79.1 percent) of the respondent farmers had low to medium organizational participation as compared to 20.9 percent had high organizational participation. However, organizational participation of the respondent farmers was positively associated with their satisfaction on the advisory services of DAE. ( $r = 0.106^*$ , at the significance level .045). Kassem et al. (2021) found participation in agriculture related organization positively influences farmers' satisfaction.

#### **4.3.3.3 Willingness to seek advisory services**

The observed willingness to seek advisory services score of the respondents ranged from 3 to 12. The mean score was 5.15 with the standard deviation of 3.074. Based on the willingness to seek advisory services scores, the farmers were classified into three categories as low willingness to seek advisory services ( up to 3), medium willingness to seek advisory services (4-8) and high willingness to seek advisory services ( $>$ 9) which is shown in Table 4.7

Data showed in Table 4.7 showed that 64.5 percent of the respondent farmers had low willingness to seek advisory services and 29.3 percent had medium willingness to seek advisory services and only 6.1 percent had high willingness to seek advisory services. However, willingness to seek advisory services of the respondent farmers was no significant relation with their satisfaction on the advisory services ( $r = 0.096^{NS}$ ). Foti et al (2007) found that the degree of commercialization of farm enterprises, farmer income, farmer location (whether urban, rural or commercial), farm size, and risk attitude of the farmer significantly affect the demand for private fee-for-service extension

Ghiasi *et al.* (2017) found a significant portion of the farmers (54%) showed willingness to use advisory services of Plant clinic in Iran. The livestock sector of Bangladesh farmers are very much willing to seek advisory service even they are willing to pay for getting advisory services.

#### **4.3.3.4 Extension contact**

Extension contact scores of the respondents ranged from 7-62 against the possible score of zero (0) to 68. The mean score was 25.38 with the standard deviation of 9.628. On the basis of extension contact scores, the respondents were classified into three classes as low, medium and high level of extension contact (Table 4.7)

Data furnished in Table 4.7 revealed that highest proportion 74.0 percent of the respondents had medium extension contact and 15.4 percent had high level of extension contact while only 10.6 percent had low level of extension contact.. However, extension contact of the respondent farmers had positive significant relationship with their satisfaction on advisory services of DAE. ( $r= 0.527^{**}$ , significant level at .000).

Since extension contact is the main source of farmers' information on agricultural innovations, farmers' frequent participation increased their satisfaction. Although this result simply implies the effectiveness of extension services. DAE mainly arrange group methods such as FFS, Field Day, extension meetings to transfer extension messages. That results effective extension service. These results were consistent with those of previous studies (Debnath *et al.* 2016; Ganpat *et al.* 2014) that confirmed the significant role of participating in extension services in increasing farmer satisfaction. Elias *et al.* (2016) also found that frequency of extension contact on a regular basis help farmers to learn and discuss in detail about agricultural extension knowledge and innovations which influence farmers' decision that enable them to take action. DAE should make it a point to have more contact with the respondents as far as possible.

### 4.3.4 Psychological Predictors

An individual farmer may possess many psychological predictors. Three psychological predictors of the respondent farmers namely innovativeness, decision making ability, and aspiration were selected for the present study. Category wise number and percent distribution of these three selected psychological predictors have been presented in Table 4.8 and discussed below:

**Table.4.8 Salient feature and distribution of the respondent farmers according to their psychological predictors (N-358)**

Predictors	Categories	Number	Percent	Mean	SD
Innovativeness (scores)	Low Innovativeness (<mean- sd, i.e. 18)	46	12.8	<b>24.26</b>	<b>6.48</b>
	Medium Innovativeness (mean± .sd, i.e. 19-30)	263	73.5		
	High Innovativeness (mean+ sd, i.e. above 30)	49	13.7		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		
Decision making ability (scores)	Low decision making ability (<20)	56	15.6	<b>24.96</b>	<b>4.26</b>
	Medium decision making ability ( 21-29)	247	69.0		
	High decision making ability (>30)	55	15.4		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		
Aspiration (scores)	Low aspiration( <22)	60	16.8	<b>27.28</b>	<b>5.366</b>
	Medium aspiration(22-32)	248	69.3		
	High aspiration(>32)	50	14.0		
	<b>Total</b>	<b>358</b>	<b>100.0</b>		

#### 4.3.4.1 Innovativeness

Innovativeness scores of the farmers ranged from 10 to 42 against the possible range 0-56, with the mean 24.26 and standard deviation of 6.48. Based on the innovativeness scores, the farmers were classified into three categories as low innovativeness, medium innovativeness and high innovativeness (Table 4.8).



Table 4.8 indicated that majority (73.5 percent) of the respondents had medium innovativeness, while 33 and 13 percent had low and high innovativeness respectively. However, there was a positive significant relationship between innovativeness of the farmers and their satisfaction on advisory services of DAE ( $r = 0.340^{**}$ , significant at 0.000 level). The probable reason might be that, farmers are moderately innovative and they practice whatever the information sent to them and they regularly use the information, so, the innovativeness and satisfactions are significantly related each other. The above findings were in contrast with the findings Raghuprasad *et al.* (2013).

Majority of the respondent had medium level of innovation proneness and were very much interested to receive and adopt cost effective innovations (new technologies) disseminated by the DAE. The farmers were innovative and always attracted by profitable innovation. They wanted to try new things from the DAE in their own field and also willing to adopt innovations.

This is due to the fact that majority of the farmers' were in active working age group and have a good educational qualification, they had interest on the latest developments and technologies. They were curious about the recent technologies in agriculture and adopt affordable new innovations. DAE personnel needed to recognize themselves as active actors in the innovation processes, feeling more inclined to perform a technical assistance role.

#### **4.3.4.2 Decision making ability**

Decision making ability scores of the farmers ranged from 10 to 36 against the possible range of 9 to 36, the mean being 24.96 and standard deviation of 4.268. Based on the decision making ability scores, the farmers were classified into three categories as low decision making ability, medium decision making ability and high decision making ability (Table 4.8).

Table 4.8 indicated that majority (69 percent) of the respondents had medium decision making ability, while 15.6 and 15.4 percent had low and high decision making ability respectively. However, there was a positive relationship between decision making ability of the farmers and their satisfaction on advisory services of DAE ( $r = 0.418^{**}$ , significant at 0.000 level).

Taleghani (2016) found that farmers' participation in decision-making processes had positive effect on increasing their power of choose right direction which will benefited them, in turn enhanced their satisfaction.

#### **4.3.4.3 Aspiration**

The computed aspiration scores of the respondent farmers ranged from 8 to 34 against possible scores of zero (0) to 48 with the mean of 27.28 and standard deviation of 5.366. Based on the aspiration scores, the farmers were classified into three categories as low aspiration, medium aspiration and high aspiration (Table 4.8).

Data presented in Table 4.8 indicated that the highest proportion (69.3 percent) of the respondents had medium level of aspiration as compared to 16.8 percent having low aspiration and 14 percent high aspiration. The data also reveal that the most (96 percent) of the farmers had low to medium aspiration. But, there was no significant relationship between aspiration and satisfaction on advisory services ( $r=.098^{NS}$ )

#### **4.4 Contribution and effect of selected predictors of the farmers to /on their satisfaction on the advisory services of DAE**

The purpose of this part is to examine the contribution and effect of selected predictors of the farmers to/on their satisfaction on advisory services. It is argued that a correlation analysis is necessary to identify the degree of association between the dependent and selected independent variables in order to determine their expected signs prior to multivariate analysis.

A correlation analysis is done and Table 4.9 demonstrates the possible signs of selected numerous factors which can influence on their satisfaction on advisory services. The positive signs of the correlation coefficients of most of the included variables imply that selected variables will contribute positively and the negative signs imply declines in satisfaction on advisory services but in this study no negative signs in any variable were found.

Satisfaction on advisory services (Y) was the dependent variable of this study. The procedure followed in measuring the dependent and independent variables have already been discussed in Chapter 3. Research and null hypotheses have been stated for testing the contribution /effect of the selected predictors of the farmers to /on their satisfaction on advisory services (Chapter 3). Spearman rank order correlation test was initially run to test the relationships between all the selected predictors of the farmers and their satisfaction on advisory services of DAE.

Correlation analysis showed that out of 15 predictors of the farmers, 8 had significant relationship with their satisfaction on advisory services of DAE. The predictors, or in other words, independent variables, viz age, education, farming experience, training exposure, organizational participation, extension contact, innovativeness, decision making ability of the farmers had significant positive relationship with their satisfaction on the advisory services of DAE. But, the variables, viz., family size, net cropped area, cropping intensity, annual crop

production income, commercialization, willingness to seek advisory services and aspiration of the farmers had no significant relationship with their satisfaction on advisory services of DAE. Inter correlation (correlation Matrix) among all the variables may be seen in Appendix- VI

**Table 4.9 Results of correlation co-efficient (spearman rank correlation) of each of the selected predictors of the respondent farmer with their satisfaction on advisory services of DAE**

<b>Dependent Variables</b>	<b>Farmers predictors (Independent Variables)</b>	<b>Co-efficient of Correlation (r)</b>	<b>Sig.(two tailed)</b>
Satisfaction on advisory services	Age	0.132 <sup>*</sup>	0.012
	Education qualification	0.180 <sup>**</sup>	0.001
	Family size	0.051	0.332
	Farming experience	0.297 <sup>**</sup>	0.000
	Net cropped area	0.066	0.212
	Cropping intensity	0.057	0.279
	Annual crop income	0.035	0.504
	Commercialization	0.018	0.731
	Training exposure	0.340 <sup>**</sup>	0.000
	Organizational participation	0.106 <sup>*</sup>	0.045
	Willingness to seek Advisory services	0.096	0.07
	Extension contact	0.527 <sup>**</sup>	0.000
	Innovativeness	0.391 <sup>**</sup>	0.000
	Decision making ability	0.114 <sup>*</sup>	0.031
Aspiration	0.098	0.064	

**4.4.1 Contribution of the selected predictors of the farmers to their satisfaction on the advisory services of DAE**

The independent variables in isolation would not give a comprehensive picture of the contribution of independent variables to the satisfaction on advisory services (Y). The different predictors of the respondents may interact together to make a

combined contribution to the satisfaction on the advisory services of DAE. Keeping this fact in view linear multiple regression analysis was used to assess the contribution of the independent variables to satisfaction on advisory services of DAE. Full model multiple regression analyses were initially run by involving the following sets of independent variables with the farmers' satisfaction on the advisory services of DAE (Y) as the dependent variable.

**Set-I:**

All the selected 15 independent variables such as age ( $X_1$ ), education ( $X_2$ ), family size ( $X_3$ ), farming experience ( $X_4$ ), Net cropped area ( $X_5$ ), cropping intensity ( $X_6$ ), annual crop production income ( $X_7$ ), commercialization ( $X_8$ ), training exposure ( $X_9$ ), organizational participation ( $X_{10}$ ), willingness to seek advisory services ( $X_{11}$ ), extension contact ( $X_{12}$ ), Innovativeness ( $X_{13}$ ), decision making ability ( $X_{14}$ ) and aspiration ( $X_{15}$ )

**Set-II:**

Significant eight (8) independent variables after running spearman rank correlation like age ( $X_1$ ), education ( $X_2$ ), farming experience ( $X_4$ ), training exposure ( $X_9$ ), organizational participation ( $X_{10}$ ), extension contact ( $X_{12}$ ), Innovativeness ( $X_{13}$ ) and decision making ability ( $X_{14}$ ).

**Set-III:**

Only selected four (4) personal variables like age ( $X_1$ ), education ( $X_2$ ), family size ( $X_3$ ) and farming experience ( $X_4$ ).

**Set-IV:**

Only selected four (4) economic variables like Net cropped area ( $X_5$ ), cropping intensity ( $X_6$ ), annual crop production income ( $X_7$ ) and commercialization ( $X_8$ ).

**Set-V:**

Only selected four (4) Institutional variables like training exposure ( $X_9$ ), organizational participation ( $X_{10}$ ), willingness to seek advisory services ( $X_{11}$ ) and extension contact ( $X_{12}$ ).

**Set-VI:**

Only selected three (3) psychological variables like Innovativeness ( $X_{13}$ ), decision making ability ( $X_{14}$ ) and aspiration ( $X_{15}$ ).

**Set-VII:** By involving all the significant variables after running set-I to set-VI

Prior to the estimation of the model parameters, it is crucial to look into the problem of multicollinearity or association among the potential variables. To this end, the variance inflation factor (VIF) and tolerance analysis was used to test the degree of multicollinearity among the variables. VIF analysis minimizes the variance of the regression coefficients by identifying multi-collinearity within the selected independent variables. The variance inflation factor for a variable is computed as  $VIF=1/1-R^2$ , where  $R^2$  refers to the coefficient of determination. The VIF and tolerance analysis values for all explanatory variables are shown in **Table 4.10**

**4.10****Table 4.10 Results of variance inflation factor (VIF) and tolerance analysis**

Explanatory variables	Collinearity statistics	
	Tolerance	VIF
(Constant)	-	-
Age	0.379	2.637
Education qualification	0.734	1.363
Family size	0.942	1.061
Farming experience	0.339	2.946
Net cropped area	0.591	1.691
Cropping intensity	0.853	1.173
Annual crop income	0.550	1.817
Commercialization	0.842	1.188
Training exposure	0.709	1.411
Organizational participation	0.849	1.178
Willingness to seek Advisory services	0.882	1.134
Extension contact	0.501	1.998
Innovativeness	0.606	1.652
Decision making ability	0.872	1.147
Aspiration	0.828	1.208

Results in Table 4.10 indicated that the values of VIF and tolerance for variables were found to be less than 10 and higher than .02 respectively. To avoid serious

problem of multi-collinearity, it is quite essential to omit the variables with VIF value greater than or equal to 10 and tolerance value higher than 0.02 from the MLR analysis. Based on VIF and tolerance result, the data have no serious problem of multi-collinearity. As a result, all the 15 independent variables were retained and entered into multiple linear regression analysis.

It was observed that the full model regression results of almost all the sets were misleading due to the existence of interrelationships 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-efficients and regression co-efficients. (Table 4.9)

Droper and Smith (1981) suggested running stepwise multiple regression analysis to insert variables in turn until the regression equation is satisfactory. Therefore, in order to avoid the 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 7 sets of independent variables with the satisfaction of the advisory services of DAE. Ali (2008) followed this method to determine the contribution of the independent variable to the dependent variable. The objective of the step wise multiple regression models were to find out the contribution of the variables, which were significant only. Results of these 7 sets of step wise multiple regression analyses in the form of table or equation have been discussed below:

### **Set-I**

All the selected 15 independent variables of this study were fitted together in this set of step wise multiple regression with satisfaction on advisory services as the dependent variable. Table 4.11 revealed the summarized results of step-wise multiple regression analysis of the farmers' satisfaction on advisory services with their 15 independent variables. It was observed that out of 15 independent

variables only 4 variables namely extension contact ( $X_{12}$ ), innovativeness ( $X_{13}$ ), farming experience ( $X_4$ ) and education ( $X_2$ ) were entered in to the regression equation.

**Table 4.11 Summary of stepwise multiple regression analysis showing the contribution of all the 15 independent variables to the farmers' satisfaction on advisory services of DAE**

Variables entered	Standardized Partial 'b' coefficient	Value of 't' (with probability level)	Adjusted $R^2$	Increase in $R^2$	Variation explained in percent
Extension contact ( $X_{12}$ )	0.265	4.590(0.000)	0.216	0.216	<b>21.6</b>
Innovativeness ( $X_{13}$ )	0.219	3.918(0.000)	0.252	0.036	<b>3.6</b>
Farming experience ( $X_4$ )	0.194	3.971(0.000)	0.275	0.023	<b>2.3</b>
Education ( $X_2$ )	0.098	2.043(0.000)	0.281	0.006	<b>0.6</b>
<b>Total</b>				<b>0.281</b>	<b>28.1</b>

Multiple R = 0.538

R-square = 0.289

Adjusted R - square = 0.281

F-ratio = 35.914 at 0.000 level of significance

The remaining variables i.e. age ( $X_1$ ), family size ( $X_3$ ), net cropped area ( $X_5$ ), cropping intensity ( $X_6$ ), annual crop production income ( $X_7$ ), commercialization ( $X_8$ ), training exposure ( $X_9$ ) org. participation ( $X_{10}$ ) willingness to seek advisory services ( $X_{11}$ ), decision making ability ( $X_{14}$ ) and aspiration ( $X_{15}$ ) were not entered into the regression equation.

Data presented in Table 6.1 indicated that the multiple R,  $R^2$  and adjusted  $R^2$  in the step-wise multiple regression analysis were 0.538, 0.289 and 0.281 respectively, and the corresponding F-ratio of 35.914 were significant at 0.000 level. The regression equation so obtained is presented below:

$$Y = 29.638 + 0.265 (X_{12}) + 0.219(X_{13}) + 0.194 (X_4) + 0.098(X_2)$$

Constant = 29.638
Adjusted R - square = 0.281
F-ratio = 35.914 at 0.000 level of significance



This indicated that the whole model of fifteen (15) variables explained 28.1 percent of the total variation in effects of the farmers' satisfaction on advisory services of DAE. But since the standardized regression coefficients (Beta weight) of four (4) variables formed the equation and were significant, it might be assumed that whatever contribution was there, it was due to these four (4) variables.

### **Set-II**

Eight (08) independent variables (significant in spearman rank correlation) were fitted together in this set of step-wise multiple regression with the satisfaction on advisory services as the dependent variable. It was observed that out of eight (08) independent variables only four (0)4 variables namely extension contact ( $X_{12}$ ), innovativeness ( $X_{13}$ ), farming experience ( $X_4$ ) and education ( $X_2$ ) were entered into regression equation. This produce same result as Set-I.

The regression equation also found same as Set-I is presented below:

$$Y = 29.638 + 0.265 (X_{12}) + 0.219(X_{13}) + 0.194 (X_4) + 0.098(X_2)$$

Constant =29.638
Adjusted R - square = 0.281
F-ratio = 35.914 at 0.000
level of significance

The results were similar to set –I.

### **Set-III**

Only selected four (4) personal variables i.e. age ( $X_1$ ), education ( $X_2$ ), family size ( $X_3$ ) and farming experience ( $X_4$ ) under this set were fitted together into stepwise multiple regression as the independent variables with the extent of the satisfaction of the advisory services of DAE (Y) as the dependent variable. It was observed that out of 4 independent variables only two (2) variables namely, education ( $X_2$ ) and farming experience ( $X_4$ ) were entered into the regression equation.

The regression equation so obtained is presented below:

$$Y = 46.803 + 0.336(X_4) + 0.227(X_2)$$

Constant = 46.803  
Adjusted R - square = 0.127  
F-ratio = 26.906 at 0.000 level of significance

This indicated that the whole model of four (04) variables explained 12.7 percent of the total variation in effects of the farmers' satisfaction on the advisory services of DAE. But since the standardized regression coefficients (Beta weight) of two (2) variables formed the equation and were significant, it might be assumed that whatever contribution was there, it was due to these 2 variables.

#### **Set-IV**

Only selected four (4) economic variables i.e. net cropped area ( $X_5$ ), cropping intensity ( $X_6$ ), annual crop production income ( $X_7$ ), commercialization ( $X_8$ ), were fitted together as the independent variables in this Set-IV of step-wise multiple regression with the extent of the satisfaction of the advisory services of DAE ( $Y$ ) as the dependent variable. It was observed that out of four (4) independent variables only one (1) entered into the regression equation.

The regression equation so obtained is presented below:

$$Y = 70.884 + 0.119(X_5)$$

Constant = 70.884  
Adjusted R - square = 0.011  
F-ratio = 5.102 at 0.000 level of significance

This indicated that the whole model of four (4) variables explained 1.1 percent of the total variation in effects of the farmers' satisfaction on the advisory services of DAE. But since the standardized regression coefficients (Beta weight) of one (1) variable formed the equation and were significant, it might be assumed that whatever contribution was there, it was due to this one (1) variable.

### Set-V

Only selected four (04) Institutional variables i.e training exposure ( $X_9$ ), organizational participation ( $X_{10}$ ), willingness to seek advisory services ( $X_{11}$ ) and extension contact ( $X_{12}$ ) were fitted together as the independent variables in this Set-V of step-wise multiple regression with the effects of the farmers' satisfaction on the advisory services of DAE ( $Y$ ) as the dependent variable. It was observed that out of four (4) independent variables only two (2) variables namely, Extension contact ( $X_{12}$ ) and training exposure ( $X_9$ ) were entered into the regression equation. The regression equation so obtained is presented below:

$$Y = 50.667 + 0.339 (X_{12}) + 0.152 (X_9)$$

Constant = 50.667
Adjusted R - square = 0.233
F-ratio = 99.415 at 0.000
level of significance

This indicated that the whole model of four (04) variables explained 23.3 percent of the total variation in effects of the farmers' satisfaction on the advisory services of DAE. But since the standardized regression coefficients (Beta weight) of two (02) variables formed the equation and were significant, it might be assumed that whatever contribution was there, it was due to these two (02) variables.

Since extension contact is the main source of farmers' information on agricultural innovations, farmers' frequent participation increased their satisfaction. Although this result simply implies the effectiveness of extension services. DAE mainly arrange group methods such as FFS, Field Day, extension meetings to transfer extension messages. That results effective extension contact.

### Set-VI

Only selected three (03) psychological variables i.e. innovativeness ( $X_{13}$ ), decision making ability ( $X_{14}$ ) and aspiration ( $X_{15}$ ) were fitted together as the independent variables in this Set-VI of step-wise multiple regression with the effects of the

farmers' satisfaction on the advisory services of DAE (Y) as the dependent variable. It was observed that out of three (3) independent variables all one (1) variables namely innovativeness ( $X_{13}$ ) was entered into the regression equation.

The regression equation so obtained is presented below:

$$Y = 42.218 + 0.432(X_{13})$$

Constant = 42.218

Adjusted R - square = 0.184

F-ratio = 81.647 at 0.000 level of significance

This indicated that the whole model of three (03) variables explained 18.4 percent of the total variation in effects of farmers' satisfaction on the advisory services of DAE. But since the standardized regression coefficients (Beta weight) of one (01) variable formed the equation and was significant, it might be assumed that whatever contribution was there, it was due to this variable named innovativeness.

#### **Set-VII (Final model)**

After running above six sets of stepwise multiple regression analysis, it was found that six (06) individual variables namely, education ( $X_2$ ), farming experience ( $X_4$ ), net cropped area ( $X_5$ ), training exposure ( $X_9$ ), extension contact ( $X_{12}$ ), innovativeness ( $X_{13}$ ) were significant in either one or more sets. Attempt has been made to run stepwise multiple regression analysis by these six (06) Independent variables with the effects of the farmers' satisfaction on the advisory services of DAE (Y) as the dependent variable. Table 4.12 revealed the summarized results of step-wise multiple regression analysis showing the contribution of all the six (06) independent variables to the effects of the farmers' satisfaction on the advisory services of DAE. It was observed that out of six (06) independent variables only four (04) variables namely, extension contact ( $X_{12}$ ), innovativeness ( $X_{13}$ ), farming experience ( $X_4$ ) and education ( $X_2$ ) were entered into regression equation were entered into regression equation. It was also found that result of this set of stepwise multiple regression analysis was exactly same as the result of set-I and

set-II. The results of this model is again shown in Table 4.12 and treated as the final model.

