Wageningen University Department of Social Sciences

Communication and Innovation Studies

Investigating Critical Factors Affecting the Linkage between Researchers and Farmers in Ethiopia: From Agricultural Innovation Perspective

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Master's Thesis for the partial fulfilment of Master of Sciences in Development and Rural Innovation (MDR) Specialization in Communication and Innovation Studies

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Declaration

To the best of my knowledge I do hereby declare that this thesis is my own work. It has not been submitted in any form of another degree or diploma to any other university or other institution of education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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Dedication

In memory to
My Dad, Brother & Uncle
Who would have loved to see these days!

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"Thy vows are upon me, O God: I will render praises unto thee. For thou hast delivered my soul from death: wilt not thou deliver my feet from falling, that I may walk before God in the light of the living." Psalms 56:12-13.

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Chapter-1- Introduction

1.1. Introduction

This chapter gives background information about Ethiopia. Due attention is given to the place of agriculture in Ethiopian economy. Organization and content of chapters is also given under this chapter. The chapter helps to understand the status of agricultural productivity in the country and the reason behind it.

1.2. Agricultural Sector background

Ethiopia is the 2nd most populated country having more than 90 million people in Africa next to Nigeria and the 13th populated country in the world. Ethiopian economy largely depends on agriculture. It accounts 47% of GDP of the country. Moreover, agriculture accounts 90% of exports and 85% of employment while 90% of the people live on agriculture. Development in the country can happen if there is yield increment both from crops and livestock in the sector of agriculture. The country has different agro-ecological zones which is conducive for the production of different types of crops and rearing of animals. There is high prospective both in the area of crops and livestock sectors and the country has the highest number of livestock per capita in Africa. The livestock sector accounts 40% of agricultural GDP. There is high opportunity to use the dairy potential to bring agricultural development to alleviate poverty. Ethiopia has high number of cattle and favourable climate for dairy farms (Pender & Gebremedhin 2008). Ethiopia has focused on improving agricultural production and productivity to bring food security in the country.

The government has focused on Agricultural development led industrialization (ADLI) policy as a strategy, which was formulated in 1991, to bring sustainable development. In accordance with this strategy, the government has devoted extensive resources in agricultural research, extension and input supplies. Participatory Demonstration and Training Extension System (PADETES) was introduced to pilot dissemination of technological packages where used to alleviate farmers problem. The government has put great effort to increase agricultural production and productivity. However, the expected benefits, increment in agricultural output, have not been realized.

Low agricultural productivity is the major problem for food insecurity. This problem emanated from the use of traditional farming practices, natural hazards like drought, lack of appropriate technologies for farmers, low adoption of agricultural innovations by farmers, poor access to market, and lack of strong and effective linkage between researchers and farmers. This has led to low agricultural productivity exposing the country to food insecurity(Abate, Shiferaw et al. 2011; Wigboldus, Seerp, et al., 2011).

Innovation in the agricultural sector is weak and slow in adoption, i.e., the use of inorganic fertilizer is limited to 37% of farmers, and application rate is 16% per hectare. Use of improved seed and agricultural technology is low. In spite of recent favourable rainfall and positive policy reforms, the production of agriculture is still low. Agricultural innovation is weak because of lack of effective linkage between researchers and farmers in the country(IFAD, 2009; Spielman, Davis et al. 2011).

Therefore, the objectives of this study are to identify key factors which have hindered the linkage between researchers and farmers in agricultural innovation in Ethiopia. The research finding hopes to inform recommendations to policy makers and public authorities to contribute to solve the problems which hinder effective collaboration of researchers to collaborate with farmers to solve practical problems at grassroots levels. In addition, the study also gives suggestions to CASCAPE project to have proper impact on the agricultural innovation in the country.

1.3. Organization and content of chapters

The thesis consists of six chapters. Introduction is given in chapter one. It describes about agricultural sector background and organization and contents of chapters. Chapter two presents background of the problem. In chapter three, theoretical framework, research objectives and research questions are elaborated. The methodology of the research is discussed in chapter four. The main findings of the research are given in chapter five and give descriptions on the critical factors affecting linkage between farmers and researchers in Ethiopia. The last part of the thesis gives conclusions and recommendations about the research in question.

Chapter-2-Background of the problem: Agricultural Research & Extension within the Ethiopian innovation system

2.1. Introduction

This chapter describes about the structure of Agricultural R&D and Extension system in Ethiopia. Moreover, problems with the contribution of agricultural research system to innovation in the country are discussed. Historical background of Agricultural extension in Ethiopia is also discussed. The chapter helps to understand why the country fails to bring national food security through agricultural research and extension. It also helps to understand the problems of agricultural research and extension in the country.

2.2. Structure of Agricultural R&D and Extension system

Low agricultural production has created national food insecurity in Ethiopia. It is happened because of lack of sufficient knowledge transfer from researchers to farmers. This problem emanates due to lack of effective linkage between researchers and farmers. To alleviate the problem of weak linkage and knowledge transfer between researchers and farmers, the government has made efforts to increase extension activities since 1930th (Belay 2002).

Agricultural extension was started before 80 years in the country. It goes back to the establishment of Ambo Agricultural School (now called Ambo University) which began teaching agricultural extension in 1931. Ambo University is one of the oldest institutions in delivering extension works. The extension activities delivered by Ambo Agricultural School was limited to Ambo areas in delivering seedlings, advisory services, improved crop varieties and animal breeds to the local community. Ministry of Agriculture, which was established in 1943, started working on expanding the area coverage of extension activities beyond Ambo area to different parts of the country. The extension activities of Ambo Agricultural School and Ministry of Agriculture were limited to the central part of the country because of limited capacity to work in the different parts of the country. Other Agricultural Colleges like the Imperial Ethiopian College of Agriculture and Mechanical Arts (Alemaya College which was established in 1950th), now called Haramaya University, started agricultural extension in the Eastern part of the country. Alemaya College was given the responsibility to build the national agricultural research and extension systems since the College was getting fund from America. Still the extension activities were limited to Haramaya areas where the College was working. In August 1963, the government took the mandate for agricultural extensions from Alemaya College and gave to Ministry of Agriculture to outreach the extension activities to the farmers in the country. In 1966 the responsibility for agricultural research and extension was given to Institute of Agricultural Research (IAR) which was replaced by Ethiopian Agricultural Research Organization (EARO) in 1997. Nowadays, EARO is changed to Ethiopian Institutes of Agricultural Research (EIAR) for coordinating national research activities to create better linkage between researchers and farmers (Belay 2002).

The change of mandate and responsibility from Alemaya College to Institutes of Agricultural Research was intended to encourage the development of agricultural innovations through effective linkage between researchers and farmers that increase

collaboration. The current government established many institutions which support agricultural development through agricultural innovations. Nowadays the key responsible institution which helps and coordinates agricultural development in the country is the Ministry of Agriculture at federal level. The Ministry of Agriculture has corresponding regional states' bureaus of agriculture at each region and offices at regional and Woreda levels (a smaller subdivision within a zone. A woreda is equivalent to a district, managed by a local government) to give grassroots supports for agricultural development. Institutions like research, universities, cooperatives, seed enterprises and investment commissions are organized at the country levels also helping to support agricultural development in the country. The government made institutional arrangements to bring agricultural development for the people at the grassroots levels through establishing of Agricultural, Technical and Vocational Education and Training (ATVET) colleges to capacitate many Development Agents (DAs) to help farmers at kebele level (the smallest administrative division with a Woreda. The smallest unit of local government in administration structure in the country). The purpose of the government idea is to assign a group of DAs at farmers training centres to help famers at the grassroots in knowledge transfer and demonstration of modern production practices, which increase adoption of agricultural innovations to increase productivity (Woodhill et al. 2011; Belay 2002). Despite of all these efforts by the government, agricultural production and productivity remains low because of low adoption of agricultural innovations in the country.

2.3. Problems with the contribution of agricultural research system to innovation

Different evidences indicate that yields of crops under farmers' condition are far lower than the yield obtained under research plots. This indicates that there is a wide gap between researchers and farmers. Lack of effective linkage between researchers and farmers has been the major reasons for the low yield and productivity in Ethiopian agriculture. Woodhill and his colleagues (2011) argue that the problems of low adoption of agricultural innovation emerge from lack of strong linkage between researchers and farmers. Lack of strong linkage is created from weak and limited collaboration and coordination. This weak linkage resulted in fragmentation of knowledge system. The knowledge or technologies produced by researchers or farmers are not well exchanged or transferred to the different stakeholders that are working in agricultural innovation in the country. There is a weak coordination of agricultural innovation at Zone, Woreda and Kebele levels (Woodhill et al. 2011). To solve this problem of linkage and coordination, the first linkage between researchers and farmers was established in 1986 following the adoption of Peasant Agriculture Development Extension Program (PADEP) in the country by the Ministry of Agriculture. Moreover, Research, Extension and Farmer Linkage Councils (REFLC) were established in 2001 by the Ethiopian Institute of Agricultural Research (EIAR) and Regional Agricultural Research Institutions and the corresponding research centres at both federal and regional levels to bring the different actors (farmers, development practitioners' researchers, and extension specialist) together. In spite of all these efforts to bring development at grassroots levels, REFLC did not work more than coordinating activities in the real sense. REFLC was not driven by research (Woodhill et al. 2011).

Belay (2008) argues that agricultural research lacks proper linage between researchers among research institutes. Lack of proper coordination between Federal and Regional agricultural research institutes and Agricultural Institutes of Higher Education (AIHE), has resulted in duplication of efforts which resulted in wastage of resources in the country. AIHE has the obligations majorly to involve in training of manpower (75% of the work load) besides conducting research in agriculture (25% of the work load) forming linkage with farmers. A few of the Universities have involved in researching in agriculture and extension activities. Most of the Universities, however, are more engaged in teaching. Agricultural researchers in the country are not conducting problem and practically solution driven research to solve farmers' problems at the grassroots to contribute their input in the development of the country. The major problems of researchers are that they address topics of their own interest for publication which have less relevance to the needs of the farmers. Moreover, lack of research facilities, incentives, and attractive payment reduced the initiatives of researchers to make good linkage with farmers to conduct solution oriented research which has relevance to the needs of farmers in the country(Belay 2008).

The linkage between researchers and farmers in agricultural innovation system is generally weak to bring food security in the country. Therefore, it is inspiring to understand the constraints that hampered this linkage. Identification of these factors enables policy makers and public authorities to pay utmost attention to problems affecting effective linkage between researchers and farmers in Ethiopia. Since linkage is an attribute of agricultural innovation system, AIS is used as a theoretical framework to guide the study.

Chapter-3- Theoretical Framework

3.1. Introduction

This chapter discusses about the theoretical framework of the study. In this chapter: innovation systems, the role of research in AIS, the importance of partnership between farmers and researchers and the enablers or disablers for effective collaboration between farmers and researchers in the world in general and in the country in particular are discussed. Research objectives and research questions are also included in this chapter. The chapter helps to understand how new technologies developed in the research reach farmers for implementation and the place of farmers in the research process in the country.

3.2. Innovation systems

Conventional approaches to agricultural development in Ethiopia have tended to regard innovation as the result of research, and see its dissemination as linear technique limited to researchers, extension staff and farmers. This does not result in increasing agricultural production and productivity and resulted in food insecurity. The research findings, once packaged for extension workers, are expected to be inherently suited to transfer to farmers in which farmers do not learn from the production of knowledge since they are not involved. Researchers have been separated from farmers in production of knowledge and technology. This is due to lack of direct linkage between researchers and farmers in knowledge and technology production, diffusion and utilization. More recent approaches to improving the impact of research on farmers live through effective collaboration put greater emphasis on partnership in which researchers do have strong linkage with farmers to conduct research which is relevant to farmers need to alleviate poverty from the country(Klerkx et al., 2012).

Different methods have been used to increase agricultural output to feed the growing world population. Agricultural innovation has been started before 40 years in different approaches. Induced Innovation, Training and Visit System, Transfer of Technology system, Participatory Research and Participatory Technology Development, Farmer First, Agricultural Knowledge and Information Systems and Agricultural Innovation Systems are some of the different agricultural innovation approaches to increase agricultural productivity to alleviate poverty (Klerkx et al., 2012). Agricultural Innovation System (AIS) is the most recent thinking in a family of systems approach. It gives an understanding of the different actors and other factors which determine innovation in agriculture to increase agricultural output. It gives holistic approach to the study of agriculture to increase yield beyond research activities(Klerkx et al., 2012;Brooks and Loevinsohn 2011). Theoretically, AIS give due attention to the relevant actors for a co-development process of innovation in agriculture. AIS are defined as "a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and polices that affect the way different agents interact, share, access, exchange and use knowledge'' (Hall et al. 2006: vi –vii). Innovation systems are

composed of interrelated parts working for a common goal. AIS is an interconnected compenents of individual, institutions and organizations collaborating to generate, utilize and diffuse knowledge and technology for its econmic value.

3.3. The role of research in AIS

The relationship between farmers and researchers is changing since the linear process is ineffective and these change created agricultural innovation approach. The conventional institutional view to researchers has been looking as a source of new agricultural knowledge and transferring the knowledge to farmers separately through extensions. This centralized model separate researchers from farmers which limit the productive collaboration of researchers and farmers. Because of this linear problem, agricultural innovations come from different actors including research staff and farmers to have impact on making research relevant to farmers need by involving them in knowledge and technology production, diffusion and utilization. Effective linkage of researchers and farmers solved the problem of farmers in many countries like Indian farmers from post-harvest loss. Direct and effective linkage of researchers with farmers brings practical solution since farmers are involved in the actual innovation process of knowledge and technology development. From innovation systems perspective, innovation emerges from systems of actors. These systems are rooted in an institutional setting that affects how individual actors (researchers and farmers) behave and interact with each other. Learning is the critical part of the system which comes from the interaction of researchers and farmers involved in knowledge production and use. Collaborative relationships are important in innovation since the benefits in innovative performance derived from productive relationships between researchers and farmers in the use of new knowledge in economic production(Klerkx and Leeuwis 2009; Hall, Bockett et al. 2001;Hall, Rasheed Sulaiman et al. 2003).

AIS in Africa lacks proper linkage among the different interrelated parts in the system to bring food securty. Researchers have ineffective linkage for proper collaboration with farmers to exchange knowledge and to increase learning and innovation. The gap between researhers and farmers is wide and resulted in food insecurity. Agriculture is the motor of economic growth and research is the fuel for genterating knowledge and technology to alleviate poverty in developing coutries. However, agricultual research is weak and ineffective and has brought little benefits for the poor people who are living in the marginalized rural areas. Researach in these countries is characterized by weak link with farmers, irrelevant to farmers need, poor incentives, high level of fragmentation, low level of professional training, high staff turnover, lack of financial independence and poor coordination among the different actors engaged in the sctor resulting in low productivity, increasing levels of poverty and declining per capita food production. The impact of agricultural research is limited since the findings are not relevant to farmers need and are not often used by them(Sumberg 2005). As one of the developing country in the world, Ethiopia has similar prblems in agricultual research. Researchers have weak link and ineffective collaboratin with farmers and the findings of the research is not often used by farmers since the findings are irrelevant to farmers need in the country. The reason why researchers do not conduct research which is relevant to farmres need through effective linkage and collaboration to bring research impact in the

development of the country is not clear. There is no strong partnership between researchers and farmers which is important to bring food security.

3.4. The importance of partnership between farmers and researchers

Effective link between researhers and farmers is critcal for creating knowledge relevant to farmers and produced when researchers have effective linkage and collaboration with farmers. Effective linkage of researchers with farmers for collaboration results in utilizaiton and acceptance of knowledge which is intended for farmers(Sumberg 2005). From AIS outlook, farmers are important in making contribution in terms of articulating knowledge demands and adding knowledge to the innovation process. AIS helps to investigate the interface between researchers and farmers(Klerkx and Leeuwis 2009). As the infrastructural view of AIS looks at factors which create conducive environment for the innovation to grow, key enablers and disablers of innovation system functioning which affect the linkage for effective collaboration of researchers with farmers in Ethiopia is identified in this research.

Partnership as a collaborative relationship between researchers and farmers in decentralized manner is highly important to create innovation and learning. But hierarchal institutional arrangements centralized agricultural research systems which created difficulties to deal with the needs of farmers at the grassroots levels. The institutional view of research is the arrangements of different actors at different levels which either include or exclude and determine the role of these actors. This hierarchy created problems in addressing the need of farmers who are marginalized from contributing their share in the innovation processes since agricultural innovation is not produced by organized science alone unless farmers are involved(Hall, Bockett et al. 2001;Hall, Rasheed Sulaiman et al. 2003).

AIS should ideally provide conducive environment for innovation to develop and give insight for the processes of agricultural research in relation to the linkage between researchers and farmers collaboration to bring food security. It looks at factors which affect the linkage between farmers and researchers.

3.5. Specifying the enablers or disablers for effective collaboration between farmers and researchers

The interaction and collaboration of researchers and farmers are affected by a numbers of factors. These linkage limiting factors include incentives and attractive salaries for both farmers and researchers that enhance the collaboration of researchers with farmers, share vision in agricultural development, adequate market for farmers to sell their produce, the level of linkage established between farmers and researchers, legislatives and policy environment, information flows between researchers and farmers, political stability in the country, merit based employment and position appointment, hierarchal approach between the actors, well-developed capital, difference between farmers indigenous knowledge and researchers formal scientific knowledge, social status, cultural differences which exclude farmers from working with the

educated researchers, intellectual property rights, professional status that affect the relationship of the actors, political interferences and ideological difference among the actors in the country(Klerkx et al., 2012).

Collaboration of researchers and farmers to bring development can be affected by a number of factors. Collaboration is related to participation of farmers in research process. Farmers' participation in research process can affect collaboration of researchers and farmers positively or negatively. According to Neef and Neubert (2011), farmers' participation in agricultural research can be affected by various factors which are interrelated to each other. The authors identified six dimensions of participation which affects collaboration and partnership of researchers and farmers. These dimensions of participation which affect collaboration through participation are researchers' characteristics, farmers' characteristics, researchers' and farmers' interaction, type of research project, research approach, and researchers' and farmers' benefit. In the following sections, these dimensions of participation which affect collaboration of researchers and farmers are discussed.

3.5.1 Research project type

This dimension of participatory research affects the linkage between farmers and researchers in different ways. It affects collaboration through research objectives, types, risks, potential users involved in the research process and the context in which the research project is conducted. Agricultural research type could be applied which has the potential to participate farmers or it could be basic research which has limited room for farmers participation in the research process and affects collaboration of famers and researchers. Research objectives could be from theoretical perspectives which has less relevance to farmers need and participation or it could be from farmers need to solve immediate problems and has wide room for farmers participation in the research process to increase collaboration of researches and farmers (Neef and Neubert 2011).

For the generation and use of agricultural innovations, farmers are the primary clients of agricultural research. This agricultural research is affected by the institutional context in which the research is conducted. Agricultural research could be designed in an institutional context which is responsive to farmers need and participate them or in a context which is not reactive to farmers need and hinder participation and collaboration. If research is designed in a research institutes or university which is less responsive to the problems of farmers in the local area in agriculture, it is unlikely for the researcher to form collaboration with farmers to search for the problems in farmers' field. It also creates difficulties to form collaboration for the flow of knowledge and technology in the innovation system. Research could have its own risk and this can affect the collaboration of researchers and farmers. The research project may fail to find the desired results for farmers need. The result of the findings may not give the expected return to the time and resources spent during the research process and affects partnership between farmers

and researchers. Research may have negative side effects like the spread of diseases if not well controlled and may bring problems for collaboration(Neef and Neubert 2011).

3.5.2 Research approach

It affects farmers' participation and collaboration with researchers in different ways. It affects collaboration through research methodology, planning and epistemology. Research methodology could be reductionist which has little room for farmers' participation or it could be system oriented holistic approach which invites farmers' participation which increases collaboration of famers and researchers in research process. Research epistemology, the adherence to scientific paradigm (constructivist vs. positivist) can affect collaboration in different angles. Researchers could have positivist world view and can assume that reality exists independently of the observer and farmers' participation has no value in research since the research results do not depend on farmers' context and shows general validity. Researchers can have constructivist world view assuming that reality is constructed by the observer and validity depends in a given context and give room for farmers' perspectives from different angles. This world view gives wider room for farmers' participation to increase collaboration and partnership between farmers and researchers. This world view also gives room for integrating local knowledge with the scientific knowledge, i.e., it integrates farmers' knowledge with expert knowledge (Neef and Neubert 2011).

Research plan can also affect participation of farmers and collaboration between farmers and researchers. Some research plans are rigid and cannot be modified during the research. Rigidity impedes farmers from having influence on the research process through negotiation with researchers. Flexible research plans do have the room for farmers' priorities, experiences and perspectives and give opportunity for farmers to negotiate with researchers. Collaboration can also be affected by the method used to access local knowledge. Some research methods integrate local knowledge to the process of knowledge generation. Some researchers may regard indigenous knowledge as less important and irrelevant or as antagonistic to scientific knowledge. Some researchers see farmers' knowledge as an important part of producing scientific knowledge and methods of accessing local knowledge are the critical part of their research approach. This type of approach increases famers' participation in research and increase collaboration between farmers and researchers to bring food security(Neef and Neubert 2011).

3.5.3 Researchers' characteristics

This is the most important factor which affects partnership with farmers. Researches' characteristics include views, experiences, attitudes, norms and values. Researchers' attitudes towards farmers' involvement in the research process can influences collaboration of researchers and farmers. Many researchers view farmers' involvement in research process as unreliable and non-scientific, impressionistic, and irrelevant for

agricultural research. They may not be interested in farmers' ideas and treat them as backward and inferior. Other researches show great empathy for farmers' perspectives and problems, see them as important partners in research and recognize the importance of farmers' in research process. Researchers' attitudes for farmers depend on a number of factors such as cultural background and education, or prejudices against certain ethnic groups. Accountability of researchers to farmers is another factor which affects linkage and collaboration of researchers and farmers. Researchers may stress only their accountability to supervisors, leaders or reviewers. This type of accountability affects an interactive collaboration with farmers. Other researchers think that they are accountable to farmers as potential beneficiaries of the research results and create collaboration with farmers. Commitment of researchers to solve farmers' problem is another characteristics of researchers which affects collaboration. Some researchers believe that researchers should be dedicated to the creation of public goods indicating a widespread sharing of research results. Other group of researchers argue that researchers have a moral obligation to involve farmers to solve the existing problems(Neef and Neubert 2011).

3.5.4 Farmers' characteristics

This dimension is as equally important as researchers' characteristics to form effective collaboration and linkage with researchers to bring food security through conducting research relevant to farmers need. This dimension looks at the place of researchers in the eyes of farmers' in the research process to alleviate agricultural problems in knowledge and technology creation, dissemination and use. In most cases farmers participate and form collaboration in research if certain conditions are met on the part of the research project, researchers and their methodological approach. Farmers' involvement in research projects depend on their own characteristics, the opportunity cost of time, and their own expectations from the research project. This is highly affected by social, economic, political and cultural environment(Neef and Neubert 2011).

Experiences of farmers' with previous research projects highly affect the linkage of farmers with researchers. In case the previous research project is failed to deliver results, farmers approach the new project with scepticism and reserve. Perception of farmers for the research project is another factor which hinders effective collaboration. Farmers participate in research project if they get increased profits from their cropping systems or rearing of animals and if they believe they can bring impact on the research process. Perception of farmers is highly important for effective linkage and collaboration. Farmers' observe the characters of researchers, categorize the social position and use this categorization in their interaction with agricultural researchers. Farmers perceive researchers as teachers who want to instruct them, ignorant outsiders, experts giving support, or as facilitators of mutual and continuous learning process. Farmers' perception has strong influence on the interaction between farmers

and researchers' in the research process. The way farmers perceive researchers' attitude is critical factor for effective collaboration in research process(Neef and Neubert 2011).

Availability of time for farmers is another factor which hinders collaboration since linkage needs a major commitment on the part of farmers in terms of labour and time. Poor farmers are concerned with meeting their basic needs for their family and may not have sufficient time to get involved in research projects. Farmers' scope of action is a limiting factor for effective collaboration. Farmers know that they need to change some of the practice but not in a position to change it. This indicates constraints that farmers are facing in changing land use system or soil conservation in high land areas. In some instances, farmers do not see any scope for changing the management systems of practices due to lack of access to credit or market, extreme poverty, unfavourable agro ecological conditions or a repressive institutional environment. At the other side, farmers collaborate with researchers since they enjoy the favourable agro ecological conditions, good economic resources, good access to rural finance and markets and a highly supportive institutional environment (Neef and Neubert 2011).

3.5.5 Interaction between farmers' and researchers'

This is the factor which limits collaboration and shows the interface between farmers and researchers in control of the research process and knowledge generation. Frequency, type, and intensity of farmers' interaction with researchers are the decisive factor for effective linkage and collaboration between farmers and researchers. Some researchers meet farmers only when they visit experimental sites on farmers plots, and others meet farmers frequently to discuss the research process, directions, evaluate and plan future steps with farmers(Neef and Neubert 2011).

3.5.6 Farmers' and researchers' benefit from the research project

This dimension of participation for effective collaboration and linkage looks at the benefits that researchers and farmers can obtain from the research project. This is the most critical factors since the actors are involved in the research process to obtain some benefits from the project. Even though the primary focus of research is generation of technical and institutional innovations and improved practices, creation of knowledge and awareness can be the benefits for farmers and researchers obtained from the research process to bring food security. Research enhances farmers' knowledge about positive or negative effects of some practices may have. Collaboration helps farmers and researchers to combine local knowledge with expert scientific knowledge in synergetic or complementary way. Collaboration increases farmers' skills like technical skills, managerial or organizational skills, experimental skills, and problem solving skills for farmers. Collaboration can bring social capital and empowerment for farmers through research. Effective linkage can increase or improve the livelihood of farmers. The research project can improve the resilience of farmers' livelihood to unforeseen external

shocks and improve the capacity of institutions and farmers to adapt to changing conditions(Neef and Neubert 2011).

3.6. Research objective

The objective of this research is to investigate critical factors that affect researchers' linkage[1] with farmers' in Ethiopian agricultural innovations by identifying the key limitting factors which affect effective collaboration to bring research impact relevant to farmers' need to bring national food security in Ethiopia.

3.7. Research question

What are the critical factors affecting the linkage between researchers and farmers to bring research impact in agricultural innovations in Ethiopia?

Sub questions:

a. *What is the influence of formal research governance mechanisms (agenda setting, research funding, and researcher incentive schemes?)*

b. *What are the perceptions, views, attitudes, values, and expectations from both sides (farmers and researchers) for each other and there influence on collaboration?*

c. *Why do researchers do not conduct research relevant to farmers need to bring research impact on Ethiopian agricultural development?*

d. *What are the factors which affect linkage of researchers with farmers?*

e. *What are the functions of farmers' collaboration with researchers in research?*

f. *What are the characteristics of researchers' and farmers' which affect collaboration?*

[1]The word linkage is operationalized in this study encompassing a range of collaborations and exchange of useful information between researchers and farmers for technology generation, dissemination and utilization. The word is conceptualized to indicate that researchers and farmers are connected by the transfer of messages to establish a stronger interaction to create suitable environments for collaboration to establish strong linkage to bring food security in the country.

Chapter- 4- Research Methodology

A case study design was employed to conduct the research. Qualitative research method was used to generate data for this research. One of the characteristics of qualitative research is the use of case studies (Stake, 1995). Yin (1989:13) states that 'in general, case studies are a preferred strategy when '' how'' or ''why'' questions are being posed, when the investigator has little control over events, and when the focus is on contemporary phenomena within some real-life context'. Thus it is appropriate to use case study to investigate the critical key factors which affect the linkage between farmers and researchers in Ethiopia. The methodology is designed to employ a variety of methods to capture different aspects of complex relationships.

Two study areas were selected from two regions from the country namely Tigray and Amhara where CASCAPE project has started implementing the project. The research is a retrospective study that looks at the factors which hindered effective linkage between researchers and farmers in the past to develop and introduce innovations into the agricultural system of Ethiopia.

Data was gathered, primarily through in-depth interviews, secondary sources (documents) and observations, from researchers (from Mekelle and Amhara Regional Agricultural Research Institute (RARI) and Mekelle and Bahir Dar Universities), staff of Tigray and Amhara Regional Agricultural Bureau, extensionists, and farmers from the two regions. Documents were reviewed during the writing up of the proposal, field work and the writing up of the study. At the regional level, six researchers, three from Amhara Agricultural Research Institute from Amhara region, and three from Tigray Agricultural Research Institute from Tigray region were interviewed. From the two Universities (Mekele and Bahirdar) which are coordinating the CASCAPE project, six researchers, three from Mekelle University, and three from Bahir Dar University were included in the interview. Two extensionists, one from Tigray and one from Amhara regions were included. Two development agents at Woreda level one from kamise Woreda of the Amhara region and one from Raya Azebo of the Tigray region were questioned. From the agricultural bureaus two experts, one from Tigray region and one from Amhara region were involved during the interview. Ten farmers, five from kamisee Woreda of the Amhara region and five from Raya Azebo of the Tigray region who do not get benefit from CASCAPE were interviewed. In general 28 interviewees were interviewed.

