Developing Country Studies
ISSN 2224-607X (Paper) ISSN 2225-0565 (Online)
Vol.4, No.21, 2014

Smallholder Farmers' Innovation and Its Determinants The Case of Hirity Mekan Seed Producers' Cooperative, Tigray, Ethiopia

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Abstract
Purpose: Based on the Memorandum of understanding signed between the researcher and ISSD –MU, the main purpose of this study was to find out the extent to which farmers in the specified study area demonstrate entrepreneurial orientation (degree of innovativeness) and examine the determinants of farmers' innovativeness.
Methodology: The units of analysis of this study are members Hryti Mekan seed producers' cooperative in Enda-Mekoni Woreda, southern zone of Tigay. In this study, farmers' innovativeness was treated as continuous dependent variables. Five point Likert scale was used to capture the innovativeness. Twelve variables, categorized under four major groups: demographic and personal variables, socio cultural variables, wealth related variables and infrastructure; were considered as variables to explain the dependent variable. Primary data was collected from 49 (83 percent of the sample frame) members of the Mekan Seed Producers using structured questionnaire, and interview as well as discussions with key informants. In order to analyze the quantitative data, the researcher applied such descriptive statistics as percentages, ratios, mean standard deviations, tables as well as statistical difference tests. It also used correlation and regression analysis for the purpose of substantiating the descriptive data analysis and examined the factors that influence the innovativeness of the members.**Results:** The results of econometric analysis show that positive attitude towards agriculture, engagement in production of improved seed, extension services provided by DAs, experts from ISSD, research institutions, and Woreda level agricultural offices have significant positive effect to enhance the innovativeness of farmers. On the other hand while mass-media exposure, total years of experience in traditional farming, inadequacy and cost of inputs are negatively associated with innovativeness of farmers. On the other hand, participation in capacity building events (e.g. trainings, visits to demonstration sites, experience sharing visits, workshops), participation in non-farm activities, level of formal education, financial position and access to credit have no any significant effect on innovation.
Keywords: Entrepreneurial Orientation, farmers' Improved Seed Producers' Cooperatives, Innovativeness,

1. Introduction

In Ethiopia agricultural sector employs 83% of the labor force, contributes about 90% of the export and 41% of Gross Domestic Product (GDP), and provides about 70% of the county's raw material requirement for large and medium scale industries (MoFED, 2011). 13 million smallholder farmers account for 95 percent of total production (Dawit Alemu, 2012).

Seed is a key input for Improving crop production and productivity. Seed is one of the most economical and efficient inputs to agricultural development (FAO, 2006). In Ethiopia, a country with agrarian based economy, production and proper distribution of improved technologies and seed are critical prerequisite for agricultural development. However, despite the release of several technologies, particularly of improved crop varieties, there has been limited use of improved seeds by the majority of farmers (CSA, 2010). Among others, unavailability of quality seed at the right place, time, price coupled with poor promotion system are some of the key factors contributing for the limited use of improved seeds, which in turn results into low productivity of the agriculture sector (Abebe & Lijalem, no date).

Since its establishment as first public and formal seed sector, the Ethiopian Seed Enterprises (ESE) has remained the sole producer and supplier of improved seeds for over three decades. However, seed supplied by the enterprise remained far behind the demand in those years, regardless of its better capacity. According to Majira et al, (2008) the average yearly supply of improved seed did not exceed 20, 000 tons since the establishment of ESE though the demand was 400,000 tons.

In order to curb such problem, there are different initiatives promoted by the public and donor communities in creating strong integrated seed sector in the country. Among the most important initiatives include promotion of the participation of private sector and licensing of public varieties. Farmer organizations involving in seed sector such as unions and cooperatives can also play key roles in multiplication and distributions of different classes of seeds and other farm inputs.

Based on the memorandum of understanding signed between the researcher and the Integrated Seed Sector Development (ISSD), Mekelle Programme Office the main objective of this study was to identify and

investigate the innovative characteristics of members Hryti Mekan seed producers cooperative in Sourthern Zone of Tigray Regional State, Ethiopia and assess their critical challenges that may help for effective and efficient intervention. This research aimed at answering the following questions:

1. To what extent the improved seed producers demonstrate entrepreneurial orientation (emphasis given to their innovativeness)?
2. What factors influence innovation of the seed producers?
3. What critical constraints do the producers face in their operation?

2. Scope and limitation of the study.

The research was undertaken based on the memorandum of understanding signed between the researcher and the Integrated Seed Sector Development (ISSD), Mekelle Programme Office the main objective of this study was to identify and investigate the innovative characteristics of members Hryti Mekan seed producers cooperative in Sourthern Zone of Tigray Regional State, Ethiopia and assess their critical challenges that may help for effective and efficient intervention. Therefore, findings of this study are limited to these farmers only. In order to examine innovativeness of other farmers, new and wider study has to be conducted in the future.

3. Review of Related Literature

3.1. Seed System in Ethiopia

Seed system in Ethiopia can be divided into two broad types: the formal system and the informal system (sometimes called local or farmers seed system). The formal seed system is called formal because it is mainly government supported system and several public institutions are also involved on it. The informal seed system operates under non-law regulated and characterized by farmers' seed exchange.

3.2. Agriculture as spring board for Development

The recent development strategy of government of Federal Democratic Republic of Ethiopia provides a comprehensive set of strategies for the agricultural sector, including the market-led transformation of the smallholder economy, and the decentralization of political, economic, and administrative powers and functions (MoFED 2002, 2005).

