Jimma University College of Natural Science Department of Information Science

Study on Knowledge Generation and Transfer in Ethiopian Agricultural Researches

By

Shimels Chala

A Thesis Submitted to the Department of Information Science of Jimma University for the Partial Fulfillment of the Requirements for the Degree of Master of Science in Information and Knowledge Management

Advisors:

Peter Ballantyne (Msc)

Worku Jimma (Msc)

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APPROVAL SHEET

This thesis entitled "**Study on Knowledge Generation and Transfer in Ethiopian Agricultural Researches**" has been read and approved as meeting the partial fulfillment for the award of degree of Master of Science in Information and Knowledge Management from Department of Information Science, Jimma University.

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	Signature	Date

ABSTRACT

Knowledge management in the agriculture sector is about the systematic connection of all stakeholders to the best practices, knowledge and expertise they need to create value by supporting creation, acquisition, transfer and utilization of knowledge. In Ethiopia, various research institute play significant roles in the generation and transfer of agricultural knowledge, but in the country the sector is one of the lowest levels of productivity in the world which suggests there are inadequate linkages between the Research Institutes and the practitioners. The main aim of this study was to investigate the knowledge generation and transfer practices that some Agricultural Research Institutes in Ethiopia have in place and assess the affecting factors involved in these processes. A mixed methods research methodology, encompassing questionnaires and interviews, was used to achieve this objective. Quantitative data were collected using questionnaires from both research institutes and their stakeholders using SurveyMonkey. Qualitative data were collected by means of interviews which were conducted with 15 key informants from both the research institutes and the stakeholders. The finding of this study indicates that in Ethiopia not all agricultural researchers and institutes fully perform end user demand analysis before generating and transferring agricultural knowledge This study confirmed that researchers and their institutes did not fully carry out assessment on their research output's impact. The result of this study disclosed that most of research institutes (84.2%) used scientific papers and professional journals to transfer their knowledge while majority of stakeholders (67.5%) acquire through both research /information reports and (67.6%) orally in conferences and workshops through both structured and unstructured processes. Easily accessibility of research knowledge, noninvolvement of research institutes stakeholders fully in their research works, using effective media and channels to communicate with the stakeholders were some of the major factors which hindered the acquisition of agricultural knowledge. In order to make agricultural knowledge effectively applied and utilized by the practitioners, it is recommended that researchers should primarily specify the recipient target groups and investigate their needs through the implementation of appropriate demand analysis techniques. To make the research institutes and stakeholders closer to each other, there should be a formal partnership established on common interest and goals with shared responsibility. The researchers have to utilize suitable transfer mechanisms which can best allow all actors to exchange knowledge and its impact should be thoroughly assessed.

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LIST OF ABBREVIATIONS AND ACRIMONIES

Abbreviations	Description
ASERCA	Association for Strengthening Agricultural Research In Eastern and Central Africa
GDP	Gross Domestic Product
ADPLAC	Agricultural Development and Partners Linkage Advisory Council
EPA	Environmental Protection Agency
EIAR	Ethiopian Institute of Agricultural Research
FDRE	Federal Democratic Republic of Ethiopia
UNDP	United Nations Development Agency
GTP	Growth and Transformation Plan
FTC	Farmers Training Center
DA	Development Agents
AAUDZAC	Addis Ababa University Debrezeit Agricultural College
JUCAVM	Jimma University College of Agriculture and Veterinary Medicine
FAO	Food and Agricultural organizations
ILRI	International Livestock Research Institute
ICARDA	International Center for Agricultural Research in Dry Areas
ICIPE	International Center for Insect Physiology and Ecology
IFPRI	International food policy research institute
MoA	Ministry of Agriculture
SNV	Netherlands Development Organizations
KM	Knowledge Management
HRM	Human Resource Management
EMDTI	Ethiopian Milk and Diary Technology Institutes
PTDA	Participatory Technology Development Approach

OPERATIONAL DEFINITIONS

Knowledge is a familiarity with someone or something, which can include facts, information, descriptions, or skills acquired through experience or education. It can refer to the theoretical or practical understanding of a subject. It can be implicit (as with practical skill or expertise) or explicit (as with the theoretical understanding of a subject); it can be more or less formal or systematic.

Research is original investigation undertaken to gain knowledge and/or enhance understanding. Research is the invention or generation of ideas, images, performances and artifacts where these manifestly embody new or substantially developed insights. It is also the use of existing knowledge to produce new or substantially improved materials, devices, products, policies or processes

Agricultural Knowledge consists of the attitudes, cumulative experiences and developed skills that enable a person to consistently, systematically and effectively perform agricultural practices. Agricultural knowledge is created from modern and indigenous sources. The modern knowledge is created through scientific research (and therefore it is explicit knowledge) by universities and research institutes. Indigenous knowledge or tacit knowledge, on the other hand, refers to traditional knowledge, innovations and practices of local communities and is developed outside the formal education system.

Stakeholders A person, group or organization that has interest or concern in an organization. In this context, by 'stakeholders' it is to mean intermediary organizations or individuals who take up research outputs and adapt or transform them for other end users (farmers, policy makers, etc) to use.

Knowledge Generation consist the creation of knowledge by knowledge producers. In Agriculture, knowledge could be generated from various sources including research institutes and indigenous sources.

"**Knowledge Transfer**" is a process by which research messages are "pushed" by the producers of research to the users of research. More recently, "knowledge exchange" is emerged as a result of growing evidence that the successful uptake of knowledge requires more than one-way communication requiring genuine interaction among researchers, decision makers, and other stakeholders. .

Knowledge Acquisiton refers to the user's first contact with the knowledge generated, adapted and disseminated by the researcher. Its success is largely rests on the researchers' generatiom,adaptation and dissiminations endeavour in order to make research results easily accessible for, and understandable by users . However, its effectiveness also requires the awareness of knowledge receivers. This awareness depends primarily on the interest the users have for research results and the concrete needs these research results could eventually satisfy.

Knowledge acquisition involves complex cognitive processes: perception, communication, association and reasoning; while knowledge is also said to be related to the capacity of acknowledgment in human beings.

Agricultural Knowledge Management knowledge management in the agriculture sector is about the systematic connecting of stakeholders/people to the best practices, knowledge and expertise they need to create value by supporting. Viewed this way, knowledge management in agriculture would then be expected to focus on knowing what needs to be done to solve the problems in the sector or to exploit opportunities; how it can be done; the source of knowledge needed to succeed; and who can do it. This is then followed by use of the networking mechanism to assemble the best expertise needed to implement the necessary tasks.

CHAPTER ONE

1. INTRODUCTION

1.1. Background

In most developing countries agriculture is the most important economic activity providing food, employment, foreign exchange and raw material for industries. Ethiopia is one of the largest countries in Africa both in terms of land area (1.1 million km2) and population (about 80 million). Agriculture is the backbone of Ethiopian economy. It accounts for a little over 40 per cent of the GDP and 90 per cent of the total export revenue and employs 85 per cent of the country's labor force (Abate, 2006). Ethiopian agriculture is virtually small-scale, low productivity, subsistence-oriented and crucially dependent on rainfall. About 90 percent of the country's agricultural output is generated by subsistence farmers who use traditional tools and farming practices (EPA, 2003). The average grain in yield for various crops is only about one metric ton per hectare (Byerlee, Spielman and Alemu, 2007).

Despite the importance of agriculture, its performance has remained poor for many years. The production system in Ethiopia is highly dominated by traditional farming and the application of modern inputs and new technologies has been extremely limited. As a result, yields of various agricultural productivities are very low. Available evidence shows that yields of major crops under farmers' management are still far lower than what can be obtained under research managed plots (Abate, 2006; EIAR, 2007).. This is a clear indication of the gap, which exists between researchers and farmers. The absence of effective linkage between agricultural research and extension systems has repeatedly been reported as one of the major reasons for the low productivity of Ethiopian agriculture (Agricultural Research Task Force, 1996; Belay, 2003; Task Force on Agricultural Extension, 1994; FDRE, 1999). This trend implies that for country to achieve substantive economic growth, reduce poverty and improve livelihoods, drastic improvement in agricultural production and productivity is indispensable. This can be achieved by promoting technology transfer and adoption, boosting commercial production, deepening agricultural markets, and improving infrastructure and agricultural policies.

Knowledge management (KM) can play a pivotal role in enhancing agricultural productivity and addressing the problem of food insecurity. If applied, KM enables appropriate knowledge to reach knowledge intermediaries and agricultural practitioners in a timely manner. Such delivery of knowledge undoubtedly minimizes the risk and uncertainty that agricultural practitioners could face from production to marketing of their produce. But, to effectively engage in agricultural knowledge management, adequate mechanisms are needed for generating, capturing, and disseminating knowledge and information through the use of effective processes and institutional arrangements (UNDP, 2012).

Transformation of Ethiopian agricultural sector requires scaling up of efforts to increase agricultural production and productivity by among others promoting domestic and foreign investment through agricultural commercialization, increasing public investment in agricultural infrastructure, promoting technology transfer and adoption, ensuring efficient use of land, labor, technology and other inputs, and specifically raising the productivity of smallholder farmers (GTP,2010). Development, testing, and dissemination of new technologies are emphasized in order to ensure continuous innovation and growth of the sector as well as to promote resilience and adaptation to changing agro-ecological environment.

The agricultural extension service is one of the institutional support services that play a central role in the transformation process. The extension approach follows Farmers Training Centres (FTC)-based extension system positioned to facilitate agricultural knowledge exchange among researchers, extension workers and farmers. Woreda level agricultural offices are responsible for managing the operation of FTCs with the support of Zonal and Regional Agriculture Bureaus and are the frontline administrative structure for implementing agricultural extension services

Although the extensions services has been utilized to make research outputs reach practitioners, it has not been ineffective in terms of bringing large scale adoption of improved technologies and practices by small scale farmers. Major problems of the extension system include top–down and non-participatory approach, primarily supply driven, low capacity of experts and development agents, low morale and high turnover of extension staff, and shortage of operational budget and facilities.

In central and eastern Africa including Ethiopia, the gaps between the knowledge produced by Research Institutes and the one used in practice come about due to the challenges outlined below (ASERCA, 2011):

- Inadequate analysis of agriculture sectors' knowledge needs, attitudes and practices due to limited end user involvement
- Inadequate mechanisms for capturing, systematizing and sharing available knowledge;
- Use of ineffective media and channels for communicating with different stakeholders;
- Inadequate evaluation for dissemination and use of agricultural knowledge;
- Poor identification of media and channels for communicating with different stakeholders
- Ineffectiveness in the extension systems and the technology dissemination processes

1.2. Statement of the Problem

One of the main aims of agricultural knowledge management is to promote uptake, utilisation and scaling up of improved agricultural technologies and it is achieved when clear mechanisms for effective communication and knowledge management practices are incorporated into Agricultural Research and Development programmes. For this to happen, the right knowledge has to be delivered to the right user at the right time in a user friendly and accessible manner.

In Ethiopia, different agricultural research institutes both national and international play a significant role by generating and transferring agricultural knowledge but the sector was one of the lowest levels of productivity in the world, used less commercially oriented production systems, low commercial market off-takes, inadequate production and marketing infrastructure, and inadequate services, institutions, and support systems. This was a clear indication of the gap, which designated deficiency of effective linkage between the Research Institute and the practitioners.

Agricultural Research Institutes in Ethiopia play significant roles in generating and transferring their research outputs utilizing varieties of mechanisms to stakeholders and the stakeholders transferred the acquired knowledge to end users. The problem is that there are gaps in the utilizations of the transferred knowledge by the practitioners as there are no known standards, techniques or methods of assessing the outputs and the effectiveness of the knowledge. This hinted that the current practices of creating new knowledge and transfer practices require

improvements as they did not adequately address the need of the practitioners who were presumed to capitalize these new technologies and improve their agricultural productivity and ultimately their living standard.

In this knowledge and information age, it is important to address the challenges that limited the obtainability and utilization of Agricultural Research Institute's knowledge and identify the opportunities that should be tapped to assist in improving the quality of knowledge transfer processes from the Research Institutes to the stakeholders and then to the practitioners. In view of this, there has to be a new approach to invent/innovate new and improved agricultural technology that should reach the practitioners, its governance and management as well as the development of systems and capacity to monitor, document and report on the progress and its impact.

1.3. Research Objectives

1.3.1. General Objectives

The general objective of this research was to investigate the processes that were in place to generate, transfer and acquire agricultural knowledge from some Agricultural Research Institutes in Ethiopia to stakeholders and then from the stakeholders to practitioners and also to assess the influencing factors and challenges involved in the course of actions.

1.3.2. Specific Objectives

The specific objectives of this research were:

- To investigate the knowledge that was generated by the research institutes and required by stakeholders
- To look into how the research institutes analyze the demands of the stakeholders
- To assess how the relationship between the research institutes and the stakeholders was established
- To investigate the mechanism, tools and processes of knowledge transfer and acquisition practices from the research institutes into stakeholders and from the stakeholders to end users
- To examine how the impacts of the transferred knowledge were assessed

- To identify main problems and factors that affected the transfer of agricultural knowledge

1.4. Research Questions

The research questions were:

- What type of knowledge was generated in the research institutes and required by stakeholders?
- How do the agricultural research institutes analyze the interest and demands of stakeholders before generating agricultural knowledge?
- Do the researchers and their institutes involve stakeholders in their research activities?
- How is the relationship between research institutes and stakeholders established?
- What tools and processes are employed in the knowledge transfer from the Research Institutes to stakeholders and then to end users?
- How do the research institutes measure the effectiveness of the transferred agricultural knowledge?
- What are the factors affecting the processes of transferring and acquiring agricultural knowledge?
- What are the future prospects with regard to enhancing agricultural knowledge generation and transfer?

1.5. Significance of the Study

The significant of this study is manifolds. Firstly, the main objective of this research was to assess the processes that were in place to generate and transfer agricultural knowledge from Ethiopian agricultural research institutes to stakeholders and from the stakeholders to end users and to investigate the influencing factors involved in the practices. Such assessments were helpful to provide insight into how agricultural knowledge was transferred from the research institutes to practices in Ethiopia context. Secondly, the study was intended to contribute to the bridging of the gap which currently exists in the agricultural knowledge transfer and utilization. Such bridging of the gap was accomplished by means of the provision of theoretical recommendations and suggestions for a more efficient transfer of new knowledge from the research institutes into practice. Thirdly, the study identified the factors and challenges affecting the processes of agricultural knowledge transfer, in the same way; it provided constructive

recommendations and suggestions for alleviating these problems. The other benefit of this study is that it had the potential to stimulate research in the fields of agricultural knowledge transfer in addition to designing interventions for better management of knowledge in agricultural research institutes. Lastly, this thesis may be used as a reference material by future researchers in this field. Agricultural research institutions will, therefore, be able to benefit from this study by learning how agricultural knowledge can be transferred into practice, so that they can, in future, utilize the appropriate strategies for harnessing such knowledge.

1.6. Scope and Limitation of the Study

The study was conducted to assess and evaluate the generated knowledge and its transfer practices that international and national agricultural research institutes by investigating the factors involved in the process that affected knowledge transfer. Due to time limitations, the study only strived to provide a detailed review of issues related to agricultural knowledge generation, acquisition and transfer and suggested constructive improvements that should be made through its recommendations. The study did not look into the practical implementation projects resulted from the investigation. Due to time and resource limitations, the study made analyses of agricultural knowledge generation and transfer practices of few research centers, only 4, among the enormous number of them. Also the current study investigated the knowledge recipients' side or stakeholder's knowledge access practices, how they acquired knowledge from the research institute and the factors affecting the process. However, only few stakeholders were investigated again due to time and resource limitations. Moreover, due to time and resource limitations, the research did not make any investigation from the end users or practitioners sides.

CHAPTER TWO

2. LITRATURE REVIEW

2.1. Knowledge, Knowledge Characteristics and Dimensions

2.1.1. Definition of Knowledge

Knowledge is defined as: "information possessed in the mind of individuals", expertise, and skills acquired by a person through experience or education. It is personalized information related to facts, procedures, concepts, interpretations, ideas, observations and judgments (Alavi & Leidner, 2001). It must go through a recreation process in the mind of the receiver (El Sawy et al, 1998). According to Nonaka et al, (2000), knowledge is "a dynamic process of justifying personal belief towards the truth".

2.1.2. Knowledge Transfer and Exchange

"Knowledge transfer" is a process by which research messages are "pushed" by the producers of research to the users of research (Lavis et al. 2003). More recently, "knowledge exchange" is emerged as a result of growing evidence that the successful uptake of knowledge requires more than one-way communication requiring genuine interaction among researchers, decision makers, and other stakeholders (Lavis et al. 2003). Knowledge transfer and exchange (KTE) is as an interactive process involving the interchange of knowledge between research users and research producers. (KTE) implies an interactive and engaged process between the research community and those engaged in and affected by policy and practice contexts (Jacobson et al, 2005). It is a process whereby relevant knowledge is made available and accessible to decision-makers for application in practice, planning, and policy making. It occurs not only at the end of a process, project, or research study, but is active throughout the life of a project, from start to finish. [KTE] refers specifically to the two way dialogue and exchange of knowledge between those who generate and those who receive and use knowledge, and it is also operational throughout the life of a project or research study. Together, these two elements serve to facilitate the use of research in practice (Barwick et al, 2005).

The primary purposes of KTE are to increase the likelihood that research output will be used in policy and practice decisions and to enable researchers to identify practice and policy-relevant research questions. KTE theorists assert that knowledge is "not an inert object to be 'sent' and 'received,' but a fluid set of understandings shaped both by those who originate it and by those who use it" (NCDDR, 1996). A KTE framework generally contains an exploration and determination of five important domains namely: the user group, the issue, the research, the researcher–user relationship and available dissemination strategies (Jacobson et al, 2003). Effective KTE strategies draw upon existing resources, relationships, and networks to the maximum extent possible, while building new resources and channels as needed (Barwick et al, 2005).

To ensure effective knowledge transfer and exchange, the literature in a variety of fields and sub-specialties have found that a combination of different dissemination activities is the best way to maximize effectiveness; that stakeholders and end users should be consulted in the development of a dissemination strategy; and that a dissemination plan should be finalized at the beginning, not the end, of a project.

2.1.2.1. Knowledge Transfer and Exchange Process

The knowledge transfer and exchange process can be divided into two groups: structured and unstructured knowledge transfer. Structured knowledge transfer is a formal, planned and intentional transfer process. In contrast, unstructured knowledge transfer is an informal, unplanned and spontaneous process. Although based on structured transfer stages, it does not adopt the structured knowledge transfer process step by step, but jumps directly to a particular step without going through the earlier steps.

An integration of the models proposed in the literature led to propose a six-step process of structured knowledge transfer and exchange process, going from the generation of knowledge by researchers to its utilization by users (Barnard et al. 2001; Hemsley-Brown 2004; Kirst 2000; Love 1985). These steps include: 1) knowledge generation, 2) knowledge adaptation, 3) knowledge dissemination, 4) knowledge reception, 5) knowledge adoption, and 6) knowledge utilization (Figure 2.1). The three first steps are commonly attributed to researchers, whereas the other three steps concern the users.

Knowledge Generation consists the creation of knowledge by knowledge producers (Hemsley-Brown and Sharp 2003; Love 1985). In Agriculture, knowledge could be generated from various sources including research institutes and indegeneous sources. **Knowledge Adaptation** concerns research results and aims to make them accessible to and easily understandable by potential users. This step is crucial for the success of the knowledge transfer process, since it will have an influence on the decision of the user to adopt or not the knowledge generated by researchers or not. Indeed, the availability of research results does not necessarily guarantee their adoption and utilization by potential users. **Knowledge Dissemination** is associated with the transfer of research results to communities of practice (Neville and Warren 1986; Hutchinson and Huberman 1993). Dissemination is a complex process whose success depends simultaneously on several dimensions like the dissemination agent's characteristics (e.g., its credibility), the disseminated product (e.g., relevance of research results for users), the final user's characteristics (e.g., personal motivation to use research results), the communication channels used (e.g., collaboration networks), the communication format (e.g., presentations, reports, etc.), as well as the resources allowed for these activities (e.g. time, human and financial resources) (Huberman and Gather-Thurler 1991; Kirst 2000). Failing to take these dimensions into account, is often cited as one of the reasons why research results are under-utilized by practitioners (Boostrom et al. 1993; Hemsley-Brown 2004; Wikeley 1998; Willmott 1994). **Knowledge Reception** refers to the user's first contact with the knowledge generated, adapted and disseminated by the researcher. The success of this step largely rests on the previous steps researchers' endeavour in order to make research results easily accessible for, and understandable by users (Barnett 2005; Bickel et al, 2003). However, the effectiveness of this step also requires the awareness of knowledge receivers (Rogers 1995 cited by Hemsley-Brown and Sharp 2003). This awareness depends primarily on the interest the users have for research results and the concrete needs these research results could eventually satisfy (Roy et al. 1995). **Knowledge Adoption** is the next step in the knowledge transfer process. The adoption concept is mainly investigated in the literature on innovations' adoption (Roy et al. 1995). As defined by Rogers (1983), cited by Roy et al. (1995), adoption refers to the path an individual, or any other decision-making unit, uses to pass through the process of 1) having a first level of awareness of the existence of an innovation, 2) forming an attitude towards the innovation, 3) making a decision whether to adopt or reject the innovation, 4) implementing the new idea, and 5) finally, confirmation of the adoption decision.

The determinants of adoption have been widely documented in the literature on innovation diffusion, especially through Rogers' works (Hemsley-Brown and Sharp 2003). In the context of knowledge transfer, the adoption determinants include the motivation of the receiver to use or not use the new knowledge, the degree of resistance to external knowledge, the actors' leadership, the compatibility with existing policies and practices, the availability of resources, etc. **Knowledge Utilization** refers to the application of the knowledge generated, adapted, and disseminated by the researcher, and received and adopted by the user in order to achieve specific goals and objectives (Bickel and Cooley 1985; Love 1985). Beyer and Trice (1982), cited by Roy et al. (1995), distinguish three forms of knowledge utilization: 1) instrumental utilization (research results are used to solve concrete problems or to meet specific needs), 2) conceptual utilization (knowledge is used to support and provide food for thought), and 3) symbolic utilization (knowledge is used to legitimate, justify and support decision making).

It is worth noting that even though the knowledge transfer process is presented here as a linear one, it is seldom the way it occurs in practice. As argued by Roy et al. (1995), each step in the process often requires continuous iterations, therefore feedback loops are necessary. However, the sequential presentation is often used instead of the cyclic one, mainly because it facilitates the knowledge transfer process description. For knowledge transfer and Exchange to be effective:

"The dissemination process needs to be accurate, imaginative and multi-channel, and all parts of the dissemination process need to be managed and well facilitated". A dissemination plan must be based on an understanding of exactly who these "wider audiences" include, what information they need and want, and how they wish to receive it (Baker & Charvat, 2008; Barnardo's, 2000; Carpenter et al, 2005; Dobbins et al, 2004; Jack & Tonmyr, 2007; Lavis et al, 2003; NCDDR, 1996).

Literature makes clear that five critical components or questions provide an organizing framework for a comprehensive knowledge-transfer effort (Reardon, Lavis & Gibson, 2006), which are listed below:

1. What (is the product)? 2. To whom (audience)? 3. By whom (the messenger)?
4 How (transfer method)? 5. With what expected impact (evaluation)?

2.1.2.2. Determinants of Knowledge Transfer and Exchange

The reviewed studies allow bringing out several determinants of knowledge transfer. Literatures suggests three main categories of determinants of the knowledge transfer process: 1) the determinants related to the transferred knowledge attributes, 2) those related to the characteristics of actors involved in the knowledge transfer process (i.e., researchers, linkage agents and practitioners), and 3) the determinants related to the transfer mechanisms.

2.1.2.3. Determinants Related to Transferred Knowledge Attributes

The determinants of knowledge transfer related to the transferred knowledge attributes correspond to the characteristics that this knowledge should have in order to facilitate its transfer between actors. The review of the included studies reveals several transferred knowledge attributes that have a direct impact on the knowledge transfer process effectiveness and results.

First, the transferred knowledge should be easy to understand by the receiver. It should use appropriate, simple, precise and clear language and be supported by concrete examples and experiences (Kilgore and Pendleton 1993; Kirst 2000). Explicit and codified knowledge is certainly easier to transfer and to explain than tacit knowledge, since it is often supported by formal conceptual frameworks and accurate language (Rynes et al. 2001). The transferred knowledge should also be applicable to the agricultural context in order to help its transfer. Hemsley-Brown and Sharp (2003) reported that the lack of applicability of the transferred knowledge is one of the most important barriers to its adoption and utilization by potential users.

The effectiveness of knowledge transfer in agricultural sector also depends on its accessibility. When the information coming from research is easily available and accessible, this makes it easier for practitioners to use it. Accessibility here is not only related to the physical availability of knowledge, but also to its intellectual accessibility (Hemsley-Brown 2004). The impressive number of scientific papers and research reports published on agriculture could be a serious barrier to their use by practitioners (Hemsley-Brown and Sharp 2003). It then becomes important for the transfer agent to assess the relevance of the available knowledge, and to make syntheses of pertinent research results before disseminating them in a simple and clear way to users.

2.1.2.4. Actors' Related Determinants

The literature reviewed helped the identification of several determinants of knowledge transfer that are related to the actors involved in the process (i.e. researchers, transfer agents, and practitioners). Determinants related to researchers concern the endeavors that these researchers as well as their institutions should make, in order to facilitate the transfer of their research results to transfer agents or practitioners. At the individual level, the adaptation, contextualization and dissemination efforts made by the researcher are crucial determinants of the process of knowledge transfer (Hemsley-Brown 2004; Bickle and Cooly 1985; Love 1985; Huberman 2000; Anderson and Franklin 2000; Ozga 2004; Anderson 1992; Abdoulaye 2003). It is then important that researchers allocate the necessary time to bring to fruition these activities.

Researchers' credibility also has a significant impact on the transfer of their research results. This credibility is often developed with time due to sustained interactions between researchers and the other actors involved in the knowledge transfer process (Huberman 1987; 1990). At the organizational level, the determinants of knowledge transfer are mainly related to the experience of the research organization (university, research institute, etc.) with knowledge transfer activities (Anis et al. 2004), as well as the importance and the recognition given by the organization to these activities (Abdoulay 2003). Therefore, research organizations willing to collaborate with transfer agents and/or practitioners, should implement incentive policies and release the necessary resources (time, funding, etc.) to encourage their researchers to engage in knowledge transfer activities.

Transfer Agents play a crucial role in the knowledge transfer process as intermediaries between researchers and end users. Therefore, the effectiveness of the process depends largely on the attributes of these transfer agents, both at the individual and the organizational level. The literature showed that the professional experience, the cognitive abilities, the social capital as well as some personal attributes of the transfer agents, are important determinants of knowledge transfer. Obviously, transfer agents should have some experience in knowledge transfer activities (Anis et al. 2004; Beier and Ackerman 2005). This experience develops with time, but could also be acquired through participation in thematic conferences, seminars and workshops (Matzat 2004). The cognitive abilities of transfer agents refer to their capacity to grasp and assess the quality of research results, as well as their ability to select pertinent research issues according to

the agriculture context and stakes (Hemsley-Brown 2004; Kilgore and Pendleton 1993; Miller et al. 1994). The cognitive abilities of transfer agents are an important determinant of knowledge transfer, since they have a direct impact on the adoption and adaptation efforts they make, before disseminating knowledge to practitioners (Hemsley-Brown 2004; Miller et al. 1994; Kilgore and Pendleton 1993). The cognitive capacities of transfer agents could be reflected by the graduate academic degrees they earned which indicate their familiarity with the research process and results.

In addition to these individual attributes, some characteristics related to the organization to which the Transfer agent belongs are also important to ensure the effectiveness of knowledge transfer. These organizational determinants particularly concern the organizational structure and context, as well as the resources and policies dedicated to knowledge transfer activities. Organizations showing a low degree of centralization and formalization are more likely to succeed in their knowledge transfer activities (Browne 2005). Moreover, bureaucratic procedures and the lack of support and negatives pressures from colleagues, figure among the major obstacles to knowledge transfer (Browne 2005; Barnard et al. 2001). It then becomes important to the transfer agent's organization to develop and sustain a culture that encourages collaboration and information-sharing, in order to improve the effectiveness of knowledge transfer (Lloyd et al. 1997).

Financial, human, and physical resources are also mentioned as important determinants of knowledge transfer (McPherson and Nunes 2002; Patricia 2000; Abdoulaye 2003; Powers 2003; Hemsley-Brown 2004). The time allowed for knowledge transfer activities is also an important factor of their success. Hemsley-Brown (2004) argued that one of the factors constraining knowledge transfer and utilization is the lack of time, for transfer agents, to read, understand, adapt and disseminate research results.

Practitioners are the end users of the knowledge produced by researchers and adopted, adapted and disseminated by transfer agents. The reviewed studies show that some determinants of knowledge transfer are related to practitioners' individual and organizational attributes. Once again, the time allowed by practitioners to acquire and adopt new knowledge is an important determinant of knowledge transfer. As argued by Hemsley-Brwon (2004), the lack of time is one of the barriers preventing practitioners from going through transferred knowledge. Practitioners' adoption and use of knowledge are also conditioned by their motivation to do this. Some authors

(e.g. Baldwin and Ford 1988; Nyden and Wiedel 1992) suggested enhancing this motivation by establishing a reward system that encourages practitioners to use and implement new practices and programs in their immediate context. The implication of practitioners at an early stage in the research process is another determinant of their adoption and utilization of research results, since it allows them to better understand these research results (Huberman 2002; Hemsley-Brown and Sharp 2003).

2.1.2.5. Determinants Related to Transfer Mechanisms

Transfer mechanisms consist of all the means through which knowledge moves along the knowledge transfer process. They allow actors (i.e. researchers, transfer agents and practitioners) to exchange knowledge and information. The reviewed literature shows that there are several mechanisms that could be used to promote knowledge transfer, and also that these transfer mechanisms have an impact on the effectiveness and the success of the knowledge transfer process. Two categories of transfer mechanisms are distinguished in the literature: 1) the information mechanisms, and 2) the interaction mechanisms. Information mechanisms refer to the ways used to acquire or disseminate knowledge without personal interaction with other actors. This includes, for example, research reports, scientific papers, professional journals, information reports, best practices guides, education tools, emails, blogs, etc. (Argote et al. 2000; Bickel and Cooley 1985; Huberman 2002; Kirst 2000; Neville and Warren 1986). Abdoulaye (2003) suggested the creation of a central database of good practices and innovations developed in agriculture as a solution to optimize knowledge management and transfer. He argued that an adequate conception and presentation of these databases, along with an available access for practitioners, would encourage the latter to use new knowledge and practices.

As for interaction mechanisms, they consist of the ways used to acquire or disseminate knowledge by relying on personal interactions with other actors. Some examples of interaction knowledge transfer mechanisms are oral presentations, academic conferences, seminars, professional colloquiums, workshops, training sessions, formal meetings, informal discussions, social activities, etc. (Boostrom et al. 1993; Chazan et al. 1998; Hemsley-Brown and Sharp 2003; Neville and Warren 1986; Ozga 2004).

Interaction mechanisms are very important to ensure the success of knowledge transfer. This kind of transfer requires an iterative, interactive and reflexive process between actors. It allows

practitioners not only to adopt the new knowledge, but also to share their experiences and to develop a collective new practice (Briscoe and Peters 1997; Hammett and Collins 2002; Kahne and Westheimer 2000; Serafini 2000; Wagner 2003). Training sessions are probably the most suitable knowledge transfer mechanism (Argote et al. 2000). They allow practitioners to develop new abilities related to the application of new knowledge in concrete work situations (Barnard et al., 2001). This should increase their interest in new knowledge and consequently its adoption and use.

2.1.2.6. Challenges to Knowledge Transfer and Exchange

Despite the increasing references to knowledge-based policy and knowledge-based practice, the challenge of moving knowledge into policy and practice requires multi-level and long-term strategies that go far beyond traditional dissemination (Trocmé et al, 2007).

Underutilization of research knowledge can best be described as a gap between "what is known" from research, and "what is currently done" in practices (Anthony & Austin, 2008; National Center for the Dissemination of Disability Research [NCDDR], 2005). A number of different rationales for this divide have been proposed, including the following:

The research community may rely on incorrect assumptions about the definition and purpose of dissemination. Most dissemination practices are based on a mechanistic, linear conception of dissemination as a process of "getting the word out". But dissemination is not synonymous with publication. Merely sending out information via an article in a scholarly journal or the World Wide Web will not get the job done (NCDDR, 1996). The job apparently done, one would then assume that others would find the paper, read it, understand it and apply the results for the betterment of humankind (Rosenbaum, 2005).

Stakeholders may be left out of the research process, or not included in discussions regarding dissemination strategies and activities. Practitioners are more likely to adopt research products when they find them useful and can contribute creatively to their development and evaluation; at least more likely than if they are simply told they should adopt them because scientific knowledge is inherently better than indigenous knowledge (Addis, 2002). Often times, potential users of research knowledge are unconnected to those who do the research, and consequently a huge gap ensues between research knowledge and practice behaviors…Negative attitudes among

practitioners about evidence-based therapies can result from a lack of knowledge about the effectiveness of treatments in real world settings. (Barwick et al, 2005).

Dissemination efforts may overlook the importance of tailoring activities and products to match the needs and interests of different audiences. Because many…were never clear about their targeted audience, it was difficult to determine if they were actually implementing their dissemination plan…"audience" has been a missing link in the research utilization and dissemination process (Chavkin, 2008). Low-intensity efforts that use a single dissemination channel simply will not achieve dependable results (NCDDR, 1996).

The language—often overly academic or full of jargon—used to communicate research findings and best and promising practices may not appeal to practitioners, administrators or policy-makers. Often, practitioners are not familiar with research language and methods, and therefore, it is important for researchers to present research in a clear manner (e.g., avoiding technical jargon and advanced statistics) (Dal Santo et al, 2002).Regardless of how fast, cheap, and accurate the transmission of data might be, those parcels of data are worthless if the receiver cannot interpret and use them"(NCDDR, 1996). Research reports are usually written in scientific language, which may appear to non-researchers as jargon and may, therefore, not be easily understood (Rosenbaum, 2005).

The most frequently-used product formats—(peer-reviewed journal articles, academic conference presentations, books, or final reports) — may fail to reach much of the field, or may not appeal to practitioners, administrators or policy-makers (who may prefer newsletters, updates, or other summaries). Researchers write primarily for their academic colleagues, with little regard to the effectiveness of this dissemination strategy (Martin et al, 1998). Information is too frequently relegated to academic journals and is not disseminated to policymakers, or funders and others (Sherrod, 1999).

The most frequently employed communication method —the posting of a single document, project description or literature citation on an institution's website—may fail to reach much of the field with new information in a timely or systematic fashion. No matter how well the product or service is designed, priced and promoted, the process fails if the offering is not readily accessible to the client at a convenient time and place. In the marketing sense, place is

synonymous with the goal of accessibility (Fine, 1986). Many studies show disappointing dissemination outcomes resulting from the inaccessibility of information—the fugitive nature of relevant social science knowledge. Important information may be unavailable, or difficult to find without a formal search (Kirst, 2000).Perhaps the most basic finding in the literature on research utilization is that users cannot attend to a message that they do not receive (NCDDR, 1996).Research evidence is less likely to be used…if it is not readily available in a timely manner (Trocmé et al, 2007).

Researchers may overlook the importance of explaining the practical implications of their work, or fail to set forth realistic recommendations for implementing change based on their findings. It was often noted that the final reports could have provided more connections between the recommendations and the necessary action steps for implementation (Dal Santo et al, 2002). Unfortunately, researchers do not always translate findings into useful information for programs and policy (Denner et al, 1999). Whatever the reason(s) for the gap between research/evidence and practice, as Martin and colleagues (1998) assert, "it has become clear that the world does not automatically beat a path to the researcher's door just because he or she has a good idea". Ensuring that research findings, best and promising practices, and other innovations reach, strengthen and support the field—and that the feedback loop remains unbroken—requires comprehensive, active dissemination planning, and a multi-faceted, strategic approach to carrying out dissemination activities.

2.1.3. Review of Agricultural Knowledge

2.1.3.1. Concept of Agricultural Knowledge

Knowledge consists of the attitudes, cumulative experiences, and developed skills that enable a person to consistently, systematically and effectively perform a function (William and Michael, 2005). Knowledge is considered as the fourth production factor after labor, land and capital (AFAAS, 2011) and is particularly critical in the agricultural sector. Making relevant knowledge accessible to the farming community helps improve production, productivity and brings higher returns. If the agricultural practice is not backed up by modern agricultural knowledge and information, agricultural households are likely to remain trapped in low productivity, food insecurity and poverty. In the context of Ethiopia, generating new agricultural knowledge and

information and making it available for use by smallholder farmers is important in promoting sustainable livelihoods and reducing rural poverty.

Various entities are engaged in the creation and development of agricultural information and knowledge. Likewise, several repositories and intermediaries play their role to bring the information and knowledge to the ultimate users. Agricultural knowledge is created from modern and indigenous sources. The modern knowledge is created through scientific research (and therefore it is explicit knowledge) by universities and research institutes. Indigenous knowledge or tacit knowledge, on the other hand, refers to traditional knowledge, innovations and practices of local communities and is developed outside the formal education system. Agricultural information and knowledge created from these sources is stored in various forms before it is disseminated for use. The main repositories of such knowledge include publications, audio visuals, and websites. The stored knowledge and information is then disseminated to users, such as rural farmers, through intermediaries notably during trainings, field visits, exhibitions, publications, and using traditional forms of ICT (TV and radio), modern forms of ICT (internet, mobile phone, etc), and others (UNDP Ethiopia, 2011).

2.1.3.2. Agricultural Knowledge Management

Many organisations engaged in agricultural research recognize that knowledge management is crucial given the proliferation of information, demands for rapid assimilation of data, and the increased value placed on knowledge as an asset. In an effort to better understand knowledge management some important concepts have been developed. These have led to a working definition viewing it as a conscious strategy of getting the right knowledge to the right people at the right time and in ways that improve its utilization. Many other practitioners also increasingly see knowledge sharing as a better description. Some would prefer to emphasize "learning", since the real challenge in implementing knowledge management is less in the "sending" and more in the "receiving", particularly the processes of sense-making, understanding, and being able to act upon the available information. Whatever term is used to describe it, knowledge management in the agriculture sector is about the systematic connecting of stakeholders/people to the best practices, knowledge and expertise they need to create value by supporting:

- The creation or acquisition of knowledge relevant to opportunities and constraints;
- The synthesis and learning from such knowledge;

- The sharing through better communication and networking;
- The utilization through promotion of uptake and scaling up by the right people at the right time in the right place to generate innovations.

Viewed this way, knowledge management in agriculture would then be expected to focus on knowing what needs to be done to solve the problems in the sector or to exploit opportunities; how it can be done; the source of knowledge needed to succeed; and who can do it. This is then followed by use of the networking mechanism to assemble the best expertise needed to implement the necessary tasks (ASERCA, 2011).

2.1.4. Conceptual Framework of the Study

To enhance the agricultural production and productivity, increasing agricultural practitioners' access to and effective utilization of agricultural knowledge through identifying and working on the problem that affects it, agricultural knowledge management play a significant role. The conceptual framework presented in the following figure (2.2) presents the most important variables hypothesized to influence the transfer and utilization of agricultural knowledge.

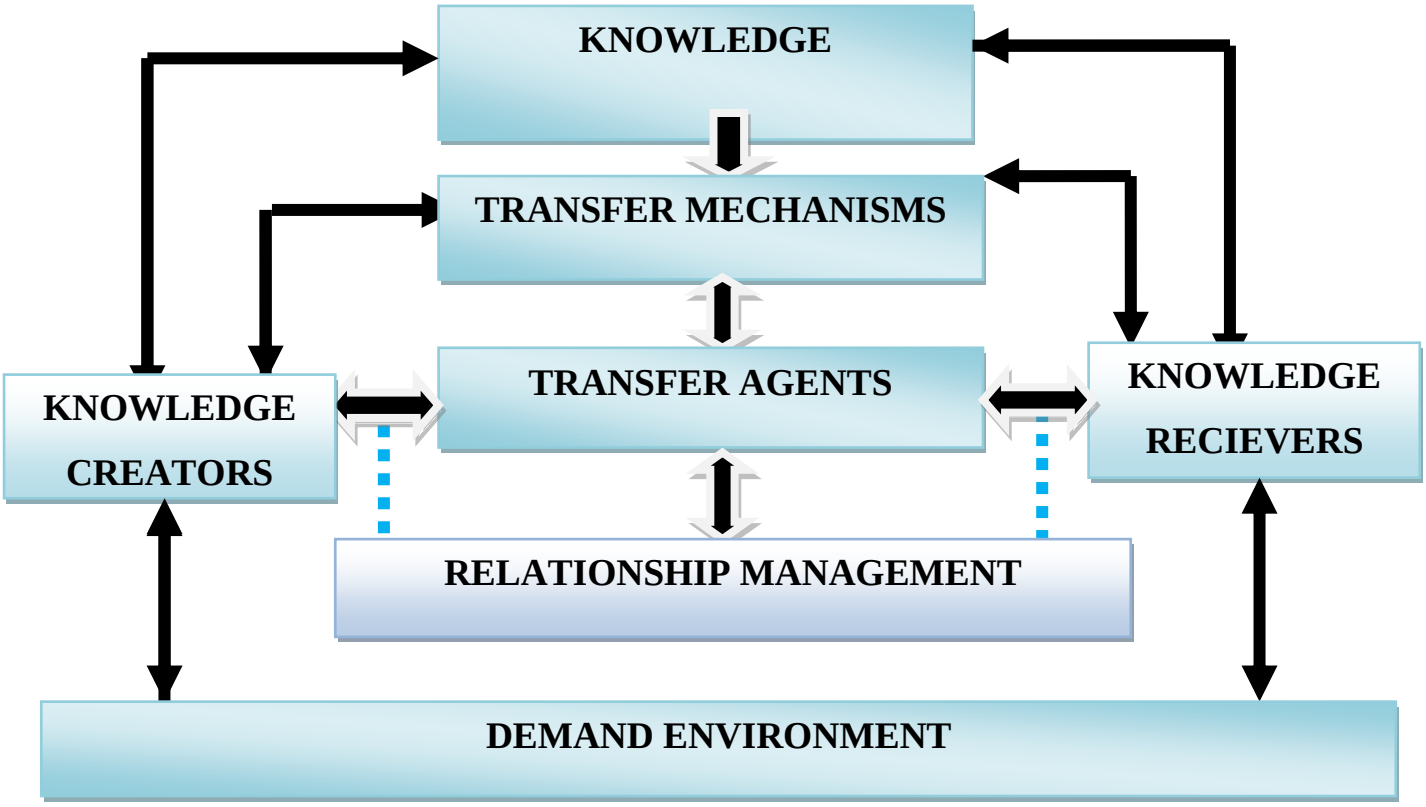

Figure2: Conceptual Framework of the Study

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Description of the Study Area

In Ethiopia, agricultural research institutes work with partners and stakeholders to help practitioners or end users keep their farm productive, sustainable and find profitable markets for their products. For the purpose of this study, research institutes and stakeholders were organized into the following groups:

- National Agricultural Research Institutes and Higher Education Institutes
- International Research Institutes
- Federal Government Organizations
- NGOs
- Agricultural Training Centers and Institutes
- Agro Businesses
- Civil Societies

Each partner groups listed above constitute a number of organizations /institutes within them. Due to time and resource limitations, it was impossible to address the all of them with this study and hence based on different selection criteria like vicinity of the organization or institute and experience of organization/institute in the generation and transfer of agricultural knowledge, only few of them in the group were identified and made part of the study. Based on these selection criterions and the indicated limitations, the following were included in this study:

- Ministry of Agriculture from the federal government organizations,
- Ethiopian Agricultural Economist Professionals Associations from civil societies,
- National Agricultural Research Institutes Main Office, Debrezeit Agricultural Research institute , Holota Agricultural Research Institute, AAUDZAC and JUCAVM from national research centers,
- International Livestock Research Institute (ILRI) Addis Ababa and five (5) other international agricultural research projects within it such as IWMI, LIVES, IFPRI, ICIPE and ICARDA.
- from international research institutes,
- Ethiopian Meat and Diary Technology Institute from agricultural training centers,
- Netherlands International Development (SNV) from NGOs and

- Eden Agricultural Field Enterprises from Agro Business were selected and participated in the study based on their willingness.

The International Livestock Research Institute (ILRI) is an international agricultural research institute based in Nairobi, Kenya and principal site in Addis Ababa, Ethiopia. ILRI in Addis Ababa is located on the east side of the city, close to the airport and local shops. It is particularly well-located with regard to Addis Ababa's agricultural community – the Ministry of Agriculture, the Ethiopian Institute of Agricultural Research, and the FAO sub-regional office are all close neighbors. The campus houses offices, laboratories and related buildings of ILRI as well as the offices of eleven partner institutes including ILRI Diseases. It focuses its research on building sustainable livestock pathways out of poverty in low-income countries.

The Ethiopian Ministry of Agriculture- (MoA) is the government ministry which oversees the agricultural and rural development policies of Ethiopia at federal level. The powers and duties of the MOA include: conservation and use of forest and wildlife resources, food security, water use and small-scale irrigation, monitoring events affecting agricultural development and early warning system, promoting agricultural development, and establishing and providing agriculture and rural technology training. The structure of the ministry owns Extension Directorate to oversee agricultural research impacts and the section has 22 experts to carry out the tasks.

SNV is an international not-for-profit development organisation started out in the Netherlands more than 40 years ago, it is now working in **38** of the least developed countries worldwide including Ethiopia. The organization's global team of local and international advisors work with local partners to equip communities, businesses and organisations with the tools**,** knowledge and connections they need to increase their incomes and gain access to basic services - empowering them to break the cycle of poverty and guide their own development. By sharing its specialist expertise in Agriculture, Renewable Energy, and Water**,** Sanitation **&** Hygiene, it contribute to solving some of the leading problems facing the world today – helping to find local solutions to global challenges and sowing the seeds of lasting change. SNV in Ethiopia is located in Addis Ababa, Kirkos sub city. The organization is led by Country Director and has currently around 25 workers serving under agricultural department.

The Ethiopian Institute of Agricultural Research (EIAR) has evolved through several stages since its first initiation during the late 1940s. The establishment of the Institute of Agricultural Research (IAR) in 1966 saw the first nationally coordinated agricultural research system in Ethiopia. The EIAR consist of Federal Agricultural Research Institutes, Regional Agricultural Research Institutes (RARIs), and Higher Learning Institutions (HLIs). EIAR is responsible for the running of federal research centers, and RARIs are administered by the regional state governments. In addition to conducting research at its federal centers, EIAR is charged with the responsibility for providing the overall coordination of agricultural research countrywide and advising government on agricultural research policy formulation. The Institute's core mandates are supply of improved agricultural technologies popularization of improved technologies, coordination the national agricultural Researches and Capacity building of Researchers. Currently, the EIAR comprise 55 research centers and sub-sites located across various agro-ecological zones. The research centers vary in their experience, human, facility, and other resources capacities. Some of the research centers and sites have one or more sub-centers and testing sites.

Debrezeit Agricultural Research center is one of the sixteen federal research center established in 1953 and located at a distance of 47km to the east from Addis Ababa. The center is administered by one center director and two sub coordinators for cereal and poultry research commodities.

Hollota Agricultural Research center is also one of the federal research center located 36km away from Addis Ababa to the west in Hollota Town. The center is lead by center coordinator and totally the center encompasses 28 senior researchers and scientists working on agricultural research activities.

Addis Ababa University, established in 1950, is the oldest and largest higher education institution in Ethiopia. The University has made a remarkable contribution to the country through provision of trained manpower, research and community services. The structure of AAU consists of 10 Colleges and seven Institutes. College of Agriculture and Veterinary Medicine is among them and is located in Debrezeit. The college has seven departments and is administered by dean of the college as well each department has its own department head. In addition the college has Research and Technology Transfer office responsible to coordinate research activities within the college.

Jimma University (JU) is a public higher educational institution established in December 1999 by the amalgamation of Jimma College of Agriculture (founded in 1952), and Jimma Institute of Health Sciences (established in 1983).The two campuses are located in Jimma city 335 km Southwest of Addis Ababa with an area of 167 hectares. JU aspires to be the leading public premier in the country, renown in Africa and recognized in the world as vision and it quests to be center of academic excellence integrating Training, Research and Service. JU is organized in six colleges and JU Agricultural and Veterinary Medicine College is one of the six colleges which offers vinous programs and carries out agricultural researches at different level. The college has six departments and is administered by the Dean of the college and each department is led by department heads. The college also has a responsible person for coordinating research activities within it.

The Ethiopian Economists Professional Association (EEA) was established as a non-profit making, non-political and non-religious professional Association. It is involved in research and in organizing short term trainings on various issues that are of critical importance to Ethiopia's agricultural development. It is governed by general assembly and has an executive leader to lead the association. The association's structure has Agricultural Research and Rural Development section responsible to oversee agricultural research activities and the section encompasses 2 employees to perform the task.

Eden field Agri -Seed Enterprise was established in January, 2007 mainly to supply quality tree and fodder seeds. The enterprise obtained the permit through the support of relevant institution like the directorates of agricultural extension and natural resources of Ministry of Agriculture and Rural Development. The enterprise is located in Addis Ababa at Yeka sub city.

3.2. Study Population and Sampling Procedure

All ILRI and partner institutes with it, National Research Institutes and Stakeholders were the units of analysis and researchers and individuals within the institutions/ organizations were key respondents of the study, consequently, the sampling technique used for quantitative data collection was both purposive and random sampling. On the other hand, only purposive sampling was used for qualitative data collection.

3.2.1. Sample Selection

From the sample frame, (the listing of the accessible population from which the sample was drawn), the qualitative and the quantitative samples was extracted. To determine who actually participated in the quantitative study, a frame originating from the list of personnel in the organization's/institute's list or database was available from their websites or from their HRM department. Selection of participants was from employees who had a direct involvement in the generation, transfer and acquisition of agricultural knowledge. Using the list of personnel, the names of everyone who were in the list was copied and pasted onto a Microsoft Excel spreadsheet. In the column next to where each name appeared, the function =rand ()was inserted, which is Excel's method of putting a random number between 0 and 1 in the cells. Selecting both the list of names and the random numbers and clicking the SORT command in the DATA tab resulted in the re-arrangement of the list to a random order from the lowest to the highest number. This decision was based on the fact that after allowing a random allocation of numbers to people's names, the chances of any of the individuals being included in the study were as good for any one name as for the next name. This process had enabled to select elements in the population which were considered as representative.

3.2.2. Sample Size Determination

In this study, the use of a questionnaire required survey type sample size calculation, meaning that a sample error formula was used. In fact the main factors that determine the sample size are the desired degree of accuracy and the confidence level. Accordingly, a common rule of thumb is a 95% confidence level so that the results are accurate to within ±5%. A sampling error of 5% and a 95% confidence level means that we can be 95% confident that the population would resemble the sample, ±5% sampling error (Ngulube, 2005). The decision in selecting the random sample for quantitative data collection was therefore to have a confidence level of 95% and a 5% sampling error, because the statistical phenomena that came out of the research were not an end in themselves, but a part of results to be compared with those from other data collection methods. The following formula was used to determine the sample size of each organization/institute.

$$n= (z2*p*q*N)/(e2(N-1)+z2*p*q \text{ and } n=N/1+N(e*e)$$

Where P= sample proportion, q = 1 – p; Z= the value of the standard variate at a given confidence level=1.96, n = size of sample. N= Total Population, e= the acceptable error=0.05

3.2.2.1. ILRI and Its Partners Sampling

Population

The population of this research is the ILRI Ethiopia employee community who has direct relationship with the generation and transfer of agricultural knowledge. Thus population included researchers, knowledge workers, partnership and liaison and administrative organs. The Institute encompasses a total 125 employees working at different levels. Of this population, nine are researchers/scientists and twenty six are research officers, research technicians and assistant researchers who have direct relationship with agricultural knowledge generation and transfer. For this study, only researchers/scientist and research officers were deemed to be appropriate which constituted 17 in total.

Sample Size

The result was a sample of 15 researchers/scientists and research officers were selected to provide quantitative data. To collect qualitative data from interviews, purposive sampling was used. In this study, the participants were interview candidates as they can give insightful information. The participants were five (5) researchers/scientists from ILRI and different projects within it and One (1) Knowledge Management and Communication Officer. These were selected from the already delineated sample and perceived by the researcher to be key individuals who would give invaluable insight and more detailed answers to the research questions.

3.2.2.2. Sampling from Stakeholders and National Research Centers

Population

At the ministry of agriculture, the Extension Directorate is the structural organ which is responsible to oversee agricultural research impacts and the section had 25 experts to carry out the tasks from which sample size was determined. JU Veterinary and Agricultural College has 6 department heads for its six departments and is administered by Dean of the college. The college also has one responsible person for coordinating research activities within the college. Totally the college encompasses around 23 senior researchers and scientists. AAU Debrezeit Veterinary and Agricultural College has 7 department heads for its seven departments and one dean of the college as well one Research and Technology Transfer coordinator responsible to coordinate research activities within the college. Currently the college has around 17 senior researchers and

scientists from whom sample was drawn. SNV Ethiopia has 15 workers performing agricultural related activities. Eden Field Agri-Enterprise has a total of two senior professionals being lead by one general manager. Ethiopian Milik and Diary Technology encompassed around 13 experts to perform agricultural research linkage activities. Hollota Agricultural Research center encompasses more than 28 employees being led by one central coordinator with 18 team coordinators. In Ethiopian Economic Professional Association there were two senior professional who were responsible to discharge agricultural related activities.

Sample Size

From the MoA, a sample of 22 individuals calculated with the use of the Sample Size Calculator to be used to collect quantitative data. To collect qualitative data from interviews, purposive sampling was used. In this study, the participants were interview candidates as they can give insightful information. Thus head of extension directorate was interviewed to get qualitative data as he is key individual who would give invaluable insight and more detailed answers to the research questions. JU Veterinary Medicine and Agricultural College was intended to contribute 20 researchers to provide quantitative data and a research coordinator was interviewed to provide qualitative data. Of AAU Debrezeit Agricultural College total population, 14 were selected using the formula to provide quantitative data and one research coordinator was interviewed to get qualitative data. From SNV a sample of 12 individuals were selected to be used to give quantitative data and one person, country director for agricultural department was interviewed to get qualitative data. Of the total population of Eden Agri- Enterprise, one general manager was selected to provide qualitative data and 2 professionals including seed technologist were selected to give quantitative data. From the Ethiopian Agricultural Economist both the 2 individuals were selected purposively to provide quantitative data and one general director for agriculture department was selected for the provision qualitative data. From the Hollota Agricultural Research Institute, 24 people were selected to be used for the provision of quantitative data and 1 center coordinator selected to provide qualitative data. Of the 19 Debrezeit's Agricultural Research Center, 16 were selected to provide quantitative data and one center director was selected for the qualitative data. From the EMDTI, 11 people were selected to provide quantitative date while one person, the institute's director was needed for the provision of quantitative data.

3.3. Data Collection Methods

To elicit the necessary information for the present study, both qualitative and quantitative data were collected to answer the research questions, and to meet the objectives of the study. Besides an extensive literature review about KM and its relevance to agricultural situations was done, a questionnaire and an interview protocol, which is annexed, to this document were developed and used as tools for data gathering, based on the research questions. To collect quantitative data, questionnaires were distributed to the identified individuals both at ILRI and Stakeholders/National Research Centers through email using SurveyMonkey. The qualitative data were collected by face to face interview with the selected individuals who were deemed to provide valuable information.

3.3.1. Survey Design and Instrumentation

Research questions, research objectives, research methodology and the literature review guided the formulation of the questions. The designed questions for the researchers in the research institutes have seven sections namely: General Background, Knowledge Generation, Knowledge Transfer, Relationships with Stakeholders, Knowledge Transfer Mechanisms and Tools, Factors Affecting the Transfer of knowledge and Monitoring and Evaluation. While questions designed for the stakeholders constitute eight sections namely: General Background**,** Knowledge Acquisition, Contacts with Researchers / Research Institute, Contacts with End Users/Practitioners, Knowledge Acquisition/Mechanisms and Processes, Knowledge Transfer, Mechanisms and Processes to End Users, Factors affecting the acquisition of knowledge and Monitoring and Evaluation.

Distribution of the web-based questionnaires (see Appendix A and B) was done with the use of the web-based SurveyMonkey tool for the researchers in both national and international research institutes as well as for agricultural professionals or experts in non research institute organizations.

Due to using SurveyMonkey the potential respondents were accessed in a cheaper and faster way, saved the researcher much effort and time in entering data, reducing and analyzing data and enabled the researcher to easily analyze the responses and download the responses in formats like Excel, SPSS, CSV and PDF.

A structured interview protocol (see Appendix C and D) with open-ended questions was used in this study to collect qualitative data, based on the research questions. The interview which was held with the participants from the research institutes was different from that of the stakeholders. The interview questions were attached to the respondents by their email in advance prior to make the interview to help them think about it.

All interviews were conducted by the researcher. After the interview was completed, the recorded responses were documented in a written form being integrated with the manually recorded one and saved by the names of institute or department of the interviewee for easy access.

3.4. Data Analysis

As this study used a mixed research approach, quantitative data were collected and analyzed to produce one set of results; and qualitative data were also collected and analyzed for another set of results. The two sets of results were compared and contrasted to produce a single interpretation. For the quantitative data, descriptive analysis was done in order to provide description of the data and reduce the data into easily and quickly understood chunks. Data from the Stakeholders and the Research Centers (both national and international) were analyzed separately. All usable responses were analyzed using SurveyMonkey and Microsoft Excel. After the analyses of the responses were done by SurveyMonkey successfully, the researcher migrated all of the data into Microsoft 2007 Excel spreadsheets.

The measurements in this study for **Factors** related survey group included a Likert type rating scale to indicate the strength of responses to the questions (see Appendix A). The scale was created in such a way that 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. Rating averages (or the weighted average) were calculated in SurveyMonkey to indicate tendencies towards “agree”, “neutral” or “disagree”. That meant that if there were more “disagree/ strongly disagree” responses, the rating average was small, while the “agree/ strongly agree” responses attracted the larger rating average of 5.

The results were then presented descriptively and in figures that indicated the “agree”, “neutral” and “disagree” categories, with explanations that included the values of the rating averages. In

the figures, percentages were rounded to two decimal places whenever applicable. For the other groups of questionnaires, multiple question type was used to indicate the order of the choices

In order to provide some structure and meaning to qualitative data, it was cleaned in some way to avoid irrelevant information. As the interview produced a great deal of information, sorting this data, comparing one interview with the other one and drawing themes from it was done in order to provide meaning to the data. A coding frame was used to sort and analyze the qualitative data.

The coding frame of the interviews was prepared in the following ways:

1. Interviews were collected and read thoroughly and relevant texts were highlighted
2. Repeating ideas were identified and grouped together
3. Themes were grouped into more abstract concepts consistent with the study framework
4. List of emerging themes/categories were identified and the text related to the research purpose, concerns and research questions, and marked them
5. Patterns , commonalities and differences were isolated and elaborated
6. Presentation of results were performed through written descriptions

3.5. Ethical Consideration

In Information Science research, emphasis on ethical standards was focused on maintaining the confidentiality of participants. In an educational institution, the Institutional Review Board (IRB) has to be made aware of the research so that they help ensure the anonymity, respect and consent of the participants. In the current study, permission from the JU IRB was sought and granted before proceeding with the study. Additionally, the research was approved by the JU Natural College Postgraduate Research Committee before being undertaken.

CHAPTER FOUR

4. RESULTS AND DISCUSSIONS

4.1. Results of the Study

The findings presented from the research in this study originated from both the qualitative and quantitative methodologies. The descriptive part reflects the qualitative element, while the statistical part reflects the quantitative one. The presentation of findings was guided by themes from the research questions that were specified above in chapter one section 1.4.

4.1.1. Quantitative Findings

This section focuses on presenting the questionnaire results of both the research institutes and the stakeholders separately. The presentation of the results followed the actual sequence of the questions in the questionnaire and results from the research questions are organized into categories that could appropriately address the research objectives. The data are presented in figures and tables, besides the descriptive parts.

4.1.1.1. Quantitative Findings of Stakeholders

4.1.1.2. Response Rate

Following the sample selection procedures explained in Chapter Three, it was deemed appropriate to distribute a total of 49 questionnaires for stakeholders, of which 40 were returned, which gives a response rate of 81.6%. Such a high response rate indicates the degree of study relevance to respondents was attributed to the use of contact persons, executives of the offices stationed at each of the organizations, who had agreed to allow and urge their employees to take part in the study, as well as the provision of frequent reminders, in terms of personal visits to the organizations and email messages sent by the researcher. Reminder messages were sent out three times into the data collection period, after some responses had been received. The message was identical to the first mailing with the addition of a statement indicating that the researcher had not received a response to an earlier request. The survey link was also included with the reminder. All participants were sent reminders, with an apology to those who had already responded by thanking those who had already completed, and requesting those who had not done so to complete the survey.

4.1.1.3. General Profiles of the Respondents

Responses in terms of Organizations Names

Stakeholders' respondents were from various types of organizations including government, private organizations and NGOs which are deemed to have a strong relationship with the agricultural research institutes in Ethiopia in terms of exchanging agricultural knowledge and technologies. From the total respondents, seventeen (17; 42.5%) were from MoA, ten (10; 25%) were from SNV, nine (9; 22.5%) were from EMDTI, two (2; 5%) were from Eden field Agri-Seed Enterprises and the remaining two (2; 5%) were from Ethiopian Economist Professional Associations. The variation in the number of respondents was dependent on the amount of population in the organizations.

Responses in terms of Organization Type

The respondents also indicated the type of the organizations in which they were working at (See Table 4.1 below).

Table 4.1 Responses According to Organization Type

Type of Your Organization		
Answer Options	**Response Percent**	**Response Count**
Extension Service provider	17.5%	7
NGO	27.5%	11
Government agency	50.0%	20
Private sector	5.0%	2
Other (please specify)		3
answered question		**40**
skipped question		**0**

As illustrated in the table 4.1 above, most respondents were from government agency which is 50% and only 2% were from the private sectors. 27.5% respondents were from the NGOs while the remaining 17.5% of the study participants were from the extension service providers.

Responses in terms of Job Title

To find out what job title the study participants had in their respective organization and observe whether or not their careers were relevant to this study, respondents were sought to describe their job titles. Based on the responses obtained, description of their current positions include:

Agricultural Advisors, Senior Research Fellow, Project Leader and Business Linkage Advisors, Agricultural Economic Development Advisors, Agricultural Sector Head, Meat Technologists, Senior Horticulture Expert, Senior Agronomist, Agricultural Extension Experts, Coffee, Tea and Spice Experts, Value Chain Development Advisors, Agricultural Extension Advisor, Senior Experts in the Supply and Distribution of Agricultural Technologies, Development partner Linkage Case Workers , Forage Seed Technologists etc. This ensured that the survey had good coverage of agricultural stakeholders from diverse disciplines and different hierarchies, and could yield highly credible and quality results.

Responses in terms of Qualifications

Survey participants at each organization were asked to choose their answers on a range from Doctoral or equivalent to Diploma regarding their highest academic qualifications and got the following answers shown on Table 4.2 below:

Table 4.2 Highest Educational Qualifications of the Respondents

Your Highest Educational Qualification		
Answer Options	**Response Percent**	**Response Count**
Doctorate or equivalent	2.5%	1
Master equivalent	55.0%	22
Bachelor or equivalent	42.5%	17
Diploma or equivalent	0.0%	0
answered question		**40**
skipped question		**0**

As clearly shown on the above table (Table 4.2), with regard to the respondents' educational qualifications, one (2.5%) had Doctoral or equivalent academic qualification, 22(50%) had Masters or equivalent, 17 (42.5%) had Bachelor or equivalent and none of the participants had diploma or equivalent educational qualifications.

4.1.1.4. Relationship with Research Institutes

This section is aimed at establishing agricultural stakeholder's practices and trends with regard to the relationship they have established with research institutes, the means of interaction among each other and for the existence formal agreement to sustain this relationship.

Responses Related to Relationships

In order to ascertain how the relationship with the agricultural research institutes in Ethiopia were established, question involving the relationship between the research institutes were posed to the agricultural stakeholders' experts and professionals. 37 respondents provided answers to this question and three skipped without answering the questions as shown in the following table, Figure 4.1 below. Respondents were given alternatives to choose from with others options to provide their own ideas which they feel were missed from the choices. Thus 11 respondents provided their ideas through others option.

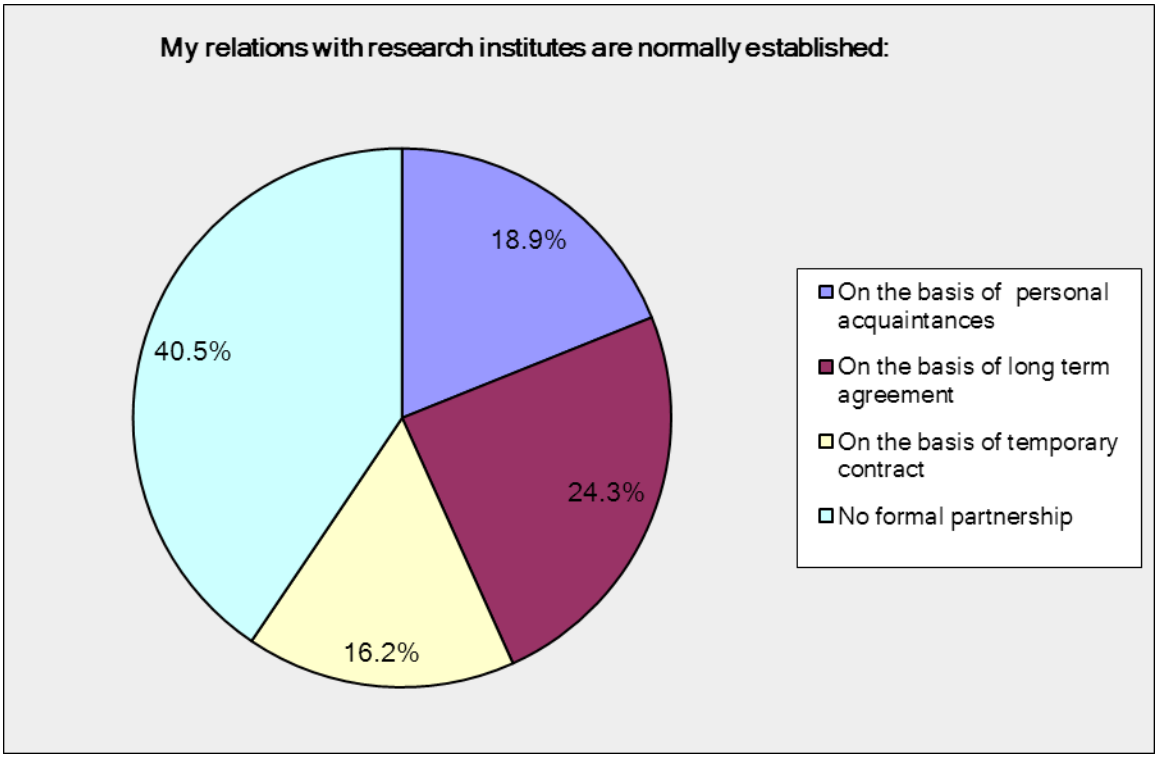

Figure 4.1 Relationships with Research Institutes

Of the respondents, 7 (18.9%) revealed that the relationship with agricultural research institute is established based on personal acquaintances, 9 (24.3%) indicated that the relationship is established based on the basis of long term agreements, 6 (16.2%) stated that the relationship is established on the basis of temporary contact while 15 (40.5%) disclosed that there is no any formal relationship established with the research institutes. In addition to these, some respondents included the following as the basis of their organization way of established its relationship with agricultural research institutes in Ethiopia:

- On the basis of Government Connection (Structural)
- Through platforms like Agricultural Development Partner Linkage Advisory Counsel
- Based on the contacts created during the availability and need of new knowledge

Responses related to Frequency of Contact

The researcher further inquired respondents the frequencies of stakeholders interact with the researchers or research institutes. This question was also answered by 37 respondents and 3 participants skipped to answer this question and 4 of the respondents also gave their own remarks as reflected in the following figure, Figure 4.2.

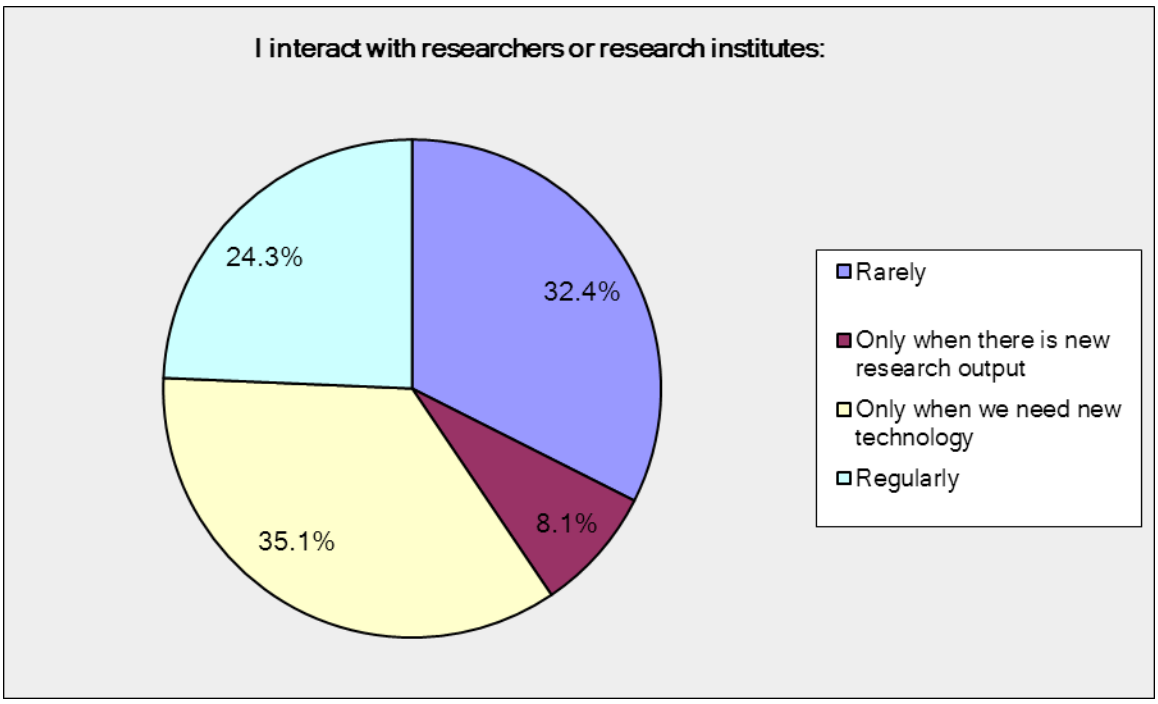

Figure 4.2 Frequency of interaction with Researchers/Research institutes

As depicted on the figure 4.2 above, among the respondents 12 (32.4%) indicated that they interact with the research institutes rarely, 3 (8.1%) made an interaction when there is new research output, 13(35.5%) interacted with the researchers/institutes when they only needed new technology that could meet their own problem, 9(24.3%) interacted with the researchers/institutes regularly. Some other respondents also provided their own views as follows:

- Interactions occur when there are some activities like training and workshops

- When somebody establish a team from both of us to work on something together
- During the allocation and production of initial new technologies

4.1.1.5. Knowledge Acquisition

This section is aimed at comprehending the knowledge acquisition practices of stakeholders from agricultural research institutes: the tools and means used to acquire the knowledge, the institutes from which they acquire knowledge. Questions involving these issues were posed to professionals in the agricultural stakeholders and their responses are given as follows.

Responses Related to Type of Research Institute to Acquire Research output

On the type of research institutes, stakeholders' respondents were inquired to indicate from which agricultural research institute they obtain research outputs directly. Based on this, 37 respondents gave answer to this question and the other three overlooked to answer the question as shown in the following fig, Figure 4.3.

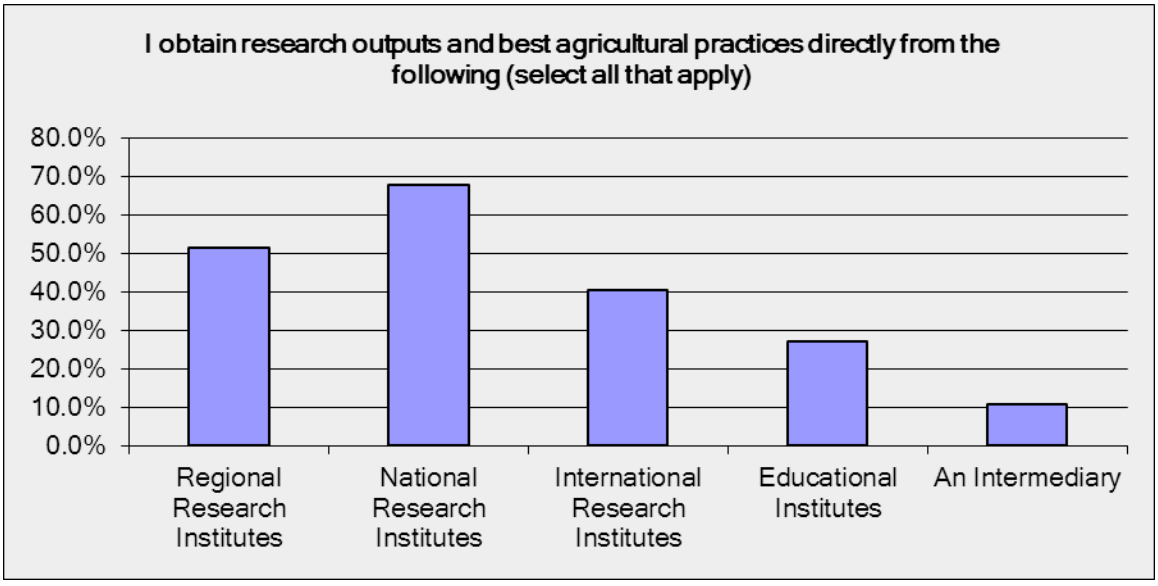

Figure 4.3 Research Institutes to Obtain Knowledge

As reflected on the above figure, figure 4.3, 25(67.1%) stated that they acquire best bet agricultural knowledge from national research institutes, 19 (51.4%) respondents disclosed that they acquire agricultural knowledge from regional research institutes, 15 (40.5%) revealed that their organization acquire agricultural research outputs from international research institutes, the other 10(27.4%) indicated that they acquire the agricultural research output from educational

institute while the remaining 4(10.8%) use other intermediaries to acquire agricultural knowledge from research institutes

Responses Related to Knowledge Acquisition Tools.

Respondents were also asked to indicate and mention the tools utilized to acquire agricultural knowledge from research institutes with the possibility of enabling the respondents to select as many tools as possible. Of the 37 respondents, putting into consideration that three respondents skipped this question to answer, 25 (67.5%) responded that they acquire through research /information reports, 19 (51.4%) responded that they use scientific papers and professional journals, 25 (67.6%) revealed that they acquire agricultural knowledge orally in conferences and workshops, 12 (32.4%) responded that they acquire knowledge through emails, portals, blogs etc while the remaining 15 (40.5%) use media like radio, television. The reflections are shown in the following figure, Figure 4.4.

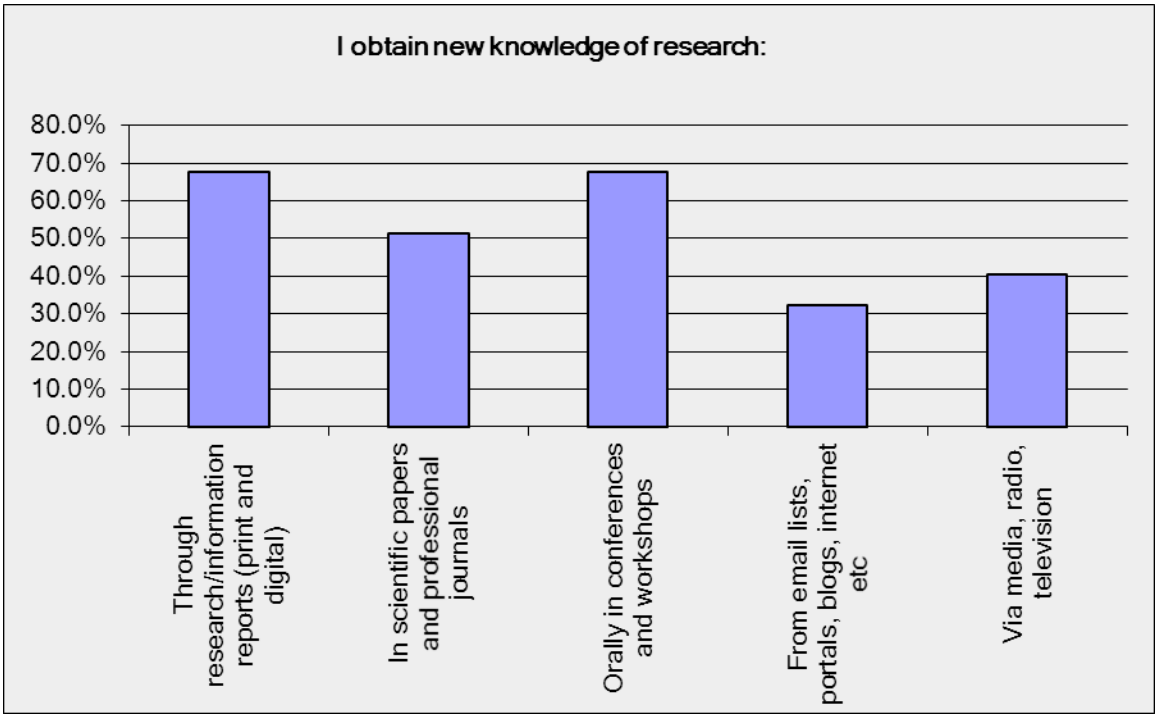

Figure 4.4 Agricultural Research Acquisition Tools

Recommended Methods/Tools to Enhance Knowledge Acquisition /Transfer

Respondents were also asked to recommend best tools and approaches that can be used to enhance agricultural knowledge transfer activities from research to development. Of the 40 study

participants who were eligible to answer this question, 7 did not answer while 33 recommended the following approaches:

- Government driven knowledge sharing and practice improvement schemes (regular bench marking of practices and knowledge)
- Through meetings, workshops calling individual or mini meetings with stakeholders, distributing relevant bulletins, on job trainings, regular follow up, and organizing regular forums
- Using Internet technology, i.e. blogs, Internet stakeholder information sharing platforms sharing research briefs with stakeholders on regular basis
- Organizing research findings into user's friendly short volume manuals and communicating on time.
- Researchers should prepare short and digestible policy briefs, not general not to the point talk for which research studies are known with lengthy introduction and also better interpretation of figures instead of mere tables nice graphs and other visual aids will also help (more pictures/figures/mapping, less long sentenced texts). Better dissemination of knowledge through internet and email portals (or even SMS to farmers or regional stakeholders) and proactively contact relevant stakeholders to have them access the information.
- The research institutes should use a web based system to reach stakeholders, the researchers should contact the stakeholders and give training on how to apply the theoretical aspects, frequent notices should be sent to stakeholders by different mechanisms for the availability of new research outputs
- On farm demonstration and on station like FTC (farmers training centers), full package extension teaching approach, orally on their place.
- Face to face extension approach, using regional, zonal, wereda experts to deliver technologies to end users, using the place of model performers, like model farmers sharing of printed materials on regular basis etc
- Participation of farmers from identification of the research agenda to end results Participatory Technology Development Approach (PTDA) to be followed.

- Participatory Planning, implementation and Evaluation of Research Problems. Adaptation trail on farm plot with the Researcher, Through Field day and field visit, by using different mass media and publication
- By using Development agents assigned in each kebele of each regions and through farmers groups organized in each kebele according to the country agricultural extension system, which is participatory

4.1.1.6. Knowledge Transfer from Stakeholders to End Users

Stakeholder's Contact with End Users

Since knowing which recipient to engage is not easy because of their sheer number, and engaging end users is difficult for the research institutes, stakeholders act between the knowledge generator and recipient for the purpose of knowledge transfer. In line with this view, stakeholders are supposed to contact end users for the exchange of agricultural knowledge. Based on this, respondents were asked to indicate how frequently they make contact with end users. From the 40 appropriate respondents, only 34 gave answer to this question and the remaining 6 skipped it. The results of their response are shown in figure 4.5.

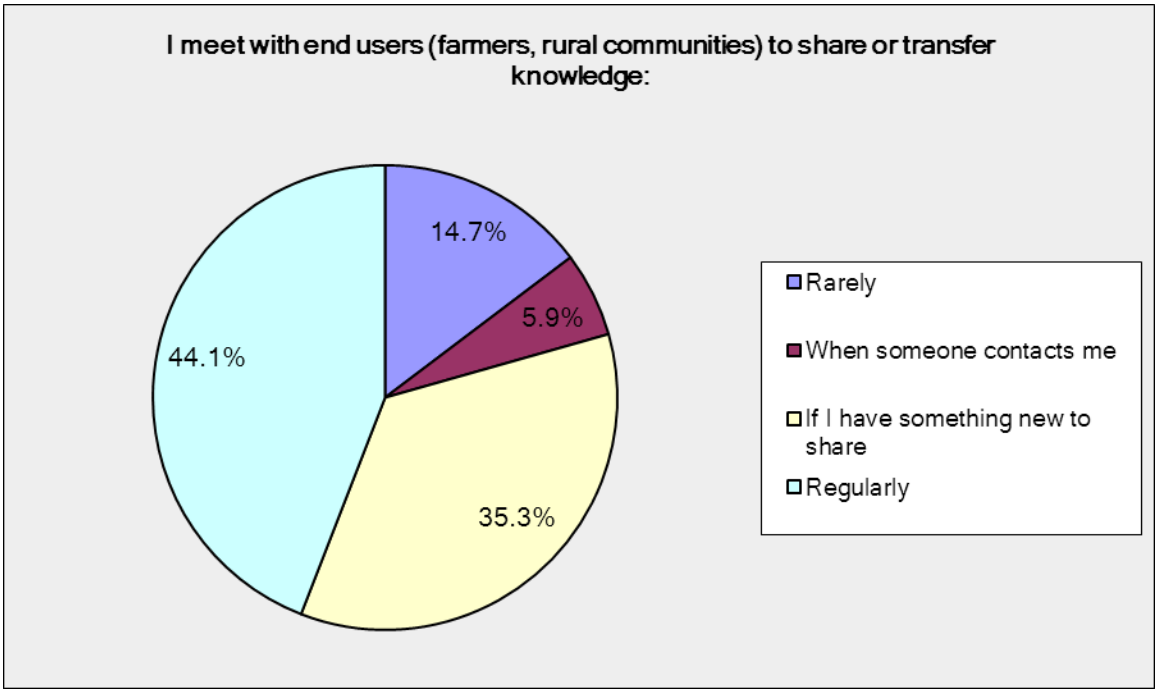

Figure 4.5 Stakeholders Contact with End Users

As shown on the above figure 4.5, 15 (44.1%) stakeholders meet their end users regularly, 12 (35.3%) meet end users when they have new thing to share, 5 (14.7%) interact with end users

rarely for the exchange of agricultural knowledge, and 2 (5.9%) meet with end users when someone who seek agricultural knowledge contact them.

Tools used to Transfer Agricultural Knowledge

Respondents were also asked to disclose the tools and means that are used to transfer knowledge to end users. Of the 40 who were eligible to answer this question, 8 did not answer while 32 stated the following tools and means of transferring:

- stakeholder platforms, web sites, publications, modeling projects, multi-stakeholder joint action coaching
- By providing leaflets that contain information about our seeds, All relevant information on specific purchased seeds that the client purchases by discussion. By organizing a field day
- Using visual aids like Pico flip charts , group discussions individual approaches demonstration sites farmers
  training centers & pastorals training centers
- Trainings and workshops. Demonstrations in FTC's and on site. using regional. zonal and wereda

  experts to deliver technologies. Face to face extension approach.
- By using group extension approaches through developmental and net working groups,

  with development agent
- Through training, experience sharing by scaling up best practices by manual and package

  Preparation and distributing it to the users, etc..

Direct Research Transmission from Research Institute to End User

Due to several reasons, including mandates, strategic directions and capacity limitations, agricultural research institutes in Ethiopia reach end users through stakeholders. In order to know whether such mode of reaching end user is effective or not in terms of boosting the effective utilization and application of the agricultural knowledge, respondents in the stakeholders were asked if the research institutes should transfer their agricultural knowledge directly to end users instead of through stake holders. On this question, 34 respondents provided answer to this

question while 6 respondents did not. The result which is demonstrated in the following figure, figure 4.6, clearly depicted that 26 (76.5%) respondents say that research institutes should transfer their agricultural knowledge directly to end users while 8 (24.5%) respondents do not support the direct transferring of agricultural knowledge from research institute to end users.

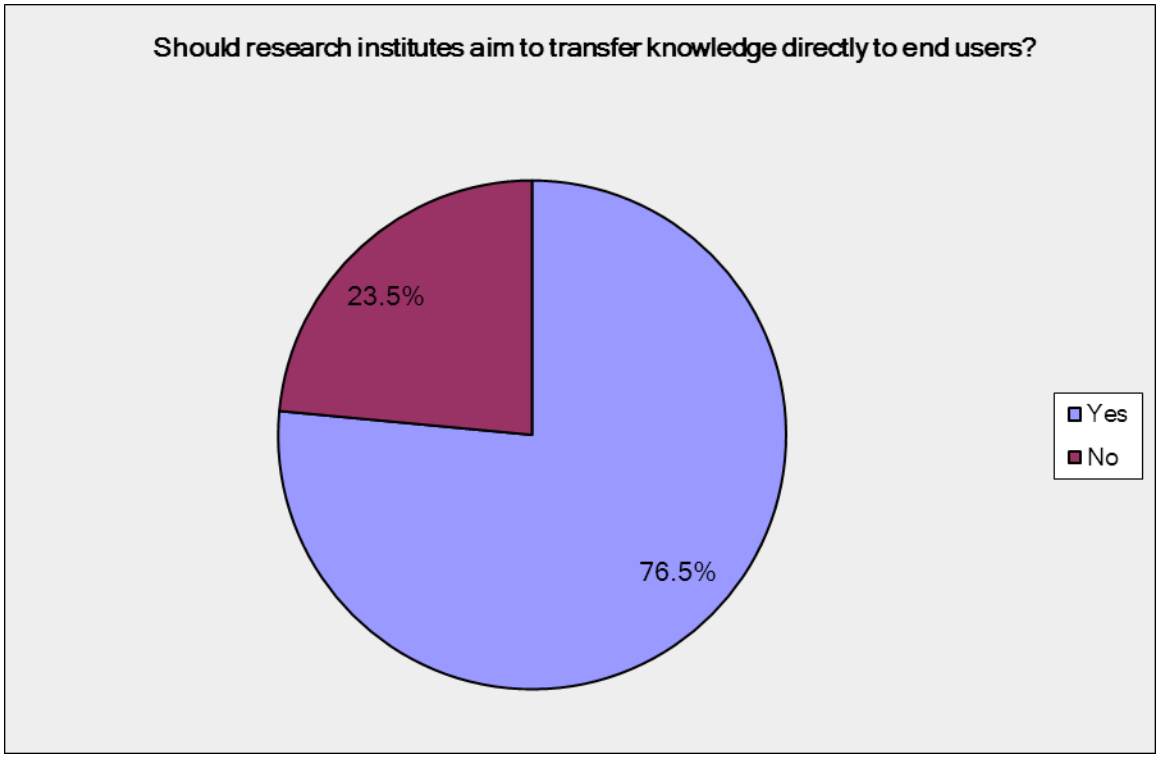

Figure 4.6 Direct Knowledge Transfer to End User

Furthermore, respondents were requested to justify their reasons of selecting either **Yes** or **No**. Of the 34 respondents, 28 of them explained their reasons as shown below:

- End users find first hand information from the researcher, researchers also can observe the problem of the end user on the spot,
- I agree with this idea because this will help the end users to get knowledge directly from the source. This avoids distortion of information which might occur in the process of dissemination by intermediate stakeholders.
- Yes, for me it is not the time to research rather to implement and engagement for change. They have so many good things on their shelf, but they just locked their doors and they expect people to come to them. For me it is time for research center and use us-NGOs,

we have so many targeted households to reach and improve their productivity, increase their income. So they should come join hands with us.

- Yes, because if researchers do the transfer by themselves it will simplify how to apply the theoretical findings as the intermediary body may not fully understand it and interpret
- Actually researchers are supposed to do their task on station and on farm. But it is by far good to see their technology is helping the end user. The regular route of technology transfer is the extension way.
- They can exclusively know the technology that they want to transfer and is better to disseminate to the end users
- I think the research institutes should have a knowledge transfer methods in their vicinity. However for a vast area of communities direct knowledge transfer by Research institutes could be difficult. Therefore in that case it is better to use the extension method through partners.
- The research institutes should plan to transfer knowledge at end user level to look at the outcomes of the research at that level either to get feedback and plan again other research and advise farmers how to apply the knowledge
- Because of "Ownership". Unless otherwise many researches are left on shelves. Since many believe that the research institution should only focus on Research and the Agriculture Bureau, for Agriculture, is responsible to disseminate the new technology. But "do the agriculture offices experts at Woreda level have the capacity to do so? This s the question that needs answer.
- Research should not be limited with generation of improved technologies and practices. It should also be involved in capacity building, provision of extension services, advisory services, etc. the end users like farmers, cooperatives and the private sector should be able to work directly with research institutes through involvement of the relevant stakeholders
- There are legislative divisions of labor between institutions. Research generates new technology/knowledge, verify it and give it to the extensionists found in other institutions, MoA, ATA, NGO's, etc.
- There mandate is invention activity, but not adoption. This is the task of M0A. But bilaterally research institutes can directly address to end users.

- Dependence up on extension agents for technology transfer cannot be effectively move the work as deemed. Researchers must first know the end users demand driven technologies as well as easy mechanisms for adoption too.
- Research institutions are established to create knowledge that will be useful to the end user. Having the research is not as such an end product by itself. Therefore, communicating created knowledge to the end user is vital. This could be done via other actors in between them but I believe the knowledge transfer will be smooth and efficient if there is a direct knowledge between the knowledge Creator and the user. According to my recent research, farmers who are have direct linkage to universities; research institutes have higher chance to adopt new innovations which have a positive effect on their performance.

Effective Utilization of Research outputs by End User

After agricultural research output is disseminated to end users through stakeholders, end users are expected to utilize and apply the acquired knowledge effectively in accordance with its implementation procedures provided by the researchers. In doing so, the required impact will be observed and agricultural productivity will be enhanced. Putting this into consideration, stakeholders' respondents were asked for their thoughts whether or not the knowledge transferred to end users are utilized and applied by end users effectively. From the 40 responded participants, 34 gave their answer to this question and the remaining 6 participants did not supply an answer to the question. The results of the respondents were illustrated on the following figure, figure 4.7.

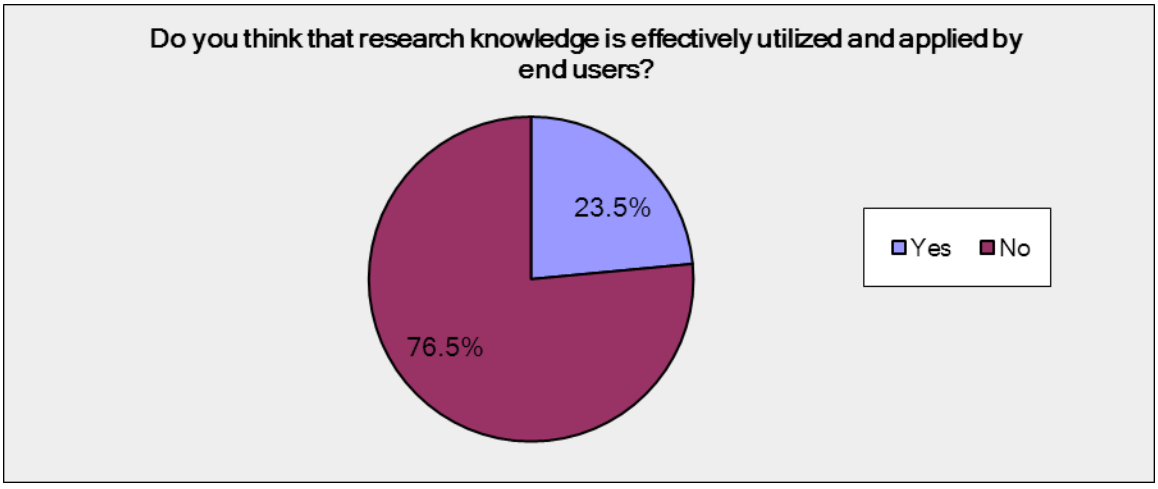

Figure 4.7 Utilization of Research outputs

As illustrated on the figure 4.7 above, 26 (76.5%) respondents do not think that the transferred knowledge is utilized effectively while 8(23.5%) respondents believed that the transferred knowledge is effectively utilized by end users. In addition to picking out their choices either Yes or No, participants were invited to explain their reasons of selecting one of the either choice. To this end 28, participants pledged their justification as described below:

- There is lack of support from researchers- they don't have incentive to do so, they don't have research to do so the end users don't know what is happening and we are a bit skeptical to show the results and know the benefit.
- We know research institutes have done tremendous job for more than 4 decades. However, regarding in the area of livestock production and productivity, the availability of crossbred cattle for better milk & beef production and the availability of quality improved forage seeds are always serious problems.
- All important research outputs reside in research centers and do not make it out to end users. Also accountability is wrong (now to supervisor or manager research institute or in some cases government) but there is no accountability to end users in terms of getting info out and adopted
- The knowledge generated by research centers are not farmers demand based rather it is researchers need based and recourse based on hand so that the end users resist to accept it
- Lack of knowledge by farmers, lack of capacity (financial, infrastructure etc), lack of commitment by experts
- The full package of the research output is not applied in many areas. That's why we see different results in applying the same technology.
- Because now days farmers are familiar to use the new technology and apply on the field
- In my view research outputs are most of the time more scientific and follow scientific methods, however end users didn't utilize scientific methods. Therefore the researches out puts are most of the time coined to the existing environment of the end users and utilized.
- No in our context, some reasons for this 1. the level of education of our farmers, Resource availability- poor farmers, limited Access to research knowledge, 4.some research results are not in line with the context of our farmers

- The linkage of the research with extension, private sectors and universities is very limited and most research do not focus on priority problems of production, processing and marketing aspects.
- Effectiveness can be measured on the utilization of end users. If something which was innovated by researchers is effectively utilized by the end users, the things have to be highly demanded. Few things may have a chance to be highly demanded and scale up. But, more things were not properly applied by end users due to resistance and properly aware and transfer the knowledge and skill.
- Because knowledge transfer in a sustainable manner and it is not participatory for all the farmers in every agro ecology.
- Unless technologies are generated based on users needs and problem solving ,the knowledge is not effectively used, So many technologies were generated, but they in shelf's, user not provide attention to the knowledge of the research ,unless the thematic areas are address the need of the users.

4.1.1.7. Monitoring and Evaluation

The researcher also inquired the availability of means and mechanisms to evaluate and monitor the effectiveness and impact of the transferred knowledge to end users. Although 40 participants responded to this survey, only 30 respondents gave explanation on this question while the remaining 10 overlooked to provide their explanation on how they perform the monitoring and evaluation. Descriptions of the responses are given as follow:

- Monitor changes in practice and behavior, measuring outcome at productivity, income and usage of products, measure how empowering are new technologies
- Through consistent system based follow up and field visit programs and supervising or inspecting the activities done on the field and also collecting feedbacks from user and DAs, by observing the availability of product on the market, end user's satisfaction and improved living standard
- The effectiveness of knowledge transfer is evaluated when the end users improve their production methods and produce much fruitful results. If the end users didn't have fruitful results then the knowledge transfer either was not successful or the technology or research output had a problem or is not applicable for that end users.

- Through undertaking multi-stakeholder discussions, field visits, asking farmers and the private actors for feedback, etc
- Through random assessment after short trainings provided to development agents and the end users /farmers.
- By using survey with using check list/questionnaires/ at the end users is one of the method, and evaluate the skill of the end users how they apply and also evaluate the changes regarding base line data or before the knowledge transferred.
- When we intervene we collect baseline data and when we finish we collect data and compare the result to see if the transferred knowledge have impact (effect) on our objective. But please note that most of the time it is difficult to disentangle this effect because transferring the knowledge is part of bigger assignment, in other-word we provide other services in addition to transferring the knowledge.

4.1.1.8. Factors Influencing Acquisitions of Agricultural Knowledge

To enhance the agricultural production and productivity, increasing agricultural practitioners' access to and effective utilization of agricultural knowledge through identifying and working on the problem that affects the agricultural knowledge management play a significant role. A number of different rationales are proposed for the underutilization of research knowledge, a gap between "what is known" from research, and "what is currently done" in practice settings. The conceptual framework of this study is based on the assumption that the transfer of agricultural knowledge are influenced by a number of factors that are broken down into three major categories: determinants related to disseminated knowledge attributes, those related to the actors involved in the process, and determinants related to transfer mechanisms. Depending on this view, survey participants were inquired to evaluate factors which deemed to affect the proper acquisition and transfer of agricultural knowledge from research institutes to stakeholders and then to end users on the basis of a scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) and obtained the following results shown in following tables

. *Table 4.3 Research Organizations Plan on Research Output Transfer*

Research organizations have no specific or formal plan for research transfer							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
	5	8	8	9	3	2.91	33
						answered question	**33**
						skipped question	**7**

Table 4.4 Accessibility of Research Knowledge

Research knowledge is easily accessible							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
	6	21	4	2	1	2.15	34
						answered question	**34**
						skipped question	**6**

Table 4.5 Easiness to Contact and know Researchers

It is easy to know and contact researchers							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
	3	11	8	7	4	2.94	33
						answered question	**33**
						skipped question	**7**

Table 4.6 Participation of Stakeholders

Research institutes fully involve stakeholders in their research							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
	4	18	8	3	1	2.38	34

answered question	**34**
skipped question	**6**

Table 4.7 Use of Effective Media and Channel

Research institutes use effective media and channels to communicate with the stakeholders							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
	5	19	5	3	1	2.27	33
						answered question	**33**
						skipped question	**7**

Table 4.8 Transparency of Research Institutes

Research institutes and their work is well-known to stakeholders							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
	4	18	8	4	0	2.35	34
						answered question	**34**
						skipped question	**6**

Table 4.9 Language is Appealing

The language used to communicate research findings is accessible and appealing							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
	4	14	8	8	0	2.59	34
						answered question	**34**
						skipped question	**6**

"**Research organizations have no specific or formal plan for research transfer**" was posed to respondents to evaluate it as a key factor which affect the agricultural knowledge acquisition from research institutes. Of the total respondents of the survey, 33 answered this question and the remaining 7 did not answer. As can be clearly seen from the table 4.3 above, 5 (15.2%) of the respondents strongly disagreed that "**Research organizations have no specific or formal plan for research transfer as a key factor"** as an influencing factor**,** 8 **(**24**.2**%) respondents disagreed with this idea, the other 8 (24.2%) respondents were ambivalent about that, 9(27.3%) respondents agreed and 3 (3%) respondents strongly agreed. A rating average 2.91 reflects that most respondents were neither agreed nor disagreed research organizations have no plan for research transfer as a key influencing factor to influence knowledge transfer. Regarding the easily availability of research knowledge, out of the 40 respondents 33 provided their evaluation and the rest 7 did not. The result of this evaluation was provided above.

As can be observed from the table 4.4 above, the accessibility of research knowledge seen as the major barrier for the knowledge transfer, 6(17.6%) respondents strongly disagreed that research knowledge is easily accessible, 21(61.8%) respondents disagreed about that, 4(11.8%) respondents were neither agreed nor disagreed with the idea, 2(5.9%)) respondents agreed that research output is easily accessible and only 1(2.9%) respondent strongly agreed with that. A rating average of 2.15 reflects that most respondents did not agree that research outputs was easily accessible. The question "It is easy to know and contact researchers" was another factor posed for the respondents. Of the total respondents of the survey, 33 provided their answer to this question while the remaining 7 did not. The results of the respondents were reflected on the following table:

The results on the above table 4.5, after evaluating "it is easy to know and contact researchers" as major barrier to transfer knowledge, 3 respondents strongly disagreed that it is easy to know and contact researchers in the research institute, 11 respondents disagreed about that, 7 respondents agreed that it is easy to contact and know researchers and 4 respondents strongly disagreed it with the rating average of 2.94. the rating average 2.94 replicate that most of the respondents were neither agreed nor disagreed that it is easy to know and access researchers in the research institutes. "Research institutes fully involve stakeholders in their research" was another factor that was posed to respondents if the saw it as a major facto to affect the knowledge transfer activities. Of the total respondents of the survey, 36 participants answered this question

and the remaining 6 overlooked it to give evaluation. The table below shows the results of the responses:

As can be observed from the table 4.6 above, 4 respondents strongly disagreed that research institutes fully involve stakeholders in the research, 18 respondents disagreed that the research institutes involve stakeholders in the research, 8 respondents remained neutral, 3 respondents agreed about that and only one respondent strongly agreed research centers involved stakeholders in research with the rating average of 2.38. A rating average of 2.38 replicated that most of the respondents were not agreed that research centers involved the stakeholders in research. "Research institutes use effective media and channels to communicate with the stakeholders" was another statement posed by researcher to respondents to evaluate it as a factor for the transfer of agricultural knowledge. 33 respondents out of the total gave evaluation for this statement and the other 7 didn't. The following table provides summery of the evaluation responses

Based on the result reflected on the above table 4.7, 5 respondents strongly disagreed that research institutes use effective media and channel to communicate with the stakeholders , 19 respondents disagreed about it, 5 of the respondents neither agreed nor disagreed with the issue, 3 respondents agreed the institutes used effective media and channel and 1 respondent strongly agreed that the research institutes use effective media and channels to communicate with the stakeholders with the rating average of 2.27. A rating average of 2.27 replicated that most of the respondents did not agree that research institutes used effective media and channel to communicate with their stakeholders. Another issue posed for respondents for their evaluation of the factors that hampered transfer of agricultural knowledge was the transparency of the research institutes. Inquiry of evaluation was presented to the respondents through this statement" Research institutes and their work is well-known to stakeholders". 34 respondents out of 40 provided their evaluation to this question while the remaining 6 skipped it. The result of the responses can be seen on the following table:

As can be observed from the table 4.8 above, of the total respondents 4 of them strongly disagreed that research institutes and their work is well known to stakeholders, 18 respondents disagreed about that, 8 respondents neither agreed nor disagreed, 4 respondents agreed and no respondents agreed that research institutes and their work is well known to stakeholders with the

rating average of 2.35. A rating average of 2.35 reflected that most of the respondents did not agree that research institutes and their work is well known to stakeholders. Finally the researcher inquired respondents to evaluate the languages research institutes used to communicate their research findings with their stakeholders as a factor by posing this statement" The language used to communicate research findings is accessible and appealing". Based on this, 34 respondents provided their evaluation towards the issue and the remaining 6 did not. The result of the respondents were presented in the following table

Based on the results showed off on the table 4.9 above, of the total respondents 4 of them strongly disagreed that the language used to communicate the research findings were accessible and appealing, 14 respondents disagreed the issue , 8 of the respondents remained neutral about that, the other 8 respondents agree on the issue, and none of the respondents were agreed strongly that the language used by the research institute to communicate their findings were accessible and appealing with the rating average of 2.59. A rating average of 2.59 exposed that most of the respondents showed their impartiality about the issue.

4.1.2. Quantitative Findings of Research Institutes

4.1.2.1. Response Rate

A total of 67 questionnaires out of 89 were completed. This was 75.3% of the total sample. Although the response rate is lower than that of the stakeholders' which attracted 85.1%, it was considered as an outstanding response rate according to different scholars. Kittleson and Brown (2005: 11) point out that "a 40-50% response rate may indeed be outstanding when one considers the amount of information overload to which many users are exposed", and they also suggest that the response rates from web based surveys continue to decrease.

4.1.2.2. General Background of Respondents

Response in terms of Research Institutes Name

All respondents were employees of research institutes both national and international and also higher educational institutes. At the time of this study, each employee had an e-mail address, computer and Internet access. Ethiopian institutes of Agricultural Research, Jimma University College of Agriculture and Veterinary Medicine, Addis Ababa University Debrezeit Agricultural and Veterinary Medicine College, International Livestock Research Institutes and other

international research institutes within it were the research organizations which partook in this study. Due to proximity, Debrezeit and Hollota Agricultural Research Centers were frequently visited by the researcher to collect the data while the remaining centers were contacted centrally through EIAR.

Responses in terms of Scope of the Research Centers

Since this study was intended to investigate the knowledge generation and transfer practices of agricultural research institutes in Ethiopia, it was imperative to know the scope of the research organizations which took part in this study and thus respondents were inquired to select from the given alternatives the scope to which their organization belongs to. On examining responses reflected in table 4.10, (59; 88.1%) of the respondents were from the national research institutes including higher educational institutes while (8; 11.9%) were from the international research institutes. According to the SurveyMonkey, the largest number, 88.1% respondents were from the national research institutes and higher educational institutes. This was due to the number of international research institute in Ethiopia were very limited compared to the national one.

Table 4.10 Organization Scope

Scope of your organization		
Answer Options	**Response Percent**	**Response Count**
Local	0.0%	0
Regional (in Ethiopia)	0.0%	0
National	88.1%	59
International	11.9%	8
answered question		**67**
skipped question		**0**

Responses in terms of Job Titles

To find out what job title they had in their respective organization and to observe whether or not their careers were relevant to this study, respondents were sought to describe their job titles. Based on the responses obtained, description of their current positions include: lecturer, professor, Researcher, Scientist, Director of Agricultural Researches, Research Team Leaders, Agricultural Research Centers Coordinators, Information and Communication Directors, Knowledge Management and Communication Experts, Research Officers, General Experts etc.

This ensured that the survey had good coverage of relevant agricultural researchers from diverse disciplines and different hierarchies, and could yield highly credible and quality results.

Responses in terms of Educational Qualifications

As far as the educational qualification is concerned, respondents who participated in this study from the research institutes were diverse in their educational qualifications. As shown in table 4.11, many of the respondents possess masters degree and above and were directly involved in the agricultural knowledge generation and transfer activates.

Table 4.11 Educational Qualifications

Your highest educational qualification		
Answer Options	**Response Percent**	**Response Count**
Doctorate or equivalent	25.4%	17
Master equivalent	49.3%	33
Bachelor or equivalent	25.4%	17
Diploma or equivalent	0.0%	0
answered question		**67**
skipped question		**0**

As can be clearly seen from the table 4.11 above, (17; 25.4%) respondents own Doctorate or Equivalent educational qualification, (33; 49.3%) have Master or equivalent, (17 ;25.4%) possess a bachelor degree as their academic achievement. Of the total respondents, no one was in the academic qualifications of below bachelor degree so that zero respondents owned diploma or equivalent educational qualification.

4.1.2.3. Knowledge Generation

Responses related to Types of the Generated Knowledge

In order to get insight about the types of knowledge generated by the agricultural research institutes in the country, the researcher requested the participants to describe the kind of knowledge they generate in the areas of their own expertise by posing this question to them **"*What type of knowledge (inventions, innovations, novelties, discoveries) is generated from your area of expertise*?"** In addition to getting insights about the type of agricultural knowledge produced by the research institutes, comprehending whether the researchers produce agricultural

knowledge based on the actual problems of the end user or stakeholders was the other aim of the question.

Based on this inquiry, 52 respondents out of the total respondents to this survey provided answers to this question while the remaining 15 did not and summery of the retorts were provided as follow:

- Technologies, scientific information, management practices and experiences of fisheries, aquaculture, other aquatic lives and water bodies
- Mostly basic research output which could be easily publishable. Not much focus on problem solving.
- Best genotypes breeds selection, factors analysis on farm animal performance and investigation on rules of inheritance in farm animals etc
- Research Technologies(improved seeds; Livestock breeds, Farming systems; animal husbandry etc) and agricultural information
- