

**DETERMINANTS OF FARMERS' SATISFACTION WITH  
AGRICULTURAL EXTENSION SERVICES IN  
*MAREKA WOREDA, DAWURO ZONE, SNNPRS, ETHIOPIA***

**MSc THESIS**

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**Determinants of Farmers' Satisfaction with Agricultural Extension  
Services: The case of *Mareka Woreda, Dawuro Zone, SNNPRS, Ethiopia***

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As Thesis Research advisor, I hereby certify that I have read and evaluated this thesis prepared, under my guidance, by Mulugeta Tegegn entitled: **“Determinants of farmers’ satisfaction with agricultural extension services in Mareka Woreda, Dawuro Zone, and Southern Ethiopia”**. I recommend that it be submitted as fulfilling the thesis requirement.

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## **DEDICATIONS**

I dedicate this thesis to my father Tegegn Ute, my mother Woyinitu W/Mariam, and for my sister Tsigie Mariam Tegegn for nurturing me with affection and love and for their dedicated partnership in the success of mylife.

## STATEMENT OF AUTHOR

First, I declare that this thesis is my original work and all sources of material used for this thesis have been accordingly acknowledged. This thesis has been submitted in partial fulfillment of the requirements of M.Sc. degree at Jimma University and it is deposited at the University Library to be made available to users under rules of the Library. I also declare that this thesis can be submitted to any other institutions, if the University found it necessary. Brief quotations from this thesis are allowable without special permission provided that accurate acknowledgement of source is made.

Name: Mulugeta Tegegn

Signature: .....

Submission Date: October, 2018

Place: Jimma University

## ABBREVIATIONS

ATVET	Agricultural Technical Vocational Education and Training Department
DAs	Development Agents
EAS	Extension and Advisory Services
FAO	Food and Agricultural Organization
IECAMA	Imperial Ethiopian College of Agriculture and Mechanical Arts
MoA	Ministry of Agriculture
MWANRO	<i>Mareka Woreda</i> Agriculture and Natural Resource Office
NEIP	National Extension Intervention Program
NGO	Non-Governmental Organization
PADETES	Participatory Demonstration Training and Extension System
SG	2000 SaSakawa Global 2000
SMS	Subject Matter Specialist
T&V	Training and Visit
UNDP	United Nation Development Plan
USAID	U.S. Agency for International Development
WHO	World Health Organization
CADU	Chilalo Agricultural Development Unit
MPP	Minimum Package Program
WADU	University Wolaita Agricultural Development Unit Extension
FTC	Farmers Training Center
SNNPR	South Nation National People Region
RKAs	Rural Kebele Administration
FGD	Focus Group Discussion
SPSS	Statistical Package for the Social Sciences

## BIOGRAPHY

The author, Mulugeta Tegegn, was born in SNNPR, *Dawuro Zone*, and *Mareka Woredain Mari kebele* in 1989. He completed his primary education in *Dawuro Zone Mari* primary and junior secondary school. He attended his high school education at *Waka* senior secondary school. Then he joined WolaitaATVETCollege in 2007 and graduated with diploma of Animal Science in November 2010. After graduation he worked at *kebele* level as development agent for four years. In 2014, he graduated with B.Sc. degree in Rural Development from YARIDASTIC Distance College. After Graduation of B.Sc. he worked in *Mareka Woreda* Agricultural and Natural Resource Office in plant work process as expert for one year and after that he worked in Trade and Industry Development Office in Agricultural Product Marketing Process as expert for two years. Then, he joined the college of Agriculture and Veterinary Medicine of the Jimma University in November 2017 to pursue his MSc Degree.

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**DETERMINANTS OF FARMERS' SATISFACTION WITH  
AGRICULTURAL EXTENSION SERVICES IN MAREKA WOREDA,  
DAWURO ZONE, SNNPRS, ETHIOPIA**

**ABSTRACT**

*Farmers' satisfaction with agricultural extension services is typically based on the direct extension service interaction between the farmers and the organization or its agents. In Ethiopia poor extension services were ranked as the top reason for farmers' agricultural extension services dissatisfaction. This study was conducted to analyze determinants of farmers' satisfaction with agricultural extension services in Mareka Woreda, Southern, Ethiopia. Cross-sectional research design was employed in the study. Twostage sampling procedure was followed to select kebeles and household heads for the study. In both stages simple random sampling techniques were used to select five sample kebeles and 146 sample household heads. Structured interview schedule was developed, pre-tested and used for collecting the essential quantitative data. Focus group discussion and key informants' interview were used to generate qualitative data. Ordered logit model was employed to analyze factors that influence farmers' satisfaction with agricultural extension services. In addition, farmers' satisfaction index was developed based on 16 four- scale questions to capture farmers' satisfaction level. Results of the study indicated that major type of extension services offered to farmers in study area were input provision services and information delivery about agricultural technology. The satisfaction level results indicated that majority of respondents were not satisfied with existing agricultural extension services in area. Moreover, results of the econometric model indicated that perception on economic return, contact with extension agent, perception on participatory nature of extension program, credit accesses, livestock holding of household in TLU and land size were significantly influenced farmers' satisfaction. The overall finding of the study underlined the high importance of extension agent contact, credit service, participatory approach extension program, economic return after extension services and land size in hectare to enhance farmers' satisfaction level with agricultural extension services. Therefore, policy and development interventions should give capacity building of extension agents, designing of participatory extension program, emphasis to improvement of such institutional support system are essential recommendations to increase farmers' satisfaction with agricultural extension services.*

**Key words:** Agricultural extension service, Farmers' satisfaction, Mareka Woreda, ordered logit model

# 1. INTRODUCTION

## 1.1 Background of the Study

The agriculture sector plays a vital role in the world economy. It supplies many countries with a wide variety of food and non-food products (Hossain & Tenaw, 2009). Ethiopia is one of the countries on the African continent with highest agricultural potential. Its natural resources base is the foundation of any economic development, food security and other basic necessities of its people (Tigist *et al.*, 2017). The performance of the Ethiopian economy as a whole is highly correlated with the agricultural sector. Having a share of 51 percent GDP, agriculture employs approximately 80 percent of the workforce and accounts for 70 percent of export earnings (Admasu, 2017).

Agricultural extension services provide an opportunity to address specific skill and knowledge gaps among farmers in rural Ethiopia (World Bank, 2016). To improve the agricultural production and productivity, agricultural extension is both a political and an organizational instrument implemented to facilitate development and its roles range from transfer of mono-crop technology to participatory problem solving educational approach, which aims at reducing poverty and enhancing community involvement in development processes (Biratu, 2008). The rapidly evolving nature of agricultural innovation processes requires agricultural extension to make necessary transformations of classical roles that previously supported linear knowledge circulation and adoption. Agricultural extension still remain one of the most crucial and critical means to reach farming households in the rural areas and globally (Adekunle, 2013).

Ethiopia's long history of agricultural extension services has been documented by a number of researchers (Belay, 2003; Habtemariam, 2004; Berhanu *et al.*, 2006). The rapid expansion of the extension service since 2005 has increased the number of DAs who hold postsecondary diplomas. Currently, in most kebeles there are three DAs and those DAs have technical skills and practical skills to assist farmers (Jones *et al.*, 2010). DAs have received relatively hard quotas for enrolling farmers in technology packages, and their supervisors evaluate them on the basis of how well they meet these quotas. Extension also works through "model" or "progressive" farmers, who tend to be better off and male. Communication is mostly one-

way, with agents transferring knowledge to farmers (Cohen and Lemma, 2011). However, the DAs recruitment and training has largely succeeded in meeting its numeric targets, while FTCs have lagged behind (Spielman *et al.*, 2011).

Satisfaction has been studied by many psychologists and sociologists prior to research on its determinants by economists since the 1990 decade (Frey and Stutzer, 2002). Researchers have usually used interchangeably the terms happiness, subjective well-being, satisfaction, utility, and even welfare (Easterlin, 2001; Moro *et al.*, 2008). Farmers' agricultural extension services satisfaction is typically based on the direct extension service interaction between the farmer and the organization or its agents. In enhancing farmers' loyalty and confidence, extension feedback is becoming increasingly paramount (Azikiwe *et al.*, 2013). According to Flores and Sarandon (2004), farmer's satisfaction with agricultural extension service is considered to be an important indicator of sustainability which has become the leading target of scientific research and policy agenda. Measuring farmers' satisfaction is important to get useful information that can be used to improve the organization and its services. This information allows management to acquire precise ideas of what farmers want, which facilitates the development of targeted services (Ganpat *et al.*, 2014).

Almost all countries in the world deliver some type of agricultural extension service to help rural people advance their agricultural productivity and improve their living standard (Mwamakimbula, 2014). Agricultural extension methods and organizational characteristics encompass a diverse range of socially sanctioned and legitimate activities which seek to enlarge and improve the abilities of farmers to adopt more appropriate and often new practices; and extension service need to adjust itself to the changing conditions and societal needs (Swanson *et al.*, 1997). The extension methods recognize the critical role of farmers that play in the success or failure of agricultural projects. It recognizes farmer's involvement in identifying farming problems as well as solutions for sustainable development (Kumba, 2003)

In the study area, *Mareka Woreda* Agriculture and Natural Resource Office is the main government institution working with farmers. The office has structure that extends down to the Kebele Administration level. Its main objective is to boost agricultural development through promotion of new technologies and improvement of cultural practices and thereby,



improves the living standard of the farming community. In the *Woreda* in all of sample kebeles we found a team of at least three DAs, and most of them are in diplomas level. This indicates that extension services are available but does not tell us anything about service quality, which is a question of effectiveness. In the area almost all farmers are food crop growers and also the extension services mainly focus on those activities (MWANRO, 2016).

## **1.2 Statement of the Problem**

Agricultural production in Ethiopia has, for long, remained subsistence with limited market orientation and reduced institutional support (Temesgen and Tola, 2015). The ever-increasing decline in agricultural production has been primarily attributed to inappropriate or ineffective dissemination of extension packages (ILRI, 2008). Agricultural extension service is one of the institutional support services that have a central role in the transformation process of agricultural sector (Berhanu *et al.*, 2006).

Agricultural extension program in Ethiopia remains one of the poor countries in the world (USAID, 2013), vulnerable to recurrent food shortfalls, national food insecurity (Abate *et al.*, 2011) and widespread rural poverty (Spielman *et al.*, 2011). Evidence on the impact of agricultural extension on productivity and poverty has been a mixed experience to date in Ethiopia, with increased use of fertilizer but reduced productivity growth (World Bank, 2006). Although many farmers seem to have adopted the packages promoted by the extension service, up to one third of the farmers who have tried a package had discontinued its use (EEA, 2006). Indeed, Bongor *et al.* (2004) also found that poor extension services were ranked as the top reason for farmers' agricultural extension services dissatisfaction. In Ethiopia, lack of quality and diversified improved seeds, limited technology choices, high price of inputs (chemical fertilizer, improved seed) and inconvenient loan system and undefined boundary between extension service and the local politics are the top reasons for farmers dissatisfaction with the extension service (Elias *et al.*, 2015). Farmers in study areas are constantly complain about the inadequate and inappropriate extension services they receive. For farmers to produce and earn decent livelihoods for themselves and their families, they require an extension service that satisfies their needs in a timely and effective manner.

Some studies were conducted in different parts of the country to identify determinants of farmers' satisfaction with agricultural extension services by (Elias *et al.*, 2015 and Ganpatet *et al.*, 2014). However, past studies have focused on determinants of farmers' satisfaction with agricultural extension services and also factors affecting farmers' satisfaction with agricultural extension services are location specific. Moreover, it is also important to look into level of farmers' satisfaction with current agricultural extension service, type of extension services offered and methods of extension services.

Therefore, the study initiated to assess determinants of farmers' satisfaction with agricultural extension services, to know their satisfaction level on existing services offered, and to identify types of agricultural extension services provided to farmers and the extension delivery methods.

### **1.3 Objective of the Study**

The general objective of the study was to assess farmers' satisfaction level and determinants of farmers' satisfaction with agricultural extension services in case of *Mareka Woreda, Dawuro Zone*, and Southern Ethiopia.

The specific objectives of the study are:

1. to assess the types of agricultural extension services delivered and methods of delivery in study area.
2. to investigate farmers' satisfaction level with the existing agricultural extension services offered in the study area and
3. to analyze determinants of farmers' satisfaction with agricultural extension services offered in the study area.

#### **1.4 Research Questions of the Study**

- Which type of agricultural extension services delivered and what are methods employed to deliver services to farmers in study area?
- What is farmers' satisfaction level with the existing agricultural extension services in the study area?
- What are the determinants that affect farmers' satisfaction with agricultural extension services in the study area?

#### **1.5 Significance of the Study**

Agricultural extension services are an essential communication intervention and a prominent companion of agricultural development. Farmers' satisfaction expresses how products and services supplied by organization meet or surpass farmer expectation. Satisfied farmers have a positive impact on the extension organization results and to a greater extent their image, they are more willing to tell others about the good service they received.

The present study, which focused on understanding factors that limit farmers' satisfaction with agricultural extension service and farmers' satisfaction level on existing agricultural extension service; and identified extension services type delivered and commonly used extension methods by extension personnel. The study is an attempt to shed light on the factors which determine the farmers' satisfaction with agricultural extension services which can be incorporated in the extension programme to enhance sustainable agricultural development of the study area.

Therefore, the study result serves as addressing service gap for extension workers, inputs for policy makers and development organizations to plan and make improvement on identified problem. This research findings can be serve as background information for others who seek to do further related research.

## **1.6 The Scope and Limitation of the Study**

The study was conducted in *Mareka Woreda, Dawuro Zone* in SNNPRS, Ethiopia on five sample kebeles and 146 sample household head. The study was limited to this sample size, study area, to analyze factors influencing farmers' satisfaction and current status of farmers' satisfactions level with extension service in the study area. Due to limited activities of animal husbandry and natural resource management, in the area main agricultural activities are more on food crop production (wheat, maize, teff, peas, beans and sorghum) and vegetable production. Therefore, this study was limited to extension services related to the main food crop and vegetables extension packages. Methodologically, this study was limited with cross sectional data and its collection methods of household survey, focus group discussion and key informants interview methods.

## **1.7 Organization of the Thesis**

This thesis was organized into five chapters. Chapter 1 is the introductory part that comprises background of the study. Chapter 2 presents literature reviews that include mainly reviewing of theoretical, empirical studies and conceptual frame work. In chapter 3, research methodology, touches the description of the study area, sampling procedure, types and sources of data, methods of data collection, methods of data analysis, and definition of variables and hypotheses are presented. The results and discussion part, which focused on the overall research findings, is presented in chapter 4. Finally, chapter 5 presents conclusion and recommendations based on the findings of study.

## 2. REVIEW LITERATURE

### 2.1 Theoretical Review

#### 2.1.1 Definition and basic concepts

**Agricultural extension services:**The term “agricultural extension” is a professional communication intervention deployed by organizations to disseminate agriculture knowledge and technologies to rural communities (Karbasioun *et al.*, 2007).Agricultural extension can be defined as the entire set of organizations that support and facilitate people engaged in agricultural production to solve problems and to obtain information, skills, and technologies to improve their livelihoods and well-being, Birner *et al.*, (2009). Agricultural extension has been recently defined as systems that facilitate the access of farmers, their organizations and other market actors to knowledge, information and technologies; facilitate their interaction with partners in research, education, agribusiness, and other relevant institutions (Christoplos, 2010).

**Agricultural extension methods:** Extension method is a particular procedure for accomplishing or approaching extension service, especially a systematic or established one (Nwaobiala, 2017).Extension methods are the ways of communicating between the farmers and the extension agents. Extension method preference is an alternatives from where farmers can choose the most desirable as well as how the different methods that exist for carrying out their farming and other operations.Extension methods are effective means of communication meant to transmit knowledge and skills and, that target farmers may easily see, hear, and learn the things conveyed by extension worker (Khan *et al.*, 2009).

**Agricultural extension services satisfaction:** Satisfaction is pleasurable or positive emotional state resulting from the assessment and it is also represents an emotional feeling individual have about service or other (Raboka, 2006).Extension service satisfaction is a matter of attitude towards or evaluation of extension product or extension 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” (Lotfy and Adeeb, 2016). Agricultural extension services satisfaction was operationalized as the degree of satisfaction of the farmers in respect of relevancy, quality and usefulness extension service(Saravanan and Veerabhadraiah, 2003).

### **2.1.2 Overview on agricultural extension services in Ethiopia**

Agricultural extension work in Ethiopia began in 1931 with the establishment of the Ambo Agricultural School which is one of the oldest agricultural institutions in Ethiopia and the first agricultural high school offering general education with a major emphasis on agriculture. However, real agricultural extension work began in the early 1950s following the establishment of the Imperial Ethiopian College of Agriculture and Mechanical Arts (IECAMA, now Alemaya University) with the assistance of the United States of America under the Point Four Programme. Later on the extension service program was transferred to the Ministry of Agriculture (MoA) and encompassed different extension approaches. The following are some of these approaches: Chilalo Agricultural Development Unit (CADU), Walaita Agricultural Development Unit (WADU), Minimum Package Program (MPP), Extension and Project Implementation Department (EPID), Training and Visit (T &V) approach, Peasant Agriculture Development and Extension Project (PADEP), and currently the Participatory Demonstration and Training Extension System (PADETES) is popular (Belay, 2003).