The strategies call for active engagement and integrated and coordinated efforts of different implementing agencies in the public and private sector NGOSs, cooperatives and cooperative union (Spielman, 2007). Cooperatives provide a wide variety of services in Ethiopia: including input supply management; grain marketing; and consumer retail services at prices that compete with local traders. The GoE's current policy aims at establishing at least one cooperative per *kebele*. But at present, cooperative coverage is less than 35 percent of all *kebeles*, with membership estimated at 4.5 million farmers (peasant association) 2010 (Rahmato 2002) cited in (Spielman, 2007).

3.3. Determinants of Development of Smallholder Seed Producers

Many factors influence the development of effective smallholder seed enterprises. The following section discusses some of the specific key requirements for establishment and sustainable operation of smallholder seed enterprises (Neate et al n.d), and Guei(2010):

1. Conducive policy environment that allocates necessary resources to increase the quality control capacity of seed producers
2. Existence of sustained market demands for the produce of smallholder farmers so that they can generate adequate cash from sales of their output that enables them to purchase inputs from the formal market.
3. Timely availability of improved varieties and sources of seed, fertilizer, chemicals and other inputs at reasonable price.
4. Entrepreneurial and technical skill and capacity of producers
5. Accessible credit at affordable cost
6. Affordable and accessible infrastructure such as processing and storage facilities, transportation, communication, water and power services
7. Linkage between formal and informal sector

3.4. Entrepreneurship and its dimensions

a). Definition of Entrepreneurship*: There is lack of universality on the definition of entrepreneurship and subsequent indicators. Miller developed instruments by which dimensions of entrepreneurial orientation can be measured. According to Miller (1983) and Lumpkin & Dess (1996) entrepreneurial orientation refers to top management's strategy in relation to innovativeness, proactiveness, and risk-taking.*

b) Innovativeness *reflects a firm's tendency to engage in and support new ideas, novelty, experimentation, and creative process that may result in new products, services, or technological processes (Lumpkin & Dess, 1996, Wiklund, 1999). Peters (1998 in Bereket, 2008) defined entrepreneurship a the process of creating something new with value by devoting the necessary time and effort, assuming the accompanying financial, psychic, and social risks, and receiving the resulting rewards of monetary and personal satisfaction and independence.*

According Masoud (2011; cited in Bereket, 2013), farm entrepreneur is referred to individual persons or groups those who organizes and involves the business and consequently sharing the result whether it is gains or losses. From the analysis of different definitions of the word entrepreneur, Bereket (2013) said that seed producing farmers cooperatives also be considered as entrepreneurs, group of persons who takes up personal responsibility in order to bring one event in to successful business enterprise

c) Innovation in Farmers: *Different authors use different conceptualization of innovativeness/innovation in their studies. Amanuel Assefa (2003) defined innovative farmers as;*

….”those farmers who have been trained by extension workers may also be recognized as innovators, when they are dealing with the incoming knowledge/technology by improving it or making it fit the local situation or blending it with pre-existing practices or technologies and ending up with a new way of using the knowledge or technology. Essentially, the term “innovative farmer” is not given to a certain social or economic group in the community, but to those farmers (regardless of their sex, wealth status or age) who are trying to add value to existing practices through creative engagement and experimentation and with a passion to seek changes that have economic, social and environmental significance”.

According to Amssalu (2008), a farmer is said to be an innovator if he makes new way of doing or doing new thing such field of agriculture as crop production, live-stock, soil and water conservation. He further listed down 21 specific types of activities that can be considered as innovation in farming. The list includes: introduction of new crops, adaptation of fertilizer, mixed use of compost and chemical fertilizer, crop rotation, weed control, bee keeping, land rehabilitation, fallowing, battle drip irrigation, introduction of water harvesting technologies, adaptation of extension/research-recommended agricultural practices

d) Determinants of Farmers’ Innovativeness

According to Nielsen (2001) Reij and Waters-Bayer (2001) cited in Amssalu (2008) farmers’ innovativeness is influenced by several factors: level of education, size of household, amount of land available, age of household head and degree of contact with other areas, demographic variables (age and sex of the farmer),farming experience, participation in non-farming activities, participation of farmers in social activities, mass-media exposure, farmers’ attitude towards agriculture, extension contacts. The way how these factors affect innovativeness will be discussed in methodology and discussion and analysis chapter parts of this paper.

4. Research methodology

4.1. Description of the study area

Tigray regional state is located in the northern part of Ethiopia. It shares common borders with Eritrea on the North and Sudan on the west and with regions of Amhara and Afar on the south and east respectively. Endamokoni district (woreda) of Tigray regional state is located 660 km north of Addis Ababa and about120 km south of Tigray Regional State capital of Mekelle.

Mekan Tabia, targeted area of this study, is one of the most productive Tabias of all the 18 Tabias found in Ena Mekonni Woreda. Having good productivity, the Tabia has been selected by Integrated Seed Sector development (ISSD) of Mekelle University coordinating office, (Tigray Region LSB innovation team) as one of the innovation sites for seed production in Tigray. For this purpose, the Local Seed Business (LSB) project together with the key stakeholders have established a new cooperative called Hiriti-Mekan Seed Producers’ Cooperative (SPC), with 65 initial number of member of which 11 were women. Currently, the cooperative has 60 active members, 45 male and 15 female and its activities are managed by different committees elected by general assebly.