Potential interviewees who are willing to participate in the interview were selected from the two regions and universities. As most qualitative research has the aim of purposive sampling, that is, explicitly selecting interviewees who are likely to generate appropriate and useful data, purposive sampling was used in this research. Purposive sampling includes information-rich cases for in-depth-study. To achieve this snowball sampling was used. Key informants were used to get people for the interview from the two regions. In research institutes and universities, people who are conducting research including the directors of the research were included in the interview. In case of farmers,

those who have the interest to be interviewed were included. Data was collected using in-depth interview and Digital recorder was used for recording the interview data. The data was translated, transcribed and descriptively analysed.

The following table summarizes the number and the type of people interviewed in both regions during the field work for the study.

Locations	**Region**	**No. of interviewee**	**Position of the Interviewed persons**
Bahirdar University	Amhara	3	1 Research director 2 Researchers
Mekelle University	Tigray	3	1 Research director 2 Researchers
Tigray Agricultural Research Institute	Tigray	3	1 Research director 2 Researchers
Amhara Agricultural research Institute	Amhara	3	1 Research director 2 Researchers
Woreda office	Amhara Tigray	1 1	1 Development agent 1 Development agent
Agricultural bureaus	Tigray Amhara	1 1	1 Extensionist 1 Extensionist
Kebele	Tigray Amhara	5 5	5 Farmers 5 farmers
Regional agricultural bureau experts	Tigary Amhara	1 1	1Experts 1Experts
Total		**28**	

The research was conducted to investigate and search answers for the research question "*What are the critical factors affecting the linkage between researchers and farmers to bring research impact in agricultural innovations in Ethiopia?*"

The names used in this document are fictions names. This is for the confidentiality of the people interviewed.

Limitations of the research

The research conducted had a number of limitations. There were problems to get access to farmers for the interview in some places. Some of the government politicians restricted the access to farmers who have the knowledge and information to share regarding the research question. On the top of this, farmers needed money for the time they spend for the interview. However, due to lack of sufficient budget for the research it was a big challenge to get practical information from the people who have information.

Chapter-5- Results and Discussions

5.1. Introduction

In this chapter critical factors affecting the linkage between researchers and farmers are described. The limiting factors affecting the linkage between farmers and researchers are under different headings for clarity. It also helps to understand the critical factors hindering the linkage between farmers and researchers in Ethiopia. Factors related to project type affecting the linkage are elaborated in section 5.2. This section includes problems of the research type, weak technology demonstration by researchers, weak documentation about the whole research process, top- down designing research plans and objectives and other important issues. In section 5.3 factors related to research approach affecting linkage are discussed in details. These factors include lack of indigenous and scientific knowledge integration, problems of priority setting and other silent issues. Researchers' characteristics affecting linkage is described in section 5.4. These factors are lack of sufficient practical skills to conduct research, researchers' attitude for farmers and their knowledge, researcher's attitude and experience about participation and other matters. In section 5.5, points related to researcher - stakeholder interaction affecting linkage are briefly discussed. Points related to resource limitation, problems of the extension system, problems of integrity among the different stakeholders, government policy and other important points. Stakeholders' characteristics are elaborated in section 5.6. These include attitude of farmers for researchers, farmers' attitude for research, bad experiences of farmers in the past, lack of sufficient time, and farmers' expectation. The last section, section 5.7, is about factors related to stakeholders' benefits affecting linkage. This includes problems of changing technologies to materials wealth, lack of good rewarding system for researchers and other issues are clearly elaborated. These different factors affecting the linkage between farmers and researchers are related to the theoretical framework of the research. Discussions are also given under this chapter.

5.2. Factors affecting linkage related to the type of the research project

The type of research conducted in research affects the participation of farmers in different ways. These limiting factors hindering linkage are stated in this subsection.

5.2.1 *Problems of the research type*

Some researchers conduct a research which has no room for farmers' participation closing its doors to stakeholders' participation. Bayissa is a senior researcher in one of the research institutes in the study area. He spends most of his time in laboratory and rarely conducts applied research. He describes the situation of his activity as follows:

> *"I have spent most of my time in laboratory since I am conducting mostly basic research as a biotechnologist. It is better for the researcher to conduct basic research which does not have a room for farmers' participation even though there are limitations of laboratory equipment's and chemicals. Conducting applied*

> *research needs resource like car, permission of bosses for peridium, travelling long distances, chances of failure of the research because of uncontrollable filed conditions, negotiation with farmers for land and labour. These factors limit the opportunity to conduct participatory research. Moreover, these problems limit researchers to develop proposal from literatures and other researchers' recommendations without identifying farmers' problems from the field."*

The above quote is a commonly shared idea among researchers who conduct basic research in the country. Researchers use the conventional research approach which bases on problem identification from literatures and other researchers recommendations. The technology developed based on literature has less relevance to farmers need. After the development of the new technology, farmers are asked or forced to use the new technology which is not in need of farmers. This researcher oriented research topic development creates gap between farmers and researchers since the research findings are not demand driven. Researchers do not often develop research topics which are applied in type. They focus mostly on basic research which does not have room for farmers' participation in research to form linkage with different stakeholders. Even when the research is of applied type, there is a problem of conducting on-farm research to involve farmers in the whole research process. Researchers conduct research on-station which excludes farmers from participating in the research process. This inhibits farmers from participating in research and farmers do not learn something from the research to use the new technology.

5.2.2 Weak technology demonstration by researchers

Technology demonstration and dissemination in the country is left to extension workers or development agents. Researchers spend most of their time on technology development which does not involve either extensionsits or development agents. Tola is a development agent in one of the study areas. He has worked as a development agent for the last 14years. He repeatedly mentions that researchers are engaged in the development of new technologies and dissemination of the result is left to extension workers and development agents. He describes the case in the following manner:

> *"Researchers spend most of their time on new technology development. They rarely come to demonstration sites to explain what is going on. They come on farmers' field days or when they like to visit the technology with higher government officials for their own advantages. When researchers come to the field, their purpose is to check whether farmers have the interest to use the technology or not. Researchers think that the mandate of technology demonstration is the work of extension workers or development agents."*

From the above case one can understand that researchers spend most of their time in laboratories or in office writing proposals or research results. Some researchers do not often demonstrate their research results to beneficiaries. This is because of lack of time

to do so and lack of mandate to demonstrate research results to farmers. Once the technology is packed, extension workers are expected to disseminate the technology to farmers for implementation. Extension workers do not properly show the technology developed by researchers to farmers since they have other responsibilities from the government which create attention diffusion. Since the developed technology is not properly demonstrated to the users of the technology, farmers do not trust the new technology and result even in failure since farmers have not properly seen the technology from the beginning to the end.

5.2.3. Weak documentation about the whole research process

Research institutions and universities do not have the culture of research process documentation. There is a problem of getting data about what was done in the past regarding farmers problems, methods used, the successful and unsuccessful technologies, challenges in adopting technologies, introduced technologies from abroad, farmers' best practices, farmers practices in specific areas, farmers attitudes about research and sources of research funds. Lack of information about research and farmers is a challenging for beginners in the research institutes. Repeating research in a given area with farmers which was failed before because of lack of information creates gap between farmers and researchers. Lack of appropriate information about the farming practices created gap between farmers and researchers in creating strong linkage between farmers and researchers.

5.2.4. Top- down designing research plans and objectives

Some research objectives and plans come from other countries which work under different context and researchers or agricultural offices are asked for implementation of the research process and technology without knowing under which conditions these technologies are suitable and successful. Since researchers and other concerned bodies are not involved in the generation of the technology, they are not interested in the diffusion and implementation since it is coming from top politicians for implementation. Because of this researchers and extension workers don't put maximum efforts for the success of the technology and it fails at the end. Some of the people who are at the top give order for technology adoption without knowing the specific conditions under which the technology works. In fact the people who are giving order from the top have great ambition to see development and change in the country but other stakeholders may not have common vision to bring agricultural growth and development.

5.3. Issues related to research project approach affecting linkage

Research approaches which affect the linkage between researchers and different stakeholders are briefly described under this section.

5.3.1. Lack of indigenous and scientific knowledge integration

Local and scientific knowledge integration is one of the problems hindering linkage of farmers with researchers in creating effective collaboration. Farmers have been using indigenous knowledge that they inherited from their ancestors whereas researchers are using scientific knowledge that is obtained from universities. Nidarba is a researcher. He is from farmers' family and knows about agriculture under farmers conditions. He criticizes researchers for the view that they have on local knowledge. He shares his view on the integration of local knowledge with scientific knowledge as follows:

> *"There is a big problem of integrating indigenous knowledge with the scientific knowledge among researchers to develop technology relevant to farmers need. Researchers give less attention for local knowledge but Farmers give more attention to it. When researchers go to farmers, they do not consider farmers knowledge to develop new technology. Problem of scientific knowledge integration with local knowledge emanates from researchers attitude for the local knowledge in technology development. Researchers think that the western knowledge is more important than the local knowledge for technology development."*

Most of the researchers are adhered to the scientific knowledge to conduct research. Farmers have used the indigenous knowledge to lead their live and highly dependent on their knowledge. There is a big gap between scientific and indigenous knowledge. Because of the gap, researchers are not integrating indigenous knowledge into the scientific knowledge. Researchers assume that local knowledge has no capacity to solve farmers' problem. Farmers have suspect on the scientific knowledge and think that it does not bring solution to their existing problems. Researchers use the scientific knowledge to produce new technology without integrating with farmers' knowledge. Lack of indigenous and scientific Knowledge integration is due to lack of experiences sharing among the different stakeholders. There is insufficient time and culture for sharing experiences to learn from each other and researchers lack experiences in local knowledge to incorporate it to the scientific knowledge to conduct demand driven research. This knowledge gap creates loose linkage between farmers and researchers.

5.3.2. Problems of priority setting

These are one of the limiting factors which hindered development. Lack of proper problem prioritization to use the scarce resources to alleviate farmers problem is a bottleneck among the different stakeholders involved in development. These problems of priority settings are discussed as follows.

5.3.2.1. Problem of selecting potential areas for research

Researchers look the research areas for conducting research whether it has the potential to give positive responses or not. Researchers have the mentality to see success from their research and select potential areas for their research. This type of mentality among

researchers created difference on the beneficiaries of the technology and on who are going to participate in the research processes. Galana is one of the poorest farmers in the study areas. Even though he is poor, he has a great interest to improve his live by involving himself in the research process and through the use of new technologies developed by research. He does not have a good attitude for them and strongly criticizes researchers for the opportunity he has missed to participate in research around his village. He described the case as follows:

> *"When researchers need to conduct research in our village, they first ask who model farmers are. They ask who are educated, rich, near towns and cities. It seems researchers are working to create a wide and big gap between the poor and the rich since they mostly work with the rich and make them the beneficiaries of the technologies. Researchers need farmers who have fertile soil and money to buy inputs. The rich is becoming richer. The poor are still poor. The poor are not involved in the research process since they do not have the potential to work with researchers because of lack of fertile soil, good house, vehicles, education and etc. This type of categorization and selection of potential farmers and resource have created gap between researchers and mass of poor famers in the country."*

From the above case one can analyse that researcher's start research work by selecting potential areas for research. These potential areas include fertile soil, model farmers who are educated and wealth, areas which have access to information and cities, rich farmers who have the capacity to buy and use technology. Poor farmers are not selected since they do not have resources to use the technology. These potential areas give good results for researchers since they have the potential to give good results. But when the technologies are taken by farmers under different conditions having less potential for the technology, it fails and farmers do not get results from the technology as they are told either by researchers or extensionists. The philosophy behind selecting potential areas for research is to get maximum yield with minimum efforts and resource to bring change in the county. These great achievements on potential areas can bring initiation on other researchers or farmers to conduct research or to use the developed technology. This is also for propaganda. This type of potential area selection creates gap between the majority of poor farmers and researchers since researchers are selecting a few rich and educated farmers from the mass and poor farmers perceive that new technologies are meant for rich farmers to widen the gap between the rich and the poor farmers.

5.3.2.2. Lack of stakeholders' Participation in policy formulations

During national or regional strategy and policy formulation, the government does not give due attention for the involvement of researchers and other stakeholders. At planning and implementation levels, different stakeholders' are not involved in research planning. These create gap in developing common vision among the different stakeholders to bring development in the country. Since researchers are not involved in national policy formulations, they do not involve farmers in research planning at

regional or institution levels to develop common vision for what will be done in the coming years or seasons. This creates developing plans at different levels in isolation which creates gap among the different stakeholders to smoothly work together.

5.3.2.3. Improper prioritization of farmers' problem

Ethiopia has different agro ecological zones suitable for different types of plants and animals and hence need different prioritization of farmers' problems for different recommendations. Trying to apply the same recommendations to different agro ecological zones creates failure of technologies. There is a problem of problem prioritization among researchers. Since researchers do not involve farmers in problem identification and even researchers do not identify farmers' problems, what researchers rank as first priority for research is not the actual problems to be first solved. Improper prioritization of farmers' problem creates loose linkage for proper collaboration.

Both researchers and the government give due attention and much time to identify problems than searching practical solutions for the prevailing problem in the country. This is because of lack of identifying the root causes of the problems with farmers in farmers live rather than developing technology for the unknown problems by extension workers and development agents. Researchers give recommendations than practical solutions for farmers. At the end of the research, the new technology is shelved since farmers are not going to use because the technology is not demand driven. This shows that there is a problem of proper understanding of farmers' problems. Most of the topics identified for research are not farmers' priority areas. Ebisa is a researcher. According to his view, researchers are conducting research around their area of interest which has less relevance for farmers need. From his view this type of research does not bring any solution for farmers' since it is not demand driven. He stated the situation of researchers' areas of research topics as follows:

> *"Researchers are not conducting demand driven research. They give due attention to their areas of interest and specialization ignoring farmers priorities. Since the research is not demand driven, farmers show little interest for the implementation of the new technology. Researchers do not check the topic of their research with the interest of the beneficiaries. There are no strong institutions which checks and controls the research proposals are priority areas of famers and national interest for the development of the country to bring national food security."*

From the above quote, it is possible to understand that the technologies which are produced by researchers are irrelevant to farmers need. This issue is the commonly shared idea by researchers who have the interest to work for the welfare of the society. Research topics are not identified with farmers to address their problems. Researchers develop research proposals based on their personal experiences, specialization, interest; others research findings recommendations and targeted benefits like publication for promotion or knowledge production for the scientific world. This type of research

proposal development does not give due attention to farmers problem and does not solve farmers problems and hence create gap between researchers and farmers.

Nowadays a few universities have started prioritization of research topics. These universities have started developing research proposal in alignment with national development directions and farmers need. This considers agricultural growth and transformation programme (AGTP) of the country and national development government policy directions. By integrating these two interest areas, government directions and farmers, research topics and priorities' are developed. After developing the documents, that is after identifying government development direction and farmers need, the document is reviewed by researchers, extensionists, agricultural experts, farmers and policy makers. This results in developing thematic areas which gives directions for researchers in universities. Researchers can conduct research around these thematic areas. The university research office check whether the research topic is in alignment with these thematic areas or not. But this works only for a few universities which have to be appreciated and encouraged. It is a good lesson for other universities if they need to contribute something in the development of the country and need to alleviate farmers' problems to bring national food security.

5.4. Researchers' characteristics affecting linkage

Researchers' characteristics' can affect participation of farmers in research. These limiting factors are elaborated in the following ways.

5.4.1. Lack of sufficient practical skills to conduct research

Employment in research institutions and universities depends on cumulative grade point average (CGPA). CGPA does not necessarily show research calibre of the candidates or graduates. University graduates may have excellent CGPA but may not have the skill and inclination to conduct research. CGPA does not demonstrate practical skills of graduates'. It does not also show the interest of graduates to work with farmers. CGPA does not indicate the background of the graduate whether she or he can identify some of the crops in the field. For some graduates', it is difficult to identify maize and sorghum, barley and wheat since they do not have agricultural background and interest to work in the village. Lack of sufficient skills is related to weak educational system of the country which is emanating from lack of sufficient practical training when students are in the university. This is the commonly shared idea by the people in the study area.

Naol is a senior researcher in the study area. He has been working for the last 20years in different research centres in the country at different positions. He highly criticizes the educational system of the country in delivering quality education for students when they are in the university in gaining practical skills. He describes the problems of university graduates in conducting demand driven research to alleviate farmers' problems as follows:

> *"Most of the university graduates have limitations of practical skills. These students do have good knowledge but they do not have sufficient practical skills to conduct research under field conditions. This problem is because of the weakness of the curriculum in the university in delivering practical skills. Lecturers in the university give due attention for the theory than for practical activities since they themselves do have limitation of practical skills. Students who have the capacity to score good grades are employed both in research institutes and in universities since it is the CGPA that is mostly seen as a criterion for employment. Evaluations in universities are mostly paper based and do not evaluate the practical skills of students. Students do not have the opportunity to work with different institutions to get practical experience to conduct research which is relevant to farmers' conditions. These limitations of practical skills are seen on researchers after graduation."*

From the above quote one can understand that students, during their stay in the university, do not get sufficient practical skills which enable them to work as researchers while they are in the university. This idea is the most commonly shared idea among many research institutes researchers. The curriculum in the universities does not make students ready to get practical skills to work with farmers during their studies. This limits the capacity of students when they become researchers. This creates gap between farmers and researchers since these students lack confidence to work with farmers because they lack practical skills. Students in a university do not have sufficient access to acquaint themselves with farmers' problems. The system in the university to acquaint students with farmers' problems through internship or practical attachment is weak. This is in fact resources demanding and related to money allocation for practical trainings. It needs budget. Weakness of the curriculum in university to give sufficient practical skills for graduates is caused by lack of strong commitment from the government to give quality education to produce qualified researchers.

The government has the interest to have many educated people in the country because of the limited number of educated people to bring development. Because of many problems in different areas in relation to educated man power in quantity, the government has focused on graduating many graduates as much as possible which is based on quantity of graduates' missing the quality attributes. The country has a serious problem of educated manpower. To fill the gap, universities are training students without having the necessary facilities for practical training. The government encourages having less attrition rate and lecturers are expected to give re -exams and tutorials for students who have less potential to get pass mark. Instead of giving tutorials, lecturers give pass point for students without student's efforts and this discourage lecturers. Students think that they do not fail and because of this they do not spend much of their time studying to get knowledge and practical skills. This lack of knowledge and skill is reflected on graduates' after graduation. This type of weak curriculum and government interference in higher education reduces highly the quality of higher education and results in lack of skills on the university graduates' to solve

farmers' problem as a researcher. There is no sufficient on job training once graduates are employed as researchers. Lack of on job training highly affects the performance and skills of researchers to work with farmers. On job training improves the knowledge and skills of researchers to conduct demand driven research which can solve farmers' problem. Since graduates lack sufficient training both in the university and on job, they do not have sufficient farm skills. This lack of sufficient farm knowledge and skills limits the opportunity to work with farmers as a researcher. Farmers know their farming system. Researchers who lack the skills and knowledge of farming system think and find solutions for farmers' problem which farmers do not need to use the new technology since the new technologies are not the interest of farmers. The problems in the mind of the researchers may not match with the problems of famers which are actually on ground. Farmers do have their own farming systems, knowledge and skills. Researchers who are employed in the university spent most of their time in school and do not have field experiences. These people do not know the existing problems of farmers in the village. This creates incompatibility between farmers' problems and research knowledge and skills and creates gap between farmers and researchers.

5.4.2. Researchers' attitude for farmers and their knowledge

Researchers' perceive farmers as uneducated people who cannot solve their own problems. For researchers' farmers are passive solution receivers from researchers. Researchers think that farmers do not have the knowledge and skills to solve agricultural problems. Researchers do not often need to hear farmers' ideas. For researchers, hearing to farmers' ideas is wastage of time.

Fayisa is a rich and sociable farmer in one of my study areas. He has nine family members. He has a good experience in working with researchers in his area. According to his view, he is a model farmer even though it means nothing for him. He repeatedly mentioned that being a model farmer is a matter of having good access to new technologies besides having good resources for the implementation of the technology developed in the research. He described the attitude of researchers' for farmers and for their knowledge and skills as follows:

> *"Researchers do not have good attitude for farmers and look as uneducated people. Researchers think that farmers do not have knowledge to solve their own problem. Researchers come to us to use our land and labour. They do not have the interest to hear from us. For researchers our ideas are valueless and they look as if we do not have any knowledge and skills. They do not have even time to share our ideas and experiences. We have practical skills even though we lack the theory. We have skills in selecting good crop varieties, animals, time of disease incidence, weeding and etc. Researchers need us for the implementation and approval of their new technology developed in the research. For researchers to work in research someone has to know the modern knowledge. Researchers do not have good attitude for the traditional or local knowledge."*

From the above saying one can understand that, for researchers' farmers do not have knowledge and skills to be partners in research. Researchers do not have the culture to appreciate farmers' knowledge to produce new technology for farmers. Researchers' think that to develop new technology only the scientific knowledge is needed. The place of indigenous knowledge is less important. To develop new technology for researchers, someone should join university and must have university degree. Since farmers in the country are uneducated, researchers undermine the knowledge and skills of farmers in research.

Researchers think that involving farmers' knowledge in research is creating complication in the research process and making the research path way long. The attitude that researchers have for farmers' knowledge in involving farmers in research is poor and not good. Researchers imagine that research is conducted by a person who have western mentality and have scientific knowledge. Researchers reflect that farmers' knowledge contribution in research is none.

5.4.3. Researchers attitude and experience about participation

Researchers do not have the culture and experience to work with farmers in research. Research topics are not participatory in nature. Researchers do not have the interest to participate farmers in research. This problem is emanated from different reasons. The first reason is related to researchers' attitude about the knowledge and skills of farmers. Researchers think that farmers' knowledge and skills in research contribution is insignificant, that means, the contribution of farmers in research process in production of new technology is nearly zero or none. The second reason is related to farmers acquiring or learning from the research process. According to this view of researchers, farmers do not learn much from the research process and do not use the knowledge and skills that is acquired from the research process involvement, that is, farmers' use of the new technology from the research to solve their problem and making it sustainable is insignificant. The third reason is related to the easiness or complexity of the research process. This school of thinking is that involving farmers in research is making the research process complex and elongating the pathway of the research to get the new technology. Researchers need to get new technology from research within short time of period without complex process. Researchers who have this mentality on participation of farmers in research argue that farmers' involvement in research is unnecessary and creating complication in research. This is excluding farmers for the sake of easiness in the research process and the need to work in isolation.

Involving farmers in the research process help them to learn and enable them to develop skills and knowledge on how to solve their agricultural problems in sustainable and promising ways. Researchers are the key actors which are responsible in engaging farmers in the whole research processes which have the room for farmers' participation. But there is a problem of farmers' participation in research process and this has created a gap between farmers and researchers to form strong linkage for effective collaboration

and partnership. Gabisa is a researcher in one of the study areas and has worked as a manager in different research centres. He mentioned several times during my stay with him for the interview that researchers do not have the interest to participate farmers in the research process. He described his observation regarding researchers' interest to participate farmers in the research process as follows:

> *"Researchers do not show interest to work with farmers in their research process. Since farmers are not engaged in the whole research process, there is no chance for farmers to learn and develop skills and knowledge on how to solve their problems in the future in sustainable way. Farmers do not develop sense of belongingness and strong relationship with researchers since they are not part of the research process. For researchers involving farmers in the research is wastage of time and creating complexity to elongate the path way of the research.*

The above quote shows that researchers do not have the interest to work with farmers by engaging them in the research process stating from planning to evaluation of research results. Researchers do not involve farmers in problem identification, problem prioritization, implementation, decision making and evaluation in the research processes. Since farmers do not involve in research processes, they do not learn from the research to solve their own problem in the future in sustainable manner. Because farmers are not involved in research process, it is difficult for farmers to trust the technology and to develop good relationship with researchers. Researchers invite farmers to visit on-station research trials which may not give similar performance under farmers' farm conditions.

5.5. Researchers–farmers (other stakeholders) interaction

The interactions between the different stakeholders in research affect the linkage between them. Factors which disable the linkage are described as follows.

5.5.1. Resources limitation

The country has a scarcity of resources to conduct demand driven research relevant to stakeholders need to bring national food security. The limited resources include researchers both in quantity and quality who are concerned and committed for the welfare of the society.

5.5.1.1. Limited number of researchers

Ethiopia has a limited number of educated manpower as one of the developing countries in the world even though the government is trying its best to have a high number of educated manpower in different specializations. Tolan is a researcher and a head of a department in one of the research areas. He has worked in different positions at different times and places in agricultural research centres and institutes. He knows the

limitations of resources especially of educated manpower in a research. I understand from his feeling and descriptions that the problem of food insecurity is majorly related to lack of well-educated man power both in number and areas of specializations. He described the case of educated manpower in research institutes as follows:

> *"The country has a problem of educated manpower in different areas of specialization. The problem is not only the number and type of specialization. Most of the educated people are from big towns, cities and rich families and they do not have the interest to work in the village with poor farmers. This adds problems on getting sufficient number of researchers to work with millions of farmers. These educated people, who are adapted to easy and better lives, do not like to work even in research centres for long. Because of this mentality they do not write proposals which take long time to get results. On the top of lack of interest to work in the village with farmers, these limited numbers of researchers are joining NGOs and universities to get better payment and services."*

The above quote shows that the number of researchers in the country is limited both in quality and quantity. This problem is a commonly shared idea among researchers including the government. The number of educated manpower in the country is not sufficient to make research at different agro ecological locations establishing many research stations to involve farmers in research closely. Because of the limitation of researchers both in number and quality, there is limited number of research institutes' or centres to work closely with farmers to form strong linkage. The proportion of researchers to farmers is very low. Besides large in number, most of the farmers are uneducated. Because of lack of education, farmers suspect the new technologies produced by research and takes time to convince them to use and work with researchers. The number of researchers is insufficient because of a number of reasons. The number of educated manpower is small in number since Ethiopia is one of the developing countries in the world. Brain drainage is a critical factor since experienced and well educated people are working in the most developed countries to get better payment and services. Besides working in developed countries, well-educated and experienced people are leaving research institutes and joining international NGOs and universities to get better payment. This is caused by lack of incentives, good payment and good working environment and resulted in high researchers' turnover. Research institutes do not have sufficient fund to retain well experienced researchers. Research works are dependent on external funds and these funds are dependent on a number of factors to give to the government and there is big gap between the amounts of fund from year to year. Researchers are leaving also because of the nature of the research which takes many years to get result.

Lack of researchers' stability in a given research institutions created problems on the continuity of the research project started on a given topic. If a researcher who started a given research leaves a given research institution, another researcher will, without his specialization and interest, take over the started research. Because of lack of skill and

knowledge and interest, the research stops somewhere and it fails. This develops bad experiences when working with farmers since researchers are changing from time to time and they do have different attitude for farmers who are working with them.

5.5.1.2. Financial limitations to purchase technologies

To use the new agricultural technologies like selected seeds, fertilizers, animal breeds, herbicides etc., farmers should have sufficient sources of money to buy the technologies. The prices of the new technologies are expensive for farmers to use and most of them cannot afford the price. Financial limitation is one of the factors which hinder farmers from using the new agricultural technologies to improve their live. Jambal is a farmer in my study area. From his views I observed that he does not have sufficient sources of income to buy agricultural inputs which are developed in research even though he has great interest to use the new technologies to improve his live. He described about the financial matters which limits the use of the new agricultural technologies as follows:

> *"I do not have sufficient sources of income. I do have 1.5ha which is not fertile. The yield I get from this land is not sufficient to feed my family. I use the money which I get from the sale of the harvest both for feed for the family and sale to buy materials for my sons for schooling. I need to use the agricultural inputs to get better yield but the price is too expensive and I cannot afford it. Last year I borrowed money from my friend to buy fertilizer and maize hybrid to give him after the sale of the harvest. But I get fewer yields and I could not pay the money for my friend. Once you start applying fertilizer to the soil, you have to continuously use it otherwise you could not get better yield. This year I do not have the money to buy the inputs and I will not get good harvest for my family."*

The above quote leads to the analysis that farmers do not have sufficient money to buy technologies. Technologies are expensive for poor farmers to use under their condition. Because of money limitation for farmers to use, farmers are forced to use the new technologies by extension agents without interest, knowledge and skills about the new technology. These forcing to use the new technology develop suspicion in the mind of farmers on the use of technologies. Farmers are forced to use the new technologies if they need to get aid from NGOs and government. Farmers take the new technologies but they do not use it properly but use it for other purposes. The aim of farmers to take the new technology is to get aid from both NGOs and government since it is the pre-condition to get aid. Farmers are asked to take mosquito nets to get safety nets. Farmers do not use mosquito nets for the intended purpose but use for other purposes. Forcing, putting pre conditions and lack of sufficient money to purchase new technologies created gap between farmers and researchers.