In the early 1990s, smallholders became the focus of interventions in agriculture in general and agricultural extension in particular. At the same time, a pilot extension system supported by the Sasakawa Global 2000 (SG-2000, the Sasakawa Africa Association and Global 2000 of the Carter Centre) was introduced in 1993, involving 160 farmers in demonstration exercises focusing on maize and wheat production (Gebremedhin *et al.*, 2006). Based on this new extension programs, the Participatory Demonstration and Training Extension System (PADETES), was introduced. As the name implies, the system is based on demonstrating and training farmers on proven technologies in participant manner. According to the new strategy, the responsibility of the MoA at the federal level is to formulate agricultural policies, design packages, organize and conduct training activities to upgrade the knowledge and skill of all partners in agricultural development (Hailu, 2002). The PADETES program described earlier worked with this T&V approach to specifically promote improved seed and chemical fertilizer and succeeded in convincing the GoE to expand its coverage under the NAEIP in 1995 (Adugna, 2008). The training, provided for agricultural extension workers, focuses on

properly using fertilizers, land, ways of sowing and other technical aspects that help to boost productivity with very small plot of land (Dereje, 2012).

Agricultural extension programs in Ethiopia have traditionally focused on the promotion of production technologies and agricultural inputs as the driving force for increasing agricultural production and productivity, with inadequate attention to market support services (Spielman *et al.*, 2011). Agricultural extension approaches in the past were renewed with no or weak evaluation and monitoring of the systems. Moreover the extensions that were put in place used one size-fit for all types of extension methods and there is no extension that suits for all categories of adopters (EEA, 2006). In the Ethiopian condition, past extension approaches have been planned and implemented in top down approach without the involvement of the people for whom they have been designed (Belay, 2003). While in many parts of the country the number of extension workers is very small, the existing ones lack qualification and communication skills (Belay and Abebaw, 2004).

### **2.2.2 Role of agricultural extension services for agricultural production**

Dissemination of the right information at the appropriate time among farmers is vital role to change in agriculture production (Asiedu, 2013). Agricultural extension services take the lions share to create competent and efficient farmers who are able to increase productivity by making effective use of knowledge and information which is available from or can be generated by several different information sources (Temesgen and Tola, 2015). Extension services can be organized and delivered in a variety of forms, but their ultimate aim is to increase farmers' productivity and income.

The roles of extension today go beyond technology transfer and training of farmers but include assisting farmer to form groups, dealing with marketing issues and addressing public interest issues in rural areas (Ijeoma and Adesope, 2015). Agricultural extension service is one of the main instruments used by Provincial Department of Agriculture to achieve its agricultural developmental goals. The goals could be achieved through provision of appropriate agricultural information and knowledge to enable and capacitate land users and farmers towards improved, sustainable and economic development (Zwane *et al.*, 2014).

According to Swanson (2008), the primary objectives associated with agricultural extension and advisory services are concerned with transferring technologies associated with the major crop and livestock production systems; enhancing the skills and knowledge among all types of farmers and rural families. To be effective extension system, it should be adequate and timely access by farmers to relevant advice with appropriate incentives to adopt the new technology according to farmers' socio-economic and agro-ecological circumstances (Anderson and Feder, 2004). The traditional view of extension in developing countries was very much focused on increasing production, improving yields, training farmers, and transferring technology. Today's understanding of extension goes beyond technology transfer to facilitation, beyond training to learning, and includes helping farmers form groups, deal with marketing issues, and partner with a broad range of service providers and other agencies (Davis, 2009).

The number of populations has increased rapidly due to decline of mortality and high birth rates, and this pressure of human numbers has caused to break down of the traditional systems. The growth of towns and the number of people involved in non-agricultural activities have led to an increasing demand for agricultural products. In order to solve this problem, agricultural extension services necessary tools for productive use of land (Adams, 1992). Agricultural extension services provide critical access to knowledge, information and technology that farmers require to improve productivity and the quality of the lives and livelihoods of farmers (UN, 2005). Agricultural extension service could be the government agency or ministry responsible for promoting the adoption and utilization of new scientific farming practices through educational procedures (Asiabaka *et al.*, 2012). Many farmers in rural areas do not have the most up-to-date information on how to grow food efficiently and economically. Improving their knowledge of new techniques and technologies, in addition to providing them with any physical resources necessary for implementation, can dramatically increase the farmer's level of productivity (Ommani and Noorivandi, 2014).

### **2.2.3 Agricultural extension methods**

Farmers need to be aware about increase in their productivity and income through several channels such as extension agents, individual farmer to farmers contact; print media have to be widely used in disseminating information to farmers (Bello *et al.*, 2014). Through extension



methods knowledge and skills are disseminated to the farmers. It is vital for the extension agent to completely be familiar with these methods since it is important for the agent to pick a certain method according to the situation (Krishiworld, 2011). Farmers as the clients in the extension teaching-learning situation share similar characteristics with the audience in the communication process, mediator through the concepts of selective attention, selective perception, and selective recall.

Success of any agricultural extension program depends largely on the optimum selection of extension activities; methods, goals and the farmers' preference of extension methods (Qtaishat and Al-sharafat, 2012). The audience as the information processor exerts their preference for types of information and this is reflected in their characteristic ways of receiving information (Idowu, 2005). There are various extension teaching methods used as tools by the extension worker to effect desirable changes in the behaviour of farmers, arrange the best learning situations and provide opportunities in which useful communication and interaction takes place between extension workers and farmers. Such teaching methods/pathways include individual, group training and mass media (Nwaekpe *et al.*, 2014). Extension methods like demonstration plots, seed multiplication programme and field days and among others are some of the major weapons for introducing the findings of modern research in agricultural practices to increase agricultural production in particular and improve welfare of target farmers (Afzal, 1995).

Individual or face-to-face methods are probably the most universally used extension methods in both developed and developing countries. In individual methods the extension agent meets the farmer face-to-face, and gives him information and advice. Individual extension method is based on face-to-face communication (Ates and Cakal, 2014). Group extension methods provide relatively broad spectrum of influences on beneficiaries of extension services. Types of group extension methods are diverse: expert lectures, group discussions, "field days", and group extension work in training centers for villagers and farmers, working groups for farmers and so called "extension clubs", different types of demonstrations of experimental results and new work techniques, expert excursions and trips, mutual (informative) meetings, etc(Issahaku, 2014). Mass communication methods can make contact at the same time with numerous people. Mass extension methods can be effectively used to inform a large number

of people about the existence of new techniques, and new ideas; to draw their attention to certain issues and to warn them against certain emergency situations (Bello *et al.*, 2014).

#### **2.2.4 Farmers' satisfaction with agricultural extension services**

Extension satisfaction is conceptualized as a process of an individual's comparison between expectations of the extension service and the service's actual performance, originally referred to as the confirmation disconfirmation process in (Festinger's, 1957) theory of dissonance. Literature confirms the crucial interaction between customers and service provider in forming the notion of satisfaction. Some believe that customer satisfaction is a result from direct interaction with the service provider (Ganpat *et al.*, 2014). The service quality model stipulates that when a perceived doesn't meet expectations, service quality is less than satisfying. Whereas, when the perceived service exceeds expectations, service quality is considered more than satisfying (Agbor, 2011).

The contrast theory suggests if actual product performance does not meet the consumer's expectations about the product, then the negative contrast between product expectation and actual performance will cause the consumer to exaggerate the discrepancy (Yi, 1990). The theory indicates the farmer will exaggerate the disparity, leading to amplified dissatisfaction with the extension service. Conversely, if the extension officer visits twice per month thereby exceeding expectations, then the contrast will lead to exaggerated levels of satisfaction. Consistent to the contrast theory, Suvedi, Lapinski, and Campo (2000) found frequent users of extension services are significantly more satisfied than less frequent users. Farmers' satisfaction remains an essential domain that must be afforded proper attention and action (Hornby and Cowie, 1995). In other words, the existence of supply-driven instead of demand-driven extension service limits farmers' satisfaction (Spielman *et al.*, 2010). One of the most important concepts in farmers' satisfaction leadership is contact surface. Contact surface (Rope & Pöllänen, as cited in Ihalainen, 2011) is the point of engagement of a certain organization to the farmer. They further explained that this communication surface includes all the following contacts, with examples from the field of agricultural extension:

- ✚ Personnel contacts, e.g. extension contact with farmer.
- ✚ Product contacts, e.g. information on technology and inputs.

- ✚ Support system contacts, e.g. help to access subsidies, incentives, and
- ✚ Ambience contacts, e.g. friendliness of the extension worker and cleanliness of the extension office.

According to Farris *et al.* (2010), farmers' satisfaction expresses how products and services supplied by organization meet or surpass farmer expectation. Evaluating the satisfaction rate of farmers is highly important for a number of reasons. First, the farmers are the intended beneficiaries of the extension service and thus, they should have the right to judge its performance. Second, as end users, the farmers have personal experiences with the service that are not shared by non-users. Third, the sustainability of the service ultimately depends on the willingness of the farmers to continue participating in it, which is a reflection of their satisfaction. 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; Moore, 1984).

Extension service providers are charged with the responsibility to ensure farmers are satisfied with the services being delivered (Ganpat *et al.*, 2014). The farmers' satisfaction level measures are used as a key component of performance measurement of extension personnel and in the continuing process of program accountability. This information allows management to acquire precise ideas of what farmer want, which facilitates the development of targeted services (Israel, 2007). Agricultural extension service should maintain farmers' satisfaction as the sustainability of the program ultimately depends on the willingness of the farmers to continue participating in it, which is a reflection of their satisfaction (Elias *et al.*, 2015)

### **2.3 Empirical Studies on Factors that Influence Farmers' Satisfaction with Agricultural Extension Services**

Studies conducted by Terry & Israel (2004) have provided a highly diverse international perspective on extension services and farmers' satisfaction. The findings from these studies demonstrated that factors such as educational level, frequency of extension visits, types extension methods provided, relevance of extension package, farmer group' organizations participation, and land size farmed influenced farmers' satisfaction with agricultural extension

service positively. Study result by Ganpat *et al.* (2014), indicated that farmers' satisfaction with agricultural extension service had affected by farmer age, education level, farm size, extension visits and participation in farmers' groups.

Study result by Terry and Israel (2004) that older farmers are more satisfied with the services provided by extension than younger farmers which may be related to their farm experience. On the contrary, older farmers are often viewed as less flexible, and less willing to engage in a new or innovative activity due to fear of risk whereas young farmers may be more risk averse to implement new technologies on their farm (Elias *et al.*, 2013). Therefore, this study hypothesizes farmers' age may positively or negatively influence farmers satisfaction. Regarding education level that farmers who attained higher levels of education (secondary/tertiary) were more satisfied with extension than farmers with lower levels of education. Aphunu and Otoikhian, (2008) argue that, being literate is necessary in effective extension communication. Knowledge and skills required to interact effectively with food producers, and better the educational status, the better they wisely utilize extension services. Therefore, farmers' education level positive relation with agricultural extension services.

Asset ownership, such as, family size, livestock ownership in (TLU), and land ownership, credit and insurance markets are important to implement extension advices effectively in Ethiopia (Ayalew and Deininger, 2012). Therefore, asset ownership such as family size in (adult equivalent), livestock ownership (TLU), and farm land size (in acre) were positively influences farmers' satisfaction with agricultural extension service. Ganpat *et al.* (2014) found that farmers with larger land sizes were more satisfied with extension services than those with smaller sized holdings. Therefore, land size of the household is positively influence satisfaction level of farmers with agricultural extension service. Farmers those participate on off farm employment are likely more satisfied because they have more opportunities to get what they desire (Frey and Stutzer, 2002). Therefore, off farm employment was positively related with farmers' satisfaction.

Duc (2008) found that satisfaction with farming was associated with farmers' perceptions of the economic rewards of farming. Rewarded values from agriculture in this analysis include agricultural productivity, food self-sufficiency, cash crop production and ability to do cost

benefit analysis. Benefits should be viewed as service provider makes to optimize users' performance, provide opportunities for them to succeed financially and gain sustainable competitive advantage (Ali *et al.*, 2012). Therefore, perceived economic return after agricultural extension services was positive and significant relation with farmers' satisfaction. Damisa *et al.* (2008) indicated helps farmers through the alleviation of capital constraints and thus enable farmers to make timely purchases of inputs that they cannot afford from their own resources. Elias *et al.*, 2015 argue that credit users influenced by the nature of credit arrangements that reduces the attractiveness of the service. In this study, credit access hypothesized positive or negative influences on farmers' satisfaction level with extension service.

Individuals that were members of farmers' cooperative society (Ganpat *et al.*, 2014) were more satisfied with extension than those not belonging to any cooperative society. Therefore, participation in cooperative society is positively influence satisfaction level of farmers' with agricultural extension service. Extension organization should provide different training for farmers to maximize program efficiency, effectiveness and extension service satisfaction of farmers' (Jones *et al.*, 2007; 2010). Therefore, in line with this concept study hypothesizes agricultural training influences farmers' satisfaction positively. Contact with extension agent on a regular bases help farmers' to learn and discuss in detail about agricultural extension knowledge which influence farmers' decision that enable them to take action (Ganpat *et al.*, 2014). According to Faramarzi and Langerodi (2013), frequent use of communication channels has positive and significant relationship with farmers' satisfaction with extension services. As Ragasa *et al.*, (2013) pointed out use of multiple communication methods influences farmers' satisfaction positively. Ganpat *et al.* (2014), found that farmers who receive more extension visits are more satisfied. Therefore, frequency of extension contact was positive and significant relation with farmers' satisfaction with extension agricultural services.

Study by FAO (1995), on the relevance of extension packages and packages provided for farmers based on need, agro-ecology, market, affordability of inputs, availability and quality of inputs and indigenous knowledge of farmers were determinant factor for farmers' satisfaction. Related study by Ifenkwe (2009), most of the respondents agreed that they prefer

appropriate agricultural extension packages that enhance greater value addition to their farm output. This factor also ensures that they earn higher income and wider array of products from their farm outputs. Odebode (2008) who reported that lack of suitable extension packages and scientific knowledge application limits agricultural utilization and economic progress. The process of arranging appropriate technology for extension service requires measuring the satisfaction of the farmers towards the provided agricultural extension services; otherwise this process is not viable (Qtaishat and Al-sharafat, 2012). However, this study hypothesizes the perception of package appropriateness was positively influence farmers satisfaction with agricultural extension service.

Farmers involved in extension program have a higher satisfaction with agricultural extension services, which may be a positive consequence derived from the higher income and higher expectation that they gain from extension program (Duc, 2008). Participatory extension approaches are considered an important aspect of improving agricultural extension provision to improve accountability and increase transparency in organizational performance (Cohen and Lemma, 2011). Therefore, this concept undertakes that farmers' perception on participatory nature extension programs is positively influence on farmers' satisfaction with extension services.

## **2.4 Conceptual Framework**

Satisfaction in this study is conceptualized as the effective reaction of a farmer towards the use of extension service. Specifically we used the same concept provided by Raboka (2006) who defines satisfaction as the fulfillment of certain prior expectations related to a product or service. Understanding and considering these factors when analyzing and interpreting farmers' satisfaction with agricultural extension services has, therefore, become important both theoretically and empirically.

The conceptual framework of this study was developed based on the assumption that farmers' satisfaction with agricultural extension services is influenced by several factors that include personal and demographic, economic, psychological and institutional factors. The following variables were conceptualized for this study that affect farmers' satisfaction with the agricultural extension service such as personal and demographic characteristics (age, family

labour, and education), economic factors such as (TLU, land size and off farm employment), psychological factors such as (perception on economic return, perception on package appropriateness and perception on participatory nature of extension program ), institutional factors such as access to credit, participation in cooperative society, training and contact with extension agent (Figure 1).

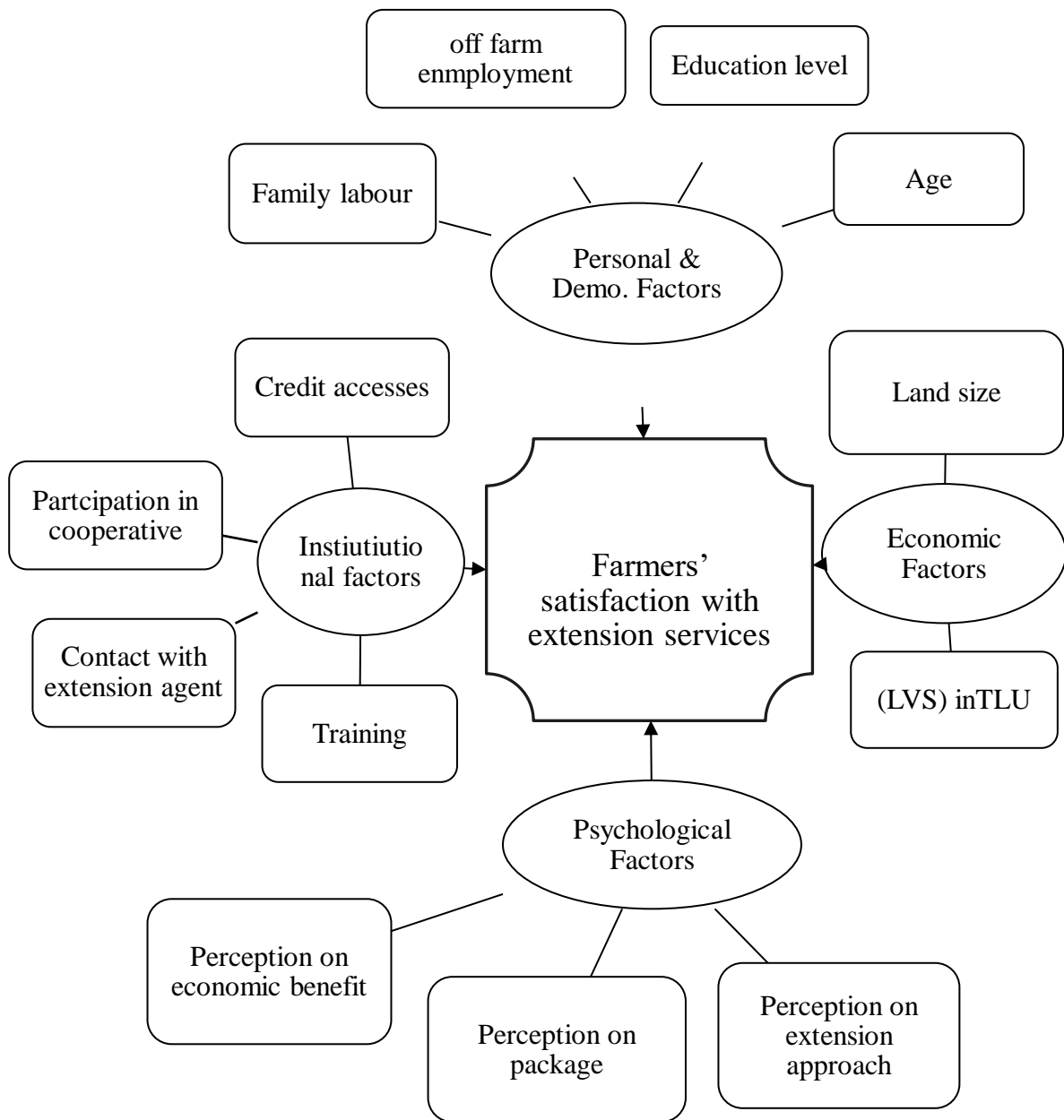


Figure 1: - Conceptual framework of study

Source: - “Own developed after review of literature”

### **3. METHODOLOGY**

#### **3.1 Description of the Study Area**

##### **3.1.1 Geographical location**

The study was conducted in *Mareka* District of *DawuroZone*, Southern Nations Nationalities and Peoples Regional State (SNNPRS). *Mareka* District is located in South Western part of Ethiopia at about 525 km from Addis Ababa, the capital of Ethiopia and at about 298 km from the region capital, Hawassa. *Mareka* woreda is one of five woreda in *Dawuro zone*. The woreda was bordered by Esera woreda in South, Tocha woreda in West, Loma woreda in South and East and Genna woreda in North and South direction. The woreda is divided into 32 Rural Kebele Administrations (RKAs) and 4 Urban Kebele Administrations (UKAs). The capital of the woreda is waka (MWANRO, 2016).

##### **3.1.2 Population and demographic characteristics**

The total number of population of the *Mareka* woreda is 147,913 of which 73,656 (49.8%) are males and the remaining 74,257 (50.2%) are females. From total population which 125,726 live in rural area while 22,187 live in urban areas (*Mareka* woreda health report, 2017). Among these rural populations, the number of household heads is 19,176 out of which 16,376 are male, 2800 are females (MWANRO, 2017).

##### **3.1.3 Natural environment**

The physiography of the woreda can be classified into mountain 15%; hilly 75% and plain/flat 10%. The altitude of the woreda ranges from 520 to 3200 masl of which 41.77% is high land, 50% medium land and 8.23% low land areas. The mean annual rainfall is 900 mm and the nature of rainfall in the woreda characterized as mono modal in which five month dry and seven month are wet season. Rain starts on the month of May and ends on the month of October. The rest months are regarded as a dry months. The temperature of the woreda ranges from 16 -29 °C. The dominant soil types of the woreda is 40% brown, 45% black, 12% red and 3% others in physical color (MWANRO, 2016).



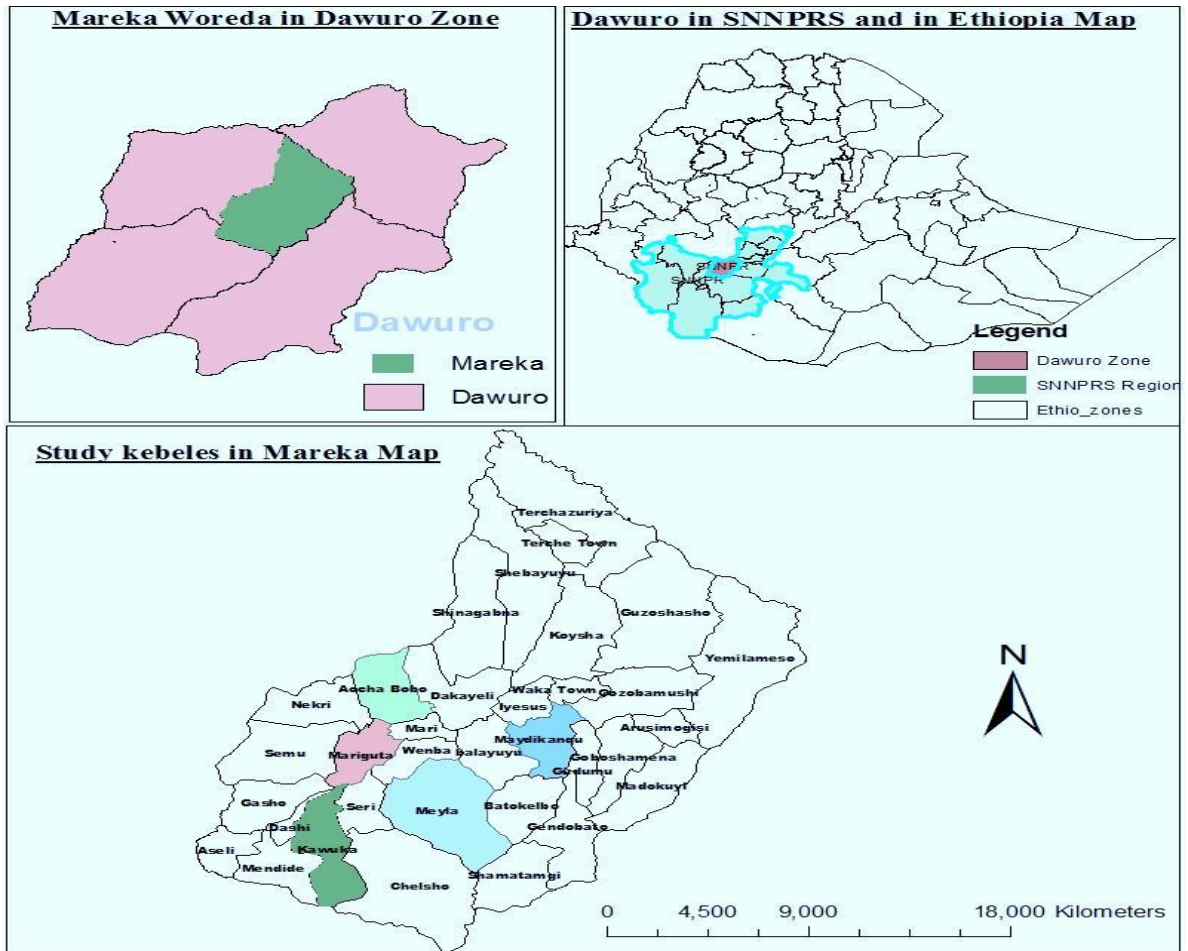


Figure 2: Map of study area

Source: - Own 2017 and MWANRO, 2015 E.C

### 3.1.4 Economic activities

Like other rural districts in Ethiopia, the economic situation of the woredais mainly based on agriculture. The people are predominantly sedentary farmers whose main livelihood is subsistence agricultural production, which include mainly mixed farming i.e. crop production (wheat, maize, teff, cotton, peas, beans and sorghum) and animal husbandry. The major crops grown in the woreda are cereals, pulses, legumes and vegetables. The woreda has been known for its high wheat and maize production and for supplying the produce for domestic market for consumption, and for neighbor woreda and zone (MWANRO, 2016).

Table1: -Land use pattern of the study area

No	Land utilization	Area in ha
1	Arable land	18,701
2	Forest land	365.33
3	Grazing land	9, 681.17
4	Water body	40
5	Bamboo tree	837.5
6	Unproductive land	1202.93
7	Perennial crop	12,120
8	Total	43,127.93

Source (MWANRO, 2016)

Animal production activity is one of the integral components of the farming system in the woreda. Livestock production has multi functions for the farmers of the study area that augments the subsistence requirement of the community in terms of milk, milk by- products and meat production, and generates household income. Livestock contributes a lot for crop production by providing draught power, manure (organic fertilizer) and transportation services.

Table 2: - Number of the livestock in the woreda

No	Types of livestock	Number
1	Cattles	134,712
2	Sheep's	52,454
3	Goats	13,795
4	Donkeys	3,512
5	Horses	2,907
6	Mules	2,199
7	Chickens	94,456
8	Bee hives	9,476

Source (MWANRO, 2016)

### 3.1.5 Agricultural extension service coverage of the study woreda

Agricultural extension service has its own impact on farm productivity of peasant agriculture. Under this objective, agricultural and natural resource office is the main government institution working with farmers. The office has structure that extends down to the KAs level. Development agents are executing the Programme at grassroots level (MWANRO, 2016). In the woreda there are 32 RKAs and 4 UKAs in each Kebele there are famers training center (FTC). From this total kebeles FTC only 8 FTC sometimes give service for farmers and the remained FTC are still not give service for farmers. There are 158 development agents (DAs)

in the woreda. Of which, 135 (84.4%) are males and the rest 23 (15.6%) are females. They are rendering regular agricultural extension services to farmers and all of them were graduated from ATVET College at middle level agricultural diploma and 10+1 level program in plant science, animal science, natural resources, animal health and cooperative professions. There are also 14 subject matter specialists (SMS) working at Woreda level, of which 10 (71.4%) are males and 4 (28.6%) are females to support the front-line extension services on field level(MWANRO, 2016).

### **3.2 Research Design**

Cross sectional study design was employed in this study. Based on the specific objectives and the nature of the research questions study,the combines both qualitative research approaches such as FGDs and key informants interview and quantitative household survey for the sake of understanding and examining the factors that limit farmers' satisfaction with agricultural extension services. The quantitative data was substantially supplemented by qualitative data in order to make the results sound. Household survey employed to measure independent and dependent variables at the same point of time by using structure interview. Key informants' interview and FGDs were used to supplement quantitative data. Secondary data employed to support quantitative primary data and obtained from MAWNRO and other published and unpublished document from different sources.Ordered logit model, was used to analyze determinants of farmers' satisfaction with agricultural extension services.

### **3.3 Sampling Techniques and Sample Size Determination**

There are several approaches to determine sample size. These include using a census for small populations, imitating a sample size of similar studies, using published tables, and applying formulas to calculate a sample size. This study applied a simplified formula provided by Yamane (Yamane, 1967). Appropriate sample size depends on various factors relating to the subject under investigation including time, cost and degree of accuracy. To determine the required sample size 95% confidence level, 5% of error term and 8% (0.08) level of precision were used.

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

$$n = \frac{2343}{1+2343(0.08)^2} = 146$$

**Note:** Where n is the sample size, N is the population size (total household heads size), and e margin of errors at 8% (modified by researcher), the desired level of precision, e = 0.08

In order to get quantitative data for the study in representative way and to increase its reliability and validity a two stage sampling procedure was employed. During first stage five kebeles were selected by using simple random sampling techniques from a total of 32 rural kebeles in the *Mareka* woreda. During second stage, 146 household heads were selected by using simple random sampling technique from total 2343 household heads in the five sample kebeles. The reason for using simple random sampling was there the same extension services in all kebeles in district and as well as the access to all households in sampled kebeles. Then probability proportional to size sampling technique used to draw the sample from each sample kebeles. Given the limited resources and time at the disposal of the researcher the total size of the sample are 146 farm household heads. In order to get qualitative data for the study 12 key informants and 22 FGDs participants from different group were selected purposively based on having information about study area and awareness about title.

Table 3: -Total sample households

No	Sample kebele name	Total households			Sample percent of kebele	Sample households		
		Males	Females	Total		M	F	Total
1	Mayela	593	85	678	28%	37	5	42
2	Kawuka	471	35	506	22.3%	29	3	32
3	Ocha	380	21	401	18%	24	1	25
4	Mayid	163	155	318	13.3%	10	10	20
5	Mariguta	375	65	440	18.4%	23	4	27
6	Total	1982	361	2343	100%	123	23	146

Source: - Kebeles Administration office, 2017

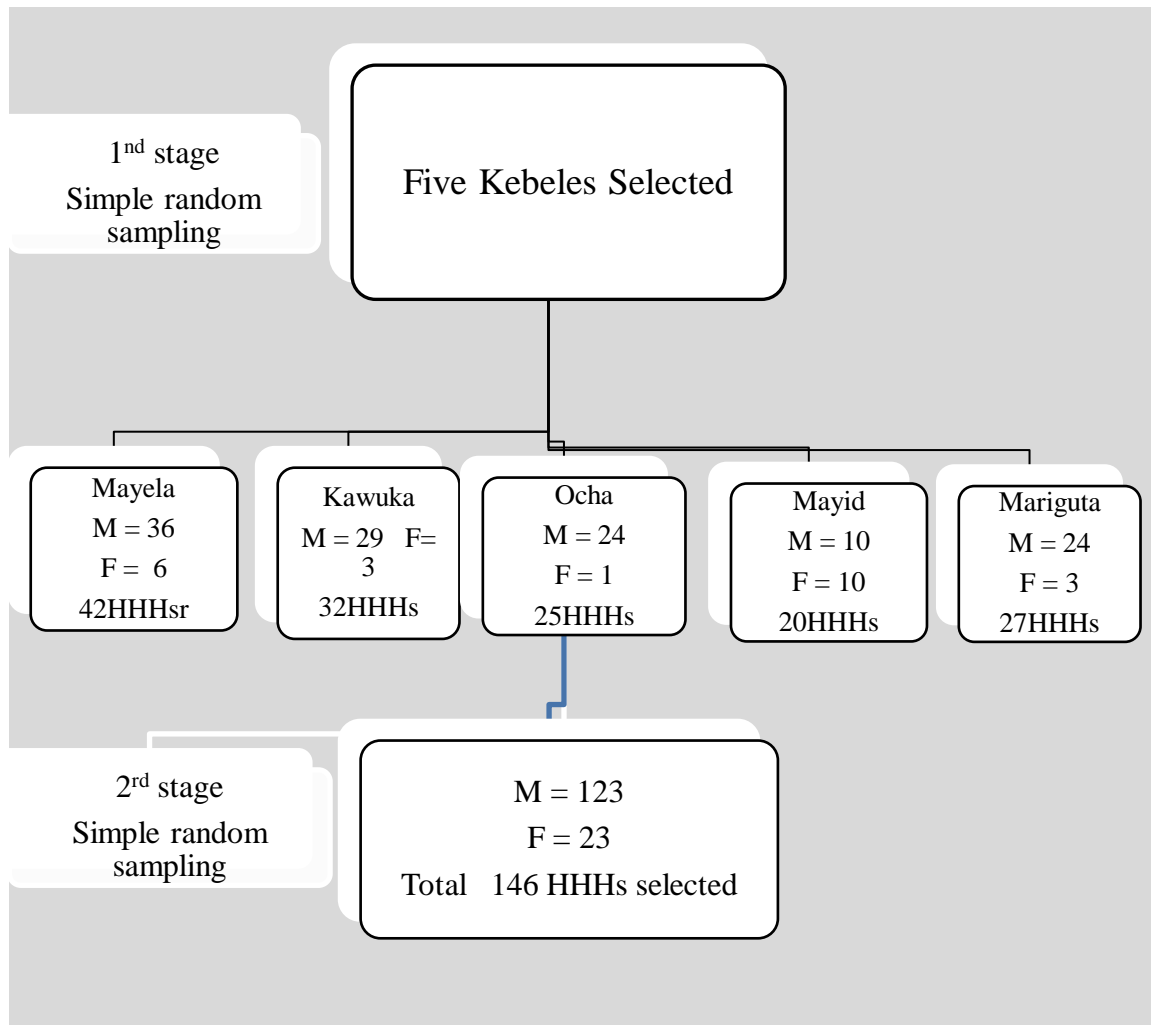


Figure 3: - Sampling produce

Source from kebeles administration data, 2018

### 3.4 DataTypes and Sources

Both quantitative and qualitative data were collected from primary data and secondary data sources. Primary data were gathered from 146 sample households which were related to personal and demographic characteristics, economic, institutional, and psychological factors that were expected to affect the farm households' satisfaction level towards agricultural extension services and type of agricultural extension services offered to farm households and extension methods used to deliver services data through interview schedule, group discussion and key informants interview.

All, secondary data were gathered through reviewing secondary sources as records, reports, and research results and other documents and publications from kebele development offices, Woreda agriculture and natural office, journals and unpublished document from different sources.

### **3.5. Data Collection Methods**

#### **I. Interview Schedule**

Quantitative data were collected using structured interview schedule from the 146 sampled respondents. First, enumerators got training before involving in data collection. They were supervised by the researcher to maintain the quality of data. Interview schedule would pre tested on twelve randomly selected farm household heads before conducting the formal survey. Data collected by researcher and enumerators were used to support filled out the questionnaire.