Accordingly, during the interview with Ato Masaebo, the chairman of the cooperative, the researcher learned that seed produced by the members of Mekan SPC is sold to ESE with a premium price of 15 percent from the prevailing market price of the respective crop. Besides, the committee members told the researcher at the end of September, the cooperative owns birr 380,833.20 worth of assets (birr 58, 341.20 Cash).

4.2.. Sources of Data, Sampling, and Data collection methods

Based on the MoU all members of Mekan Seed Producers cooperative were included in this study. However, during the data collection period only 53 members were available.

Primary data was collected from the five smallholder investors and the 49 members (82% response rate) of the Mekan Seed Producers using structured questionnaire, interview and key informants discussions. In order to gain their trust, the respondents were carefully informed about the objectives of the survey and the direct and indirect benefits to them. In this regard, chair person of the respective seed producers’ cooperatives was first approached and efforts were made to convince them of the objectives of the study. Farmers were also informed that the information related to household and farm characteristics would be kept confidential.

4.3 Variable of the study

i) Dependent Variable

The major focus of this study was to find out the extent to which farmers in the study area demonstrate entrepreneurial orientation (degree of innovativeness, risk taking, and proactivness), and examine the

determinants of farmers' EO (with specific emphasis to innovativeness). For this purpsoe, farmers' propensity to innovation is treated as continuous dependent variables. Five point Likert scale (1= complete disagreement with the statement and 5= complete agreement with the statement) was used to capture the innovativeness and degree of entrepreneurial orientation of farmers. The mean score of the items was used as the one construct of EO: the higher the score, the more entrepreneurially oriented the owner is considered to be. In addition to use of previously tested measures of EO, the researcher tested internal consistency and reliability of the EO measures by Cronbach's alpha and its coefficient was turned out to be 0.78 which is beyond the acceptable range recommended by Nunnally (1978) as cited by Fairoz et al (2010).

b) Independent Variables and Related Hypothesis

This section briefly discusses how different factors affect innovativeness of farmers' innovativeness following the works of Reij and Waters-Bayer (2001) and Amssalu (2008)

Age:The level of innovativeness is expected to be affected by the age of the farmer (Reij and Waters-Bayer, 2001). It was hypothesized that the pick in innovativeness is found among farmers in the age bracket of 35-50 years.

Sex (Gender): Although women often do a large share of the farm work, it is usually the men who are the household heads and represent the family in public, and are therefore most likely to take credit for any changes made on their farms (Reij and Waters-Bayer, 2001).

Formal education: Education enhances the capacity of individuals to obtain, and utilize information disseminated by different sources. This in turn strengthens their innovativeness. Based up on this premise, some studies indicate that innovators are better educated (Reij and Waters-Bayer, 2001). Thus researcher hypothesises a positive association between age of a farmr and innovativeness

Farming experience: Experience will enable farmers to have better knowledge which in turn may be the basis for innovativeness. Hence, farming experience was hypothesized to affect farmer innovativeness positively.

Participation in non-farm activities: This reflects on the degree of involvement of the respondent in non-farm income generating activities. Majority of farmers may derive their livelihoods not only from crop and livestock production but also from a range of activities outside of agriculture. Such engagement may consume time and efforts of farmer that could be used for innovative farm activities. It appears that the more innovative farmers can produce enough from their land, and therefore need not seek off-farm sources of income (Reij and Waters-Bayer, 2001).

Participation in Social Activities: This reflects on the degree of involvement of the respondents in existing formal and/or non-formal organizations. Those farmers who participate in social organization(s) have an opportunity to get information on various improved agricultural practices, which in turn may be the basis for their innovativeness. Therefore it was hypothesized that those farmers who participate in some social organizations like, Idir, Iqub, PAs, Marketing cooperatives, Unions, school councils, are likely to be innovative.

Mass-media exposure: Mass media play great role in creating awareness about farmer innovation in shortest time possible over large area of coverage. This will motivate farmers to innovate. Mass media exposure, therefore, was expected to have positive influence on farmers' innovativeness.

Attitude towards agriculture: Some people do not feel proud to be a farmer and consider farming as a last option. They generally prefer to go for other option than agriculture. In contrast, some farmers are proud of their farms and do not consider farming to be an inferior occupation. Therefore, it was hypothesized that, favorable attitude towards agriculture influences farmer innovativeness positively. It was measured using Likert scale.

Exposure to other areas: Innovators have better exposure to external areas. They pick up ideas while in other parts of the country, outside their own PAs, or abroad (Reij and Waters-Bayer, 2001). Therefore, it was hypothesized that exposure to other areas influences farmers innovativeness positively.

Credit: Using available resources in new ways is considered to be a characteristic of innovative farmers. Some studies show that if innovative farmers are not obliged to take credit to do specific things like buying fertilizer only, they would prefer to look for ways to use what they have more efficiently (Reij and Waters-Bayer, 2001). Access for free credit; therefore, was assumed to be positively associated with innovativeness.

Extension contacts: Contact with extension agents refers to the number of times the extension agent visits the farmer to give extension advice in a year. The frequency of extension contact was hypothesized to positively influence farmer innovativeness.

4.4. Methods of Data Analysis

In order to analyze the quantitative data, the researcher applied descriptive statistics, statistical difference tests, and regression analysis for the purpose of data analysis. The study reported different descriptive statistics like percentages, mean, standard deviations, and tables. In addition to descriptive analysis the regression analysis was also applied to examine the factors that influence the EO (innovativeness of the members and small holder investors). For the present study, multiple regression model, using Stata version 12, was applied to identify the determinant variables of farmer innovativeness.