**Table 4.12 Summary of stepwise multiple regression analysis showing the contribution of all the significant variables after running Set-I to Set-VI of stepwise multiple regression analysis to the effects of farmers' satisfaction on the advisory services of DAE.**

Variables entered	Standardized Partial 'b' coefficient	Value of 't' (with probability level)	Adjusted R <sup>2</sup>	Increase in R <sup>2</sup>	Variation explained in percent
Extension contact(X <sub>12</sub> )	0.265	4.590(0.000)	0.216	0.216	<b>21.6</b>
Innovativeness (X <sub>13</sub> )	0.219	3.918(0.000)	0.252	0.036	<b>3.6</b>
Farming experience (X <sub>4</sub> )	0.194	3.971(0.000)	0.275	0.023	<b>2.3</b>
Education (X <sub>2</sub> )	0.098	2.043(0.000)	0.281	0.006	<b>0.6</b>
<b>Total</b>				<b>0.281</b>	<b>28.1</b>

Multiple R = 0.538

R-square = 0.289

Adjusted R - square = 0.281

F-ratio = 35.914 at 0.000 level of significance

The remaining variables i.e. age (X<sub>1</sub>), family size (X<sub>3</sub>), net cropped area (X<sub>5</sub>), cropping intensity (X<sub>6</sub>), annual crop production income (X<sub>7</sub>), commercialization (X<sub>8</sub>), training exposure (X<sub>9</sub>) org. participation (X<sub>10</sub>), willingness to seek advisory services (X<sub>11</sub>), decision making ability (X<sub>14</sub>) and aspiration (X<sub>15</sub>) were not entered into the regression equation of set-I, set-II and set-VII.

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$$Y = 29.638 + 0.265 (X_{12}) + 0.219 (X_{13}) + 0.194 (X_4) + 0.098 (X_2)$$

Constant = 29.638
Adjusted R - square = 0.281
F-ratio = 35.914 at 0.000 level of significance

This indicated that the whole model of four (04) independent variables explained 28.1 percent of the total variation with the effect of the farmers' satisfaction on the advisory services of DAE. But since the standardized regression coefficient of four (04) variables formed the equation and were significant, it might be assumed that whatever contribution was there, it was due to these four (04) variables. It is noted that the results of Set-I, Set-II and Set-VII (Final Model) were same.

Results showed that extension contact, innovations, level of education and farming experience (F-ratio = 35.914 at 0.000 level of significance) of the respondents were statistically significant. This implies that farmers with some level of education and relatively long years of experience in farming were more aware of extension services and likely to adopt innovations quickly, owing to their higher skills acquisition and understanding of the economic advantages offered by innovations, with less fear of risk. This implies that an increase in years of farming experience would lead to an increase in satisfaction level and vice versa. This is in line with expectation that a fair duration of farming experience could lead to a better understanding of newly introduced agricultural programs.

These findings are in line with those of Daramola and Aturamu (2005) who noted that contact with extension agents, as well as formal education, exposes the farmers to the availability and technical know-how of innovations and increases their desire to acquire them. Umar *et al.* (2015) found that level of satisfaction with the growth enhancement support scheme among farm families in Nigeria increased with higher farming experience (coefficient = 0.05) and education (coefficient = 0.008)

### **Extension contact ( $X_{12}$ )**

It was found from correlation matrix that farmers having higher extension contact tended to be characterized by higher education, higher farming experience, having more net cropped area, higher annual crop production income, high training exposure, high organizational participation, high innovativeness, high decision making ability and high aspiration. (Appendix-VI)

The co-efficient of correlation also showed significant positive relationship between extension contact ( $X_{12}$ ) of the respondent farmers and their satisfaction on the advisory services of DAE (Appendix- VI)

Step-wise multiple regression analysis (Set-VII) indicated that extension contact of the farmers had significant and positive influence on their satisfaction on the advisory services of DAE. Extension contact was by far found to be the most important positive contributor to the satisfaction on the advisory services of DAE.

Since extension contact is the main source of farmers' information on agricultural innovations, farmers' frequent participation increased their satisfaction. Although this result simply implies the effectiveness of extension services. DAE mainly arrange group methods such as FFS, Field Day, extension meetings to transfer extension messages. That results effective extension service. These results were consistent with those of previous studies (Debnath *et al.* 2016; Ganpat *et al.* 2014) that confirmed the significant role of participating in extension services in increasing farmer satisfaction. Elias *et al.* (2016) also found that frequency of extension contact on a regular basis help farmers to learn and discuss in detail about agricultural extension knowledge and innovations which influence farmers' decision that enable them to take action. DAE should make it a point to have more contact with the respondents as far as possible.

### **Innovativeness ( $X_{13}$ )**

It was found from correlation matrix that farmers having higher innovativeness tended to be characterized by higher education, higher farming experience, having more net cropped area, high annual crop production income, high training exposure, high organizational participation, and high willingness to seek advisory services, high extension contact and high aspiration. (Appendix- VI)

The co-efficient of correlation also showed significant positive relationship between innovativeness ( $X_{13}$ ) of the respondent farmers and their satisfaction on the advisory services of DAE (Appendix- VI)

Step-wise multiple regression analysis (Set-VII) indicated that innovativeness of the farmers had significant and positive influence on their satisfaction on the advisory services of DAE. Innovativeness was by far found to be the important positive contributor to the satisfaction on the advisory services of DAE.

Majority of the respondent had medium level of innovation proneness, this is due to the fact that majority of the farmers' were in active working age group and have a good educational qualification, they had interest on the latest developments and technologies. They were curious about the recent technologies in agriculture and adopt affordable new innovations. These findings were consistent with the findings of Kumar (2019).

#### **Farming experience ( $X_4$ )**

It was found from correlation matrix that farmers having higher farming experience tended to be characterized by older farmer, higher education, higher cropping intensity of his / her land, high training exposure, high willingness to seek advisory services, high extension contact, high innovativeness and high aspiration. (Appendix- VI)

The co-efficient of correlation also showed significant positive relationship between farming experience ( $X_4$ ) of the respondent farmers and their satisfaction on the advisory services of DAE (Appendix- VI).

Step-wise multiple regression analysis (Set-VII) indicated that farming experience of the farmers had significant and positive influence on their satisfaction on the advisory services of DAE. Farming experience was by far found to be the important positive contributor to the satisfaction on the advisory services of DAE.



Experience is an indicator of knowledge and practical skills. Farming experience may affect their level of knowledge about the services offered by extension agents. Which might positively influences their satisfaction on advisory services of DAE due to their acquaintance with exposure. This was supported by the studies of Elias *et al.* (2015) and Adesiji *et al.* (2014).

### **Education (X<sub>2</sub>)**

It was found from correlation matrix that farmers having higher education tended to be characterized by older farmer, higher farming experience, higher net cropped area, higher annual crop production income, high organizational participation, high willingness to seek advisory services, high extension contact, high innovativeness, high decision making ability and high aspiration. (Appendix- VI)

The co-efficient of correlation also showed significant positive relationship between education (X<sub>2</sub>) of the respondent farmers and their satisfaction on the advisory services of DAE (Appendix- VI).

Step-wise multiple regression analysis (Set-VII) indicated that education of the farmers had significant and positive influence on their satisfaction on the advisory services of DAE. Education was by far found to be the important positive contributor to the satisfaction on the advisory services of DAE.

The better the educational status of farmers is, the more wisely they utilize extension services. Literacy is necessary to maximize the benefit from extension messages. Education positively influences farmers' satisfaction because education increases the individual's resources and capacity to achieve goals. Ao *et al.*, (2017) and Ganpat *et al.*, (2014) found that the higher the farmers' education level is, the greater their likelihood of satisfaction on extension services.

#### **4.4.2 Direct and indirect effects of the selected predictors of the farmers' with their satisfaction on the selected advisory services of DAE**

In the present study Spearman rank order 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 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:

$$e = \Sigma b_x r$$

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 final model of step-wise multiple regression analysis (set-VII). Path coefficients showing the direct and indirect effects of significant 4 independent variables of final model (set-VII) of step-wise

multiple regression analysis on the farmers' satisfaction on the advisory services of DAE have been presented in Table 4.13.

**Table 4.13 Path coefficients showing the direct and indirect effects of 4 significant independent variables of Set-VII of stepwise multiple regression analysis on the farmers' satisfaction on advisory services of DAE**

Independent variables	Variables through which indirect effects are channeled	Indirect effects	Total indirect effect	Direct effect
Extension contact( $X_{12}$ )	Innovativeness ( $X_{13}$ )	0.525	0.933	0.265
	Farming experience ( $X_4$ )	0.163		
	Education ( $X_2$ )	0.245		
Innovativeness( $X_{13}$ )	Extension contact( $X_{12}$ ),	0.525	0.821	0.219
	Farming experience( $X_4$ )	0.127		
	Education ( $X_2$ )	0.169		
Farming experience( $X_4$ )	Extension contact ( $X_{12}$ ),	0.163	0.09	0.194
	Innovativeness( $X_{13}$ )	0.127		
	Education ( $X_2$ )	-0.200		
Education ( $X_2$ )	Extension contact ( $X_{12}$ ),	0.245	0.214	0.098
	Innovativeness( $X_{13}$ )	0.169		
	Farming experience( $X_4$ )	-0.200		

The results of path coefficients indicated the strength of the relationships between the variables. The separation of direct and indirect causal effects of the components can be found in Figure 4.1, as well as in Table 4.13. Regarding the direct and indirect effects, the following observations can be made.

Table 4.13 indicated that among the independent variables, Extension contact ( $X_{12}$ ) had the highest direct effect (0.265) in the positive direction followed by innovativeness ( $X_{13}$ ), farming experience ( $X_4$ ) and education ( $X_2$ ) in the positive

direction on farmers' satisfaction on the advisory services of DAE and their direct effect were 0.219, 0.194 and 0.098 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.

The variable extension contact ( $X_{12}$ ) had the highest (0.933) total indirect effect followed by innovativeness ( $X_{13}$ ) had 0.821, education ( $X_2$ ) had total indirect effect 0.214 and farming experience ( $X_4$ ) had negligible (0.09) total indirect effects on farmers' satisfaction on advisory services of DAE. Extension contact always has immediate direct effect, while education has always has long term spill over benefits with less direct effect.

#### **Extension contact ( $X_{12}$ )**

Path analysis showed that extension contact ( $X_{12}$ ) had the highest total indirect effect of (0.933) and a positive direct effect of 0.265 on farmers' satisfaction on the advisory services of DAE (Table 4.13). The indirect effect was channeled positively through innovativeness ( $X_{13}$ ), farming experience ( $X_4$ ) and education ( $X_2$ ). It may be inferred that other variables remaining constant, extension contact ( $X_{12}$ ) was a determinant of the farmers' satisfaction on the advisory services of DAE.