#### **II. Focus Group Discussion**

Focus group discussions were conducted with 22 respondents from three sampled kebeles (20 men and 2 women), who were organized in to three groups and one group in each kebeles. The discussions carried out after appointments for group meetings and made with the selected members such as development agents, kebeles managers, community leaders and model farmers. Each FGD was taken 2:00 – 3:00 hour. The group discussions mainly focused on constraints that limit farmers' satisfaction with agricultural extension services, types of extension services offered for farmers, extension methods used to offer extension services and farmers preferences among extension methods used to disseminate information to the farm households.

#### **III. Key Informants Interview**

Key informants' interview was conducted with five development agents and five model farmers from five sampled kebeles and two subject matter specialists from woreda agriculture and natural resource office. The key informants' interview mainly focused on factors which limit farmers' satisfaction extension services, agricultural extension services offered and extension methods used to delivery services to farmers in study area.

### **3.6 Method of Data Analysis**

Following the completion of the data collection, the data were coded and entered into Statistical Package for Social Science (SPSS) version 20 computer programs for analysis. In this study, quantitative data were analyzed using different methods of descriptive statistics such as frequencies, mean, maximum and minimum values, standard deviations, ranking, Chi-square test and F-test) and ordered logit model, which are relevant to the nature of the data. In this study qualitative data analyzed through interpretation and conceptual generalization. The qualitative data that were obtained through in-depth interview and focus groups discussion (FGDs) were stated qualitatively in the form of statements or narration. Besides, qualitative data were analyzed on the spot models to minimize the risk of overlooking important information used for triangulation to reinforce the information obtained from primary data.

#### **3.6.1 Descriptive statistics**

Different descriptive statistical methods were employed to analyze the generated data (such as frequencies, mean, maximum and minimum values, standard deviations, ranking, Chi-square test and F-test). Frequencies and percentage were used to find out farmers satisfaction level, type of agricultural extension provided and methods of deliver, constraint to farmers satisfaction with extension services. One way ANOVA and  $\chi^2$  used to test potential power of the continuous and discrete variables that influence the satisfaction of farmers' with agricultural extension services of farmers' with agricultural extension services in the study area. In addition, (one way ANOVA) Post Hoc Test was used to compare mean significant differences between satisfaction categories and continues variables.

#### **3.6. 2. Regression analysis**

Often the response variable can have more than two outcomes and very often these outcomes are ordinal in nature; that is, they cannot be expressed on an interval scale. These are ordinal scales in that there is clear ranking among the categories but to study phenomena such as the preceding, one can extend the bivariate logit and probit models to take into account multiple ranked categories (Gujarati, 1995). Use of appropriate model is usually determined by the nature of the dependent variables. Here in this study the dependent variable has categorical

and ordered nature. Therefore, ordered logit regression model is appropriate in this study. The ordered logit model is a logistic regression model for an ordinal response variable. The model is used widely to analyze ranked responses (Green and Hensher, 2009). Questions relating to satisfaction with life assessment and expectations are usually ordinal in nature (Anderson *et al.* 2009). Hence, this study employed ordered logit model to test the degree of the relationship and to determine the relative influence of various explanatory variables on the dependent variable. The values of  $Y$  (*dependent variable*) represents the ordered values that  $Y_i$  be the level of satisfaction of farmers with extension service, defined as:

0: *not satisfied*

$Y_i = 1$ : *moderately satisfied* (1)

2: *satisfied*

$Y_i$  is not a continuous value but categorical thus a larger value means better satisfaction with the service. In this case, there exists a known natural number ( $m$ ), such that:

$$P\{y_i \in \{0, 1, 2, \dots, m\}\} = 1 \quad (2)$$

This type of data is usually modeled *via* latent (unobserved) variable model given by:

$$Y_i^* = \alpha + \beta_i X_i + \varepsilon \quad (3)$$

- Where,  $Y_i^*$  = Latent (unobserved) measure of satisfaction face by the respondents,
- $X_i$  = A vector of explanatory variables,
- $\alpha, \beta_i$  = Coefficients to be estimate, and
- $\varepsilon$  = A random error term (assume to follow a standard normal distribution for logistic distribution).

If  $y_i$  is considered as a discrete and observable variable which shows different levels of farmers' satisfaction. Relation between latent variable  $y_i^*$  and observable variable  $y_i$  is obtained from ordered logit model as follows:

$$\begin{aligned}
 &0 \rightarrow \text{if } \textit{not satisfied } y^* \leq \mu_0 \\
 Y = &1 \rightarrow \text{if } \textit{moderately satisfied } \mu_0 < y^* \leq \mu_1 \quad (4) \\
 &2 \rightarrow \text{if } \textit{satisfied } y^* > \mu_1
 \end{aligned}$$



Where,  $\mu_1$  is a set of thresholds of the satisfaction gap to be estimated with the parameter vector  $\beta$  and  $\alpha$ . The probability associated with the coded responses of an ordered probability model is as follows:

$$\Pr (Y_i = j) = \Pr (\mu_{j-1} < Y_i^* \leq \mu_j) = \Pr (\mu_{j-1} < [\alpha + \beta_i X_i + \varepsilon] \leq \mu_j) \quad (5)$$

Where,  $j$  represents the ranked value of satisfaction.

The random error 'ε' is such that:

$$\Pr (Y_i = j) = \Pr (\mu_{j-1} < Y_i^* \leq \mu_j) = F(\mu_j - \alpha - \beta_i X_i) - F(\mu_{j-1} - \alpha - \beta_i X_i) \quad (6)$$

In a simplified form:

$$\begin{aligned} \Pr (Y_i = 0) &= F(\alpha - \beta_i X_i) \\ \Pr (Y_i = 1) &= F(\mu_1 - \alpha - \beta_i X_i) - F(\alpha - \beta_i X_i) \\ \Pr (Y_i = 2) &= 1 - F(\mu_1 - \alpha - \beta_i X_i) \quad (7) \end{aligned}$$

In ordered logit,  $F(x)$  is specifying as the logistic distribution function given by:

$$F(x) = \frac{\exp(x)}{1 + \exp(x)} \quad (8)$$

Like logistic regression, ordered logit uses maximum likelihood methods, and finds the best set of regression coefficients to predict values of the logit-transformed probability that the dependent variable falls into one category rather than another. Logistic regression assumes that if the fitted probability,  $p$ , is greater than 0.5, the dependent variable should have value 1 rather than 0. Ordered logit doesn't have such a fixed assumption. Instead, it fits a set of cutoff points (Bruin, 2006).

**Estimation procedure:** Following the completion of the data collection process, the responses were coded and entered into statistical package for social science (SPSS) version 20 software for analysis. Before estimating the models, the explanatory variables were checked if multicollinearity exists among them to exclude the highly collinear explanatory variables.

**VIF (variance inflation factor)** was used for testing the association between the hypothesized continuous variables and the value of VIF can be computed using the formula,

$$VIF=1/(1 - R_i^2) = (1-R_i^2)^{-1} \text{-----} (9)$$

Where,  $R_i^2$  was the squared multiple correlation coefficient between  $X_i$  and the other explanatory variables (Maddala, 1989). A statistical package known as SPSS (statistical package for social science) version 20 was employed to compute the VIF values. To avoid the problem of multicollinearity, it is essential to exclude the variables with the high VIF value greater than 10 is used as a signal for the strong multicollinearity (Gujarati, 1995).

**Contingency coefficients:** These were also computed for dummy/discrete variables. In order to test multicollinearity problem between discrete as well as dummy variables, contingency coefficient, which is  $\chi^2$ -chi-square based measure of correlation was computed. The values of contingency coefficient, ranges between 0 and 1, with zero indicating no association between the variables and values close to 1 indicating high degree of association. The association is said to be high when the value is greater than 0.75.

$$C.C = \sqrt{\left(\frac{\chi^2}{n+\chi^2}\right)} \text{-----} (10)$$

Where C is coefficient of contingency,  $\chi^2$  is chi-square test and n= total sample size.

A goodness of fit measure is a summary statistic indicating the accuracy with which a model approximates the observed data. The parameters of the models were estimated using the iterative maximum likelihood (ML) estimation procedure. Due to the non-linearity of the logistic regression model, an iterative algorithm is necessary for parameter estimation (Maddala, 1989; Gujarati, 1995). The ML method is very general method of estimation that is applicable to a large variety of problems. In large samples the maximum likelihood estimates have been proved to have all the usual desirable statistical properties (Maddala, 1989). Maximum likelihood is the most efficient (and sometimes the only) way to estimate the parameters of specifications that involve limited dependent variables. In very general sense, the method of ML yields values for the unknown parameters, which maximize the probability of obtaining the observed set of data (Hosmer and Lamesho, 1989).

### 3.3 Definition of Variables and Working Hypothesis

After having appropriate analytical tools, it is plausible to identify, define and describe the independent variables with their appropriate symbols and measurements in a workable way.

## The dependent variables

In this study dependent variable was farmers' satisfaction with agricultural extension services. A variety of scales and self-developed questionnaires have been employed to measure extension services satisfaction level of farmers'. This study employed a questionnaire comprising extension services satisfaction scale to measure extension services satisfaction using (Ganpat *et al.*, 2014) extension services satisfaction index. This scale is a self-report instrument that measures extension services satisfaction across 16 different items. Respondents were instructed to indicate the extent of their agreement with each item on a four point scale agreement option ranging "strongly disagree = 1, disagree = 2, agree = 3 and strongly agree = 4 scored to each statement. The overall index of farmers' extension services satisfaction is identified on mean frequency obtained from 16 item questions by using Farmers' Satisfaction index (FS<sub>i</sub>) by (Ganpat *et al.*, 2014). An index to assess farmers' satisfaction derived as follows:

$$\text{Farmers' Satisfaction Index (FS}_i\text{)} = \frac{\sum R_i}{R_{max}} * 100$$

R<sub>i</sub> is the response to each statement of individual *i* dividing by R<sub>max</sub> are the maximum and minimum obtainable score ranged from 25 to 100. (Obtained score of 16 items multiply by 100/64 maximum obtainable score). Higher values indicated greater satisfaction and lower value indicated dissatisfaction with the extension services. This helps to know the level of satisfaction with extension services of each farm households and also it used as dependent variable. The dependent variable for the ordered logit regressions has ordered in nature, that is, the dependent variable can take the value (0), not satisfied with provided extension services, (1) moderately satisfied with provided extension services and (2) satisfied level with provided extension services. Reliability of the questionnaire was measured by computing of Cronbach's Alpha coefficient, the measure of internal consistency, this coefficient for job satisfaction was 0.90 which indicates the acceptable level of reliability.

## **The independent variables**

The independent variables that expected to influence farmers' satisfaction with agricultural extension service can be many types. Here in below, the definition and explanations of the 14 independent variables are presented

**1. Age of the household head:** - Age is continues variables measured in number of years of household head age. The results by (Lavis and Blackburn, 1990; Duc, 2008) older farmers achieve higher probability of satisfaction with agricultural extension services than that of younger farmers which may be related to their farm experience. On the contrary, older farmers are often viewed as less flexible, and less willing to engage in a new or innovative activity due to fear of risk whereas young farmers may be more risk averse to implement new technologies on their farm (Elias *et al.*, 2013). Hence the influence of age on farmers' satisfaction is ambiguous. Therefore, in this study age was hypothesized it might have positive/negative influence on farmer's satisfaction with agricultural extension services.

**2. Education level of household head:** - Household head education level is continues variable measured in number of years spent in formal school. The higher grade educational level, the better they wisely utilize extension services and educated farmer is more satisfy on extension service than that of illiterate farmer (Hegde, 2005; UNESCO, 2005). Aphunu and Otoikhian, (2008) argue that being literate is necessary in effective extension communication. Therefore, in this study education was hypothesized to have a positive influence on farmer's satisfaction with extension services.

**3. Family labour:** - The variable has been treated as continuous variable measured by man equivalent of the family labour. Households with better availability of family labor more likely implement the extension advices that help them to increase their agricultural productivity and other farm related benefits (Elias *et al.*, 2015). Therefore, in this study effect of family labour was hypostasized positively and significantly influences farmers' satisfaction with extension services.

**4. Livestock owned:** - It is a continuous variable measured in Tropical Livestock Unit (TLU). Households that have more large number of livestock are likely satisfy with extension services than others who have less number of livestock because the farmers with more

number of livestock have better opportunity to get credit (Wegayehu, 2003). Therefore, this study hypothesized to affect farmers' satisfaction with agricultural extension service positively and significantly.

**5. Credit use:** - It is a dummy variable, which takes the value 1 if the farm household uses credit and 0 otherwise. However in the study of (Damisa, 2008 and Dercon, 2000), credit service access and farmers' satisfaction with agricultural extension service showed negative and significant correlation. Elias *et al.*, 2015 argue that credit users influenced by the nature of credit arrangements that reduces the attractiveness of the service. In this study, credit access was hypothesized it might have positive or negative influences on farmers' satisfaction level with extension service.

**6. Off-farm employment:** Off-farm employment increases the additional income of the household and develops the capacity to invest in technology adoption. It is a dummy variable that takes a value of 1 if the farm household members participate in off-farm activities and 0 otherwise. Elias *et al.*, (2015), those who are doing off farm activities to earn additional income contribute not only to the increase of total income, but, more importantly, to income stability that facilitates farmers to afford the expenses of extension service inputs. Therefore, in his study off farm income was hypothesized as positively significant.

**7. Land size:** - it is continuous variable measured in household owned land size in hectare. Those farmers with larger total farm land sizes were more satisfied than those with smaller sizes of farm land (Terry and Israel, 2004). Therefore, in study land size was hypothesized positively influence on farmer's satisfaction with extension services.

**8. Participation in cooperative society:** - It refers to household head membership in cooperative society. It is dummy variable measured in household head participation in cooperative society. (1) If member in cooperative society (0) not member in group. Hence, the involvement of farmers in organization is influence farmer's satisfaction with extension positively (Pender *et al.*, 2004). Therefore, in this study participation in cooperative society was hypothesized positively and significantly affects farmers' satisfaction with agricultural extension services.

**9. Contact with extension agent:** This refers to the number of contacts farmer had with extension agent to take advice in last cropping season. Extension workers are the main source of information and training of farmers in adopting new extension packages, their frequent contact with farmers is important for improving the effectiveness of the extension services (Faramarzi and Langerodi, 2013). Therefore, in this study frequency of extension contact was hypothesized positively influence farmers' satisfaction with agricultural extension services.

**10. Perception on economic return:** - Perception of economic return is categorical variable measured in economic return after extension services 0 those perceived as reduced 1, somewhat improved and 2, improved. Respondents were graded item variables based on their perception of economic return after extension services. The total perception of economic return was the sum of the scores from item variables. Satisfaction with farming is associated with farmers' perceptions of the economic rewards of (Elias *et al.*, 2015). Therefore, total perception of economic return was hypothesized positively and significantly influences farmers' satisfaction with agricultural extension services.

**11. Perception on package appropriateness:** - It is dummy variable measured farmers perceived as 1, for those suitable 0, otherwise. Respondents will rate the appropriateness of each package practices based on their perception. The total perceived appropriateness of the package would sum of the scores of each package components. As noted by Brennan (2005), people are more likely to accept solutions that are consistent with their local situation. Therefore, in this study farmers' perception on extension package appropriateness positively and significantly influences farmers' satisfaction with agricultural extension services.

**12. Perception on participatory nature of extension program:** - It is dummy variable measured in 1, for those perceived as participatory 0, not. Hence data was 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. Study by Cohen and Lemma (2011) participatory approaches are considered an important aspect of improving agricultural extension provision to improve accountability and increase transparency in organizational performance. Therefore, in this study perception of participatory nature of extension program was hypothesized positively significant for farmers' satisfaction.

**13. Participation in training:** Training is one of the means by which farmers acquire new knowledge and skills and it is measured by the number of times, the farmer has participated in training in the last years. According to Ziaemehr and Panahi (2011), number of (session) extension-training periods that the companies held for cultivation was positive influences on farmers satisfaction with agricultural extension services. Therefore, this study hypothesizes training positively influence farmers satisfaction with extension services.

Table 5: - Summary of predictors' definition and expected signs

Variable	Code	Type	Operation definition of the variable	Exp
Age	AGE	Continues	Household head age in year	+/-
Education	EDUCA	Continues	Grade of formal education in year	+
Family Labour	FAMLAB	Continues	Man equivalent of the family labour.	+
Livestock Owned	LIVOWN	Continues	Total number of livestock owed by a household measured in (TLU)	+
Access to credit	ACTOCR	Dummy	1, if a person has access to credit and 0 otherwise	+/-
Off - farm employment	OFFAIEM	Dummy	1 if the household members engaged in off-farm employment and 0 otherwise.	+
Land size	LANDSA	Continues	Household land owned in hectare	+
Participation in cooperative society	PARTFAO	Dummy	Participated farmers'orgn. 1, otherwise 0	+
Contact with extension agent	FERQEXC	Continues	Number of times the farmer has made contact with extension agent in the last cropping season.	+
Perception of participatory nature extension program	PERPAEX	Dummy	1 for those perceived as participatory 0. otherwise	+
Perception of economic return	PECOBEN	Ordinal	Economic return after extension services 0 those perceived reduced 1, somewhat improved 2, improved	+
Perception of package appropriateness	PEPACKA	Dummy	1, for those appropriate 0, other wise	+
Training	TRAIN	Dummy	Number of time farmers participated in training last two year	+

## 4. RESULT AND DISCUSSION

The first section presents sample household demographic characteristics, second section is about the type of agricultural extension services provided to the farming households, types of extension methods used, and farmers' preference among extension methods. The third section discussed about farmers' satisfaction level with the existing agricultural extension services. The fourth section discussed about analysis of independent variables' effects on farmers' satisfaction towards agricultural extension services using descriptive analysis under different appropriate subheadings. The fifth section focused on econometric result on determinants of farmers' farmers' satisfaction with agricultural extension services.

#### 4.1 Sample Respondents Demographic Characteristics

In order to understand the sample households, it is very important to describe their demographic characteristics of respondents. From out of 146 total sample household heads male respondents were 115 (79%) and female respondents were 31 (21%) in number (Figure 4). The survey data showed that majority of sample respondents were male farmers. Result implies in area majority of household heads area males. The marital statuses from total respondents 110 (75%) were married, 4 (3%) were not married, 12 (8%) were divorced and 20 (14%) widowed respondents (Figure 4). The survey data indicated that on in study area majority of respondents were married and followed by widowed, divorced and single respondents.

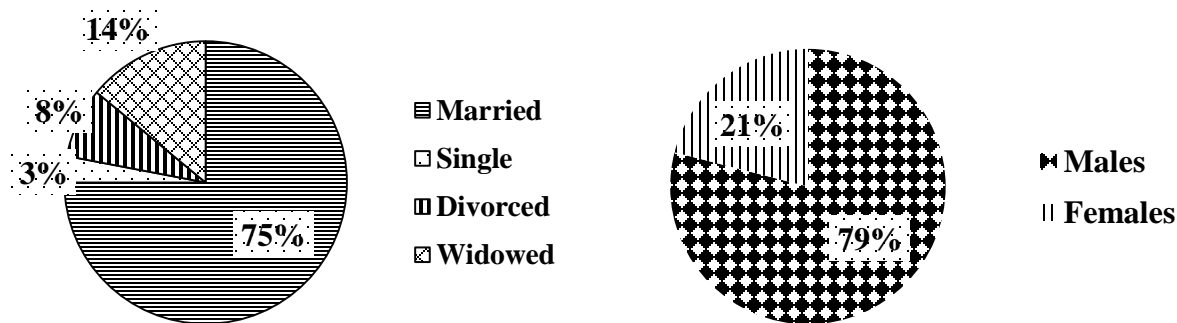


Figure 4: Respondents sex and marital status characteristics

Source survey data 2018

#### 4.2 Agricultural Extension Services Delivered for Farmers



In the study area, different types of agricultural extension services have been delivered to farmers from woreda agriculture and natural resource office through kebele extension workers. The extension services delivery in a given area by extension workers are the components of different services that most of them are difficult to quantify. However, based on the context of the study area types of extension services delivered are possible to identify. In this topic the study result discussed about agricultural extension services offered to farmers in study area.

The result on Table 5 indicated that, common type of agricultural extension services offered for farmers in the study area were input delivery services like (chemical fertilizer and input variety), land preparation techniques, fertilizer application techniques, planting technique, weeding practice techniques, Herbicides/ Pesticides application techniques, irrigation technique and information providing about new technology were major agricultural extension services type offered to farmers in study area.

Table 5: - Agricultural extension services delivered for farmers

Provide extension services	Not		Provided	
	Count	%	Count	%
Information delivery service	39	26.7	107	73.3
Input provision service	20	13.7	126	86.3
Row planting techniques	42	28.8	104	71.2
Fertilizer application techniques	41	28.1	105	71.9
Weeding techniques	82	56.2	64	43.8
Land preparation techniques	73	50.0	73	50.0
Harvesting techniques	93	63.7	53	36.3
Chemical application techniques	114	78.1	32	21.9
Irrigation techniques	106	72.6	40	27.4

Source data computed from field survey 2018

Survey result on Table 5 showed that majority of respondents indicated as input provision information delivery, fertilizer application techniques were provided to them and some respondents indicated as not used those type of extension services. While irrigation techniques, chemical application like herbicide and pesticide, harvesting and weeding were not provided extension services as indicated by majority of respondents. The result indicates that in study area the main agricultural extension services offer to farmers are inputs

distributions like chemical fertilizer and improved seed varieties and agricultural information deliver from kebele development agents mainly in time of input provision were farmers timely to use input. Farmer's access to extension services makes them aware of, and gets better understanding about improved agricultural technologies, and ultimately leads to decision to take risk for technology utilization.

#### 4.2.1 Extension methods used to deliver extension services

Extension methods are effective means of communication meant to transmit knowledge and skills and, that target farmers may easily see, hear, and learn the things conveyed by extension workers. However, farmers are often blamed for poor adoption of extension services and success or failure is based on the level of adoption without considering the effectiveness of extension delivery mechanisms (Kassem, 2014). The extension services therefore are used to serve as a vehicle for conveying and educating farmers on the new agricultural policies and practices. Extension personnel, which could be achieved by providing adequate and relevant information. The study result on Table 6 showed that in study area group discussion and farm/home visit were frequently used extension methods to deliver agricultural extension services for farmers.

Table 6: - Extension methods used for extension services delivery

Extension methods	Never		Occasionally		Frequently	
	Count	%	Count	%	Count	%
Group discussion	6	4.1	58	39.7	82	56.2
Farm/home visit	4	2.7	101	69.2	41	28.1
Demonstration plot	88	60.3	58	39.7	0	0.0
Office call	99	67.8	47	32.2	0	0.0
Model farmer visit	135	92.5	11	7.5	0	0.0
Field days	144	98.6	2	1.4	0	0.0
Informal contact	81	55.5	65	44.5	0	0.0
Mobile contact	113	77.4	33	22.6	0	0.0

(Source data computed from field survey 2018)

The result on Table 6 showed that majority respondents indicated group discussion and farm/home visit extension methods frequently used by extension agents to deliver extension services and some respondents indicated occasionally and never used those types of extension

methods. On other hand majority respondents indicated that on farm demonstration, office call and mobile contact extension methods were occasionally used extension methods. While most of respondents indicated that, model farm visit, mobile contact and farmers' field day extension methods never used extension methods to deliver extension services for farmers in study area.

Effective agricultural extension is not just a matter of availability of information and extension agents. It is also an issue of the methodology adopted in ensuring that the available information reaches the majority of the farmers. Several options were provided from where the extension officers were to choose the methods they used in information delivery. However, in study area extension officers were requested to provide on one part, information on the main methods they used in passing information to the farmers.

These result also supported by FGDs, that focused groups participants fingered that: "In study area commonly used extension methods for extension services delivery are public meeting extension method when on time of farmers conference agents deliver message about chemical fertilizer or other improved seed variety on provision time of input and group discussion method occasionally use on time farmer development group discussion time and farmer's farm or home visit methods use on time of credit collection time".

#### **4.2.2 Farmers preference among extension methods**

Farmers' preferences of extension methods have been recorded with liken scale of three preferences level such as most prefer, prefer and less prefer. These preferences have been obtained for the above mentioned eight modes of extension methods. The basic descriptive analysis is done in order to find out the frequencies and percentage of each level of preferences with the all information access methods separately. In study area, various extension methods used to deliver agricultural extension service for farmers as indicated (Table 7). Results revealed that, majority of respondents indicated on farm demonstration, farm and home visit, model farm visit and group discussion extension methods were most prefer extension methods for them. The result implies farmers interested to fulfill their technical gap mainly on use new agricultural technology for reason extension methods like on farm demonstration and model farm visit are preferable by them. Result agreement with study

by (Afzal 1995) argued that extension methods like demonstration plots, seed multiplication programme and field days etc., are some of the major weapons for introducing the findings of modern research in agricultural practices to increase agricultural production in particular and uplift of the rural masses in general. Farmers showed a mixed preference towards field days methods, public meeting and radio listing extension methods in study area. Mobile contact and informal contact extension methods were the less preferred methods among farmers in study area. Although, the study is in agreement with the findings of Aphunu & Otoikhian (2008) that regular farm visit and on farm demonstration plot is crucial for dissemination of extension messages and should be encouraged.

Table 7: - Farmers preference among extension contact methods

Extension methods	less prefer		prefer		most prefer	
	Count	%	Count	%	Count	%
Farm/home visit	6	4.1	116	79.5	24	16.4
Group discussion	55	37.7	85	58.2	6	4.1
On farm demonstration plot	0	0.0	54	37.0	92	63.0
Office call	67	45.9	79	54.1	0	0.0
Field days	55	37.7	85	58.2	6	4.1
Model farmers farm visit	38	26.0	61	41.8	47	32.2
Informal contact	71	48.6	75	51.4	0	0.0
Mobile phone contact	107	73.3	39	26.7	0	0.0

Source analysis result from field survey 2018

The reason indicated in time of FGDs for preferred extension methods were that, farm/home visits are also referred to as individual extension. Farmers strongly favour this method of extension, which emphasizes individualized dialogue. On farm demonstration plots ought to be simple, preferably comparing only the traditional with the improved method. Group discussion helps members identify and find solutions to their problems. Further, they provide opportunities to influence participants' behaviour.

## Box 1. Focused Group Discussion

Most of farmers in the study area grows food crops mainly wheat and maize. FGDs result showed that, in this area extension service mainly focused on input provision like wheat and maize improved seed variety and chemical fertilizer delivery and their performance also weight by those targets. The main extension methods used to deliver extension services in area were group discussion methods and farm visit extension methods.

One of FGD participant from Ocha kebele indicated that: “In our kebele extension services has top-down without considering local agro ecological conditions and needs. Main extension services offered from DAs are chemical fertilizer and improved seed without demand of farmers. Sometimes information delivery in time of new technology distribution and visit farm to see tillage for chemical fertilizer distribution.



FGDs Photo, May/2018 Kawuka

FGD participant from Mayid kebele indicated that: “We got extension agents only on time of farmers’ conference and they deliver message about chemical fertilizer distribution in farming season. In addition he said that there are no field days and model farm visit extension methods used in our kebele.”

Key informant from Mayid kebele indicated that: “In our kebele some type of extension services offered to farmers like input delivery service, planting techniques, land preparation practice on vegetation and information on new technology. To deliver further services there is low support of woreda offices on demonstration budget and there was still no equipment in FTC”.

### 4.3 Farmers' Satisfaction Level with Agricultural Extension Services

Measuring farmers' satisfaction level used as a key component of performance measurement of extension personnel, extension organization and in the continuing process of program accountability. In order to evaluate farmer's satisfaction level with agricultural extension services, 16 item statements were designed and the respondents were asked to state their response on prepared question (Appendix Table4). In this study, 12 statements adopted from a previous study (Ganpat *et al.*, 2014) and 4 statements like "extension offers a high quality services", extension package i received were appropriate/relevant", there is an adequate number of visits from the extension officers and I am happy on current agricultural extension services were included by researcher for calculating the extension satisfaction index (Appendix Table 4).

The actual mean score of extension services satisfaction is 58.76 with a standard deviation of 10.31 with minimum and maximum score of 29.69 and 79.69, respectively. The extension services satisfaction categories were calculated on the bases of mean and standard deviation. Accordingly, result on (Table 8) showed that total score computed from satisfaction item statements to identify satisfaction categories of respondents. That respondents scored 25 –50 point from total item statements was interpreted as not satisfied with current agricultural extension services, respondents scored with total point of 51- 75 was interpreted as moderately satisfied with current agricultural extension services, while respondents scored with 76 and above point from total satisfaction item statements was considered to represent satisfied with current agricultural extension services in study area.

Table1: Frequency distribution of extension services satisfaction level of farmers

Overall satisfaction level	Percent	Mean	SD	Min	Max
Not satisfied	44.5				
Moderately satisfied	32.9				
Satisfied	22.6				
Total	100.0	58.76	10.31	29.69	79.69

Source computed from field data 2018

The study result on Table 8 indicated that majority of the respondents 44.5% were not satisfied with provided agricultural extension services, followed by 32.9% respondents had a moderately satisfied with provided agricultural extension services and 22.6% of respondents were satisfied with provided agricultural extension services in study area. The study result implies that in study area the majority of farmers are not happy on current agricultural extension services provided from extension organization.

The result of farmers' satisfaction level with agricultural extension service from structured interview schedule data supported with qualitative data by FGDs and key informants interview. The result found from focus group discussion majority of participant indicated that farmers were low satisfied with existing agricultural extension services in study area. In those group discussion one participants' that: "The main reasons for farmers dissatisfaction with extension services in our kebele are extension package received were low quality, high price and not need based, extension program process in study area is not participatory in nature and extension workers not treats all farmers fairly and equality".

"Extension package in study area are low quality, not demand based on supply of chemical fertilizers, not timely deliver and not affordable this are the main reason for extension services dissatisfaction for farmers in study area".

#### **4.3.1 Constraints of farmers' satisfaction with agricultural extension services**

Constraints that affect farmers' satisfaction with agricultural extension services were investigated in this study. The results on Table 9 showed constraints that affect farmers' satisfaction were, high cost of agricultural inputs was 1<sup>st</sup> ranked based on the response of respondents, untimely dissemination of agricultural technologies ranked 2<sup>nd</sup>, no change in yield ranked 3<sup>rd</sup>, lack of fund ranked 4<sup>th</sup> and poor understandings of technology ranked 5<sup>th</sup>,

which are the most important constraints that affected farmers' satisfaction towards agricultural extension services negatively.

Table 9: Factors that constrain the farmers' satisfaction with extension services

Constraints	No		Yes	
	Count	%	Count	%
land shortage	84	57.5	62	42.5
input scarcity	77	52.7	69	47.3
Untimely dissemination of technologies	51	34.9	95	65.1
No change in yield	58	39.7	88	60.3
Irregular visit and supervision of farmers by extension agent	75	51.4	71	48.6
Lack of fund	59	40.4	87	59.6
low input quality	83	56.8	63	43.2
Poor understanding of technology	59	40.4	87	59.6
high cost of input	48	32.9	98	67.1

Source computed from survey data 2018

The study result on Table 9 showed that the major constraint militating against satisfaction of farmers' agricultural extension services indicated by respondents were high cost of input was 1<sup>st</sup> ranked (67.1%) respondents agreed as constraint, while 65.1% of respondents agreed as constraint of extension services satisfaction was untimely dissemination of agricultural technology technologies and 62.3% of respondents agreed with statement which constrains affect extension service satisfaction was no change in yield, and followed reduced understandings of technology and capital constraint were constraint that affect farmers' satisfaction with extension services with frequency of 59.6% and 58.9% respectively. While the remaining variables like low input quality, land scarcity, input scarcity, and low quality of input were also indicated as constraint by some respondents which limit agricultural extension service satisfaction. These constraints of farmers' satisfaction with extension service were also supported by the opinions of FGD participants. The FGD participant explained that farm households in their area are not happy with extension service due to these constraints.



## **Box 2. Focus Group Discussions and Key Informants Interview**

The reason indicated on time of focus group discussions that major constraints limit farmers' satisfaction with agricultural extension services in study area were high cost of input (like new seed variety, chemical fertilizer, pesticides etc.), untimely dissemination technology like (chemical fertilizer, pesticides and improved input variety), no change in yield, lack of fund agricultural input credit, lack of input quality were major constraint affect farmers satisfaction with extension services fingered on time FGDs. Before two year input like chemical fertilizer and improved seed delivered by credit for reduced farmers but know a day there was no input credit accesses for poor farmers. So there was capital constraint and how can purchase high cost input, they said those reason limit our agricultural extension services satisfaction. Also in those discussions no change in yield was one of constraint for farmers' satisfaction with agricultural extension services.

In FGD one of participant from Ocha kebele said that "In our kebele the main factor that limit satisfaction on agricultural extension services are high cost of input (improved wheat and maize variety cost highly different from local variety cost), low input quality like improved seed variety (like bean, wheat, barely), chemical fertilizer and pesticide. The other main constraints which affect farmers' satisfaction with agricultural extension services in study area were untimely dissemination of technology" like improved seed deliver.

"FGD participants from Kawuka said that: "In our kebele agricultural technology like chemical fertilizer, vegetable seed, and maize variety are not timely distributed for farmers, he said in addition their lack of quality for input like maize variety".

The other FGD participant from this kebele reported as there are many "problems limit our satisfaction on extension services some of this are the extension agents in kebele level are not regularly visit and supervision of farmers out of this diseases and pest attach our crop the we harvest low yield.



FGDs& key informant as research instrument (photo by author, May 2018).

The key informants interview also agreed with FGDs, pointed in time of key informants discussion that factor constrain farmers satisfaction with agricultural extension services in study area are untimely delivery of extension technology like improved seed variety from research and seed center , land scarcity was major factor for most farmers in high land area, reduced understanding of technology and irregular visit of extension agent raised from woreda SMS key interview those problem were major problem pointed from key informants' discussions

The reason rose from key informant of development agent from Kawuka kebele said that “there are three development agents in each kebele the number of farmers in each kebele and DA number are not much, out of this there is some limitation on farm visit and supervision”.

The other DA from Mayid kebele reported that “we are visit farm but still know there were reduced understanding of farmers for agricultural technology mainly they do not want to use chemical fertilizer”. So training and demonstration plot in FTC and model farm visit are very necessary for those but there is budget constraint for FTC”.

The

FGD opinions were summarized in the Box2.

#### **4.4 Descriptive Summery of Variables that Affect Farmers' Satisfaction towards Agricultural Extension Services**

Variation among respondents' household could related to: personal and demographic characteristics, economic, institutional, and psychological factors. Hence identifying the

variation due to influencing factors of farmers' satisfaction with agricultural extension services is the main objective of this study.

#### 4.4.1 Personal and demographic factors

In this study, personal and demographic characteristic were educational level and age of household head studied as explanatory variables that influence farmers' satisfaction with agricultural extension services. Each of the characteristics and its influence on farmers' satisfaction with agricultural extension services are discussed as follows.

##### Age of the sample household heads

Farmer age is one of the important explanatory variables that affect farmers' satisfaction with agricultural extension services. This study hypothesized that the farmer's age and farmers' satisfaction with agricultural extension services are positively and significantly associated.

As described on Table 10 total mean age of respondents was, 49.48 years with the standard deviation of 10.79 respectively. The mean age for not satisfied, moderately satisfied and satisfied group with extension services was found to be 48.3, 47.64 and 54.42 years. The maximum age of the respondents 79 years while minimum age was 29 years. One way ANOVA analysis indicated that there was significant mean difference between household heads age and not satisfied, moderately satisfied and satisfied group with extension services.

The F-test result on Table 10 showed that there was significant mean difference ( $F= 4.77^{**}$ ,  $P= 0.01$ ) between farmers age and among not satisfied, moderately satisfied and satisfied group with extension services. Result of this finding agreement with the study conducted by Ganpat *et al.* (2014), which confirms there was significant mean difference between farmers' age and farmers satisfaction level with extension services. In addition, (one way ANOVA) Post Hoc Test result showed that mean significant differences between low and high, moderate and high, high and low and high and moderate satisfaction categories (in Appendix Table 5).

Table 10: - Relationship of personal and demographic factors with farmers' satisfaction

Variables	Categories	Satisfaction level				F	p-value
		Not	Moderate	Satisfied	Total		
AGE	Mean	48.33	47.64	54.42	49.48		
	St. dev.	9.93	8.66	13.60	10.76		
	Min.	29	35	34	29		

	Max.	70	75	79	79	4.77**	.010
Year of schooling	Mean	2.21	1.97	1.66	2.01		
	St. dev.	1.41	1.13	1.26	1.30		
	Min.	0	0	0	0		
	Max.	6	5	6	6	1.98NS	.142
Family labour	Mean	3.48	3.66	3.92	3.64		
	St. dev.	1.11	1.14	1.40	1.19		
	Min.	1	1.8	1.8	1		
	Max.	7.1	7.2	7.2	7.2	1.44NS	.239

Source: Own survey data, 2018. \*\* Significant mean deference at 0.01 level and NS (non-significant)

### **Educational level of the sample household heads**

Education enhances the capacity of individuals to obtain, and utilize information disseminated by different sources. Aphunu and Otoikhian, (2008) argue that, being literate is necessary in effective extension communication. Farmer who has better education level has a capability to understand and interpret information easily. In this study, education was hypothesized positively influence on farmers' satisfaction with agricultural extension services.

As indicated on Table 10, that total average education level of respondents was, 2.01 with the standard deviation of 1.30 respectively. The maximum education level of the respondent was grade 6 and while minimum education level was no school attended. The statistical test using One way ANOVA (F= 1.98NS and P=.142) on Table 10 indicated statistically insignificant variation between farmers education level and among not satisfied, moderately satisfied and satisfied group with extension services. Result agreement with Damisa *et al.* (2008), indicated that education level no relation with farmers' satisfaction with agricultural extension services.

### **Family labour**

Family labor was assumed to be the main source of labour required for farm operations such as land preparation, planting, weeding, and harvesting. Large family size assumed as an indicator of more labour availability in the family. Based on this fact family labour was

hypothesized to have positive and significant relationship with farmers' satisfaction with agricultural extension services.

As study result on Table 10 indicated, that the average family labour of the sample households was 3.64 in adult equivalent and standard deviation of 1.19 respectively. The maximum family labour was 7.2 in adult equivalent and while minimum family labour was 1 in adult equivalent. The result of mean test using one-way ANOVA on Table 10 showed that there was insignificant mean difference ( $F = 1.44NS$ ,  $P=.239$ ) between family labour in adult equivalent and among not satisfied, moderately satisfied and satisfied group with extension services.

#### **4.4.2 Economic factors**

##### **Livestock possession of sample household**

In rural areas, livestock are basic assets for households. Besides, it is one of the good indicators of households' wealth level. Livestock is an important source of income, food and draught power for crop cultivation in Ethiopian agriculture. Thus, in this study the number of livestock owned by a farmer in TLU was hypothesized to be positively related to the farmers' satisfaction with agricultural extension services.

The finding on Table 11 showed that, total mean livestock holding of household was 6.44 and SD of 4.40 in tropical livestock unit (TLU) respectively. The minimum livestock holding of household was .68 in TLU and whereas the maximum livestock holding was 18 in TLU. The finding further indicated that the mean livestock in TLU of household for not satisfied, moderately satisfied and satisfied groups were 4.84, 5.85 and 10.44 in tropical livestock unit respectively.

Test using one-way ANOVA on Table 11 showed that there was statistically significant mean difference between livestock ownership in TLU and among not satisfied, moderately satisfied and satisfied group with extension services ( $F= 24.21^{***}$ ,  $P= 0.000$ ) at less than 1% significance level respectively. This result is in consistent with the finding of (Ayalew and Deininger, 2012). It was observed that households found in moderately satisfied and satisfied group owned more livestock in TLU than respondents found in not satisfied group. In addition, (one way ANOVA) Post Hoc Test result showed that mean significant differences

between low and high, moderate and high, high and low and high and moderate satisfaction categories (in Appendix Table 5).

Table 11: - Relationship of economic factors with farmers' satisfaction with agricultural extension services

Variables	Categories	Satisfaction level				F	p-value
		Not	Moderate	Satisfied	Total		
livestock owned	Mean	4.84	5.85	10.44	6.44	24.21***	.000
	St. dev.	3.60	3.63	4.52	4.40		
	Min.	.68	1.09	2.00	.68		
	Max.	16	16.9	18	18		
land size	Mean	1.75	2.08	4.21	2.41	17.26***	.000
	St. dev.	1.68	1.26	3.18	2.23		
	Min.	.50	.50	.50	.50		
	Max.	13.5	7.50	12.75	13.50		

Source: Own survey data, 2018. \*\*\* Significant mean deference at 0.01level

### Land size of sample households

Land is one of the most important factors for agricultural production in our country. Farm activities, particularly crop production, require primarily the availability of suitable farm land. Nevertheless, in the study area land is scarce due to high population pressure. Hence, in this study, farm land size was hypothesized to have positive and significant relationship with farmers' satisfaction on agricultural services.

As study result on Table 11 indicated, that the Total mean land size of the sample respondents was 2.41 hectare with standard deviation of 2.23 respectively. The maximum land size in hectare was 13.5 and while minimum land size was 0.5 hectare. The mean land size of sample respondents for not satisfied, moderately satisfied and satisfied group with extension services were 1.75, 2.08 and 4.21 hectares respectively.

The one-way ANOVA analysis test revealed that there was significant difference on the mean land size of households between those respondents among not satisfied, moderately satisfied and satisfied group with extension services at less than 1% significant level ( $F=17.26^{***}$  and  $P=.000$ ). The finding is agreement with the study conducted by (Terry and Israel, 2004), which confirms that mean significant differences between land size in hectare and farmers satisfaction categories. In addition, (one way ANOVA) Post Hoc Test result showed that

mean significant differences between low and high, moderate and high, high and low and high and moderate satisfaction categories (in Appendix Table 5).

### Off farm employment

Rural poor are adversely affected partly along summer, when there is no rain and enough food production. This forces HHs to look for other income sources. Off farm activities considerably contribute to household income. Study by Elias *et al.* (2015) which confirm significant relation between farmers off farm employment and farmers' satisfaction groups. Therefore, the study hypothesized off farm employment significant association with farmers' satisfaction with extension services.

Table 12: - Relationship of off farm income with farmers' satisfaction with extension services

Variables	Categories	Satisfaction level			Total	$\chi^2$	p-value
		Not	Moderate	Satisfied			
Off farm employments	Engaged	37.5	31.25	31.2	21.9	1.84NS	.398
	Not	46.49	33.3	20.1	78.1		
	Total	44.52	32.87	22.6	100		

Source: Own survey data, 2018. NS (non-significant)

As indicated on Table 12 that, from total respondents 78.1% of respondents were not engaged on off farm employment and while 21.8% of sample respondents were engaged on off farm employment. The statistical test using Chi-square statistics ( $\chi^2=1.84NS$  and  $P=.398$ ). Indicates statistically insignificant relation between farmers off farm employment and respondents among not satisfied, moderately satisfied and satisfied group with extension services.

### 4.4.3 Institutional factors

#### Credit access of sample households

The availability of agricultural credit to subsistence farmers who have little or no capital or savings to invest in farming is important component of small farm development programs.

Moreover, credit is an important source of earning future income. In line with this, an attempt was made to assess the number of households who had benefited from farm credit. In the study area credit is often provided in the form of cash and/or kind. Thus, in this study accesses to credit was hypothesized positively and significantly influence farmers' satisfaction with agricultural extension services. It was measured as dummy variable, 0 for no access and 1 otherwise.

Result from Table 13 above indicated, 59.6% of the respondents had no accesses for credit, while 40.4% of the sample households had accesses for credit. Result shows majority of respondents do not accessed to credit in study area. The respondents those accessed agricultural credit in not satisfied, moderately satisfied and satisfied group with extension services were 28.8, 37.3 and 33.8 respectively and while that respondents not accessed agricultural credit in not satisfied, moderately satisfied and satisfied group with extension services were 55.2%, 29.9%, and 14.9% respectively. Descriptive result shows that, respondents in moderately satisfied and satisfied group are accessed to credits than respondents found in low level satisfaction category.

The Chi-square test result ( $\chi^2= 11.66^{***}$   $P=0.003$ ) the test Table 13 indicated that there was significant relationship between access to credit and farmers' satisfaction with agricultural extension services among not satisfied, moderately satisfied and satisfied group with extension services. This study result agreement with study conducted by Hailu (2002) which confirms that indicated that there was significant relationship between access to credit and farmers' satisfaction groups. Those households who received farm credit have possibility to invest in farming activities, which is important component in small farm development programs.

Table 13: - R/ship of participation on coop.society and credit access with farmers satisfaction

Variables	Categories	Satisfaction level			Total	$\chi^2$	p-value
		Not	Moderate	Satisfied			
Credit access	Accessed	28.8	37.3	33.8	40.4	11.66 <sup>***</sup>	.003
	Not	55.2	29.9	14.9	59.6		
	Total	44.52	32.87	22.6	100		



Cooperative membership	Member	42.10	34.73	23.1	65.1		
	Not	49	29.4	21.6	34.9		
	Total	44.5	32.87	22.6	100	.68NS	.712

Source: Own survey data, 2018. NS not significant \*\*\*significant at less than 1% level

### **Membership in cooperative organization**

Membership in cooperative organization is one of explanatory variable that affect farmers' satisfaction with agricultural extension services. Therefore, in this study the member in cooperative organization was hypothesized to be positively related to the farmers' satisfaction with agricultural extension services.

As indicated on Table 13 that from total respondents 65.1% member in kebele cooperative organization and while that 34.9% respondents were not member in cooperative organization. The statistical test using Chi-square ( $\chi^2 = .68NS$  and  $P = .712$ ) indicated that statistically insignificant association among farmers membership in cooperative organization in low, moderate and high level satisfaction categories were based on membership of cooperative organization.

### **Contact with extension agents**

Extension agents 'contact plays a great role in raising awareness about technology to increase the productivity. The most important source of information in the study area was provided by government Office of Agriculture and Natural resource through extension agents residing in their respective areas. However, extension agents are one of the most known actors as a source of information. For this reason, frequency of extension agents' contact was hypothesized significant mean difference with in farmers' satisfaction categories. This refers the number of contact made between the household head and extension agent with a given production year.

The study results putted on Table 14 indicated that total mean contact with extension agents of respondents in last year was 2.61 and standard deviation 1.66, respectively. The respondents mean contact with extension agents' in not satisfied, moderately satisfied and satisfied group with extension services were 2.11, 2.44 and 3.85 in numbers of contacts

respectively. The minimum and maximum frequency of extension contact on total sample household's ranges from 0 to 12 in number of contact.

The one-way ANOVA analysis test on Table 14 revealed that there was significant mean difference between contact with extension agents of respondents and not satisfied, moderately satisfied and satisfied group with extension services at less than 1% significant level (F=14.81<sup>\*\*\*</sup>, P-value=0.00). This study agreement with study result by Ganpat *et al.* (2014). In addition, (one way ANOVA) Post Hoc Test result showed that mean significant differences between low and high, moderate and high, high and low and high and moderate satisfaction categories (in Appendix Table 5).

Table 2: - Relationship of contact with extension agent and training with farmers' satisfaction

Variables	Categories	Satisfaction level				F	p-value
		Not	Moderate	Satisfied	Total		
Contact with extension agent	Mean	2.11	2.44	3.850	2.61	14.81 <sup>***</sup>	.000
	St. dev.	1.01	1.30	1.341	1.66		
	Min.	0	1	0	0		
	Max.	4	8	12	12		
Training	Mean	.538	.625	.151	.479	10.82 <sup>***</sup>	.000
	St. dev.	.502	.489	.364	.501		
	Min.	0	0	0	0		
	Max.	1	1	1	1		

Source: Own survey data, 2018. <sup>\*\*\*</sup>, significant mean deference at 0.01 level

### **Training on agriculture activities**

Training is given to farmers on different agricultural activities to aware them and improves their skills on how to utilize new technologies. It equips farmers with new knowledge and skills, which help them to perform new practice properly. Participation of farmers on training was measured by the number of time he/she participated on training.

Results on Table 15 above showed that total mean training of the sample household was .479 with SD of .501 respectively. The mean score of training on agricultural activities of respondents in low, moderate and high level were 0.538, .625, and .151 respectively. Maximum trained was 4 times in number while minimum trained was 0 which means not trained.

The one-way ANOVA analysis test on Table 14 ( $F= 10.82^{***}$ ,  $P=.000$ ) revealed the test indicated that there was significant mean differences among number of times respondents trained number of training and not satisfied, moderately satisfied and satisfied group with extension services. Study result is agreement with Ziaemehr and Panahi (2011) confirms that, number of (session) extension-training periods that the companies held for cultivation was positive association with farmers' satisfaction with agricultural extension services. In addition, (one way ANOVA) Post Hoc Test result showed that mean significant differences between low and high, moderate and high, high and low and high and moderate satisfaction categories (in Appendix Table 5).

#### **4.4.4 Psychological factors**

##### **Perception on nature extension programs**

Farmers' participation in the planning, implementation and evaluation of extension programs is desirable because they have information, which can improve the program, because it increases their motivation to cooperate and because it improves opportunities for collective decision making. It also increases farmers' power to influence their own destinies. Hence, in this study was hypothesized significant association between perception on participatory nature extension programs and farmers satisfaction groups.

Study result showed on Table 15 that 31.5% of respondents perceived as extension programs were not participatory in nature and the remaining 68.5% of respondents perceived as extension programs were participatory in nature. The result on Table 15 proportion shows that respondents perceived as not participatory in not satisfied, moderately satisfied and satisfied group with extension services were 52.2%, 39.1%, and 8.7% respectively, while the proportion of perceived as participatory on each farmers satisfaction level of not satisfied, moderately satisfied and satisfied group with extension services were 41%, 30%, and 29% respectively. Result implies that those perceived as participatory are more likely satisfies than that of not participated.

The Chi-square test result on (Table 16) ( $\chi^2=7.43^{**}$ ,  $P=0.024$ ) indicated that there was significant relationship between perception on participatory nature extension program and farmers' satisfaction with agricultural extension services among not satisfied, moderately

satisfied and satisfied group with extension services. This study result agreement with study conducted by Hailu. (2002). Participatory kind of extension program needs to give particular attention on describing and analyzing the situation, identifying needs, problems, and aspiration.

### Perception on package appropriateness

Perceived extension package appropriateness is one of explanatory factor affect farmers' satisfaction with agricultural extension services. In this study, perceived package appropriateness was hypothesized significantly and positively influences farmers' satisfaction with agricultural extension services. Accordingly, the rating of (0) disagree, (1) moderately agree, (2) agree were used to measure the respondents perception on the item variable of extension package appropriateness such as extension packages affordable, considered farmers knowledge, market based, timely deliver quality based, agro ecology based and need based. . Farmers' perception on seven extension package variables was considered in order to capture the perception on package appropriateness. Based on the obtained mean score of perception on item variables below meanscore were categorized as not perceived as appropriate and above mean were categorized as perceived as appropriate extension packages.

The result on (Table 15) showed that 57.53% of respondents perceived as extension packages are not appropriate while 42.46% of respondents perceived as extension packages are appropriate. The Chi-square test result on (Table 16) ( $\chi^2= 2.48$ NS,  $P=0.289$ ) indicated that there was insignificant relationship between perception on package appropriateness and farmers' among not satisfied, moderately satisfied and satisfied group with extension services

Table 15: - Relationship of psychological variables with farmers' satisfaction

Variables	Categories	Satisfaction level			Total	$\chi^2$	p-value
		Not	Moderate	Satisfied			
Perception on participatory nature	Participatory	41	30	29	68.5	7.43**	.024
	Not	52.2	39.1	8.7	31.5		
	Total	44.5	32.9	22.6	100		
Perception on	Appropriate	40.5	38.1	21.4	42.46		

package	Not	50	25.80	24.2	57.53		
appropriateness	Total	44.5	32.9	22.6	100	2.48NS	.289
Perception on economic return	Improved	18.60	25.58	55.81	29.5		
	SW improved	34	53	13	36.30		
	Reduced	78	18	4	34.2		
	Total	44.5	32.9	22.6	100	61.59***	.000

Source: Own survey data, 2018. \*\*\* and \*\* at less than 1% and 5% significant level. NS not significant

### Perception on economic benefits

Perceived economic benefit is one of important explanatory variable which affect farmers' with extension services. In this study, perceived economic benefit after extension services hypothesized significantly and positively influences farmers' satisfaction with agricultural extension services. Farmers' perception on item variables of economic benefit such as agricultural production, food self-sufficiency, cash crop production and able to do cost benefit analysis after extension services was considered as economic benefit and in order to capture the perceived economic benefit after extension services. Accordingly, the rating of (0) reduced, (1) somewhat improved, (2) improved were used to measure the respondents' perception of the economic benefit after use of extension services. Perceived economic benefits was computed from item variables of economic benefit and according to farmers' perception on each variable were computed to total mean score result of perceived economic benefit after use of extension services.

As indicated on Table15 that 34.2% of the sampled households' perceived economic benefit after extension services reduced, 36.3% the sampled households perceived economic benefit after extension services somewhat improved, and while other 29.5% of the sampled households perceived economic benefit after extension services improved. Study result on above Table15 indicates that majority of farmers perceived as reduced economic benefit, which means there were no satisfactory economic benefit after use of extension services in study area.

The result on Table 15 showed that respondents perceived reduced economic return after extension services in low, moderate and high satisfaction categories were 78%, 18% and 4% respectively. Those of respondents perceived somewhat improved economic return after extension services on each category of satisfaction level in not satisfied, moderately satisfied

and satisfied group with extension services were 34%, 53% and 13% respectively. While the respondents perceived as improved economic return after extension services in not satisfied, moderately satisfied and satisfied group with extension services were 18.6%, 25.58% and 55.8% respectively. Result satisfaction groups shows that households found in moderately satisfied and satisfied with extension services categories are perceived as improved economic return after extension services than respondents found in not satisfied category.

The Chi-square test result on Table 15 ( $\chi^2 = 61.59^{***}$ ,  $P = .000$ ) indicated that statistically significant association among perception on economic benefit categories and satisfaction groups in not satisfied, moderately satisfied and satisfied group with extension services with agricultural extension services. Study result is agreement with Elias *et al.* (2015). 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.

#### **4.5 Econometric Analysis on Determinants of Farmers' Satisfaction with Agricultural Extension Services**

In this study, Ordered Logit Regression Model was used to identify determinants of farmers' satisfaction with agricultural extension services. Out of the 13 hypothesized explanatory variables 8 variables were found to be significant in descriptive statistics of Chi-square and One way ANOVA tests. The purpose of this section is to identify the hypothesized independent variables that influence the dependent variable using ordered logit model. Before running the model analyses the existence of a serious of multicollinearity or high degree of association problem among independent variables for all continuous and discrete variable were checked by Variance Inflation Factor (VIF) for continuous explanatory variables and contingency coefficients for dummy explanatory variables.

After deciding on the variables to be included in the model, maximum likelihood estimation (MLE) procedure was employed to estimate parameter of the regression model, and to identify the explanatory variables, which are statistically significant to influence the dependent variable. Ordinal logit model was a type of logistic regression analysis that when the response variable is categorized more than two with having natural order or rank. That is,

we can rank the values, but the real distance between categories is unknown. The dependent variable used in ordered logit model analysis was farmers' satisfaction level with extension services in the study area. It had three ordered categories in to three level that include (0 = not satisfied, 1 = moderately satisfied, and 2 = satisfied). The independent variables (predictors/regressors that were hypothesized to affect farmers' satisfaction with extension services (dependent variable), were include 7 continuous and 6 non-continuous independent variables.

Under Ordinal Logistic Regression Analysis we can deal Model Fitting Information, Goodness-of-Fit, Pseudo R-Square, Parameter Estimates and Test of parallel lines. Looking at the model fit, Table 16 showed that a highly significant chi-square statistic ( $p < .001$ ) indicates that the model gives a significant improvement over the baseline intercept-only model (Elamir and Sadeq, 2010). This basically tells us that the model gives better predictions than if we just guessed based on the marginal probabilities for the outcome categories. Therefore, the full model (with factors that affect satisfaction level as a predictor) is significantly better. The Pearson and Deviance goodness of fit statistics (Table 16) test whether the observed data are inconsistent with the fitted model. If the significance values are large, the data and the model predictions are similar and that the model is a good model (Elamir and Sadeq 2010). Therefore, the large values for significance Table 18 showed that the model fits the data well.

The Nagelkerke  $R^2$  (Table 16) indicates the model can account for 56.1% of the variance in agricultural extension service satisfaction. Here, the pseudo  $R^2$  values (e.g. Nagelkerke = 56.6%) indicates that there is relatively medium proportion of the variation in extension services satisfaction level between farmers. This is just as we would expect because there are numerous factors that affect extension services satisfaction of farmers. In ordinal logistic regression models there is an important assumption which belongs to ordinal odds. According to this assumption parameters should not change for different categories (Ari and Yildiz, 2014). If the assumption does not hold (if the chi square value is significant), then you may want to consider another approach, such as the multinomial or generalized ordered logit models (Williams R, 2010). Since this chi-square value (Table 16) is insignificant, the use of Plum is justified.

Estimates of the parameters of the variables expected to determine the farmers' satisfaction level with extension services are displayed in (Table 16). As it was mentioned above, out of total 13 explanatory variables entered into the ordered logit model seven (6) explanatory variables for each of the categories were found to be significantly influencing farmers' satisfaction agricultural extension services. These are land size, livestock holding in TLU, accesses to credit, contact with extension agent, perception on economic return and perception on participatory nature of extension program result categories summarize on (Table 16).

Table 16: - The ML Estimates of the Ordered Logit Model

	Variables	Estimate	Std. Error	Wald	Sig.	Odd ratio
Threshold	[Satisfaction = 0]	2.486	1.196	4.320	.038	.
	[Satisfaction = 1]	5.080	1.273	15.933	.000	.
Location	Age	-.017	.020	.785	.376	0.9831
	Family labour	.084	.164	.264	.607	1.0876
	Livestock owned	.099	.049	3.993	.046**	1.1040
	Contact with agents	.355	.144	6.117	.013**	1.4261
	Perception economic	1.361	.288	22.313	.000***	3.9000
	Land size	.211	.106	3.941	.047**	1.2349
	Training	-.663	.410	2.607	.106	0.5153
	Years of schooling	-.184	.155	1.408	.235	0.8319
	Credit access	1.137	.391	8.438	.004***	3.1174
	Perception on participation	.892	.439	4.131	.042**	2.4400
	Perception on package	.049	.390	.016	.901	1.0502
	Participation on coop.	-.128	.404	.100	.752	0.8798
	Off farm employment	-.125	.472	.070	.791	0.8824
Model fitness	Chi- square			99.38***		
Goodness of fit	Pearson sig.			.446		
	Deviance sig.			.999		
Test of parallel line	Sig.			.265		
Pseudo R <sup>2</sup>	Nagelkerke			56.1%		

Source: Model output\*\*\* and \*\* are significant at less than 1% and 5% probability level respectively.

In the Parameter Estimates table we see the coefficients, their standard errors, the Wald test and associated p-values (Sig.), and odds ratios. If p values less than alpha level they are statistically significant; otherwise not. The thresholds are shown at the top of the parameter estimates output, and they indicate where the latent variable is cut to make the three groups that we observe in our data. The threshold coefficients are representing the intercepts,



specifically the point (in terms of a logit) where farmers' extension satisfaction categories might be predicted into the three categories.

The estimates labeled location are the coefficients for the predictor variables. Based on the small observed significance level, we can reject the null hypothesis that it is zero. The estimates labeled location are the ones we are interested in. They are the coefficients for the predictor variables. The Wald statistic is the square of the ratio of the coefficient to its standard error. The significance of the Wald statistic in the column with heading sig ( $< 0.05$ ) indicates the importance of the predictor variables in the model (we reject the Null hypothesis  $H_0: = 0$ ) and high values of the Wald statistic shows that the corresponding predictor variable is significant.

### **Livestock Holding of Household**

The Livestock holding of household was positively influence farmers satisfaction with agricultural extension services at less than 5%, significant level. The positive parameter estimate sign indicates that farmers' with large number of livestock owned in TLU are more likely satisfy with agricultural extension services than respondents with small number of livestock. The implication is that owners of large number of livestock in TLU are often rich, have access to more resources, including extension information, and can better afford risk. In addition to this livestock husbandry practices have a stronger integration with cropping activities with mutual benefit. Other variable held constant, for a one unit increase tropical livestock unit cause farmers' satisfaction level with agricultural extension services score to be increases by the factor of 1.104 in reference to base category. This result is in consistent with the finding of (Ayalew and Deininger, 2012). This might, livestock is an important source of income, food and draught power for crop cultivation in Ethiopian agriculture.

### **Land Size**

As expected, household land size influences farmers' satisfaction with extension services positively and significantly at less than 5% significance level. The positive estimate sign indicates that household with large land size in hectare are more likely satisfy than that of respondents with small land size in hectare households. Other variable held constant, for a one hectare increase in land size cause farmers' satisfaction score to be increases by the factor of

1.23 in reference to base category. This finding is in line with the findings of (Terry and Israel, 2004; Ganpat *et al.*, 2014), they concluded that those farmers with larger land sizes in hectare, whether a single parcel or several parcels, were more satisfied than those with smaller sizes of land in hectare, may be related to the commodity produced and extension services provided.

### **Contact with Extension Agents**

In the study area the main sources of agricultural information are agents who visit farms and homes of individuals to provide agricultural extension education. The variable showed significant and positive relation with farmers' satisfaction with agricultural extension services at less than 5% level of significance. The estimate positive sign implies that, those farmers making frequent contact with extension agent are more likely satisfy than that of less or no contact farmers with extension agents. Other variable held constant, for a one unit increase contact number with extension agents cause farmers' satisfaction level with agricultural extension services score to be increases by the factor of 1.42 in reference to base category. As the extension worker is the main source of information and training of farmers in adopting new extension packages, their frequent contact with farmers is important for improving the effectiveness of the extension services. Study result agreement with results of (Faramarzi and Langerodi, 2013; Ganpat *et al.*, 2014). Thus farmers who gain extension message/contents form extension agents have a good knowledge on agricultural production and as a result decide to use extension services strategy more than those who do not get extension message.

### **Perception on Economic Return**

Perception on economic return is positively influence on farmers' satisfaction with agricultural extension service at less than 1% significant level. Therefore, it is reasonable to say the higher economic return from extension service the greater likelihood of farmers' overall satisfaction with extension service. The positive sign estimate indicates that farmers perceived as improved economic return after extension services more likely satisfy than that offarmers perceived as reduced economic return after extension services provided. The probability of being satisfied with the agricultural extension service is 3.9 times greater

for those perceived as improved economic return than that of those perceived as somewhat improved and reduced economic return groups. Benefit or economic rewards provide opportunities to succeed financially and gain sustainable competitive advantage. This result is consistent with findings of (Duc, 2008 and Elias *et al.* 2015). This implies that, satisfaction with farming is associated with farmers' perceptions of the economic rewards of farming.

### **Access to Credit**

The result of ordered logit model revealed that access to credit was significantly and positively influences farmers' satisfaction with agricultural extension services at probability at less than 1% significant level. Observed positive sign estimation shows that those farmers accessed agricultural credit in cash or in kind are more likely to satisfy than that of farmers' not accessed credit farmers. The probability of being satisfied with the agricultural extension service is 3.11 times greater for credit-users than non-users. The probable reason of result might be, credit access helps farmers through the alleviation of capital constraints and thus enables farmers to make timely purchases of inputs that they cannot afford from their own resources. This study result agreement with (Damisa *et al.*, 2008).

### **Perception on Participatory Nature Extension Program**

The other hypothesized psychological variable was perception on participatory nature extension program and positively significant at probability level of less than 5% observed. The result implies that farmers those perceived as participatory nature extension program are more likely satisfy with agricultural extension services than that of not perceived as participatory nature of extension program processes. The probability of being satisfied with the agricultural extension service is 2.44 times greater for those perceived as participatory nature extension program than not perceived as participatory nature of extension program processes. Participatory approaches are considered an important aspect of improving agricultural extension provision to improve accountability and increase transparency in organizational performance. The result is agreement with (Cohen and Lemma, 2011).

## **5. SUMMARY, CONCLUSION AND RECOMMENDATIONS**

This chapter is the last section of this thesis and it has three sections. In the first section, summary of the objectives, research methodology, and key findings of the model were presented. In the second section, conclusion of thesis and third section useful policy recommendations were devised based on the finding of the study.

### **5.1 Summary**

Farmers' agricultural extension services satisfaction is typically based on the direct service interaction between the farmers and extension organization or extension agents. While extension agents are charged with the responsibility to ensure farmers are satisfied with the agricultural extension services being delivered. Farmers in study areas are constantly complain about the inadequate and inappropriate extension services they receive. For farmers to produce and earn decent livelihoods for themselves and their families, they require an extension service that satisfies their needs in a timely and effective manner. Some studies were conducted in different parts of the country to identify determinants of farmers' satisfaction with agricultural extension services. However, factors affecting farmers' satisfaction with agricultural extension services are location specific. Therefore, the study initiated to assess determinants of farmers' satisfaction with agricultural extension services, to know their satisfaction level on existing services offered, and to identify types of agricultural extension services provided to farmers and the extension delivery methods.

The study was conducted in *Mareka Woreda* of *Dawuro Zone*, Southern Ethiopia. *Mareka Woreda* is located in South Western part of Ethiopia. The cross sectional research design was followed to study. Two-stage random sampling procedure was followed to select *kebeles* and household heads for the study. Both quantitative and qualitative data type generated from primary and secondary data sources. Primary data were collected from 146 sample household heads by using structured interview schedule to generate quantitative data and key informants interview and focus group discussions to generate qualitative primary data. Descriptive statistics and econometric analysis were used to analyze personal and demographic, economic, institutional and psychological factors affecting farmers' satisfaction with agricultural extension **services**.

Results of the study indicated that major type of extension services offered to farmers in study area were input provision services and information delivery about agricultural technology from kebele development agents. Result on extension methods indicated that in study area, group discussion and farm/home visit were frequently used extension methods. The satisfaction index result revealed that 44.5% respondents were not satisfied, 32.9% moderately satisfied and 22.6% of respondents were satisfied with provided agricultural extension services. Result from survey data and FGDs indicated that major constraint affect

farmers' satisfaction level with extension services in study area were, low input quality, no change in yield, poor understanding of agricultural technology, untimely availability of input and high prices of input.

According to the result of the descriptive analysis credit accesses, perceived participatory nature of extension program and perceived economic return have significant relationship with satisfaction categories. While the relationship between the satisfaction categories and member in cooperative group, off farm employment engage and perceived extension package appropriateness were not reported to be significant. Concerning farmer age, livestock owned in TLU, land size in hectare, contact with extension agents and training were statistically significant mean difference between satisfaction groups. While family size and schooling in years were statistically insignificant differences between satisfaction groups.

As mentioned earlier, ordered logit model was also used to estimate the effects of hypothesized independent variables on the dependent variable. Out of thirteen explanatory hypothesized variables six variables were found to be statistically significant in model analysis. Those variables include; contact with extension agents, number of livestock owned in TLU, land size in hectare, credit access, perceived participatory nature of extension program and perceived economic benefit were positively and significantly influence farmers' satisfaction with agricultural extension services.

## **5.2 Conclusion**

The study result indicates that delivery of low quality input, no change in yield, poor understanding of farmers about new agricultural technology, untimely availability of input and high price of input are major constraint limit farmers' satisfaction level with agricultural extension services. In these areas, as well as other areas, this factors attracted high levels of dissatisfaction of farmers to which governments need to pay much attention on those problems. Fully satisfied farmers are likely to be more productive and more cooperative with government's plans and additionally, this could positively impact on food security and in country GDP. The empirical finding of ordered logit model underlined the high importance of farmers' psychological fields such as perceived economic return and perceived participatory nature extension program, institutional support such as credit access and extension agents' contact, land size and livestock owned in TLU to enhance farmers' satisfaction level with

agricultural extension services. Based on the findings of this study, the following recommendations that are expected to enhance farmers' satisfaction level with agricultural extension services.

### **5.1 Recommendations**

Based on findings of quantitative as well as qualitative data of this study, the following recommendations are drawn from the study to enhance farmers' satisfaction with provided agricultural extension services.