Model 1: Multiple Regression using average innovativeness as dependent variable

$$\text{avinn} = \alpha + \beta_1\text{Gender} + \beta_2\text{farmexpt} + \beta_3\text{Farmexis} + \beta_4\text{LevFoEd} + \beta_5\text{Nonfac} + \beta_6\text{MME} + \beta_8\text{Pide2ctry} + \beta_9\text{FSfnoExnServc2} + \beta_{10}\text{FSoAdqTQCstIFzr} + \beta_{11}\text{ovafattcaty2} + \varepsilon_i$$

This section is devoted to results and discussion of the study. To understand the relationship between farmers' characteristics and farmers' innovativeness, the descriptive analysis is first presented under different appropriate subheadings. Finally, the extent of the influence of the explanatory variables on farmers' innovativeness was tested using Correlation analysis, t-tests and regression analysis will be follwed.

5. Analysis of Results

5.1. Descriptive Analysis

1. Gender and innovativeness

Out of the total respondents 41 (84%) respondents were male farmers. Compared to the female farmers, male farmers seem to be more innovative (with 4.67 mean innovativeness against 4.3 for female) which is consistent with findings of (Reij and Waters-Bayer, 2001) which may be because of women specific social and economic factors that negatively affect operating and entrepreneurial activities of women. These women specific challenges may include, among others: (1) burdens of house hold responsibility which consumes much of the working hours of women, (2)Females are less endowed in human capital (educational attainment, business related experience, and training) than male ones.

2. Relationship between Age Innovation

The level of innovativeness is said to be affected by the age of the farmer. Literature and empirical studies show that level of innovativeness to be lower among older farmers. The mean age of the farmers in this study was found to be 41 years with minimum and maximum age of 22 and 76, respectively. Result of this study indicated that, the sector absorbed more of the young and working age of the population (18-55 years age).

With regard to relationship between age and degree of innovativeness the researcher observed that extent of innovativeness/entrepreneurial orientation decreases with increase in age. This may because of younger individuals posses high commitment, flexibility and motivation than older ones. While younger individuals want to prove their own abilities, the older ones usually have more legalistic view of possibilities as the result of which younger owner-mangers achieve more growth rate and innovativeness (Cheng, 2006:47).

3. Degree of Farmers' innovativeness in the study area

In this paper innovativeness, which is one of the main components used to measure the member's behaviors toward innovativeness was defined as the propensity of farmers (either by their own initiation or as per the advice of extension agents) to introduce/adopt new cultivars of seeds provided by extension agents or research institutions; adaptation of fertilizer; mixed use of compost fertilizer; use of chemicals; crop rotations; fallowing; soil and water conservation; use of modern livestock such as modern beehives). .

For the purpose of descriptive analysis the researcher classified degree of innovation into three categories-low, medium and high; based on the mean score of each dimension. Low category includes mean scores below 3 and high category belongs to those farmers with mean score of greater than 4 while the medium category consists of those farmers with mean score ranging from 3 to 4. Accordingly, results of the descriptive statistics showed that only 6 farmers (12%) were found to be low innovators and the remaining 43 farmers (88%) were high innovators.

When the farmers innovativeness is disaggregated into different fields of agriculture in which farmers have innovated, many of the farmers' innovativeness was related to crop production and none of them have used chemicals to control weeds and pesticides. Spacing, adaptation of chemical fertilizer, mixed use of compost and fertilizer, use of modern bee hives, as per the recommendation of extension agents/DA, are the other types of innovative activities in which the farmers have been engaged. Almost all farmers reported that crop rotation, fallowing, and soil and water harvesting/conservation were their usual practice since long time.

4. Effect of Education on farmers' Innovation

Generally education enhances the capacity of individuals to obtain, and utilize information disseminated by different sources. Education enhances the knowledge base of individuals. It increases the analytical and problem solving skill of individuals that they can effectively and efficiently exploit opportunities.

71 percent of the respondents were found to be literate. The mean years of schooling of those literate farmers was 7th grade with minimum schooling of 4 years and 12 years maximum schooling. Consistent with the literature, the descriptive analysis showed that the mean innovativeness of the illiterate farmers was 22% less than those literate farmers. This indicates how educational attainment enhances farmers' innovativeness in adopting improved seed, fertilizers and other farming technologies introduced by the stakeholders-mainly government. Thus, from this descriptive analysis, consistent with findings of Amssalu (2008), the writer did get convincing evidence that supports the conceived hypothesis that higher education leads to higher level of innovation.

5. Relationship between Farming Experience and Innovativeness

Higher farming experience can enable farmers to have better knowledge about agricultural activities and to understand its requirements to develop, which in turn may be the basis for innovativeness (Amssalu, 2008)

It was found that their average total farming experience of farmers in the study area was 25 years with 2 and 60 minimum and maximum years of experience, respectively. According to the descriptive analysis, degree of innovativeness shows minor reduction as the years of experience increases.

The second type of experience taken in this study was farmers' experience in improved seed production and it was discovered that the mean years of experience of farmers in improved seed production was 14 years. Contrary to the relationship of total farming experience with innovativeness, faming experience in improved seed production shows minor increment in innovativeness with the increase in experience.