#### **Innovativeness( $X_{13}$ )**

Path analysis showed that innovativeness ( $X_{13}$ ) had the 2nd highest total indirect effect of (0.821) and a positive direct effect of 0.219 on farmers' satisfaction on the advisory services of DAE (Table 4.13). The indirect effect was channeled positively through extension contact ( $X_{12}$ ), farming experience ( $X_4$ ) and education ( $X_2$ ). It may be inferred that other variables remaining constant, innovativeness

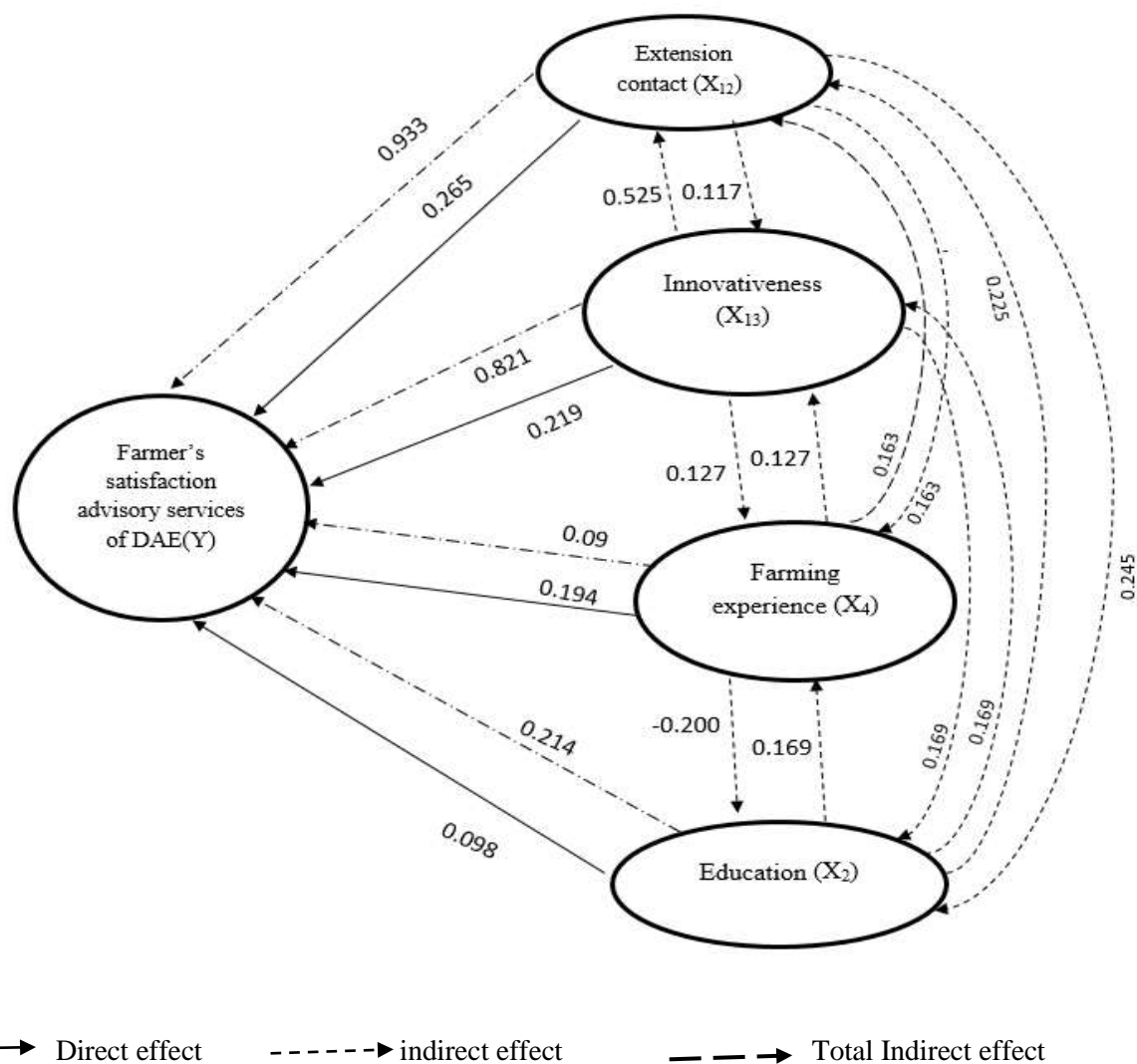
( $X_{13}$ ) was a determinant of the farmers' satisfaction on the advisory services of DAE.

### **Education ( $X_2$ )**

Path analysis showed that education ( $X_2$ ) had the 3rd total indirect effect of (0.214) and a positive direct effect of 0.098 on farmers' satisfaction on the advisory services of DAE (Table 4.13). The indirect effect was channeled positively through extension contact ( $X_{12}$ ), innovativeness ( $X_{13}$ ) and farming experience ( $X_4$ ). It may be inferred that other variables remaining constant, education ( $X_2$ ) was a determinant of the farmers' satisfaction on the advisory services of DAE.

### **Farming experience( $X_4$ )**

Path analysis revealed that farming experience ( $X_4$ ) had the lowest total indirect effect (0.09) and a positive direct effect of 0.194 on farmers' satisfaction on the advisory services of DAE (Table 4.13). The indirect effect was channeled positively through extension contact ( $X_{12}$ ), innovativeness ( $X_{13}$ ) and education ( $X_2$ ). It may be inferred that other variables remaining constant, farming experience ( $X_4$ ) was a determinant of the farmers' satisfaction on the advisory services of DAE.



**Fig. 4.1** Diagram showing the direct and indirect effect of variables to the Farmer's satisfaction Advisory services of DAE(Y)

#### 4.5 Farmers' suggestions to improve their satisfaction on low and moderate satisfied items of advisory services of DAE

Respondent farmers were asked to mention some suggestions to increase their satisfaction on DAE advisory services against each of the satisfaction items. Based on their maximum number of citation of suggestion(s) against lower and moderately satisfied items, important one or two suggestion(s) are presented in Table 4.14.

**Table 4.14 Farmers' suggestions to improve their satisfaction on low and moderate satisfied items of advisory services of DAE**

Sl. No	Items (arranged in lowest to upward rank)	Suggestions
<b>Technical quality of advisory services</b>		
1	Providing support for commercialization of fruits and high value crops	<ul style="list-style-type: none"> <li>• Technical support need to be provided for commercial orchard establishment</li> <li>• Quality planting material/ high yielding germplasm should be supplied by Horticulture center of DAE</li> </ul>
2	Early and post disaster loss assessment for quick rehabilitation	<ul style="list-style-type: none"> <li>• Emergency fund need to keep in every disaster prone area for every year</li> <li>• Timely proper assessment and rehabilitation</li> </ul>
3	Introducing ICT mediated services like agri-related organizations' websites, apps, blogs and social media	<ul style="list-style-type: none"> <li>• Providing training for using agri-related websites, apps, blogs and social media for both farmers and extension agents</li> </ul>
4	Helping farmers in buying and using agri-machinery through Government subsidy	<ul style="list-style-type: none"> <li>• The coverage providing agri- machinery program on a subsidized rate need to be expand</li> <li>• Providing down payment for purchasing agri-machineries as low interest loan</li> </ul>
5	Involving at least 25% women farmer in extension program	<ul style="list-style-type: none"> <li>• Involving women farmers in agril Extension program</li> <li>• Introducing family approach by involving husband and wife together</li> </ul>
6	Conduction of FINA, PRA, RRA, Problem census to identify and address the needs of farmers and develop need based technology	<ul style="list-style-type: none"> <li>• Regular conduction of FINA, PRA, RRA, Problem census, etc. to address farmers' need</li> </ul>
7	Helping farmers in cost-benefit analysis to reduce production cost and increase income	<ul style="list-style-type: none"> <li>• Providing necessary information by arranging training on cost-benefit analysis of each crop production</li> </ul>
8	Encouraging farmers for the production of potentially cultivable crop (pulses, oilseed and species)	<ul style="list-style-type: none"> <li>• Introducing new cropping pattern with short duration variety crop/intercrop/relay crop including pulses, oilseed and species</li> <li>• Providing quality seeds from authentic source</li> </ul>
9	Maintaining links and co-coordinating activities with other extension service providers like livestock,	<ul style="list-style-type: none"> <li>• Coordination of agricultural advisory services by establishing National Agricultural Extension System (NAES) for holistic advisory services for crop,</li> </ul>

	fisheries organizations and NGOs.	<p>livestock and fisheries</p> <ul style="list-style-type: none"> <li>Establishing local committee of NAES for providing integrated service to the farmers by arranging regular learning events like meeting, idea sharing, training, workshop, etc.</li> </ul>
10	Formation of farmers group like IPM club, FFS, CIG etc. for rapid knowledge transfer program	<ul style="list-style-type: none"> <li>Reviving and monitoring of existing farmers' groups</li> <li>Formation of new group in case of existing any farmers' group</li> </ul>
11	Helping farmers in conservation and utilization of their available resources for the betterment of their life	<ul style="list-style-type: none"> <li>Project should be taken to conserve soil, water and other environmental factors and farmers need to aware to protect them</li> </ul>
12	Appreciating farmers for commendable performances	<ul style="list-style-type: none"> <li>Introducing program by DAE to appreciate farmers for their commendable performances up to Block level</li> </ul>
13	Encouraging farmers in testing soil and using recommended doses of organic and inorganic fertilizers to maintain soil health and productivity	<ul style="list-style-type: none"> <li>Helping farmers for testing soil from local SRDI office</li> <li>Establishing local soil testing laboratory at upazilla level</li> </ul>
14	Helping farmers in diversified and intensified crop cultivation	<ul style="list-style-type: none"> <li>Undertaking project to introduce new crops like Perilla ( new oil seed crop), kinoa (new cereal crop), sugar beet, etc.</li> </ul>
15	Providing farmers technical support in harvesting and processing to reduce post-harvest loss	<ul style="list-style-type: none"> <li>Providing training on crop harvesting and post-harvest processing to reduce crop loss by proper cooling, sorting, grading, wrapping, packaging, handling, loading, transporting, etc.</li> <li>Providing subsidized transportation system for agricultural produces</li> </ul>
16	Technological support in value addition, marketing and export oriented skill	<ul style="list-style-type: none"> <li>Providing information on how to find export market, what should produce, how it should be produce, what are the requirement of importing country etc.</li> </ul>
17	Regular monitoring to make agricultural inputs available to the farmers	<ul style="list-style-type: none"> <li>Providing transport facility to every Upazila for proper monitoring of input availability</li> </ul>
18	Providing early warning and helping in minimizing crop damage	<ul style="list-style-type: none"> <li>Strengthening weather forecasting support and proper use of kiosk</li> </ul>
19	Transferring new and demand driven technology to farmer	<ul style="list-style-type: none"> <li>Encouraging farmers to use innovations by regular advisory services</li> </ul>



	through formal training, demonstration, field visit, and other extension services	
20	Providing early warning and helping in minimizing crop damage	<ul style="list-style-type: none"> <li>Coordinated effort need to strengthen with meteorological department</li> </ul>
21	Encouraging Farmers to join in group meeting, discussions and other group activities	<ul style="list-style-type: none"> <li>Strengthening group dynamics and group activities by the related project</li> </ul>
<b>Functional quality of advisory services</b>		
1	Sufficient farmer and extension agent ratio to serve farmers' purposes	<ul style="list-style-type: none"> <li>Increasing DAE field level advisory service providers</li> <li>Strengthening ICT mediated advisory services for farmer to farmer extension service</li> </ul>
2	Perfect knowledge and skill of DAE agents to perform tasks	<ul style="list-style-type: none"> <li>Increasing capacity of every frontline extension agent by providing sufficient training to be skilled and knowledgeable</li> </ul>
3	Easily accessible proximity of point (office visit/face to face contact/phone) of DAE agents to provide advisory services	<ul style="list-style-type: none"> <li>Strengthening FIAC center</li> <li>Establishing advisory center at Block level</li> </ul>
4	Availability of equipment and facilities of DAE to provide training or advisory services	<ul style="list-style-type: none"> <li>Establishment of modern training center (equipped with laptop, multimedia and other modern devices) in every Upazila</li> </ul>
5	Allocation of sufficient time by DAE extension agents for any farmer	<ul style="list-style-type: none"> <li>Providing sufficient time for the farmers by proper program designing</li> </ul>
6	Useful and easily understandable information provided by DAE	<ul style="list-style-type: none"> <li>Providing training materials (modules) by using easy language</li> </ul>
7	Well preparedness of DAE agents during extension training program	<ul style="list-style-type: none"> <li>Providing training program conducted by master Trainers and expert persons</li> </ul>
8	Creating environment of trust and provide bias free services by DAE extension agents	<ul style="list-style-type: none"> <li>Maintaining good relationship and establishing rapport with every farmers by the local extension agent</li> </ul>
9	DAE as a reliable organization that concern about farmers' welfare and committed to do so.	<ul style="list-style-type: none"> <li>Fulfillment of committed task by DAE to increase farmers' confidence</li> </ul>

## CHAPTER 5

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Summary

##### 5.1.1 Introduction

Agricultural extension has a tremendous potential to improve agricultural productivity and increase income through transfer and facilitation of knowledge, skills, and technologies (Feder *et al.*, 2010; Swanson and Rajalahti, 2010; Davis, 2008; and Dercon *et al.*, 2006). Performance of agriculture sector depends upon its ability to cope with the contemporary challenges like rising population, changing demand pattern of food and agricultural product, climate change, resource scarcity and many more uncertainties. However, available empirical evidence shows mixed results in terms of the performance and impact of agricultural extension systems. Extension systems and delivery methods in many developing countries have been constantly viewed as ineffective in responding to the demands and technological challenges of various types of clients and in reaching the rural poor (Davis *et al.*, 2012; Benin *et al.*, 2011; Van den Berg and Jiggins, 2007; Birner *et al.*, 2009; Rivera *et al.*, 2001). There is a need on assessing the performance and impact of extension systems and understanding the factors and specific components of an agricultural advisory service providing organizations. The advisory system influences the performance of both service providers and farm households. The farm households play a central role in the analytical framework as their interaction with the advisory services is critical to both performance and impact (Faure *et al.*, 2012).