5.5.1.3. Problems of resources monopolization

Resources such as cars, money, offices, laboratories etc. are highly important to conduct demand driven research. Besides scarcity of such resources, there is a problem of

sharing the available resources for effective and efficient resources mobilization among researchers in the country. This is due to lack of common vision to bring development in the country among the concerned bodies to feed the whole population. Bona is a researcher and a lecturer in one of the universities in the country. He worked as a researcher in one of the research centres in the country before he joined the university. During his stay in the research centres, he observed that there is a problem of resources usage for common proposes in research centres to alleviate farmers' problems. He shared his observation of resource sharing among researchers as follows:

> *"The problem of our country is not only scarcity of resources but also problems of sharing or using it effectively and efficiently for common goals among researchers and other stakeholders in the country. Senior research need to use resources only for themselves especially cars for field works. For senior researchers, it is not important for junior researchers to use cars from the senior researchers' point of view. Senior researchers even do not like to use the available cars with junior researchers'. Some researchers even write research projects for their own advantage. If these senior researchers get fund for their project, they do not pay good and attractive amount of money for farmers for their labour and land. They do not pay proper amount of money for development agents when they help these researchers in data collection and filling of long listed questionnaires'. Researchers need to use the available resources only for their own purpose."*

One can understand from the above case that researchers in the country do not need to share the resources that they get for research. This is due to scarcity of research budget allocation. Researchers do not pay sufficient amount of money for farmers for their labour, land, and animals when they are involved in research. Researchers try to use even the money they get from different sources like from international donors, and national organizations for their personal benefits. Researchers develop research projects to get their own benefit in the form of pardium, or to buy cars for universities or to construct offices instead of doing something for farmers which can alleviate farmers' problems. This resources monopolization by researchers create gap between farmers and researchers and hinder the establishment of linkage between them.

5.5.2. Problems of the extension system

The extension system of the country affects the relationship between the different stakeholders to form strong linkage for effective collaboration and partnership. A factor related to extension system is given below as follows.

5.5.2.1. Problems of the linear model(research-extension-farmer)

The transfer of technology from the research to farmers in the country is through the linear process, i.e., using the research-extension-farmer model. In this type of model, technology development is given to researchers where as its dissemination is the work of extension workers and farmers are expected for implementation technology without

getting the knowledge and skills on how to implement it. This model limits the chance of researchers to involve farmers in the research process. Between researchers and farmers in the linear model, agricultural office or extension offices are obstacles of researchers to work with farmers. Mule is a researcher in one of the regions in which the study is conducted. For him, one of the obstacles which are hindering researchers and farmers direct linkage is the linear model of technology development and transfer to beneficiaries. Agricultural offices are great obstacles for researchers, according to him, to work with farmers. He stated the problems of the existence of agricultural office (extension offices) between researchers and farmers:

> *"Researchers do not have a direct structure to work with farmers. Farmers are told not to give and work with anyone unless they come through the government structures starting from the Woreda agricultural offices to the Kebele level. Getting permission from these offices is not simple. People who are working at different government offices are bureaucratic and they kill researchers' time. Some times when we go to the agricultural office for permission, it is difficult to get the concerned body since they have spent most of their time on meeting. Most of the time, I prefer not to go to this office for permission. Even sometimes, they do not show willingness where the researchers need to conduct the research. Agricultural officers tell us to go somewhere they need. The existences of agricultural offices (extension offices) at different levels create obstacles for the researcher to work where and when the researcher needs to work with farmers."*

Researchers are mostly engaged in technology development in the research process. Dissemination of the technology is given to ministry of agriculture which gives the mandate in turn to extension wing of ministry of agriculture. Research does not have direct structure to reach and work with farmers. The structure of reaching farmers from research is occupied by agricultural offices from ministry of agricultural to kebele levels. For researchers it is difficult to establish direct linkage with farmers because of the government structures. If a researcher needs to work with farmers, the researcher has to get permission from agricultural offices to reach farmers through development agents otherwise farmers do not give any information for the researchers. The government fear that somebody probably the opposition party by the name of researchers can give wrong information to farmers. The mandate of working with farmers directly is given to agricultural offices including the extension activities in the country.

Extension agents disseminate the technology to farmers for implementation. The mandate of research is technology development. Researchers are not expected to introduce the technology developed to farmers' farm. Researchers spend their time, energy, knowledge and skills on new technology development. This approach is the linear model of technology dissemination which is the research-extension-farmers model. This model creates gap between farmers and researchers to form direct linkage since extension system is working between the two stakeholders. This type of model

does not involve farmers in the research process starting from problem identification to result evaluation to learn from the research process.

5.5.2.2. Pluralistic activities of extension workers

Extension workers in the country are engaged in different extension and non-extension activities. Extension workers are busy throughout the year since they are given assignments form different government bodies from different sectors for different purposes. Humnaanbuli is an extension worker in one of the study areas. He has worked for the last 13years as extension agent. He is not happy with his work since the payment he gets and the load of his extension work is not proportional. He mentioned several times that being an extension worker is being an instrument for government cadres to implement different routine extension and non-extension activities. He described his experiences of working as an extension agent as follows:

> *"I am busy throughout the year both for extension and non-extension activities. I am given different assignments from Woreda agricultural office to disseminate new agricultural technologies like selected seeds, fertilizers, animal feeds and breeds. I am also given the assignment to collect tax from farmers. Moreover, the Woreda political office gives the assignment to organize farmers in to different groups. Teaching politics as government cadre is another assignment. I am extremely busy especially when election comes. Most of the time non-extension activities take lots of my time. Then how can I properly disseminate the new agricultural technologies to farmers from the research to bring agricultural research impact on the lives of poor farmers? I do not even have sufficient time to spend with my family."*

Extension workers are given assignments from the government besides technology dissemination to farmers for implementation. Extension workers are busy with government assignment and they do not have sufficient time to properly identify farmers' problems for researchers. There is high attention diffusion on the parts of extension workers since they are engaged in extension and non-extension activities. Moreover, extension workers get lower payment and incentives. These discourage extension workers from putting their maximum efforts to properly work with research.

5.5.2.3. Weak linkage between researchers and extension workers

The relationship between researchers and extension workers is not strong. There is rough relationship between them. The problems emanate from different sources. One of the basic causes for the weak relationship between researchers and extension workers is that researchers undermine extension workers for their academic status. Moreover, researchers do not pay attractive incentives for extension workers when extension agents help researchers for the work which is not extension workers obligations. Busha is an extension agent working in one of the Weredas. He has worked for many years as an extension worker with researchers and describes his experiences as follows:

> *"Researchers do not have good attitude for extension workers. They undermine us since the academic status of extension workers is not as researchers. Most of the extension workers have below BSC whereas most of the researchers have MSc and PhD. Because of their academic status, researchers look as their servant which is not the fact. Everything has its own place and value. Extension workers are also important for the development of the country. Do you think that our country needs only researches that are spending most of their time talking things in theories in offices and laboratories? Is it Professor Ejeta Gabisa who disseminated drought resistant sorghum varieties though out African villages? The professor developed these excellent crop varieties in laboratory and checked its adaption under field conditions for its adaption. It is the extension workers who worked miracles on the dissemination of the new technology through our Africa to feed the population. Even researchers do not pay proper payment when extension workers help in site and farmers selection out of their time and obligations."*

From the above quote it is possible to understand that there is a weak and rough relationship between researchers and extension workers. Extension workers do not get proper incentive from researchers and government and this limits the linkage between extension workers and researchers. Since extension workers are engaged in different activities given from the government and they do not get proper payment and incentives from researchers, extension workers give false data to researchers which result in wrong conclusion of the research results. This deteriorates the relationship between researchers and extension workers.

5.5.2.4. Weak linkage between farmers and extension workers

Because of the nature of the work of extension workers, farmers do not trust them since extension workers are involved in non-extension activities like tax collection. Ragasa is an extension worker in one of the regions. He has been working as extension worker for many years. From his opinion I observed that farmers do not want to see extension workers since they are involved in tax collection for the government. Since farmers are poor they do not like to pay tax. He described the situations which created gap between extension workers and farmers as follows.

> *"Extension workers do not have good relationship with farmers since we are engaged in activities which farmers do not like. Farmers do not like to see anyone who asks them about tax and meeting. Extension workers are given the assignment to implement government policy like teaching politics. Farmers do not have interest and time to attend several meetings. Besides organizing farmers in to different groups for political affairs, extension workers engage themselves in dissemination of agricultural technologies. For extension workers, nowadays, it is becoming challenging to convince farmers about the importance of the new technologies to improve their lives. The problem emanates because of extension workers engagement in extension and non-extension activities. This has created a problem*

between farmers and extension workers and has created a big gap between them and hence resulted in weak linkage between them."

The above paragraph indicates that there is a weak linkage between farmers and extension workers and there is a big distrust between them. Extension workers are involved in political activities and collection of taxes from farmers besides technology dissemination. Farmers are poor and do not like somebody who asks them about tax collection. Farmers think that these extension people are agents of the government for tax collection by the name of technology dissemination. This creates gap between them.

5.5.2.5. Weak linkage between extension workers and the government

The relationship between the government and extension workers is weak. The government use extension workers to implement its policy. Extension workers do not get sufficient salary. Extension workers are assigned to the lower administrative levels in which they cannot get access to modern technologies. Moreover, extension workers do not get incentives from the government. Lalise is an extension worker in the study area for the last ten years. She has seven family members. The salary she gets from the government is not sufficient to support her family. Her work load is not proportional to her salary. She spends most of her time in the village teaching farmers about new technology use, government policies and directions. From her opinion it is easy to understand that the government is using her to implement its rural development policies without improving the lives of extension workers. She is not happy with her profession since she gets low payment. She described the case as follows:

"Extension workers spend most of their time in the village to implement government policies. For the government extension workers are doing routine activities. Extension workers are trying to improve the lives of poor farmers through disseminating new technologies. Even though extension workers are spending most of their time to improve the lives of poor farmers the government is not working to improve the lives of extension workers. My salary is not sufficient to support my family. Extension workers are trying to work other works to support their family. The government cadres do not have good attitude for extension workers. Government cadres think that extension workers are supporting opposition parties since they are not satisfied with their work and payment. These matters have created gap and mistrust between them."

The above paragraph shows that there is a weak linkage between the government and extension workers in the country. These problems are aroused from lack of extension workers satisfaction from their salary payment and the suspect that the government has on extension workers in a sense that they are supporters of opposition parties and they can use farmers against the government for opposing party purposes.

5.5.3. Problems of integrity among the different stakeholders

Integrity and common vision is one of the factors which affect the mentality of the different stakeholders to work towards a common goal to bring national food security in the country. Factors related to these issues are discussed as follows.

5.5.3.1. Lack of coordination between research and agricultural offices

Coordination and communication for effective and efficient use of resources to bring development among the different stakeholders in the country is weak. Even there is a big problem among the different institutes and offices that are working on similar sectors. Agricultural research institutes and agricultural bureaus are different bodies working to bring food security. But there is a rough and weak relationship between these two bodies. The two bodies lack strong coordination to work together to make the country food self-sufficient. Ejeta is a researcher in one of the research institutes. He has worked at different positions at different research institutes. From his explanation, I observed that he has a longing to bring food security in the country. As an obstacle to his desire, lack of good coordination and communication among the different stakeholders in the country is the critical factors among many. He gave an example taking the problems among research institutes and agricultural offices as follows regarding the working relationship between the institutes and the offices.

> *"The working relationship between research institutes and agricultural offices is not good and attractive to work together towards a common goal to bring food security. There is complexity among the two offices. People who are working in research are more educated than the people who are working in the agricultural offices. But people who are working in agricultural offices are politician and have more political power than researchers. Most of the researchers are not politicians and they do not have the interest to be accountable for these politicians. So there are complexity in terms of academic status and political power. When the research asks agricultural office for support they do not give positive responses. When the research calls them for meeting they do not often come to share our vision. This lack of coordination has created a gap between research and agricultural offices."*

Ejeta's explanation shows that there is a weak linkage and coordination between research and agricultural office. There is a difference in political attitude between researchers and agricultural officers. Agricultural officers are politicians and do have political power on researchers. Researchers are educated people and are not as such responsive to politics and politicians. There is complexity in their political and academic status among researchers and agricultural officers. Since extension workers are responsible and accountable to agricultural offices, the chance of getting extension workers for researchers depends on the relationship between research and agricultural offices. These create gap between researchers and agricultural officers.

5.5.3.2. Lack of common vision among the different stakeholders

Lack of common vision for the development of the country to alleviate problems of the society is one of the major problems in the country. The way the government see at things to bring development cannot be accepted positively by researchers and other stakeholders. The government has the ambition to bring national food security as soon as possible but researchers prioritise research for publications to get promotion which is not relevant to farmers need and has less relevance in bringing food security. Even university researchers and research institutes researchers do not have shared vision for national food security. University researchers think that conducting routing research activities is the work of research institutes'. Researchers in the university think that their work is teaching with minimum contribution in research. For research institutes, university researchers are the cause for lack of well skilled researchers since these people are teaching without conducting research. University researchers themselves do not have good skills in conducting research and they are producing graduates who do not have skills, commitment, responsibility and concern for the society. This lack of common vision among researchers and other stakeholders including politicians is because of lack of concern for the society to help them in improving their life.

5.5.3.3. Lack of willingness to learn from one another

To bring change on the lives of the society, there should be the willingness and readiness among researchers and other stakeholders' to learn from each other. Naafsii is a senior researcher. He has worked at different positions. He has worked as a manager for many years at different centres. For him one of the problems among the educated people is lack of readiness and willingness to learn from each other to bring positive impact as educated people. He stated his observation as a researcher on this issue as follows:

> *"There is a big problem among the educated people to learn from each other. There is a big complexity among the senior and junior researchers to learn from each other. Senior researchers do not have the interest and willingness to hear to junior researchers ideas. Senior researchers think that senior researchers have to be respected both for their age and academic status. But junior researchers think that seniority is a matter of age. Someone can hold a PhD over time and no need to give due attention of age and academic status. For junior researchers seniority should be seen from the angle of research results achievements which is relevant to beneficiaries need. Junior researchers argue that there are little or no experiences that are learned from senior researchers. senior researchers need to lead junior researchers as a boss because of their seniority but junior researchers complain that to be a leader, appointment should be merit based and a leader should be some who has a willingness and readiness to learn from his colleagues. But senior researchers are not ready to learn from others and as a result junior researchers do not have the readiness to learn from senior researchers."*

The above conclusion shows that there is a problem among researchers to learn from each other. Junior researchers do not have the interest and willingness to learn from experienced researchers. Senior researchers do not have the willingness and culture to share experience and information for junior researchers. There is complexity among senior and junior researchers. This gap creates gap between researchers and farmers since researchers lack practical experience, commitment and responsibility to work with farmers.

5.5.3.4. Lack of institutionalized body for coordination

There is no strong institution which coordinates the different stakeholders to have common vision for the development of the country. Because of lack coordinating institution, there is duplication of research and wastage of resources which is scarce to help the society. Research institutes, universities and agricultural offices are accountable to different bodies and it is difficult to get even support from each other. The Ethiopia agricultural research institute is not strong since it is full of junior researchers. Senior researchers have left the institutions for the search of better payment and working environments. Universities have potential experienced researchers to conduct demand driven research to bring research impact on the lives of the society. The majority of people who are teaching in universities are from research institutes. They left research institutes and join universities for the search of better working environment, payment and easy life. Still because of lack of sufficient resources, incentives and commitment, these experienced researchers who come from research institutes are not conducting demand driven research for the society.

5.5.4. Government policy

Government policy can affect the linkage between the different stakeholders working for the common goal. Factors related to this affecting linkage are elaborated here.

5.5.4.1. Lack of attention for research from the government

The contribution of research in the development of the country in the eye of the government is little. This is due to lack of research impact on the lives of the society. Most of the time research results or findings are shelved and has not reached the beneficiaries of the technology. For the government researchers are not even working in collaboration with the government and hence there is rough relationship between the government and researchers. The roughness between the government and researchers arises from different resources. People who are working in the government structure as politicians are less educated than researchers but they do have more political power than researchers and are more influential in policy formulation and governance. Researchers are more educated than most of the politicians in the government structures but have little places in influencing the policy directions in the development of the country. Mulata is a researcher in one of the research institutes in the study area. For him one of the problems which cause weak linkage between the different

stakeholders is lack of attention from the government for research. According to his views, lack of research impact in the country on the lives of the society is the basic reason besides resources limitation to reach millions of farmers who need food security. He mentioned his views on the issue as follows:

> *"I think research agendas are located in the last priority in the government development agenda's. You do not hear from the government when they talk about research. If they talk it is about the research results produced somewhere in the word outside Ethiopia. There is no sufficient budget for research. Researchers are not considered as development partners. I think the government is not happy with the research. Most of the time government cadres talk about the impact of research which is not as such achieved, in fact because of a number of factors. The government says the impact of research in the lives of the society is insignificant. For the government researchers are working their own business. Few researchers are conducting demand driven research relevant to farmers need. Farmers are in poverty trap. Researchers are not often committed, concerned and responsive to alleviate farmers' problems. Most of the researchers are not self-initiated. They talk mostly about government failures and lack of incentive. I guess that lack of attention from the government on research is because of lack of positive research impact on the lives of the society."*

The government does not see research as problem solving and technology generating institutions to bring development. There is no sufficient budget allocation for research. Lack of sufficient budget and incentive result in high staff turnover in research institutions. Policy makers do not recognize the problems related to human resources in research since these policy makers do not have experiences in research and consider that if one researcher leaves another researcher will come to work in place of the researcher who left the work. But it is difficult to replace the place of one researcher by another new inexperienced researcher which results in failure of the research. Less attention from the government for research is related to the impact of research findings on the lives of the society. In the country the impact of research on the society is insignificant and the government has not seen the impact in the development of country.

There is no control from the government on researchers to conduct demand driven research. In universities even the time allocated for research is not sufficient to conduct research. Universities researchers spend 25% of their time on research and 75% on teaching. This shows that due attention is not given on research in universities.

5.5.4.2. Lack of culture to use research results for policy formulation

There is a problem of using research results to solve the problem of the country. Policy makers and government advisors do not give due attention to the importance of research results which is developed in the country. Government advisors mostly use research results which are obtained from developed countries that are produced in

different context and have less relevance for Ethiopian problems. Gabre is an extensionist. He has been working for many years at different positions. From his opinion, I observed that one of the problems for the cause of weak linkage between the different stakeholders is lack of culture to use research results developed under Ethiopian context for policy formulation that is suitable for Ethiopian context. He described the case as follows:

> *"The country does not have the culture of using research results to improve the problems of the country. Even the government is not using research results to address problems of the society. It rather needs research results of the western world, India and china. Research results produced in the country are not used by the government and are shelved. Government advisors do not tell the weakness and problems identified by the research to policy makers to solve the problems. The government also does not want to hear the problems and weakness in the country. Policy makers do not use or at least consider recommendations given by researchers to improve the lives of the society. This emanates from lack of culture to use research results for policy formulations that alleviate problems of the society."*

One can understand from the above paragraph that government advisors do not use research results for developing development strategies and policy. Advisors use research results which come from abroad and do not have the culture of using results which is developed in the country. Government advisors do not trust the result of research and give due attention on results which are developed in the western for policy formulations. Advisors do not tell to the government the problems of the society based on the research findings. Government advisors need to hear from researchers only positive research results and need to give to the government positive issues about the society which leads to wrong conclusions about the development status of the society. Government advisors do not have forum for sharing experiences with researchers to discuss on what are the problems of the society and on the prioritization of the problems for the government to take action. Research findings can fill this gap but advisors are not using these results. Research institutions also do not have the culture to give the research results to government or government advisors. There is a big gap between researchers and government in sharing information. The government bodies do not have the culture to read research publications to give proper solutions for the identified problems through research recommendations for the society.

5.5.4.3. Lack of continuity in government policy directions

The government tries every possible opportunity to bring development in the country to improve the lives of the society through national food security. To witness the development in different areas, the government is changing policies and strategies by adopting good experiences from both developed and developing countries that have similar context to Ethiopia. Dinka is a social science researcher who mostly conducts on socio-economic areas in the country. From his explanation, I observed that one of the

problems in the country that is creating gap between the government, researchers and farmers is change of development policies, and strategies over time without evaluating the previous policies with the concerned stakeholders who are engaged in the development of the country. He described his observation as follows:

> *"The government is changing development policies and strategies from time to time. In fact the aim of the government is to bring development in all sectors through the use of effective and efficient development policies and strategies by adopting or adapting to our condition. But the changes does not participate the different stakeholders on why it is changed. Mostly the top politicians know why it is important to change policies from time to time without evaluating the pervious policies. For researchers it is confusing that they do not know on which government development directions they have to track forward towards a common goal. Since the development polices and strategies are changing continuously from time to time, it is discouraging for researchers to change the direction of their research areas from time to time to go in accordance with the government directions to get fund from their research project proposals."*

The above idea is a commonly shared idea among the interviewed researchers and gives an indication that the government changes development policy and strategy directions from time to time. Research agendas change over time without evaluating the progress of the previous research agendas. There is no evaluation why some research fails. Research agendas are like campaigns. Politicians bring new research agendas and stop what is already started. If some problems happen while the research is on progress, it brings new structure, directions and changes in topics and agendas of research. This changes of research agendas and directions results in changes of extension systems in the country several times and results in confusion among the different stakeholders on the directions of the research and extension systems.

The government changes research policy and strategy directions with the assumption that changing policy and strategies bring change in development in the country. The problem is that these change of strategies and policies are not based on research and evaluation of the process and results. The confusion created among the different stakeholders on change of strategies and policies reduced the confidence of researchers and extension workers with farmers.

5.5.4.4. Problems of originality, Plagiarism, and patent rights

The laws protecting plagiarism and copy right in the country is weak. Researchers do not get the benefit from their research findings. This discourages researchers' initiation to work on demand driven research to bring national food security.

5.5.4.5. Communication barrier

The language that researchers use is not the one that farmers are using. Researchers are not often using the local languages that farmers are using in their daily practices. Researchers use English for proposal writing, and for writing of the research results. Farmers cannot use this language in their life. For farmers, it is difficult to understand what is written on the technologies. It is difficult to use the recommendations of the technologies under their field conditions because of the language problems. Even researchers try to use English on awareness creation or on research trainings which farmers could not understand. This creates gap in communication and creates problems in establishing linkage between farmers and researchers.

5.6. Farmers' characteristics affecting linkage

Farmers' characteristics highly affect the linkage between farmers and researchers in establishing strong partnership for effective collaboration. The limiting factors affecting farmers' participation in research are discussed below.

5.6.1. Attitude of farmers for researchers

Farmers do have agricultural experiences which they have inherited from their families. They have their own local knowledge to solve their own problems. They evaluate everything in relation to practical applicability. Kumala is a farmer in one of the study areas. He knows about farm works since his childhood. He attended his school up to grade 10 before 17 years. He has been working with researchers for many years since he has a land near the town which is fertile and suitable to give good yield. Mostly researchers have been using his land and he has been involved in daily labourer for the research. Since he has worked for many years with researchers, he has his own observation on researchers and described his attitude for researchers as follows:

> *"Researchers come to the site to visit what we are doing. When they come to the site they talk a number of things in theories. They do not need to touch soil. They do not like to eat and drink with us. They undermine our knowledge and they do not need to hear anything from us. They stay only for a few minutes and go to the cities and town for enjoyment. They are white-collars. They employ someone who shows us how to sow seeds, apply fertilizers and other activities. They do not show us anything in practice. They are theory people."*

The above quote shows that farmers perceive researchers as people who talk things in theory without demonstrating things in practice. Farmers evaluate researchers skill based on their long term experiences inherited from their fathers and grandfathers over centuries. For farmers, researchers are white collars who do need to touch soil, teachers who talk mostly things in theory, and people who ignore farmers' knowledge and have less interest to hear farmers' ideas. Farmers look researchers as bosses and fear them to work with them. Farmers perceive researchers as educated people and see them as a higher class. Researchers are not working with farmers in friendly manner. For farmers,

researchers are working their own business and selling the results of their research which they collect from farmers. These attitudes create gap between farmers and researchers to establish proper linkage to bring national food security.

5.6.2. Farmers' attitude for research

Farmers are adapted to the traditional way of farming and rearing of animals which they have learnt from their ancestors. Research activities in agriculture are the western way of farm practice which farmers look as a difficult. Research is a special activity which is done by educated people from farmers views. Joono is a farmer in the study area. For him research is a complex process which is difficult for a layman to work with researchers. He describes his attitude for research as follows:

> *"I have been using the traditional way of farming which I learnt from my father's in the past. I did not go to school. I am a layman. I do not know anything about the modern science which is obtained from schools. My father was a farmer and did not go to school too. Participating in research is difficult for me since I do not know and understand what researchers are saying. Research is a complex process beyond my knowledge and capacity. The educated people can do it without problems. Researchers say you have to weed many times which is two or three times the traditional weeding practices. They say you have to sow crops in rows which are difficult for some seeds to sow in rows. Working in research is a challenging work since researchers themselves even say do this and that which is irritating."*

It is possible to understand from Joono's explanation that farmers look research as a complex process and think that working in research is beyond their capacity since they did not attend university and do not have university degree as researchers. Farmers think that they cannot contribute anything to research since they do not know about scientific knowledge and they do not have western mentality. Farmers perceive that to conduct research somebody should have university degree. This attitude is developed because of the working habit and culture of the educated people since the educated people are seen as solution providers to farmers.

5.6.3. Bad experiences of farmers in the past

Farmers do have their own experiences in relation to research in the past. Farmers know about new technologies produced in research before many years even though they have not used the agricultural technologies in a proper way because of the bad experiences they encountered before. Chimdessa is a rich farmer in the study area. He was involved in research and was using the agricultural technologies for many years. He has a bad experience in the use of agricultural technologies developed from research. He described his encounter as follows:

> *"I was using agricultural technologies developed in research before many years. Extension workers came to me to tell about the availability of new agricultural*

technologies like selected seeds and animal breeds for implementation. They told me several times that these selected seeds and animal breeds give good return at the end of the cropping and breeding seasons. Once upon a time I decided to use the modern technologies to improve my live. I sold my oxen to buy the new technologies. I used maize hybrid and it was failed. I got no harvest in that year. I was suffered since I used most of my land for the maize hybrid and I could not get sufficient harvest to feed my family. The crop was failed because of lack of rain and disease incidence in that year. The research was promised to give me money if it fails but I did not get anything after the failure of the crop. The research did not keep his words and they break it. After that encounter I am not using these new technologies especially when it comes first. This is my bad experiences in working with research."

Farmers have experienced bad experiences in the past. Researchers go to farmers and give false promises which they could not do. Technologies fail under farmers' field and they have not obtained what they expected from the technologies. Researchers tell farmers that they can get more benefits from using the new technologies. Farmers sell what they have to buy the technologies. After buying the technology, it either fails or gives less result than the one which they used before. Inappropriate technologies are also given to farmers for adoption. These technologies which are not appropriate to the given agro ecological zones fail and farmers conclude that new technologies are not working under their farm condition. This emanates from lack of considering the local problems before the introduction of the new technologies. Failures of technologies have risk on farmers live and they fear risk since there is no insurance for the failure of the technology. Because of the failure of technologies and fear of risk, farmers need to adhere to the practice that they have used for many years. Farmers know from their experiences the type of technologies which suits to their conditions. This creates gap between researchers and farmers in establishing linkage.

5.6.4. Lack of sufficient time

Farmers engage themselves in different activities. They spend their time on agricultural routine activities, social affairs and family matters. Kululi is a socially active farmer. From his views, he does not have sufficient time to engage himself in research activities since he is engaged in different activities to support his family besides social affairs. He stated his views on time allocation for the different activities in his daily live as follows:

"I have eight family members. Three of my sons and two daughters are students. The rest of the family are children. I am engaged in different agricultural activities to support my family. It is me who is cultivating the land, weed crops, and keep animals, harvest crops and other agricultural activities. I am also expected to involve in social affairs like idir, mahiber, izen etc. in the community. There are also different government meetings which I should attend when the government cadres call us for meeting. Funeral and wedding ceremonies are also the basic activity in the community which I must participate. Since I am poor, I am forced to engage

myself in different agricultural and non-agricultural activities to support my family life. Because of these activities, I do not have time to engage myself in research."

Since farmers in the country are poor, they are engaged in different agricultural and non-agricultural activities to support their live. Ethiopian farmers are socially active and spend their time on social affair and daily routine activities. Because of these routine activities, farmers do not have sufficient time to engage themselves in research. This create gap between farmers and researchers to establish strong linkage.

5.6.5. Farmers expectation

Farmers expect monetary aid from NGOs and government for technology subsides since they do not afford the cost of the technologies. Farmers also expect positive returns from the use of the technology. They do not need to see failure in their farm since they do not have other opportunities to support their life if they lose the on-season for their crop production and rearing of animals. Farmers also expect coffee, sugar, and other type of payments and incentives from researchers when they fill questionnaires. Non-fulfilment of the expectation creates gap between farmers and researchers to form linkage

5.7. Stakeholders' benefits affecting linkage

Both farmers and researchers are engaged in research to get different types of benefits from the research project. Lack of benefit from the research results in weak and loose linkage between them. These factors related to benefits are discussed in this subsection.

5.7.1. Problems of changing technologies to materials wealth

Beneficiaries of the new technology need the material benefit in terms of money or other materials which can bring change on the life of the users including researchers. Naahil is an extension worker. For him, one of the biggest problems which hindered the linkage between researchers and stakeholders is limitation of changing the new technologies in to material wealth including money. The people for whom the technologies are intending for are not getting material benefit from the technology developed in research. He described the limitation of changing technology to money in the following manner:

"The results of the research are not bringing change on the lives of the end users. New technologies developed in the research are shelved. Even those technologies which have reached the end users have not brought material wealth. Some of the technologies fail under farmers' field or give lower yield than the local varieties or breeds. Or because of the problem of market, farmers do not get good and satisfactory return from the new technology on which they have spent their time, labour and money. Farmers need benefit from their efforts. Researchers also need benefit but they are not getting material wealth from the efforts and the technologies are left on shelf. Researchers are not conducting research which brings material wealth in terms of money with in short time of period."

It is possible to understand from the above quote that researchers spend their time on developing ideas than developing technologies which is practically visible to users. Researchers spend most of their time on discussing theories than doing practical things under field conditions for beneficiaries. Researchers do not change the result of technologies to materials which give material benefit in terms of money for users. The societies need material benefits from technologies developed by research. This shows that the research findings are not technologies which bring material wealth for farmers. Since farmers are not getting material wealth from research results, they do not have the interest to work with researchers in the research process. Researchers try to adopt new technologies without considering farmers conditions. This is due to lack of research on the new technology on how to adopt to farmers conditions. This resulted in bringing insignificant impact on the lives of farmers.

5.7.2. Lack of good rewarding system for researchers

The rewarding system in the country for researchers who have showed good performance in alleviating farmers' problems is weak and not encouraging. This discourages researchers who have the calibre and interest to work demand driven research that brings impact on the lives of the society. There is no difference in payment and promotion between a researcher who conducts a research relevant to farmers need by involving them in the research process and a researcher who conduct research for publications only for his own advantages. Saka is a researcher in the study area. For him one of the biggest problems which have created weak linkage between researchers and farmers is lack of good rewarding systems. He described his observations as follows:

> *"The rewarding system in the country is weak. The system does not differentiate researchers who have devoted their time and energy on research that can solve farmers' problems from those researchers who are working only to get salary. To bring change in the lives of farmers the government should establish a good rewarding system which can encourage researchers who are conducting demand driven research and discourage and divorce researchers who are not conducting demand driven research to solve farmers' problems. If there is a good rewarding system, differences among researchers are created and demand driven research that is relevant to farmers need is conducted. It also creates competition among researchers and helps to develop competent and strong researchers"*

The above quote shows that there is a weak rewarding system and this idea is the commonly shared idea among researches that have the interest to conduct demand driven research. The rewarding system for researchers who show outstanding performance from the government is weak and discouraging. There is no competition among researchers to conduct demand driven and outstanding research. This is because of lack of good rewarding system which isolates committed researchers from uncommitted researchers for the society. Researchers who work for the society and has brought impact on the lives of the society do not get something encouraging in the form

of incentives, rewards, recognitions and other benefits which encourage the outstanding researchers to continue their research in a better way and initiate other researchers to conduct demand driven research which brings societal and scientific impact and creates competition among researchers to work in a better way. There is no strong policy which encourages strong researchers and discourages weak, uncommitted and unconcerned researchers and divorces them from the research work.

A few researchers are working with farmers by engaging them in research activities even though it is not rewarding. Working with farmers is a resource demanding. It needs time, money, energy, patience, concern, and commitment since working with farmers is being in the villages for days in areas where there is no access to electricity, things which are available in towns and cities and walking on foot long distance. On the top of the above mentioned problems, to get research results it can take many years and even can lead to failure since farmers may not accept the research findings or it may fail because of the unforeseen natural conditions like drought, heavy rain, floods etc. Wagri is one of the researchers who are working in the study areas. From his opinion one can understand that he has been working with farmers for the welfare of the society through conducting demand driven research by engaging them in the research process. He described that working with farmers is not rewarding even though it gives mental satisfaction since they can learn how to solve their own problems in sustainable manner in their lives in the future. He stated his opinion as follows:

> *"Working with farmers is laborious and not rewarding. You have to go on foot many kilometres. You have to take time to convince farmers what you are going work. You have to eat, drink and share their social lives. There are problems of getting materials which you get from towns. There are no hotels in the village. The research may even end up with nothing at the end of the day because of several reasons like bad weather conditions, heavy rain, floods, drought which are out of the researchers' control. Or farmers may not accept the new technology since the taste and preference of farmers may not match with the research result. Even if farmers accept the technology and the weather conditions are good, the benefits that the researchers get is by far less than the sweat that the researchers spend in the villages to get the results. Working in laboratory or desk research is more rewarding than working with farmers."*

Working with farmers can bring solutions for farmers' problems but not rewarding for researchers. Researchers do not get proportional benefits from working with farmers. Because of this, researchers do not have the interest to work with farmers which can solve farmers' problems. There is no attention from the government to reward researchers who work with farmers. Lack of reward discourages researchers from conducting demand driven research. This also reduces researchers' commitment in helping the society. Since researchers are not getting incentives, they conduct research which improves their life.

Researchers are among the government workers who are getting lower payment. This is related to the economic development of the country to pay attractive and satisfactory payment to conduct demand driven research to alleviate poverty. Mulata is a lecturer and researcher in one of the universities in my study areas. Before he joined the university, he worked for many years in different researcher centres. He joined the university to get better payment and life. Even though doing research is for the welfare of the society, it is not rewarding for the researcher since the researcher himself needs better life and payment. He stated the case as follows:

> *"I have a big doubt whether a researcher is conducting research to improve his life or the life of others. Do you think that a hungry person begs for others? As a member of the society, researchers get low payment which cannot sufficiently support the life of their family. The salary of a government cadre or politician having a BSc degree is greater than a researcher having PhD degree. Researchers are trying to conduct research first to improve their life than the mass of uneducated farmers. Are they doing wrong in this aspect? I do not think so. Everybody needs better life for him first and start thinking and working for others. Everybody first thinks for himself. This is because of our poverty."*

The above quote leads to the analysis that shows researchers are among the people who are living in lower standards. Low payment and standard of living force researchers to conduct research on areas requiring less effort and resources for publications. Researchers are trying to solve their own problems first and give less attention to farmers' problems. Researchers' philosophy of working to improve their live and status created gap between researchers and farmers since researchers are not often working to improve the lives of famers. To improve their life, researchers mostly conduct research which has the potential for publication since promotion is publication based.

In universities: assistant, associate and full professorship is based on a number of research publications. The promotion does not look for the impact that the research has brought on the lives of the beneficiaries. Researchers do not select the topic that takes long time to complete the research process and they do not look whether the research is demand driven or not since their objective is publication for promotion. The government does not look at the publication during the promotion whether it has relevance to the need of the society or not. Hirpa is a researcher in one of the research institutes. He described the situation of research in universities since he was working as a lecturer before he left the university and returned back to his previous home to the research institute in the country. His opinion is described as follows:

> *"I do not think researchers in universities are working for the welfare of the society. They are conducting research to improve their status and live. They mostly conduct research for publication since their promotion is based on the number of publications. The promotion does not look at the impact of research on the beneficiaries. University researchers prefer to work in towns and they do not like to*

> *go to villages. They would like to live easy and enjoyable life in cities. I do not think they understand the problems of the society. Most of the researchers in the university have spent most of their time in schools and started working in universities upon completion of their studies. They do not need to go where there is no access to hotels, roads, electricity and access to modern technologies. Because of these reasons they conduct research which is irrelevant to farmers need. Mostly they focus on topics which have the potential for publications within short time of period demand less resources such as money, labour, and energy."*

The above paragraph shows that research in universities is meant for publication which brings promotion and change on the lives of the researcher than beneficiaries.

Discussions

The researching findings show that low agricultural productivity in the country is one the major problems to bring national food security to feed the society. The major causes according to the research findings for low agricultural productivity is related to lack of strong linkage between researchers and famers, low adoption of agricultural innovations by farmers, the use of traditional farming practices, and poor access to market. According to the findings of Abate and his colleagues (Abate, Shiferaw et al. 2011) the above factors are critical in bringing national food security. Wigboldus and his colleages findings strengthen the results of the findings (Wigboldus, Seerp, et al., 2011).

From the findings, agricultural innovation in Ethiopia is weak and slow in adoption and has resulted in low production and productivity. This has created food insecurity in the country. Lack of effective and strong linkage between the different stakeholders especially between farmers and researchers has been the major reasons for the low yield and productivity in Ethiopian agriculture. This weak linkage has created in fragmentation of knowledge. The technology created by researchers are not well exchanged or transferred to the different stakeholders in agriculture (Belay 2008; Wigboldus, Seerp, et al., 2011; IFAD, 2009; Spielman, Davis et al. 2011).

Belay (2008) argues that the linkage between farmers and researches in the country is weak. Researchers are not conducting demand driven research to alleviate farmers' problems to give practical solutions to farmers at the grassroots levels to contribute their input in the development of agricultural sector. The findings show that researchers are conducting research that addresses the topics of researchers' personal interest for publication which has less relevance to the needs of the majority of farmers. Moreover, the findings indicate that the interaction and collaboration of researchers and farmers in Ethiopia is weak and affected by a numbers of factors. According to the research, these linkage limiting factors in the country include lack of incentives and attractive salaries for both farmers and researchers that enhance the collaboration of researchers with farmers, lack of common vision in agricultural development, low level of linkage established between farmers and researchers, legislatives and policy environment, information flows between researchers and farmers, political instability in the country,

not merit based employment and position appointment, hierarchal approach between the actors, not well-developed capital, difference between farmers indigenous knowledge and researchers formal scientific knowledge, social status, cultural differences which exclude farmers from working with the educated researchers, intellectual property rights, professional status that affect the relationship of the actors, political interferences and ideological difference among the actors in the country. Many findings in many countries show that linkage are affected by the these factors (Klerkx et al., 2012; Belay 2008)

From the study, one of the problems which hindered strong linkage between farmers and researchers in Ethiopia is the use of the linear process of technology development and dissemination which is ineffective. Different evidences indicate that the conventional institutional view to researchers has been looking as a source of new knowledge and transferring the knowledge to farmers separately through extensions. This linear model separate farmers from researchers creating gap between them (Klerkx and Leeuwis 2009; Hall, Bockett et al. 2001;Hall, Rasheed Sulaiman et al. 2003).

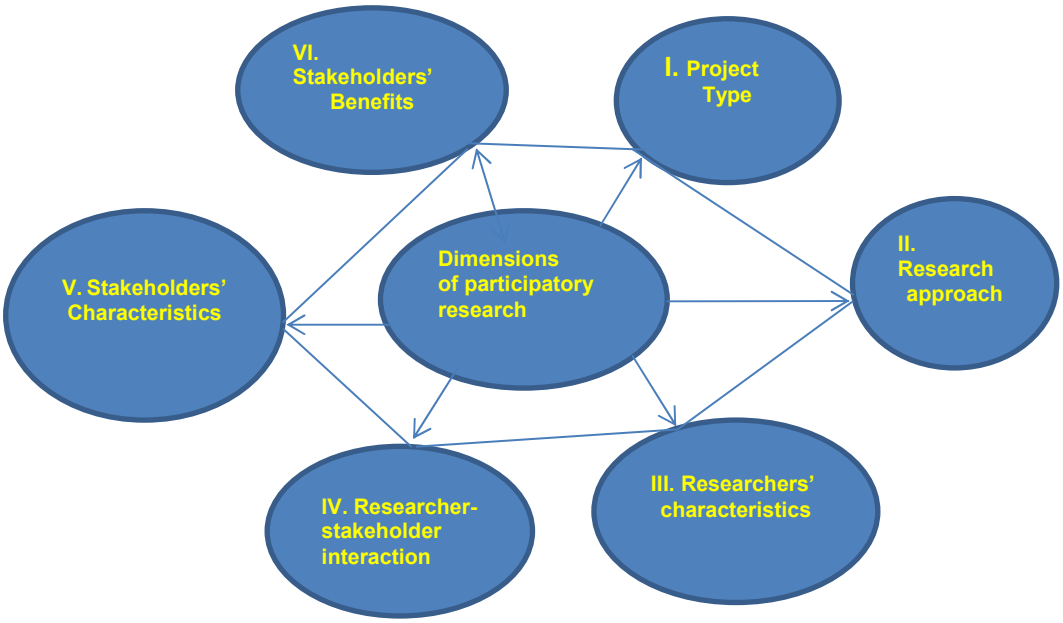
Agricultural innovation system in Ethiopia lacks proper linkage among the different interrelated parts in the system to bring national food security. Ethiopian researchers do have ineffective linkage with farmers for proper collaboration to exchange knowledge and learning and innovation. The findings also show that the gap between researchers and farmers is wide and resulted in national food insecurity in the country. Moreover, agricultural research is weak and ineffective and has brought little benefits for the poor people who are living in the marginalized rural areas of Ethiopia. Research in Ethiopia is characterized by weak linkage with farmers, irrelevant to farmers need, poor incentives, low level of professional training, high level of fragmentation, high staff turnover, lack of financial independence and poor coordination among the different actors involved in the sector, and lack of willingness to learn from each other resulting poverty and declining per capita food production. Various research results show that agricultural innovation in Ethiopia has similar characteristics like many African countries characterized by the above mentioned research characteristics (Sumberg 2005).

Effective linkage between farmers and researchers is most critical for creating knowledge relevant to farmers and produced when researchers have strong and effective linkage with farmers. This effective linkage of researchers with farmers for collaboration results in utilization and acceptance of knowledge which is intended for farmers (Sumberg 2005). However, Ethiopian agricultural researchers do not have strong linkage with farmers for the creation and utilization of knowledge and skills produced for farmers in research when farmers are involved in the research process.

Partnership as a collaborative relationship between researchers and farmers in Ethiopia is loose and weak. Hierarchal institutional arrangements centralized agricultural research systems which created difficulties to deal with farmers at grassroots levels. Different research results show that partnership is affected by institutional hierarchal

arrangements which exclude or include and determine the role of different actors in the research process (Hall, Bockett et al. 2001;Hall, Rasheed Sulaiman et al. 2003).

The findings show that participation of farmers in research for effective linkage and collaboration is affected by the research system, farmers' characteristics, researchers' characteristics, farmers' - researchers' interactions and the benefits that researchers and farmers get from the partnership in research. According to Neef and Neubert (2011), farmers' participation in agricultural research can be affected by various factors which are interrelated to each other. The authors identified six dimensions of participation which affects collaboration and partnership of researchers and farmers. These dimensions of participation which affect collaboration through participation are researchers' characteristics, farmers' characteristics, researchers' and farmers' interaction, type of research project, research approach, and researchers' and farmers' benefit(Neef and Neubert 2011).



Six dimensions of participatory research taken from A. Neef and D. Neuert (2011)

Chapter-6- Conclusions and Recommendations

6.1. Introduction

In this chapter conclusions drawn from the research and recommendations are given.

6.2. Conclusions

From the research conducted the following conclusions are drawn. The linkage between farmers and researchers in Ethiopia is weak. Agricultural innovation system is not strong to bring national food security in the country. The limiting factors hindering the linkage between farmers and researchers are the research system, characteristics of farmers and researchers, extension system, government policy, and participation. From the research findings, it can be concluded that the research system in the country is weak. The extension systems in the country are weak. The linear model (research-extension-farmer) of technology transfer is mostly used for technology transfer. There is a gap in integration of farmers' knowledge with researchers' knowledge in knowledge production. The research system is not participatory and community based. Researchers mostly conduct research which does not have room for farmers' participation in research processes. Researchers' do not have good attitude and experience about participation to engage farmers in research besides their insignificant impact of research on farmers live. There is a problem of integrity among the different stakeholders to bring national food security. The rewarding system in the country for researchers who show outstanding performance is not rewarding and attractive. The promotion system in universities in the country does not encourage demand driven research since promotion is publication based. Researchers conduct for their publication which helps them for their promotion demanding less effort and resources.

6.3. Recommendations

The research recommendations' hope to inform policy makers and public authorities to solve the problems hindering effective collaboration of researchers with farmers to solve practical problems at grassroots levels. This study also gives suggestions to CASCAPE project to have proper impact on the agricultural innovation in the country.

6.3.1. Giving quality education in higher institutions

The government should emphasis on quality of education in higher education which equips students with practical skills to conduct research. Special attention should be given to graduates who will work as a researcher since it is the research which brings development. The government policy should focus on education which solve problem of the country. The curriculum should give practical skills and sufficient knowledge.

6.3.2. Giving specific recommendations to specific agro ecological zones

Research should be conducted in the context in which the agro ecological zones are found. Specific recommendation should be given for each agro ecological zones.

6.3.3. Involving all stakeholders in research process

Research should involve farmers so that they can learn from the research to solve their own problems in the future in sustainable manner. Farmers should be involved in research starting from problem identifications to evaluation of the technology.

6.3.4. Conducting demand driven research

Researchers should conduct research which is demand driven to solve farmers problem. Researchers should identify farmers' problem properly. To do these researchers should identify problems with farmers at field condition.

6.3.5. Integrity of different stakeholders in the development of the country

Different stakeholders working for the welfare of the society should work in harmony having a common vision.

6.3.6. Willingness of farmers to learn and work with researchers

Farmers should be willing and ready to learn from researchers to use new technologies to improve their live.

6.3.7. There should be proper documentations of research process

Research institutions and universities should have proper method of documenting research process starting from problem identification to the result of the technology.

6.3.8. Valuing research results

The government should give due attention to research and should value research results. They should use research results to bring change and development. Government advisors should tell to the government the weakness based on research results.

6.3.9. Good rewarding system

There should be a good rewarding system for researchers who show outstanding performance in research and bring impact on societies live.

6.3.10.Developing monitoring and evaluation systems

There should be a good system of monitoring and evaluation systems for research process and researchers. There should be strong evaluation system on the research whether it is demand driven or not. Researchers should be divorced if they are not conducting demand driven research for the society.

6.3.11.Strengthening the linkage between research and extension

For proper dissemination of technology, there should be strong linkage between research and extension in the country.

6.3.12. Focusing on indigenous knowledge in the research process

Researchers should give due attention to indigenous knowledge in research process to produce technologies which are applicable to farmers conditions.

6.3.13. Allocation of sufficient resources for research

Research institutes and universities have to allocate sufficient fund for research. Government should give special attention to research during budget allocation for different sectors in the country.

6.3.14.Merit based appointment of leaders in research institution

Government should give due emphasis on leaders appointment in universities and research institutes for proper coordination and initiation of researchers to conduct demand driven research which bring change and development. Leaders' appointment should focus on research calibre and experience rather than political commitment.

6.3.15.Educating farmers

There should be continuous training and education for farmers to work with researchers and to use the technologies developed in proper way.

6.3.16. Establishing strong extension system

There should be strong extension system in the country which link researchers and farmers properly.

6.3.17.Changing the research findings to material wealth

Researchers should develop technologies which can bring material wealth for farmers. There should be development of new technology which has practical application.

6.3.18.Establishing forum for experience sharing for different stakeholders

There should be forum for sharing experiences among the different stakeholders in the country. Junior researchers should get experiences from senior researchers. Experience sharing is important to initiate researchers to conduct demand driven research.

6.3.19.Researchers commitment

Researchers should be committed to bring national food security for the welfare of the society and development of the country.

6.3.20. Donors commitment

International donors should help the country in funding sufficient amount of money for research and capacity building. Developed countries should give priorities for educating Ethiopian young researchers to fill the gap of educated manpower.

References

Abate, T., B. Shiferaw, et al. (2011). "A systems and partnership approach to agricultural research for development: Lessons from Ethiopia." Outlook on Agriculture**40**(3): 213-220.

Anandajayasekeram P and Berhanu Gebremedhin, (2009). *Integrating innovation systems perspective and value chain analysis in agricultural research for development: Implications and challenges.* Improving Productivity and Market Success (IPMS) of Ethiopian Farmers Project Working Paper 16. ILRI (International LivestockResearch Institute), Nairobi, Kenya. 67 pp.

Belay, K. (2008). "Linkage of higher education with agricultural research, extension and development in Ethiopia." Higher Education Policy**21**(2): 275-299.

Belay, K. (2002) 'Constraints to extension work in Ethiopia: the insiders' view', South African Journal of Agricultural Extension 31: 63–79

Belay, K. and D. Abebaw (2004). "Challenges Facing Agricultural Extension Agents: A Case Study from South-western Ethiopia." African Development Review 16(1): 139-168.

Befekadu, D. and N. Berhanu (eds.) (1999/2000), Annual Report on the Ethiopian Economy, Vol. I, The Ethiopian Economic Association, AddisAbaba.
Brooks, S. and M. Loevinsohn (2011). "Shaping agricultural innovation systems responsive to food insecurity and climate change." Natural Resources Forum**35**(3): 185-200.

Hall, A., W. Janssen, E. Pehu, and R. Rajalahti (2006). *Enhancing agricultural innovation: How to go beyond the strenghthening of research systems*. Washington: World Bank.
Hall A, Mytelka L and Oyeyinka B. 2005. *Innovation systems: Implications for agricultural policy and practice.* ILCA Brief 2. ILCA (International Livestock Center for Africa), Addis Ababa, Ethiopia.

Hall, A., G. Bockett, et al. (2001). "Why Research Partnerships Really Matter: Innovation Theory, Institutional Arrangements and Implications for Developing New Technology for the Poor." World Development**29**(5): 783-797.

Hall, A., V. Rasheed Sulaiman, et al. (2003). "From measuring impact to learning institutional lessons: An innovation systems perspective on improving the management of international agricultural research." Agricultural Systems**78**(2): 213-241.

Hekkert, M. P., R. A. A. Suurs, et al. (2007). "Functions of innovation systems: A new approach for analysing technological change." Technological Forecasting and Social Change 74(4): 413-432.

Horton DE. 1990. Assessing the impact of international research: Concepts and challenges. In: Echeverria RG (ed), *Methods for diagnosing research system constraints and assessing theimpact of agricultural research. Vol. II.* ISNAR (International Service for National Agricultural Research), the Hague, the Netherlands.

Hounkonnou, D., D. Kossou, et al. (2012). "An innovation systems approach to institutional change: Smallholder development in West Africa." Agricultural Systems**108**(5): 74-83.

IFAD, 2009. Federal Democratic Republic of Ethiopia Country Programme Evaluation Report No. 2045-ET

L. Klerkx, B. van Mierlo, and C. Leeuwis **(2012).**Evolution of systems approaches to agricultural innovation: Concepts, analysis and interventions. In Elzen, B., M. Barbier, M. Cerf, and J. Grin(Eds.) Stimulating transitions towards sustainable farming systems(pp. 459-485). Dordrecht: Springer, in press.

Klerkx, L., N. Aarts, et al. (2010). "Adaptive management in agricultural innovation systems: The interactions between innovation networks and their environment." Agricultural Systems**103**(6): 390-400.

Klerkx, L. and C. Leeuwis (2009). "Operationalizing Demand-Driven Agricultural Research: Institutional Influences in a Public and Private System of Research Planning in The Netherlands." The Journal of Agricultural Education and Extension**15**(2): 161-175.

MEDaC (Ministry of Economic Development and Cooperation) (1999), Survey of the Ethiopian Economy: Review of Post-Reform Developments,1992/93–1997/98, MEDaC, Addis Ababa.

Neef, A. and D. Neubert (2011). "Stakeholder participation in agricultural research projects: a conceptual framework for reflection and decision-making." Agriculture and Human Values**28**(2): 179-194.

Pender, J. and B. Gebremedhin (2008). "Determinants of Agricultural and Land Management Practices and Impacts on Crop Production and Household Income in the Highlands of Tigray, Ethiopia." Journal of African Economies 17(3): 395-450.

Spielman, D., K. Davis, et al. (2011). "Rural innovation systems and networks: findings from a study of Ethiopian smallholders." Agriculture and Human Values**28**(2): 195-212.

Sumberg, J. (2005). "Systems of innovation theory and the changing architecture of agricultural research in Africa." Food Policy**30**(1): 21-41.

Wigboldus, Seerp and Jan van der Lee (2011). Going for gold in innovation partnerships responsive to food insecurity – the role of knowledge institutes. Vol. 1: Context study. Wageningen UR Centre for Development Innovation. 116 pp.

Wigboldus, Seerp, Jan van der Lee, Gareth Borman, Karen Buchanan and Wouter Leen Hijweege (2011). Going for gold in innovation partnerships responsive to food insecurity – the role of knowledge institutes. Policy paper. Wageningen UR Centre for Development Innovation. 6 pp.

Woodhill et al. (2011). Market Linked Innovation Systems: Opportunities for Strengthening Agricultural Development in Ethiopia. Report for the Netherlands Embassy in Ethiopia, Wageningen UR Centre for Development Innovation and Royal Tropical Institute

World Bank. 2006.*Enhancing Agricultural Innovation: How to Go Beyond the Strengthening of Research Systems?* Agriculture and Rural Development Department. Washington, D.C.: World Bank.

Annex:

Questionnaire guidelines for different stakeholders. The interviews were conducted using the Ethiopian local languages depending upon the study areas interviewee's language.

1. ***For researchers both at agricultural institutes and universities**:*

    a. What is the influence of formal research governance mechanisms (agenda setting, research funding, and researcher incentive schemes)?
    b. What are the perceptions, views, attitudes, values, and expectations of researchers for farmers?
    c. Why do researchers do not conduct research relevant to farmers need to bring research impact on Ethiopian agricultural development?
    d. What are the factors which affect linkage of researchers with farmers?
    e. What are the functions of farmers' collaboration with researchers in research?
    f. What are the characteristics of farmers' which affect collaboration?
    g. How farmers' knowledge does is integrated to the local scientific knowledge?
    h. Do farmers get sufficient payment for their labour and land?
    i. How do researchers select farmers to participate in their research?
    j. At what stage of the research process do farmers are involved in research?

2. ***For extensionists:***

    a. What is the influence of formal research governance mechanisms (agenda setting, research funding, and researcher incentive schemes) on researchers?
    b. What are the perceptions, views, attitudes, values, and expectations from both sides (farmers and researchers) for each other?
    c. Why do researchers do not conduct research relevant to farmers need to bring research impact on Ethiopian agricultural development?
    d. What are the factors which affect linkage of researchers with farmers?
    e. What are the functions of farmers' collaboration with researchers in research?
    f. What are the characteristics of researchers' and farmers' which affect collaboration?
    g. How is the government policy for researchers and farmers to conduct demand driven research?
    h. How is the salary, incentives, promotions and other benefits for researchers to conduct demand driven research in the country?
    i. How is the economic power of farmers to purchase new agricultural technologies to improve their lives?

j. How is the resource availability for extension works to disseminate technology?

3. For agricultural experts at region levels

a. What is the influence of formal research governance mechanisms (agenda setting, research funding, and researcher incentive schemes)?
b. What are the perceptions, views, attitudes, values, and expectations from both sides (farmers and researchers) for each other?
c. Why do researchers do not conduct research relevant to farmers need to bring research impact on Ethiopian agricultural development?
d. What are the factors which affect linkage of researchers with farmers?
e. How is the government policy to conduct demand driven research?
f. How is the perception of the government for research?

4. Development agent

a. What are the perceptions, views, attitudes, values, and expectations from both sides (farmers and researchers) for each other?
b. Why do researchers do not conduct research relevant to farmers need to bring research impact on Ethiopian agricultural development?
c. What are the factors which affect linkage of researchers with farmers?
d. What are the functions of farmers' collaboration with researchers in research?
e. What are the characteristics of researchers' and farmers' which affect collaboration?
f. Do researchers pay sufficient payment for farmers for their labour and land?
g. How is the policy of the government to conduct research in the village?

5. Farmers

a. Why do researchers do not conduct research relevant to farmers need to bring research impact on Ethiopian agricultural development?
b. What are the perceptions, views, attitudes, values, and expectations of farmers for researchers?
c. What are the factors which affect linkage of researchers with farmers?
d. What are the characteristics of researchers' which affect collaboration with farmers?
e. Do farmers get sufficient payment for your labour and land?
f. Does u have sufficient time to work with farmers?
g. How do researchers select farmers to participate in research?
h. At what level do researchers participate farmers in research?
i. How is the policy of the government regarding farmers' participation in research?