6. Effect of Farmers' Engagement in Non-farm activities on their Innovativeness

Twenty one farmers (43 percent) participate in some non-farm activities in addtin to their improved seed production activities; such as running own shop in nearby rural towns, working as employee of private or public institutions in different capacities (mainly as guards). Though both farmers (participants and non-participants in non-farm activities) are categorized as high innovators, participation in non farming activity enhances innovation of farmers. That is, farmers who participate in non-farm activities are more innovative than those farmers who are engaged only in their agricultural activities. Those farmers who participate in non-farming activities scored mean innovation of 4.7 against 4.5 mean innovations for those who do not have any activity other than faming.

8. Effect of Inputs and output Market on farmers' innovation

Availability of improved varieties of seeds, fertilizer, chemicals and other inputs at affordable price and at the right time are the key success factors for the growth of smallholder seed enterprises in many countries. Using five point Likert scale (1= strongly disagree, and 5= strongly agree), the researcher asked respondent to indicate their degree of satisfaction on timely availability of adequate inputs (mainly of improved seed, fertilizer) in the market, their quality (measured in terms of farmers satisfaction on its suitability to their farm), and costs. As described in table 4.6 of this paper more than 90 percent of the farmers are satisfied with the adequacy, timeliness and quality of both inputs. But nearly 95 percent of them are dissatisfied with the cost of the inputs.

Besides, the farmers are not happy with the price ESE pays for their produces. For this reason, during the interview, the researcher noticed that the farmers need some mechanism of subsidy to the cost of the inputs so that they can expand and sustain existing production of improved seed.

If we see the relationship between farmers' extent of satisfaction on adequacy, timeliness, quality, and cost of both inputs with degree of innovativeness and EO, result revealed that degree of farmers' satisfaction did not bring any difference in their innovativeness/EO. Both those somewhat satisfied and fully satisfied farmers registered about 4.6 mean score of innovativeness, which is classified as higher level of innovation (See table 4.7)

7. Output market and Farmers' Innovation

The farmers covered in this study sale their produce to ESE (government institution) at 15 percent premium. But majority of the farmers (90 percent) said that the price paid by ESE to their produce is less attractive compared to the efforts they exerted during the production process. The remaining 10 percent said delay cash payment by ESE to be their cause of dissatisfaction with the marketing channel.

8. Extension services and Innovativeness

Information and extension services provided by Village-level Development Worker, (D.A) Woreda extension officials, research institutions (researchers) play important role to increase the awareness of farmers about new technology, including farmers' innovation. These extension service providers are supposed to visit the seed cooperative members and educate them on the importance and applications of new innovation through counselling and demonstrations on a regular basis (Bereket, 2013). If the number of times the extension agent visits the farmer is more frequent, the probability of the farmer to be influenced to innovate will be higher

The researcher asked respondents to express their degree of agreement/disagreement to different extension service related statements presented in five-point Likert scale (1= strongly disagree, and 5= strongly agree). The statements include to what extent village level development agents (DA), Woreda extension officials, researchers from research institutions such as TARI, and experts from ISSD visit the farmers during such important periods: land preparation, input provision, sawing, and harvesting seasons.

Majority of the farmers (67 percent) of the total respondents take neutral position response on the services, that is, they are neither happy nor unhappy with the service provided by the aforementioned service providers (see Table 4.8). From the summary of responses from structure questionnaire and interview made with key informants, the researcher observed that, based on the level of satisfaction of the respondents, services provided by the aforementioned bodies is not up to the expectation of the farmer.

With regard to the relationship between farmers' satisfaction with the services and their degree of innovativeness, the descriptive report showed that those satisfied farmers registered about 4.46 mean innovativeness against mean score of 4.14 for those dissatisfied farmers (see Table 4.9). This implies that the

services provided by the extension agents and research institutions have positive effect on innovativeness of farmers which in turn affects productivity of improved seed.

9. Farmers' Participation in Capacity building events and Innovativeness

The other means through which farmers get agricultural information is through participating in different extension events arranged by different institutions. Participation of farmers in such extension events as training, experience sharing field visits, visits in agricultural demonstration sites, workshop/meetings can be good sources of information to gain best innovative practices, new knowledge and technology.

It was found that while about 88 percent of the farmers had no any chance to participate in experience sharing field visits, capacity building training and visits to demonstration sites. Only 12 percent of them, who are mainly from the committee members of the cooperative, participated in capacity building events such as training, field visits, workshops. In line with the literature, depicted in table 4.10 farmers with better exposure to external events registered higher mean score of innovation (4.83) than those farmers without any such external exposures with mean score of 4.58. This implies that those with better exposure pick up ideas and gain new knowledge and skill with the help of such activities as training, field visits, visit to demonstration sites, participation in workshops etc, which is supported with these results of this study.

10 Financial Services and Innovation

44 farmers (almost 90 percent) reported that their operations had been constrained due to financial shortages. However, the researcher did not find any difference in the mean score of those financially constrained and unconstrained farmers. While the farmers with some financial shortage registered mean score of 4.761, mean score those without any financial constraints was 4.757.

11. Mass Media Exposure and Innovation

In order to achieve sustained growth in a competitive world and ensure a sustained market for outputs an effective communicating strategy should be in place. Mass media play a great role in creating awareness about seeds farm and entrepreneurships. The information about new agricultural technologies or innovations, disseminated by mass media will motivate farmers to use the same or it will encourage them to generate appropriate innovation which is suitable for their seeding situation

In this study, respondent members' exposure to mass media was measured on frequency of attending different Medias-Radio, TV, and print media such as news letter etc. The frequency of media exposure is more in radio and TV than print media. While 80% of the famers have no access to news letters, about 46% of the farmers have very rare access to radio and television. Those who mostly attend mass media information registered a mean registered an innovation score of 4.72 against 3.85 for those who rarely attend mass media. This show that mass media exposure enhanced innovativeness of farmers-means score of innovativeness and EO of those exposed farmers is 15% more than those non-exposed counterparts.