- Results showed that major constraint limit farmers' satisfactions with agricultural extension services study in area were deliver of low quality input, untimely availability of input, low productivity rate of crop and high price of input like chemical fertilizer and improved seed variety. In general the satisfaction level of farmers in the study area is low. Hence, researchers, extension agents and policy makers' should focus on identified factors to enhance farmers' satisfaction level with agricultural extension services.
- The result of the ordered logit estimates confirms the significant role contact with extension agents would play in increasing farmers' satisfaction level. Extension agents are the main sources of agricultural information and knowledge for farmers' in study area. Therefore, agricultural and natural resources office consider the important determinants which contribute the actual performance of DAs and also concerning body should facilitate capacity building for DAs and expansion and access by farmers of extension institutions.
- As model output revealed that perception on participatory nature extension program high probability to enhance farmers' satisfaction level with agricultural extension services. In order to increase farmers' satisfaction level, the extension services institutions need to marry existing top-down policy guidance and resource flows to bottom-up demands for services, participatory planning, and management, as well as the provision of appropriate capacity development and support, particularly at the local level.

- Livestock holding affects farmers' extension service satisfaction positively. The condition indicates strengthening the economic performance of farmers. Furthermore, development of improved livestock feed and health service should be paid attention to improve their productivity and to increase farmers income earns from livestock.
- Access to credit services and resources determine the satisfaction of farmers with agricultural extension services. High input cost is main constraints that limit farmers' satisfaction with extension services in study area. Nevertheless, governmental and non-governmental organizations need to rethink to increase the volume of credit delivered in the study district so as to address more needy farmers.
- Perception on economic return was positively influences farmers' satisfaction. The economic return such as crop productivity, cash crop production, food self-sufficiency, and farmers able to do cost benefit analysis after extension services provided is deriving factor for farmers' extension services satisfaction. As mentioned in above discussion in study area no change yield is main constraint limit farmers satisfaction level the reasons behind are their low quality input and untimely deliver of input. Hence, it is recommended that concerned governmental and non-governmental organizations need to take action to revert this situation so as to ensure timely and quilted seeds delivery to the farmers.

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## APPENDICES

### Appendix I Tables

Table 1: - Conversion factors to estimate Total Livestock Unit (TLU)

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Animal category	TTLU	Animal category	TTLU
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Calf	0.20	Sheep and goat (young)	0.06
Weaned calf	0.34	Donkey (adult)	0.70
Heifer	0.75	Donkey (young)	0.35
Young bull	0.80	Horse and mule	1.10
Cow and ox	1.00	Chicken	0.013
Sheep and goat (adult)	0.13	Camel	1.25

Source: Storch *et al.* (1991)

Table 2: -Conversion factors for computation of man- equivalent

Age group in years	Male	Female
<10	0	0
10-13	0.2	0.2
14-16	0.5	0.4
17-50	1	0.8
> 50	0.7	0.5

Source: Storch *et al.* (1991)

Table 3: - Variance inflating factors (VIF) and Contingency coefficient

Variables	Collinearity Statistics	
	Tolerance	Tolerance
Family Labour	.859	1.165
Age	.822	1.217
Livestock owned in (TLU)	.893	1.120
Contact with extension agent	.812	1.231
Land size	.798	1.253

Training	.891	1.122
Education level	.878	1.139

Variables	CREDIT	PARNU	PRECON	EXTPAC	PARTNCOO	OFFAR
CREDIT	1.000					
PERCEXPA	-.083	1.000				
PARTCOOP	.106	.126	1.000			
OFFARMP	.137	.087	.041	1.000		
PERCPART	.078	.163	.122	.074	1.000	
PRECOBEN	.139	.068	.062	.198*	-.010	1.000

Source survey data, 2018

Table 4: Agricultural extension services satisfaction index (N = 146)

Satisfaction item statements	Mean	SD
Agricultural extension is effectively increasing agricultural productivity in to me and my community	2.39	.568
I belief extension services help me without expecting anything in return	2.35	.478
I get economic benefit from agricultural extension programs	2.40	.506
Extension workers value my opinion	2.44	.587

The Extension service is concerned about my welfare and my family	2.44	.575
I believe extension treats all farmers fairly and equality	2.58	.549
I have changed my farming practice due to agricultural extension services	2.32	.560
I am pleased with the extension service and was continue to depend on it	2.40	.605
Extension program process in my community is participatory in nature	1.99	.627
Extension offers a high quality service	2.08	.513
Extension package I received were appropriate/relevant	1.97	.575
The information I receive from extension meeting groups are helpful	2.79	.878
There is an adequate number of visits from the extension agents	2.67	.797
Extension workers give immediate answer for my questions	2.54	1.031
I enjoy the teaching methods used during demonstrations and training	2.12	1.063
I am happy on current agricultural extension services	2.12	.751
<b>Overall Satisfaction</b>	<b>2.51</b>	<b>.367</b>

Source computed from field survey result 2018

Table 5: - Post Hoc Tests for continues variables

\*. The mean difference is significant at the 0.05 level.

Variables	(I) Satisfaction level	(J) Satisfaction level	Mean Difference (I-J)	Sig
AGE	0 low	1 moderate	.69263	.729
		2 high	-6.08578*	.008
	1 moderate	0 low	-.69263	.729
		2 high	-6.77841*	.005
	2 high	0 low	6.08578*	.008
		1 moderate	6.77841*	.005
Family Labour	0 low	1 moderate	-.17036	.454
		2 high	-.43167	.092
	1 moderate	0 low	.17036	.454
		2 high	-.26132	.334
	2 high	0 low	.43167	.092
		1 moderate	.26132	.334
Livestock owned by household in TLU	0 low	1 moderate	-1.00760	.169
		2 high	-5.60188*	.000
	1 moderate	0 low	1.00760	.169
		2 high	-4.59429*	.000
	2 high	0 low	5.60188*	.000
		1 moderate	4.59429*	.000
Contact with extension agents	0 low	1 moderate	-.330	.256
		2 high	-1.741*	.000
	1 moderate	0 low	.330	.256
		2 high	-1.411*	.000
	2 high	0 low	1.741*	.000
		1 moderate	1.411*	.000
Land size	0 low	1 moderate	-.33320	.387
		2 high	-2.45962*	.000
	1 moderate	0 low	.33320	.387
		2 high	-2.12642*	.000
	2 high	0 low	2.45962*	.000
		1 moderate	2.12642*	.000
Training	0 low	1 moderate	-.08654	.335
		2 high	.38695*	.000
	1 moderate	0 low	.08654	.335
		2 high	.47348*	.000
	2 high	0 low	-.38695*	.000
		1 moderate	-.47348*	.000
Education level	0 low	1 moderate	.23622	.341
		2 high	.54872	.050
	1 moderate	0 low	-.23622	.341
		2 high	.31250	.289
	2 high	0 low	-.54872	.050
		1 moderate	-.31250	.289

Source survey data, 2018

## Appendix II: - Forms and Questionnaire Used

### Instruction for Enumerators

- Make brief introduction to each farmer before starting any questions, get introduced to the farmers, (greet them the local way) get his name; tell him yours, the institutions you are working for, and make clear the purpose and objective of your questions.
- Please ask each question so clearly and patiently until the farmer understands your point.
- Please fill up the questionnaire according to farmers' replies (do not put own opinion).
- Please try not to use technical terms while discussing with farmer and do not forget the local unit.

### Basic Information

Date of interview \_\_\_\_\_

Identification number (code) \_\_\_\_\_

Name of peasant association \_\_\_\_\_

Name of the village \_\_\_\_\_

Starting time \_\_\_\_\_ finishing time \_\_\_\_\_

Name of enumerator: \_\_\_\_\_

Interview schedule checked by: \_\_\_\_\_

**I. Personal and Demographic Factors**

1. 1 Respondent’s Address

Zone.....Woreda.....Kebele.....Village.....

1.2 Sex                   1) Male                                   0) Female

1.3 Age \_\_\_\_\_Years

1.4 Number of years spent in formal school -----

1.5 Information on family member

No	Name	Sex	Age	Education level	Relationship to head
1					
2					
3					

1.5 What is your farming activity status per day? 1) full time           0) otherwise

**II: Economic factors**

2.1 How many acre of land do you have? -----

2.2 Land use 1. Cultivated \_\_\_\_\_ 2.Grazing land \_\_\_\_\_ 3. Homestead \_\_\_\_\_ 4. Woodlots \_\_\_\_\_

2.3 Livestock production

List of livestock owned by household

Livestock type	Number
Cow	
Heifer	
Oxen	
Bulls	
Calf	
weaned calf	
Goat	
Young goat	
Sheep	
Young sheep	
Donkey	
Chicken	

2.4) Do you involved in off-farm activities in last year? 1) Yes   0) otherwise

### III: Institutional factors

3.1 Did you get credit in last two years? 1) If yes; 0) otherwise

3.2 If not received, what were the reasons?

1. No credit provision
2. Loan repayment not consider crop production price fluctuation
3. Interest rate is high
4. Others (specify).

3.3 If your answer is “yes” for question, from which organization/s did you obtain credit?

No	Source of credit	Type of credit		Amount of credit in birr	Amount unpaid	Appropriateness of the time of payment	
		In cash	In kind			Good	Not good
1	From OMFAs						
2	CBE						
3	Coop. union						
4	Ikube						
5	Idire						
6	Neighbors						
7	Relatives						
8	Others (specify)						

\* Omo micro finances (OMFAs), \*\* Commercial Bank of Ethiopia (CBE), \*\*\* Farmers' Cooperative union, \*\*\*\* Ikube, use \* according to their order

3.4 For what purposes did you use the credit obtained in last three years?

1. Purchase of improved seeds
2. Buy food for consumption
3. Purchase of fertilizer/chemical
4. Livestock rearing
5. Buy farm implements
6. Others (specify)

3.5 Do you participate in any farmers' group? 1) If yes 0) otherwise

3.6 If you participate in which farmers' group you participate?

No.	Variable	Not (0)	Member (1)
1	Credit and saving		
2	Cooperative		
3	Any other group (specify)		

3.7 What service do you get from this group?

No.	Type of service	Possibility

		SD (1)	D (2)	A (3)	SA (4)
1	Credit				
2	Input				
3	Information				
4	Marketing				
5	Any other (specify)				

3.8 How many times you do you contact development agent in last cropping season?

3.9 If there is no any contact with DAs, what is the reason?

1. No need for services; 2. Less skilled and reduced experience of DAs; 3. DAs is not attractive to contact; 4. I don't know the presence of DA in the area; 5. Other reasons (specify)

3.10 If there is contact with extension agent when you contact?

Variable	Always	Sometime	Never	Rank
During input provision				
During group meeting				
During credit collection				
During land preparation				
During sowing				
Whenever disease/ pest occur				

3.11 From where did you get information about different new technologies?

No.	Variable	Possibility		
		Always (1)	sometimes (2)	Never (3)
1	From extension workers			
2	Neighbors			
3	Market place			
5	Other reasons (specify)			

3.12 Are you received any agricultural training? 0) No 1) Yes

3.13 If yes how many time participated on training?

3.14 Which type agricultural extension services delivered from extension workers?

Extension services	Never(0)	Occasionally (1)	Commonly (2)



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Information about new technology

Input provision

Row planting technique

Fertilizer application

Weeding technique

Land preparation techniques

Irrigation technique

Herbicides/ pesticides application

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3.15 Which agricultural extension methods have you had contact with extension workers?

No.	Contact methods	Never(0)	Occasionally (1)	Commonly (2)
1	Farm visit			
2	Demonstration			
3	Meeting			
4	Extension workers office visit			
5	Model farmers visit			
6	Field days			
7	Group discussion			
8	Telephone			

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3.16 Which extension methods do you prefer?

Contact methods	less prefer	Prefer	most prefer
farm/home visit			
group discussion			
demonstration plot			
public meeting			
office call			
field days			
model farmers farm visit			
informal contact			
radio listen			

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mobile phone contact

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#### IV. Psychological Factors

4.1 What do you perceive in participatory nature of extension program process?

No	Type of process	0) Participatory	1)Not
1.	Participating in planning processes		
2	Participating in implementation processes		
3	Participating in evaluation processes		
4	Participate whole family		

4.2 Are you invited in different occasions like meeting, field visits and demonstrations?

0) never 1) sometimes 2) always

4.3 In those different occasions; do you get a chance to express your views about the program?

No.	Occasion variable	SD (1)	D (2)	A (3)	SA (4)
1	If I have anything to say, I am always encouraged to express my view.				
2	If I have anything to say, I am not always encouraged to express my view.				
3	Unless a chair man is willing, I am not allowed to say anything else				
4	Others (specify)				

4.4 What about the extent of your participation to decide up on the selection, testing, acceptance and/or rejection of different technologies?

No.	Variable	Never (0)	Sometimes(1)	Always (2)
1	Selection			
2	Testing			
3	acceptance /rejection			
4	Other (specify)			

4.5 Which agricultural extension package do you use in last cropping season?

No.	Package	Never (0)	Sometimes(1)	Always (2)
1	Chemical fertilizer DAP/urea			
2	Improved seed			
3	Herbicides/ pesticides			

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4 Other (specify)

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4.6 What are shortcomings of the present distribution system of modern inputs?

No.	Short coming	SD (1)	D (2)	A (3)	SA (4)
1. Fertilizers	1.1 Late arrival				
	1.2. High price				
	1.3. Lack of credit				
	1.4. Shortage of supply				
	1.5.other (specify)				
2. improved seed	2.1 Late arrival				
	2.2. High price				
	2.3. Lack of credit				
	2.4. Shortage of supply				
	2.5.other (specify)				

4.7 How you perceived extension package relevance and appropriateness?

No	Variable	Not (0)	Appropriateness (1)
1	Package is need based		
2	Package is agro ecology based		
3	Package is quality based		
4	Package timely deliver		
5	Package are market based		
6	Package are considered IK for farmers		
7	Package are affordable by farmers		

4.8How doyou perceivedeconomic return after receive of extension service?

No.	Variable	(0)reduced	(1)somewhat improved	(2)improved
1	What about agricultural productivity after extension service?			

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2	What about conditions of food self-sufficiency after extension service?
3	What about cash crops after extension service?
4	What about ability to do cost benefit analysis?

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4.9 What are constraint that militating satisfaction farmers' with agricultural extension services?

Constraint	No(0)	Yes(1 )	Priority R
land scarcity			
input scarcity			
Untimely dissemination of technologies			
Reduced understanding of technology			
Irregular visit of farmers by extension agent			
No change in yield			
Lack of fund			
low input quality			
high cost of input			
Market price fluctuation			

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5.6 Statement which indicate farmers' satisfaction level

Extension satisfaction item	S	D	A	S
	D			A
Agricultural extension is effectively increasing agricultural productivity in to me and my community				
I belief extension services help me without expecting anything in return				
I get economic benefit from agricultural extension programs				
Extension workers value my opinion				
The Extension service is concerned about my welfare and my family				
I believe extension treats all farmers fairly and equality				
I have changed my farming practice due to agricultural extension services				
I am pleased with the extension service and will continue to depend on it				
Extension program process in my community is participatory in nature				

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Extension offers a high quality service

Extension package I received were appropriate/relevant

The information I receive from extension meeting groups are helpful

There is an adequate number of visits from the extension officers

Extension workers give immediate answer for my questions

I enjoy the teaching methods used during demonstrations and training

I am happy on current agricultural extension services

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SD (Strongly Disagree) 1, D (Disagree) 2, A (Agree) 3 and SA (Strongly Agree)

## **II:FGDs and key informants interview**

### **1. Focus group discussions**

The following questions designed for focus group discussions with development agents, kebele administrators and development group leaders.

1. What are the current extension approaches? Is it participatory?
2. What are the main roles of farmers in the participation of extension program processes?
3. What do you recommend the extension package appropriateness/ relevance?
  - 3.1 Is it demand driven or supply driven? Why?
  - 3.2 What is the input delivery system? Is it timely delivers to farmers?
  - 3.3 What is cost of chemical fertilizer is it affordable by famers?
  - 3.4 How about improved seed quality?
  - 3.5 What is your main problem related to market values of the different crops?

4. Which type of agricultural extension service mostly given to farmers?
  - 4.1 Which type of extension contact methods that have been always used for reaching farmers extension service?
  - 4.2 Which extension contact method is mostly preferred on farmers? Why?
5. How do you see the economic benefit of farmers after extension service?
  - 5.1 Is agricultural production increase after receive of extension service? By what?
  - 5.2 What are conditions of food self-sufficiency after extension service are they ensured food self-sufficiency? By What
  - 5.3 Are cash crop production increase after extension service? Which crop type? By what amount?
  - 5.4 Are farmers' ability to do cost benefit analysis? By what?
6. In general, from your experience, what are the limiting factors satisfactions of farmers' agricultural extension service?

## **2. Key informants interview**

The following questions designed for key informants' interview with development agents, kebele administrators, model farmers, extension expert (SMS, Office, and managers)

1. What is your work position?
2. What role you play on agricultural extension service in your area?
3. Farmers participate in extension program processes? Why? By what?
4. What do you do in promoting and strengthening the participation of farmers?
5. Are agricultural extension services are effectively increasing agricultural productivity in your community? Why?
6. How do you see the living conditions of extension services received farmers?
7. What are the main problems for agricultural extension service in your area?
8. What do you recommend the extension package appropriateness/ relevance?
9. Which type of agricultural extension service delivery to farmers?

10. Which type of extension contact methods that have been always used for reaching farmers extension service? Which is preferred by farmers? Why?
11. What challenge for extension service provider to deliver extension message?
12. In general, from your experience, what are the limiting factors satisfactions of farmers' agricultural extension service?