Farmers are the end user of the Department of Agricultural Extension (DAE), the largest public advisory service providing organization in Bangladesh for crop sector. Long term objective of this organization is to satisfy the farmers' information and knowledge needs. But, there is ongoing debate if the farmers are satisfied or not on the advisory services of DAE. On the above considerations, the present researcher felt necessity to measure farmers' satisfaction on the advisory services of DAE.

### **5.1.2 Objectives of the Study**

- To assess the extent of farmers' satisfaction on the advisory services of DAE
- To describe the predictors related to farmers' satisfaction on the advisory services of DAE
- To explore the contribution of the selected predictors of the farmers to their extent of satisfaction on the advisory services of DAE
- To find out the suggestions to improve the advisory services of DAE as perceived by the farmers

### **5.1.3 Methodology**

This study was aimed to measure farmers' satisfaction on the advisory services of DAE. By using multi-stage sampling procedure, Batiaghata and Dumuria Upazila from Khulna region, Companigonj and Sylhet sadar Upazila from Sylhet region, Charghat and Bhagha Upazila from Rajshahi region and Singair and Savar Upazila from Dhaka region were considered as the locale of the study. Among 5227 farmers, 358 farmers were determined as the sample size of the study. The face to face interviewing method was used for collecting data from the sample farmers by using a pretested interview schedule. Necessary scales were developed for this purpose. Coding, categorization and analysis of data were done according to the objectives of the study.

## **5.1.4 Results and discussion**

### **5.1.4.1 Farmers' satisfaction on the advisory services of DAE**

Farmers' satisfaction scores on technical quality of advisory services of DAE ranged from 11 to 73 against the possible range of 0 to 75 with the mean of 52.72, standard deviation of 15.6 and co-efficient of variation of 29.60%. Majority (74.6 percent) of the farmers had medium Satisfaction on technical quality of advisory services as compared to 19 percent had low and 6.4 percent had high Satisfaction on technical quality of advisory services of DAE.

Farmers' satisfaction on functional quality of advisory services scores of DAE ranged from 6 to 28 against the possible range of 0 to 30 with the mean of 21.57, standard deviation of 4.95 and co-efficient of variation of 22.95%. Majority (82.7 percent) of the farmers had medium satisfaction on functional quality of advisory services as compared to 14.2 percent had low and 3.1 percent had high satisfaction on functional services of DAE.

Farmers' overall satisfaction on advisory services scores of DAE ranged from 18 to 99 against the possible range of 0 to 105 with the mean of 74.28, standard deviation of 19.82 and co-efficient of variation of 26.68 %. Majority (79.1 percent) of the farmers had medium satisfaction on the overall advisory services as compared to 17.9 had low and 3.1 percent had high satisfaction on overall advisory services of DAE.

### **5.1.4.2 Item-wise satisfaction on the advisory services of DAE**

Among 25 items of technical quality related advisory services of DAE, farmers had high satisfaction on four (4) items, namely- i)Introducing New, HYV, Hybrid, GMO and fortified variety to farmer, ii) Providing appropriate solution (chemical, mechanical and biological control measure) against pest management and crop protection iii)Helping farmers in quality seed production and storage and iv)

Introducing women friendly skill development programs like homestead gardening, livestock rearing, nutrition improvement; moderate satisfaction on 16 items; and low satisfaction on five (5) items, namely - i) Early and post disaster loss assessment for quick rehabilitation, ii) Involving at least 25% women farmer in extension program, iii) Introducing ICT mediated services like agri-related organizations' websites, apps, blogs and social media, iv) Helping farmers in buying and using agri- machinery through Government subsidy, and v) Providing support for commercialization of fruits and high value crops.

Among ten (10) items of functional quality of advisory services of DAE, farmers' had high satisfaction on "Courteous, polite, and respectfulness of DAE agents to all categories of farmers"; low satisfaction on "Sufficient farmer and extension agent ratio to serve farmers' purposes"; and moderate satisfaction on rest eight (8) items.

#### **5.1.4.3 Selected predictors of the farmers**

**Age:** The majority (66.2 percent) of the farmers were middle-aged compared to 3.6 percent being young and 30.2 percent old. Findings indicated that a large proportion (96.4 percent) of the farmers were middle-aged to old.

**Education:** Fifty (50) percent of the farmers had secondary of level education, while 21.2 percent and 17.9 percent had higher secondary level education and primary education respectively. Only 7.5 percent of the farmers could sign only and 3.4 percent were illiterate. Findings also revealed that overwhelming majority (89.1 percent) of the respondent farmers had education from primary to above secondary level.

**Family size:** More than half (50.6 percent) of the farmers had medium family size compared to 39.4 percent small family and 10.1 percent large family. Data also

indicated that average family size (5.28) of the farmers were higher than the national average of 4.06 (BBS, 2016).

**Farming experience:** Highest proportion (43.9 percent) of the farmers belonged to low farming experience category compared to 23.5 percent had medium experience and 32.7 percent had high farming experience. However, the majority of the farmers (56.2%) have more than 15 years of farming experience.

**Net cropped area:** Highest proportion (59.2 percent) of the farmers had small net cropped area, while 2.2, 36.2 and 2.0 percent had marginal, medium and large net cropped area respectively.

**Cropping intensity:** Majority (61.2 percent) farmers' land had medium cropping intensity compared to 18.7 percent and 20.1 percent farmers' land had low and high cropping intensity respectively.

**Annual crop production income:** Highest proportion (45.3 percent) of the farmers belonged to medium annual crop production income compared to 34.4 percent belonged to low annual crop production income and 20.4 percent high crop production income.

**Commercialization:** Highest proportion (52.5 percent) of the farmers belonged to high commercialization group compared to 9.8 and 37.7 percent low and medium commercialization group respectively.

**Training exposure:** Majority (42.7 percent) of the farmers had low training exposure, while 25.1 and 32.1 percent had medium and high training exposure respectively. The data also revealed that above two third (67.8 percent) of the respondent farmers had low to medium training exposure.

**Organizational participation:** Majority (79.1 percent) of the respondent farmers had low to medium organizational participation as compared to 20.9 percent had high organizational participation.

**Willingness to seek advisory services:** About two-third (64.5 percent) of the farmers had low willingness to seek advisory services and 29.3 percent had medium willingness to seek advisory services and only 6.1 percent had high willingness to seek advisory services.

**Extension contact:** Highest proportion (74.0 percent) of the farmers had medium extension contact, while 15.4 percent had high extension contact and only 10.6 percent had low extension contact.

**Innovativeness:** Majority (73.5 percent) of the farmers had medium innovativeness, while 33 and 13 percent had low and high innovativeness respectively.

**Decision making ability:** Majority (69 percent) of the farmers had medium decision making ability, while 15.6 and 15.4 percent had low and high decision making ability respectively.

**Aspiration:** Highest proportion (69.3 percent) of the farmers had medium aspiration compared to 16.8 percent had low aspiration and 14 percent had high aspiration.

#### **5.1.4.4 Contribution of the selected predictors of the farmers on their satisfaction on the advisory services of DAE**

Stepwise multiple regressions showed that 4 independent variables combinedly explained 28.1 percent of the total variation. Extension contact, innovativeness, farming experiences and education of the farmers had significant positive contribution to their satisfaction on the advisory services of DAE. Since the rest

eleven (11) variables or predictors of the farmers did not enter into the regression model, it was inferred that these eleven (11) predictors had no significant contribution to their satisfaction on the advisory services of DAE.

#### **5.1.4.5 Direct and Indirect effects of the selected predictors of the farmers on their satisfaction on advisory services of DAE**

Path coefficients showed that extension contact had the highest direct effect (0.265) in the positive direction followed by innovativeness, farming experience and education in the positive direction on farmers' satisfaction on the advisory services of DAE. Extension contact had the highest (0.933) total indirect effect followed by innovativeness, education and farming experience on farmers' satisfaction on advisory services of DAE. Indirect effect of each of these four (4) variables was channeled through other three (3) variables.

## **5.2 Conclusions**

The findings and relevant facts of research work prompted the researcher to draw following conclusions:

- i. The findings revealed that an overwhelming majority of the farmers had medium satisfaction on technical quality (74.6 percent), functional quality (82.7 percent) and overall (79.1 percent) quality of advisory services of DAE. It is therefore, concluded that advisory services provided by DAE to the farmers were moderately satisfactory. But, there is still scope to improve the quality of DAE advisory services for higher satisfaction of the farmers.
- ii. Out of 35 items of satisfaction, farmers were highly satisfied on five (5) items, moderately satisfied on 24 items and low satisfied on six (6) items. Therefore, it may be concluded that DAE need to address the moderate and low satisfied items to increase farmers' satisfaction.
- iii. Overwhelming majority (89.4%) of the farmers had medium to high extension contact and extension contact of the farmers had the highest



significant positive contribution to their satisfaction on the advisory services of DAE. So, it may be concluded that frequency of extension contact on a regular basis helps farmers to learn and discuss in detail about agricultural extension knowledge and innovations which influenced farmers' satisfaction on the advisory services of DAE.

- iv. Overwhelming majority (87.2 percent) of the farmers had medium to high innovativeness and innovation had 2<sup>nd</sup> highest positive contribution to their satisfaction on the advisory services of DAE. Therefore, it may be concluded that farmers having more innovativeness had more satisfaction on DAE advisory services.
- v. Majority (56.2 percent) of the farmers had more than 15 years of farming experience and farming experience positively influenced (3<sup>rd</sup> contribution) their satisfaction on advisory services of DAE. This implies that an increase in years of farming experience would lead to an increase in satisfaction level and vice versa. This is in line with expectation that a fair duration of farming experience could lead to a better understanding of newly introduced agricultural programs. So, farming experience may affect their level of knowledge about the services offered by extension agents. Therefore, it may be concluded that farmers having more farming experience had more satisfaction on the advisory services of DAE.
- vi. Findings indicated that education of the farmers had significant positive contribution (4<sup>th</sup> contribution) to their satisfaction on the advisory services of DAE. Level of educational attainment can increase the ability of a farmer to access and interpret relevant information about agricultural innovations, facilitate managerial skills which in turn lead to efficient use of agricultural inputs to enhance productivity. Therefore, it may be concluded that farmers

having higher education had higher satisfaction on the advisory services of DAE.

### **5.3.1 Recommendation for policy implications**

- i. Overwhelming majority of the farmers had medium satisfaction on technical, functional and overall advisory services of DAE. It means that still there are some farmers who are not much satisfied with the existing status of advisory services of DAE. It may be therefore, recommended that DAE should take initiatives to increase better technical and functional advisory services for the farmers.
  
- ii. Farmers had high satisfaction on five (5) items, moderate satisfaction on 24 items and low satisfaction on six (6) items. Suggestions were asked from the respondent farmers to increase their satisfaction on moderately and low satisfaction items of DAE advisory services. Therefore, it may be recommended that DAE should increase its advisory services for the moderate and low satisfied items as suggested by the farmers, especially on the following low satisfied items:
  - Early and post disaster loss assessment for quick rehabilitation
  - Involving at least 25% women farmer in extension program
  - Introducing ICT mediated services like agri-related organizations' websites, apps, blogs and social media
  - Helping farmers in buying and using agri-machinery through government subsidy
  - Providing support for commercialization of fruits and high value crops, and
  - Sufficient farmer and extension agent ratio to serve farmers' purposes.

- iii. Extension contact of the farmers had positive significant contribution to their satisfaction on the advisory services of DAE. Therefore, it may be recommended that the DAE should increase its contact with the farmers frequently and regular basis, so that they could increase their level of awareness on yield, productivity, income which in turn increase satisfaction on advisory services of DAE.
- iv. Innovativeness of the farmers had positive significant contribution to their satisfaction on the advisory services of DAE. Therefore, it may be recommended that the DAE should incorporate innovations to its advisory services, so that farmers would be encouraged to keep contact with DAE.
- v. Farming experience of the farmers had significant contribution to their satisfaction on advisory services of DAE. So, it is strongly recommended that adequate technical support, motivational campaign and training facilities should be extended to the young and low experienced farmers, so that they could perform better farming activities and increase their level of satisfaction.
- vi. Education of the farmers had positive significant contribution to their satisfaction on the advisory services of DAE. Therefore, it may be recommended that the DAE should give emphasis on how to increase satisfaction of the farmers having lower level of education.

### **5.3.2 Recommendations for the future study**

A single research work is very inadequate to have in-depth understanding of the farmers' satisfaction on the advisory services of DAE. Further studies should be undertaken covering more dimensions of the same issue.

The following recommendations are made for the future study:

- i. The present study conducted on the farmers of eight (8) Block of eight (8) Upazilas from four (4) agricultural regions of Bangladesh namely Dhaka, Rajshahi, Khulna and Sylhet. The findings of the study need to be varied by undertaking similar research in other areas of the country.
- ii. The study investigated the contributions of the 15 selected predictors of the farmers to their satisfaction on the advisory services of DAE. They might be affected by other various personal, social, psychological, cultural and situational factors, It is, therefore, recommended that further study should be conducted by involving other predictors of the farmers.
- iii. In addition to farmers' satisfaction on the advisory services of DAE. Such types of study may be conducted for determine the satisfaction of the farmers on the advisory services DLS, DoF or other advisory service providing organizations.

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## Appendix- I

Department of Agricultural Extension & Information System  
Sher-e-Bangla Agricultural University, Dhaka – 1207

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Interview schedule for farmer to conduct research on  
**“Farmers’ Satisfaction on the Advisory services of Department of  
Agricultural Extension (DAE)”**

Sl. No: .....

Please answer the following questions

Name of the respondent

Village:

Union:

Upazila:

District

### 1. Age

What is your present age? .....years

### 2. Education

Please state your educational level

a) Cannot read and write.

b) Cannot read and write but can sign only.

c) I passed ..... class.

d) Did not read in school but can read and write a little. My level of education is  
equivalent to class .....

### 3. Family size

How many members are in your family? ----- Person.

### 4. Farming Experience

How many years are you engaged in agricultural farming? ..... Years

### 5. Net cropped area

Please mention your cropped area on the following heads:

Sl. no	Types of Land	Area	
		Decimal	Hectare
1	Single cropped (1)		
2	Double cropped (2)		
3	Triple cropped (3)		
4	Net cropped area ( 1+2+3)		
5	Total cropped area ( 1x2+2x2+3x3)		

### 6. Cropping intensity

Cropping intensity = (Total cropped area / Net cropped area) X 100

### 7. Annual crop production income

Sl. No.	Sources of Income	Total yield (unit)	Unit price (Taka)	Total price (Taka)	Sold price (Taka)
a)	<b>Field crop</b>				
	Boro rice				
	Aman Rice				
	Aus rice				
	Wheat				
	Maize				
	Potato				
	Jute				
	Pulse crop				
	Oil Seed crop				
	others				
b)	<b>Vegetables</b>				
c)	<b>Spices and condiments</b>				
d)	<b>Fruits</b>				
<b>Total= (a+b+c+d)</b>					

### 8. Commercialization

Commercialization score =  $\frac{\text{Value of sold Produce}}{\text{Total value of raised produce}} \times 100$

## 9. Training exposure

Sl. No.	Name of the Training Courses	Conducting Agency	Duration (Days)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

## 10. Innovativeness

Please furnish your information about the extent of use of the following technologies

Sl No	Name of technology	Duration of use				
		Within 1 year	1-2 years	2-3 years	After 3 years	Never used
		4	3	2	1	0
1	Seed germination test					
2	Knowing of soil fertility status through soil test					
3	Dry Seedbed Management					
4	Weeding done by Rice weeder					
5	Use of granular urea					
6	Efficient use of water by AWD					
7	Use parching as insect management technology					
8	Marketing of fruits and vegetables through grading technology					
9	Varietal development of fruit through grafting					
10	Fruit bagging for insect management					
11	Mushroom cultivation					
12	Store quality seed in Plastic container					
13	Honey bee cultivation in mustard field					
14	Prepare organic fertilizer					

### 11. Organizational participation

Please mention the nature and duration of your participation with the following organization

SL. No.	Name of Organization	Nature of participation and duration			
		Not Participated (0)	Ordinary Member (1)	Executive Member (2)	Executive Officer (3)
1.	Farmers' cooperative society				
2.	Union Council				
3.	School Committee				
4.	Youth Club				
5.	Any Political Organization				
6.	Religious Committee				
7.	Hat/Bazaar Committee				
8.	NGO				
9.	others				
Total					

### 12. Willingness to seek advisory services

Please mention tick on appropriate column for your extent of willingness to seek advisory services

Items	Not at all willing to seek advisory services	Motivated by Extension agents	Motivated by Ideal farmer / neighbor/ input dealer	Own interest	Ready to pay for get advisory services
	0	1	2	3	4
Adoption of new technology					
Information for solving problems					
Establishing and maintain commercial farming					

### 13. Extension contact

Please mention the extent of your extension contact frequency with the following source

Sl. no	Sources of Information	Extent of accessibility and use				
		Regularly (4)	Often (3)	Occasionally (2)	Rarely (1)	Never (0)
1.	Ideal farmer	>6 times/ month ( )	5-6 times / month ( )	3-4 times / month ( )	1-2 times / month ( )	Not at all ( )

2.	Agri input dealer	>4 times/ month ( )	3-4 times / month ( )	2-3times / month ( )	1-2 times / month ( )	Not at all ( )
3.	Local/ group leader	>4 times/ month ( )	3-4 times / month ( )	2-3times / month ( )	1-2 times / month ( )	Not at all ( )
4.	SAAO	>3 times/ month ( )	3 times/ month ( )	2 times/ month ( )	1 times/ month ( )	Not at all ( )
5.	NGO worker	>3 times/ month ( )	3 times/ month ( )	2 times/ month ( )	1 times/ month ( )	Not at all ( )
6.	AEO /Upazila Agriculture officer (UAO)	1-2 times/ fortnight ( )	1-2 times/ months ( )	1-2 times/ 6 month ( )	1-2 times/ year ( )	Not at all ( )
7.	Method Demonstration	8 times in whole life ( )	5-7 times in whole life ( )	3-4 times in whole life ( )	1-2 times in whole life ( )	Not at all ( )
8.	Result Demonstration	8 times in whole life ( )	5-7 times in whole life ( )	3-4 times in whole life ( )	1-2 times in whole life ( )	Not at all ( )
9.	Agricultural fair	8 times in whole life ( )	5-7 times in whole life ( )	3-4 times in whole life ( )	1-2 times in whole life ( )	Not at all ( )
10.	Agricultural discussion meeting	8 times in whole life ( )	5-7 times in whole life ( )	3-4 times in whole life ( )	1-2 times in whole life ( )	Not at all ( )
11.	Motivational tour	8 times in whole life ( )	5-7 times in whole life ( )	3-4 times in whole life ( )	1-2 times in whole life ( )	Not at all ( )
12.	Agricultural rally	8 times in whole life ( )	5-7 times in whole life ( )	3-4 times in whole life ( )	1-2 times in whole life ( )	Not at all ( )
13.	Listening farm program on Radio	>9 times/ month ( )	7-8 times / month ( )	5-6 times / month ( )	3-4 times / month ( )	Not at all ( )
14.	Watching Farm program on Television	1 times/ week ( )	1-2 times/ fortnight ( )	1 times/ 1-3 month ( )	1times/ 3-4 month ( )	Not at all ( )
15.	Leaflet/ booklet/ print material	1 times/ month ( )	1-2 times / month ( )	3-4 times / month ( )	5-6 times / month ( )	Not at all ( )
16.	Daily Newspaper	1 times/ week ( )	1-2 times/ fortnight ( )	1 times/ 1-3 month ( )	1times/ 3-4 month ( )	Not at all ( )
17.	Using Internet for searching farm Information	1 times/ week ( )	1-2 times/ fortnight ( )	1 times/ 1-3 month ( )	1times/ 3-4 month ( )	Not at all ( )

#### 14. Decision making ability

Please state your extent of decision making on the following subject

SL. No	Subject	Extent of decision making			
		Able to make self-Decision (4)	Able to make decision with family members (3)	Able to make decision with outsiders of the Family (2)	Able to make decision with SAAO (1)
1.	Adoption of agricultural technology				
2.	Purchasing of agricultural inputs				
3.	Selling of agricultural produce				
4.	Education of children				
5.	Income management				
6.	Engage in other Income Generating Activities				
7.	Finding loans and loan repayment for farm resources				
8.	Participation in social activities				
9.	Other family affairs				

#### 15. Aspiration

Please state your level of aspiration on the following items by putting tick mark (√) in appropriate column.

Sl.	Aspiration statements	Extent of aspiration				
		(0)	(1)	(2)	(3)	(4)
1	What level you expect your sons to reach in their education?	No education ( )	Primary level ( )	Secondary level ( )	Higher Secondary level ( )	Graduate or above level ( )
2	What level you expect your daughters to reach in their education?	No education ( )	Primary level ( )	Secondary level ( )	Higher Secondary level ( )	Graduate or above level ( )
3	What level you expect your sons to reach in their occupation?	Own occupation ( )	Improved cultivation ( )	Small business or service ( )	Big business/ good service/ respectable occupation ( )	Most respectable service/ occupation ( )
4	What is your aspiration in respect to increase your own land in the	None	≤ 25%	>25% to 50%	>50% to 75%	> 75%

	next three years?	( )	( )	( )	( )	( )
5	What is your aspiration in respect to increase your crop production in the next three years?	None ( )	≤25% ( )	>25% to 50% ( )	>50% to 75% ( )	> 75% ( )
6	What is your aspiration in respect to increase your income in the next three years?	None ( )	≤25% ( )	>25% to 50% ( )	>50% to 75% ( )	> 75% ( )
7	What is your aspiration in respect of farming	None ( )	Subsistence farming ( )	Commercial farming ( )	Become an entrepreneur ( )	Become an exporter ( )
8	What is your expectation with regard to purchase of agricultural equipment's/ machines in the next three years?	None ( )	Small agricultural equipment's ( )	Power tiller ( )	Irrigation equipment's ( )	Combine harvester ( )
9	What is your aspiration in respect to renovate/ construct your house by next three years?	None ( )	Small renovation of the existing house ( )	1 tin shed house ( )	1 semi paka house ( )	Building paka house ( )
10	What your expectation with regards to purchase of recreational instruments in the next three years?	None ( )	Mobile phone ( )	Black and white television ( )	Color Television ( )	Television with cable connection ( )
11	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 ( )
12	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 off in more cases ( )	Well of in all cases ( )



## 16. Satisfaction on Advisory Services provided by DAE

### A. Technical quality of services

Please mention your extent of satisfaction and give tick mark where necessary.

Sl. No.	Items of services	Extent of Satisfaction				Suggestions for improvement
		Service is Useful, available and relevant (Highly Satisfied)	Service is Useful and relevant but not timely available (Moderately Satisfied)	Service is Useful and available but less relevant (Low Satisfied)	Not Satisfied in all cases of Usefulness availability and relevance (Not at all satisfied)	
		3	2	1	0	
<b>Increasing production and productivity as a whole</b>						
1.	Introducing new, HYV, Hybrid, GMO and fortified variety to farmer					
2	Transferring new and demand driven technology to farmer through formal training, demonstration, field visit, and other extension service					
3	Encouraging farmers in testing soil and using recommended doses of organic and inorganic fertilizers to maintain soil health and productivity					
4	Providing appropriate solution (chemical, mechanical and biological control measure) against pest management and crop protection					
5	DAE helping farmers in buying and using agri-machinery through Government subsidy					
6	Providing farmers technical support in harvesting and processing to reduce post-harvest loss					
7	Helping farmers in quality seed production and storage					

8	Encouraging farmers for the production of potentially cultivable crop (pulses, oilseed and species)					
9	Helping farmers in diversified and intensified crop cultivation					
<b>Cost effective efficient decentralized demand responsive extension services</b>						
10	Helping farmers in conservation and utilization of their available resources for the betterment of their life					
11	Regular monitoring to make agricultural inputs available to the farmers					
12	Helping farmers in cost-benefit analysis to reduce production cost and increase income					
13	Introducing environment friendly technology like Organic Agriculture, IPM, ICM, GAP					
<b>Targeting and mobilizing farmers group (FG)</b>						
14	Formation of farmers group like IPM club, FFS etc for rapid knowledge transfer program					
15	Encouraging Farmers to join in group meeting, discussions and other group activities					
<b>Bottom-up planning and implementation</b>						
16	Conduction of FINA, PRA, RRA, Problem census to identify and address the needs of farmers and develop need based technology					
17	Appreciating farmers for commendable performances					
<b>Coordinated and integrated extension services through NAES</b>						
18	Maintaining links and co-coordinating activities with other extension service provider like livestock, fisheries organizations and NGOs					

<b>Support to development of agri-business and market linkage</b>						
19	Providing support for commercialization of fruits and high value crops					
20	Technological support in value addition, marketing and export oriented skill					
<b>Adoption to climate change and development of specialized extension service for climatically distressed areas</b>						
21	Early and post disaster loss assessment for quick rehabilitation					
22	Providing early warning and helping in minimizing crop damage					
<b>Mainstreaming women in agriculture</b>						
23	Involving at least 25% women farmer in extension program					
24	Introducing women friendly skill development programs like homestead gardening, livestock rearing, nutrition improvement					
<b>Digitalized agricultural extension services (e-agriculture)</b>						
25	Introducing ICT mediated services like agri-related organizations' websites, apps, blogs and social media					

**B. Functional quality of Advisory Services provided by DAE**

Please mention your extent of satisfaction by putting tick (✓) mark in the appropriate column

Sl. No.	Determinants	Highly satisfied	Moderate satisfied	Low satisfied	Not satisfied	Suggestions for improvements
Reliability (Involves consistency of performance and dependability)						
1.	DAE as a reliable organization that concern about farmers' welfare and committed to do so					
2	Creating environment of trust and provide bias free services by DAE extension agents					

Responsiveness (Readiness of employees to provide service)						
<b>3</b>	Sufficient farmer and extension agent ratio to serve farmers' purposes					
<b>4</b>	Allocation of sufficient time by DAE extension agents for any farmer					
Competence and Courtesy						
<b>5</b>	Well preparedness of DAE agents during extension training program					
<b>6.</b>	Courteous, polite, and respectfulness of DAE agents to all categories of farmers					
<b>7.</b>	Perfect knowledge and skill of DAE agents to perform tasks					
Access & Facilities(Physical facilities, Tools or equipments used to provide the service)						
<b>8.</b>	Easily accessible proximity of point (office visit/face to face contact/ phone) of DAE agents to provide advisory services					
<b>9.</b>	Availability of equipment and facilities of DAE to provide training or advisory services					
<b>10</b>	Useful and easily understandable information provided by DAE					


Thank you for your kind co-operation

Signature of the interviewer & date

.....

## Appendix- II

Letter to Judges for Judges' Rating from Chairman, Advisory Committee of the concerned PhD student

	<b>Department of Agricultural Extension &amp; Information System</b> <b>Sher-e-Bangla Agricultural University, Dhaka -1207</b> <b>Tel. +88 02 -44814039</b>
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Ref: SAU/AEIS-20 /118	Date: 07.12.2020
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To

.....

.....

Subject: **Construction of Scale for Farmers' Satisfaction on the Advisory Services of the Department of Agricultural Extension (DAE)**

Dear Sir

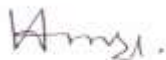
This is in connection with the study of one of my Ph.D. student, Kbd. Mahbuba Moonmoon, Additional Deputy Director (LR), DAE. She has undertaken a research study on "**Farmers' Satisfaction on the Advisory Services of the Department of Agricultural Extension**".

For constructing the scale of **farmers' satisfaction on the advisory services of DAE**, Kbd. Moonmoon collected 52 items of satisfaction under 9 dimensions after thorough consultation with the related Experts and reviewing of related literatures. Farmers will be asked to indicate their level of satisfaction against each of these statements with four alternative responses as 'highly satisfied', 'moderately satisfied', 'low satisfied' and 'not at all satisfied' after assigning the scores of 3, 2, 1 and 0 respectively.

This scale requires suggestions from Judges for appropriate selection of items/statements for measuring farmers' satisfaction on the advisory services of DAE. 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 satisfaction statements based on the suitability of the statements. In order to enable you to offer your valuable suggestions, the list of statements on farmers' satisfaction on the advisory services of DAE has been enclosed. It may be mentioned that it will also be highly appreciated if you include statements on this issue. Please return this material back at your earliest convenience after completing the work.

With personal regards

Sincerely yours,



Prof. Dr. Md. Sekender Ali  
Department of Agricultural Extension & Information System  
Sher-e-Bangla Agricultural University, Dhaka

Enclosed: List satisfaction statements with instruction for rating

**Judgments of satisfaction statements**

Please rate the extent of suitability of the following statements regarding the farmers' satisfaction on the advisory services of the Department of Agricultural Extension (DAE). Please mention the numbers by putting tick (√) mark against each appropriate column. (1 for least suitable, 9 for most suitable)

Sl. No.	Statements	Least suitable								Most suitable
		1	2	3	4	5	6	7	8	9
<b>1. Increasing production (horizontal and vertical) and productivity as a whole</b>										
1.a)	Introducing of New, HYV, Hybrid and improved variety									
1.b)	Informing farmers about appropriate technology through classroom training, demonstration, field visit etc.									
1.c)	Conservation and management of agricultural land fertility									
1.d)	Encourage in using recommended dozes of fertilizer and pesticide									
1.e)	Solving problems in disease and pest management									
1.f)	Helping in Agri-machinery using, buying and borrowing system									
1.g)	Providing proper harvesting and processing technology									
1.h)	Helping in preservation and storage									
1.i)	Providing technology to use each and every inch of land horizontally and vertically									
1.J)	Helping in diversified and intensified cultivation									
1.k)	Introducing of crop production system based on crop zoning									
<b>2. Cost effective efficient decentralized demand responsive extension services</b>										
2.a)	Identifying and disseminating location specific innovative and adapted technology like floating Agriculture, sorjan etc.									
2.b)	Using of IPM, ICM, Organic Agriculture									
2.c)	Helping in conservation and utilization of available resources									
2.d)	Providing market information in buying and selling produce									
2.e)	Safe food grain production									
2.f)	Adopting Good Agricultural Practices (GAP									

Sl. No.	Statements	Least suitable								Most suitable
		1	2	3	4	5	6	7	8	9
<b>3. Targeting and mobilizing farmers group (FG)</b>										
3.a)	Formation of farmers group like IPM club, FFS, etc. for knowledge transfer program									
3.b)	Encourage Farmers to join in group meeting, discussions and other group extension activities like field day, farm walk									
3.c)	Organizing group extension training session									
3.d)	Promoting farmers' decision making ability									
3.e)	Managing conflict									
3.f)	Encouraging and helping group members to gain confidence and increase their bargaining power									
3.g)	Regular monitoring of group activities									
3.h)	Helping farmers in group registration account opening, etc.									
<b>4. Bottom-up planning and implementation</b>										
4.a)	Bottom up planning, implementation and overseeing local production target (to feed into National food security target)									
4.b)	To avoid shortage estimate the amount of essential input ( seed, fertilizer, pesticide etc.) required									
4.c)	Addressing the need of farmer and develop new extension program									
<b>5. Coordinated and integrated extension services through NAES</b>										
5.a)	Maintaining links and co-coordinating activities with other extension service providers like livestock, fisheries organizations and NGOs									
5.b)	Development and Strengthening FIAC as "One-Stop Service Center"									
5.c)	Coordination with Agriculture Research organization									
5.d)	Linking with credit providing organizations for credit support									
5.e)	Integrated service for overall farm management through in time input support and subsidies									
<b>6. Support to development of agri-business and market linkage</b>										

6.a)	HVC Production Support																	
6.b)	Value Addition Support																	
6.c)	Credit Support																	
6.d)	Institutional Strengthening																	
<b>7. Adoption to climate change and development of specialized extension service for climatically distressed areas</b>																		
7.a)	Early warning																	
7.b)	Demand and loss assessment																	
7.c)	Emergency agricultural rehabilitation activities																	
7.d)	Adaptive Techniques and Management for Disaster and Climate Risk Reduction in Agriculture																	
7.e)	Providing training on things to do to cultivate crops in drought																	
7.f)	Provide training on things to do in crop cultivation in floods and flash floods																	
7.g)	Provide training on things to do in crop cultivation in salinity																	
<b>8. Mainstreaming women in agriculture</b>																		
8.a)	Involving at least 25% women farmer in extension program																	
8.b)	Implementing women friendly skill development program like homestead gardening, livestock rearing, nutritional improvement																	
8.c)	Awareness building on disaster management																	
8.d)	Involving women in production, processing and marketing																	
<b>9. Digitalized agricultural extension services (e-agriculture)</b>																		
9.a)	Introducing the web address <a href="http://www.dae.gov.bd">www.dae.gov.bd</a>																	
9.b)	Using online Fertilizer recommendation Guide software <a href="http://www.frs-bd.com">www.frs-bd.com</a>																	
9.c)	Making Phone call to Krishi call centre 16123 and krishok bondhu sheba 3331 for problem solving																	
9.d)	Using of “Balinashok prescriber”, “Krishoker Janala” like apps																	

Signature of the Judge/Expert with date

Address:



## Appendix-III

### American Customer Satisfaction Index

The ACSI was developed in 1994 and is rooted in a Swedish customer satisfaction index. The model consists of six constructs (Figure 1). In the model, CS has three parts: perceived quality, customer expectations, and perceived value. These variables directly determine a person's satisfaction. The model has two distinct outputs: customer loyalty and complaint behavior. In the model, perceived quality and CS jointly determine perceived value. In turn, perceived quality, customer expectations, and perceived value determine CS. Finally, CS determines customer loyalty and complaint behavior (for more details please see Fornell, Johnson, Anderson, Cha, & Bryant, 1996; Grigoroudis & Siskos, 2004 ; Hsu, 2008; Yazdanpanah et al., 2013;).

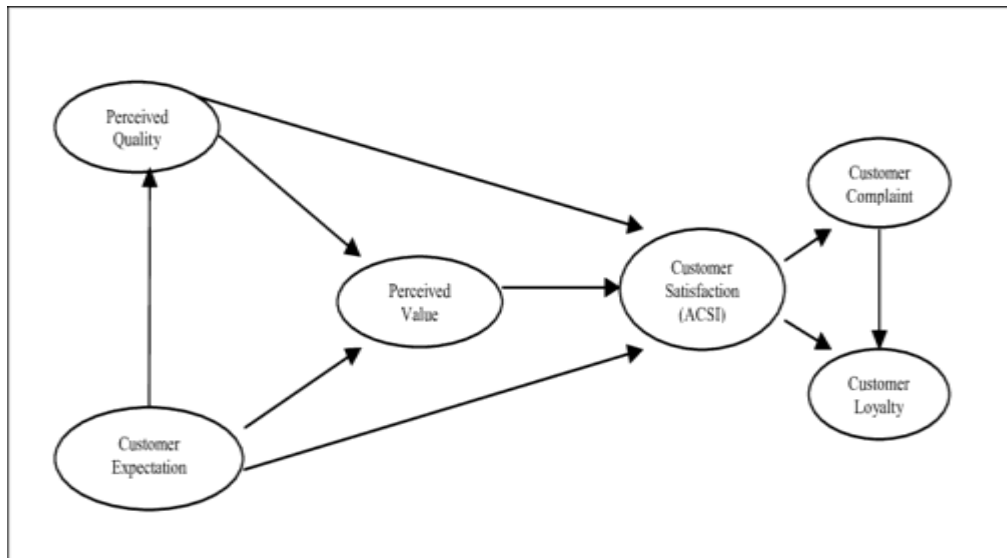


Figure 4: The American Customer Satisfaction Index (ACSI)

(Source: Anderson, E. W., Fornell, C., & Lehmann, D. R. (1994),

2nd International Symposium on Sustainable Development, June 8-9 2010, Sarajevo)

**Perceived quality**, the first determinant of satisfaction, refers to a judgment regarding a supplier's current offering (Anderson et al., 1994) or the consumer's judgment about a product's overall standard (Zeithaml, 1988). Perceived quality is conceptualized as a measure of a provider's output. The model assumes that it has direct and positive effect on both perceived value and CS (Cronin, Brady, & Hult, 2000).

**Customer expectation** is the second determinant of satisfaction. This variable has a direct and positive effect on perceived quality, perceived value, and CS. It refers to how well the customer expected the product or service to perform and captures a customer's prior experience with good or bad services (Johnson et al., 2001).

**Perceived value**, the third determinant of CS, is related to the price paid and has a direct and positive effect on CS. Perceived value is conceptualized as the consumer's evaluation of the utility of perceived benefits and perceived sacrifices (Yazdanpanah et al., 2013). In other words, there is a positive association between perceived value and CS (Fornell et al., 1996). CS refers to an overall assessment of usefulness of a product or service and is a comparison of what the customer has expected and what he/she has received (Parasuraman, Zeithaml, & Berry, 1988). Hsu (2008) has argued that it is a tradeoff between benefit and cost, which can be either monetary or non-monetary.

The consequences of 7 increased CS, according to Hirschman's exit-voice theory, are decreased **customer complaints** and increased **customer loyalty** (Fornell *et al.*, 1996).

There is considerable evidence that an increase in CS causes greater intention to use more of a firm's products or services, that is, loyalty. Loyalty is important in marketing because there is a strong positive link between loyalty and long-term profitability (Yazdanpanah et al., 2013). The last factor is **customer complaints**.

In the original ACSI, this referred to customer dissatisfaction and a decision to no longer use the firm. Complaints can be defined as a conflict between the customer and the organization (Hsu, 2008). However, researchers agree that complaint resolution has become more important than complaints per se and thus "customer complaints" has become "complaint management" (Johnson et al., 2001).

## Appendix-IV

### SERVQUEL Model / Service Gap Model

Their measurement of service quality proposes a gap-based comparison of the expectations and performance perceptions of consumers. This measurement paradigm is similar to the disconfirmation model traditionally used to assess consumer satisfaction (see Cronin and Taylor, 1992, 1994; Parasuraman et al., 1994). Cronin and Taylor (1992) were the first to offer a theoretical justification for term “performance-only measures” has thus come to refer to service quality measures that are based only on consumers’ perceptions of the performance of a service provider, as opposed to the difference (or gap) between the consumers’ performance perceptions and their performance expectations.

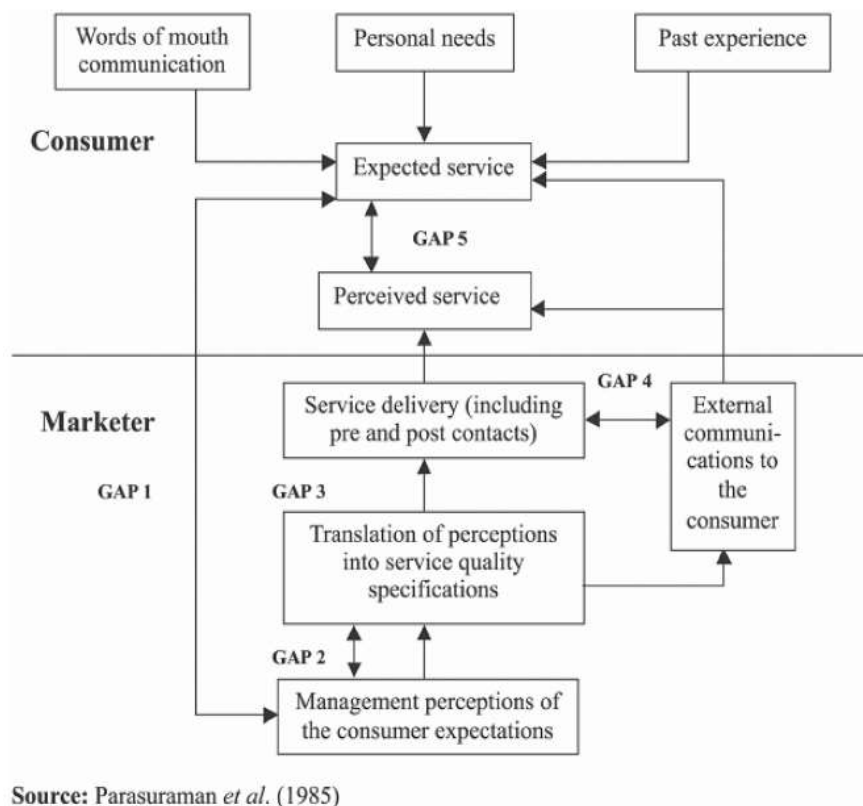


Fig-5: SERVQUEL Model

## Appendix-V Common Measurement Tools

**Table-5.2 Service Dimensions and Variables Identified By Canadian Centre for Management Development**

Dimensions	Variables
Responsiveness	<ul style="list-style-type: none"> <li>• timely delivery of service</li> <li>• number of contacts to receive service</li> <li>• waiting time</li> <li>• timely reaction to expressed concerns Service Staff are:</li> <li>• empathetic</li> <li>• courteous</li> <li>• helpful</li> <li>• skillful and competent</li> <li>• equipped with up-to-date information</li> <li>• respectful</li> <li>• flexible</li> <li>• fair</li> <li>• able to protect my privacy/confidentiality</li> </ul>
Reliability	<ul style="list-style-type: none"> <li>• provided needed service</li> <li>• provided what was promised</li> <li>• adhered to policy and standards</li> <li>• minimal error rate</li> </ul>
Access & Facilities	<ul style="list-style-type: none"> <li>• convenient location</li> <li>• physical access to building</li> <li>• comfort of offices and waiting areas</li> <li>• adequate parking</li> <li>• hours of service</li> <li>• appearance, clarity and location of signs</li> <li>• ease of obtaining appointments</li> <li>• telephone access</li> <li>• use of technology</li> <li>• variety of access modes</li> </ul>
Communication	<ul style="list-style-type: none"> <li>• questions were answered</li> <li>• availability of information</li> <li>• plain language</li> <li>• consistency of information/advice</li> <li>• services delivered in official languages</li> <li>• ease of understanding information, documents</li> <li>• ease of understanding procedures</li> </ul>
Cost	<ul style="list-style-type: none"> <li>• ease of billing/payment</li> <li>• reasonable cost</li> </ul>

**Source:** F. Schmidt, T. Strickland (1998) Client Satisfaction Surveying: Common Measurements Tool. Citizen-Centred Service Network Canadian Centre For Management Development December 1998

**Appendix - VI**  
**Inter Correlation Matrix**

	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>	X <sub>6</sub>	X <sub>7</sub>	X <sub>8</sub>	X <sub>9</sub>	X <sub>10</sub>	X <sub>11</sub>	X <sub>12</sub>	X <sub>13</sub>	X <sub>14</sub>	X <sub>15</sub>	Y
X <sub>1</sub>	1.000															
X <sub>2</sub>	-.213**	1.000														
X <sub>3</sub>	-.048	-.102	1.000													
X <sub>4</sub>	.758**	-.200**	-.057	1.000												
X <sub>5</sub>	-.089	.125*	.105*	-.053	1.000											
X <sub>6</sub>	.057	-.021	-.047	.127*	-.163**	1.000										
X <sub>7</sub>	-.044	.122*	.092	-.009	.622**	.113*	1.000									
X <sub>8</sub>	-.011	.098	-.107*	-.013	.242**	.014	.464**	1.000								
X <sub>9</sub>	.155**	-.020	-.019	.286**	.074	.200**	.056	-.042	1.000							
X <sub>10</sub>	.025	.273**	-.026	.065	.181**	-.069	.132*	.003	.055	1.000						
X <sub>11</sub>	.009	.174**	-.027	.126*	.068	.034	.131*	.051	.270**	.064	1.000					
X <sub>12</sub>	.066	.245**	-.063	.163**	.171**	.022	.107*	.087	.384**	.283**	.098	1.000				
X <sub>13</sub>	.028	.169**	-.053	.127*	.142**	.019	.104*	.052	.296**	.109*	.111*	.525**	1.000			
X <sub>14</sub>	.100	.105*	-.084	.067	-.102	-.085	-.008	.081	-.007	.069	-.013	.128*	-.046	1.000		
X <sub>15</sub>	-.100	.300**	.009	-.013	.100	.015	.118*	.069	.014	.228**	.042	.167**	.170**	-.071	1.000	
Y	.132*	.180**	.051	.297**	.066	.057	.035	.018	.340**	.106*	.096	.527**	.391**	.114*	.098	1.000

\*\*Correlation is significant at the 0.01 level (2-tailed).

\*Correlation is significant at the 0.05 level (2-tailed).

X <sub>1</sub>	=	Age	X <sub>6</sub>	=	Cropping Intensity	X <sub>11</sub>	=	Willingness to seek advisory services
X <sub>2</sub>	=	Education	X <sub>7</sub>	=	Annual crop production income	X <sub>12</sub>	=	Extension contact
X <sub>3</sub>	=	Family Size	X <sub>8</sub>	=	Commercialization	X <sub>13</sub>	=	Innovativeness
X <sub>4</sub>	=	Farming experience	X <sub>9</sub>	=	Training Exposure	X <sub>14</sub>	=	Decision making ability
X <sub>5</sub>	=	Net Cropped Area	X <sub>10</sub>	=	Organizational participation	X <sub>15</sub>	=	Aspiration