5.2. Analysis of the Econometric Model

i) Model Specification

For the present study, multiple regression models, using Stata version 12, were applied to identify the determinant variables of farmer innovativeness. A total of thirteen independent variables were included in the model (refer Independent Variables and Related Hypothesis section (3.3.2) of this paper). The model along with results of the multiple regression are presented in the following section.

ii)The Model

$$\text{avinn} = \alpha + \beta_1\text{Gender} + \beta_2\text{farmexpt} + \beta_3\text{Farmexis} + \beta_4\text{LevFoEd} + \beta_5\text{Nonfac} + \beta_6\text{MME} + \beta_8\text{Pide2ctry} + \beta_9\text{FSfnoExnServc2} + \beta_{10}\text{FSoAdqTQCstIFzr} + \beta_{11}\text{ovafattcaty2} + \varepsilon_i$$

iii) Outputs of Regression

Stata produced the following the regression model


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reg avinn Gender farmexpt Farmexis LevFoEd Nonfac MME  Pide2ctry FSfnoExnServc2 FSoAdqTQCstIFzr ovafattcaty2, robust

Linear regression                               Number of obs =      32
                                                F( 10,    21) =   11.98
                                                Prob > F      =  0.0000
                                                R-squared     =  0.7277
                                                Root MSE      =  .21336

------------------------------------------------------------------------------
             |               Robust
       avinn |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      Gender |   .0380657   .2737426     0.14   0.891    -.5312132    .6073445
    farmexpt |  -.0134102   .0034027    -3.94   0.001    -.0204865   -.0063339
    Farmexis |    .021041    .010258     2.05   0.053    -.0002915    .0423736
     LevFoEd |   .0082743   .0253428     0.33   0.747     -.044429    .0609776
     Nonfac  |  -.0100955   .1047098    -0.10   0.924    -.2278514    .2076603
         MME |   -.141324   .0767979    -1.84   0.080     -.301034    .0183861
   Pide2ctry |   .1069901   .1719763     0.62   0.541    -.2506542    .4646344
FSfnoExnServc2 |  -.2362637   .1346265    -1.75   0.094    -.5162349    .0437074
FSoAdqTQCstIFzr |   .0559709   .1501891     0.37   0.713    -.2563645    .3683063
ovafattcaty2 |   .9370135   .1573324     5.96   0.000     .6098229    1.264204
       _cons |   3.887099   .4519707     8.60   0.000     2.947175    4.827024
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Summary of Variables and their effect on Farmers' Innovation

Code	Description of the variable and Measurement	Effect variables on Innovativeness	
		Expectation	Result
avinn	Average innovativeness	Dependent Variable	
farmexpt	Total farm experience in years	+	_
Farmexis	Farm experience in improved seed in years	+	+
LevFoEd	Level of Formal education in years of schooling	+	+
Gender	Sex or Gender of respondents (1= male, 0=female)	Male > female	Insignificant
MME	Mass Media Exposure (1= yes, 0=no)	+	+
Pide2ctry	Participation of farmers in Capacity bldg events (training, demonstration sites, field visits etc) (1= Yes 0= No)	+	+
FSfnoExnServc2	Two categories of Farmers' Level of satisfaction on **Extension services** of DA, ISSD, Researchers, (1= Satisfied; 0= Not satisfied)	+	_
FSoAdqTQCstIFzr	Farmers' Satisfaction on Adequacy, Timeliness, Quality, and Cost of Improved Seed and Fertilizer (1= Satisfied; 0 = Somewhat Satisfied)	+	+
ovafattcaty2	Overall categories of Famers' Attitude towards Agriculture (1= Favorable; 0= Unfavorable)	+	+

iv) Interpretation of empirical results

As indicated in the methodology section, 16 independent explanatory variables were hypothesized to influence farmers' innovativeness. Accordingly results of teh econometric model are discussed in the following sections

(a). Total years of farming experience. The total years of experience in farming (both in traditional agricultural activities and improved seed production) has statistically significant negative influence on innovativeness of farmers ($P < 0.01$). This implies that the longer years a farmer stays in agriculture, especially in the traditional one, the more he/she becomes resistant to accept new way of doing and adopt new agricultural technology in order to transform his old or traditional agricultural activities.

(b). Faming Experience in improved seed. Experience is expected to enable farmers to have better knowledge which in turn may be the basis for innovativeness. However, though this study showed that farming experience in improved seed and farmers engagement in new technology enhances innovative capacity of farmers, significant at 5% level**.** The positive and significant result of the model demonstrates that respondents with high

farming experience are more likely to be innovative farmers than respondents with low farming experience. This may imply that having cumulative experience on farming in improved seed and new cultivars will enable farmers to have better knowledge about the same which in turn can increase their capacity to solve problems related to agriculture, which is an act of innovativeness. This in line with the findings of Reij and Waters-Bayer (2001); and Amssalu (2008).

(c). Farmers' Attitude to Agriculture. Some famers consider agricultural activities as last option because they are not proud of being farmers while other considers it as an important source of income and superior occupation. Individual's attitude towards agriculture determines the measure to be taken by the individual to improve the same. A person with positive attitude towards agriculture may take any possible measure to bring changes in his/her agricultural activities, tries to get new information and skill which would make him capable of taking appropriate measure for the transformation of agriculture a result of which innovativeness follows. On the other hand a man-of-negative-attitude towards agriculture will do the opposite. In support of the literature and empirical evidences, the regression result of this study shows that farmers with positive/favorable attitude towards agriculture are more innovative than those farmers with negative/unfavorable attitude, significant at 1 percent level ($P<0.001$).

(d). Extension Contacts. In this research extension service providers were to include village level development, agents (DAs), agricultural extension officials from Woreda Agricultural offices, researchers and experts from research institutions and ISSD. Consistent with the hypothesis and empirical results as well as existing literature, results of the regression model of this study show that such services has significantly influence the innovativeness of the farmers ($P < 0.1$).

(e) Mass-media Exposure. In this paper mass media exposure defined as to what extent farmers listen radio, watch television programmes and use print media such as newsletter as means sources of information. It was expected that the more exposure to mass media the higher innovation will be. The OLS result of this study shows that mass media exposure has negative significant result which implies that more exposed farmers were found to be less innovative than those exposed farmers.

6. Recommendations

Consistent to the objectives of the study, several issues were examined and revealed in relation to the determinants of farmers' innovativeness in the study area, Hiriyti_Mekan of Endamekonni woreda. Based on the major findings of this research and conclusion drawn, the following recommendations are forwarded to improve member farmers' entrepreneurial skills in production/multiplication of seeds supply.

The study found that, though marginal, higher educational attainment enhances farmers' innovativeness in adopting improved seed, fertilizers and other farming technologies introduced by the stakeholders-mainly government. While 28 percent of the members of the cooperative are illustrate, educational level of more than 50 percent of the famers with some formal education are below second cycle. Therefore, efforts aimed at promoting collective entrepreneurship of seed/seedling multiplication by member farmers should take the importance of improving educational background to seed producing member farmers for analytical and dynamic entrepreneurial capacity. Hence, to sufficiently extend education to the illiterate farmers, establishment of rural adult literacy institutions and appropriate functionality of the existing program can contribute valuable benefits for such purpose.

If the government expects the member of the cooperatives to produce quality seeds, they need to get tailor – made (capacity building) training in order to develop their knowledge and skill. Technical trainings, experience sharing field visits, visiting agricultural demonstration sites, participation in workshops and business counseling services may enhance the entrepreneurial and innovative capacity of farmers. However, it was found that about 88 percent of the farmers had no any chance to participate in such events. Therefore, in order to the farmers with knowledge and technologies required to produce a product that can meet the quality standards set by the government, need assessment should be done and tailor made training programmes need to be provided to all farmers. Besides farmers need to be exposed to experience-sharing visits, visit to demonstration site and work-shops.

This study found that almost all the farmers possess high entrepreneurial/innovative characteristics which show existence of fertile ground for the expansion of improved seed production of improved seed, chemical fertilizer, and other innovative technologies so as to improve the living condition of the society through enhanced productivity. On the other hand majority of farmers are either neutral (67 percent) or dissatisfied and 12 percent are unhappy on the extension support services provided by DAs, extension officials from Woreda Agriculture office and researchers. Therefore, the writer forwards the following comments.

a. Government, with the help of Extension agents need to identify innovative farmers and local innovations, organize farmers' capacity building trainings and workshops, supporting farmers in organizing their own exchange and study visits. To fit extension approaches and services into this new paradigm of agricultural research and development, extension agents need training in the skills required

to fulfill these roles.

b. The government should facilitate for the formation of an appropriate policy, which encompasses redefinition of the role of extension agents, capacity building and expansion and access by farmers of extension institutions.

The other issue to enhance farmer innovativeness is related to farmers' exposure to mass media. As seen above mass media exposure has positive and significant relationship with farmer innovativeness. Based upon this reality government should take an appropriate measure to establish relevant mass media and increase their accessibility by the farmers.

According (Tripp, 2006) without markets for their produce, farmers will not be able to purchase inputs such as seed and fertilizers and hence will not provide a market for seed enterprises' produce. In this study, in-line with the case in Côte d'Ivoire and Brazil, the price paid by ESE to the produce of the farmers was found very discouraging compared to the efforts the farmers they exert in production of the seed and cost of input. Note that about 95 percent of the respondents are dissatisfied with the cost of input. Therefore, the government is expected to consider some incentive/subsidies to the cost of input and selling price of improved seed produced by the farmers.

References

Abebe, A. & Lijalem, K. no date. Recent Developmetn in Seed Systems in Ethiopia.

Amanuel Assefa, 2003. Promotion of Farmer Innovation and Experimentation in Ethiopia (PROFIEET): Background to and report on the National Workshop, 25-27 August 2003.

Amanuel Assefa, 2005. Challenges and Prospects of Farmer Innovation in Ethiopia: Paper presented in the workshop organized by IFAD under the theme "What are the innovation challenges for rural development" on 15-17 November 2005, Italy, Rome.

Bajwa, H. S. Gill, and O. P. Malhotra, 1997. Innovative Farmers in the Punjab, pp. 67-79. In: Van Veldhuizen, L., Ann Waters-Bayer, Ricardo Ramirez, Debra A. J., and John Thompson (eds). Farmers' Research in Practice, Intermediate Technology Publications, London

Bajwa, H. S. Gill, and O. P. Malhotra, 1997. Innovative Farmers in the Punjab, pp. 67-79. In: Van Veldhuizen, L., Ann Waters-Bayer, Ricardo Ramirez, Debra A. J., and John Thompson (eds). Farmers' Research in Practice, Intermediate Technology Publications, London.

Barringer, B.R., and Ireland,R.D.2006. Entrepreneurship: Successfully Launching New Ventures. Pearson Education, Inc,

Berekt, G. 2013. Assessment of Entrepreneurial Characteristics and their Determinants: The Case of Primary Seed Producing Cooperatives in Tigray. Thesis submitted in partial fulfillment of the Requirement for Degree of Masters of aRts in Development Studies.

Central Statistical Authority of Ethiopia (CSA). (2005-2010). Annual Agricultural Sample Survey Report Addis Ababa, Ethiopia

Central Statistical Authority of Ethiopia (CSA). (2005-2010). Annual Agricultural Sample Survey Report Addis Ababa, Ethiopia

*C*heng,R.W.(2006). The Determinants of Growth in Small and Medium Enterprises: An Empirical Study in the Logistics Industry in Hong Kong. Thesis presented for the Degree of Doctor of Business Administration of Curtin University of Technology. Graduate School of Business Curtin Business School

FAO/WFP Crop and Food Supply assessment mission to Ethiopia, 24, February 2006.

Fetien Abay, Mamusha Lemma, Pauline O'Flynn and Ann Waters-Bayer, 2001. A Challenge and an Opportunity: Innovation by women farmers in Tigray, pp. 155-167. In: Chris Reij & Ann Waters-Bayer (eds). Farmer Innovation in Africa: A source of inspiration for agricultural development. Earthscan Publication Ltd., London.

Guei R. G. 2010. Promoting the Growth and Development of Smallholder Seed Enterprises for Food Security Crops, Case studies from Brazil, Cote D'ivoire and India

Kugbei, S. and Zewdie Bishaw. 2002. Policy measures for stimulating indigenous seed
enterprises. *Journal of New Seeds* 4(1): 47-63. 1894.

Kostopoulos, K. C., Spanos, Y. E. and Pransracos G. P. (no date). 'The Resource – Based View of the Firm and Innovation: Identification of Critical Linkages'

Miller, D. 1983. "The Correlates of entrepreneurship in three types of firms", Management Science, vol 29: 770-791.

Lumpkin, G.T. and Dess, G. G. 1996." Clarfying the Entrepreneurial Orientation construct and Linking it to performance", *The Academy of Management Review,*Vol 21 : 135- 172.

Neate, J. H. and Guei, R. G. (no date). Promoting the Growth and Development of Smallholder Seed Enterprises for Food Security Crops. Best practices and Options for decision making.

Kugbei, S. and Zewdie Bishaw. 2002. Policy measures for stimulating indigenous seed enterprises. *Journal of New Seeds* 4(1): 47-63.

Reij, C., and A. Waters-Bayer, 2001b. An Initial Analysis of Farmer Innovators and their Innovations, pp. 77-91. In: Chris Reij & Ann Waters-Bayer (eds). Farmer Innovation in Africa: A source of inspiration for agricultural development. Earthscan Publication Ltd., London.

Spielman, D.J., Daviss,K., Negash, M., Ayle, G. 2007. Enabling Smallholder Innovation: Findings from Ethiopia, Paper presented for the World Bank's:"Enahancing Agricultural Innovation Workshop", Washington, DC, March 2007.

Tarmidi, L.T. 2005. The importance of MSEs in Economic Development of Developing APEC Countries, paper presented at the APEC Study Centre Consortium Conference 2005, Jeji, Korea, 22-25 May 2005.

Spielman, D.J., Daviss,K., Negash, M., Ayle, G. 2007. Enabling Smallholder Innovation: Findings from Ethiopia, Paper presented for the World Bank's:"Enahancing Agricultural Innovation Workshop", Washington, DC, March 2007.

Wiklund, J. and Shephared, D. 2003. 'Aspiring for, and achieving growth: the moderating role of resources and opportunities', Journal of management studies, Vol 40 No 8: 1919-194.

Wiklund, J. and Shephared, D. 2003. 'Knowledge based resource, Entrepreneurial Orientation, and the performance of Small and Medium-sized business', *Strategic management Journal,* Vol 24, Iss 3

Wiklund, J., and Shepherd, D. 2005. " Entrepreneurship and Small Business Performance: A configurationally Approach", *Journal of Business Venturing*, Vol 20 : 71-91.

Write, P, M, McMhan, G. C., and Williams, A. (no date). 'Human resource and sustained competitive Advantage: A Resource- based View perspective'

Waters-Bayer, A., 2004. PROLINNOVA [PROmoting Local INNOVAtion in Ecological Agriculture & Natural Resource Management]: from local initiatives to a global programme pp. 6-12. Proceedings of national workshop, Ethiopian Management Institute, Debrezeit, Ethiopia, August 25-27, 2003, Addis Ababa, Ethiopia

Yohannes Gebremichael, 2001. Community Assessment of Local Innovators in Northern Ethiopia. pp. 171-177. In: Chris Reij & Ann Waters-Bayer (eds). Farmer Innovation in Africa: A source of inspiration for agricultural development. Earthscan Publication Ltd., London. 112

Zewdie Bishaw and Van Gastel, A.J.G. 2008. ICARDA's seed-delivery approach in lass favorable areas through village-based seed enterprises: conceptual and organizational issues. *Journal of New Seeds* 9(1):68-88.

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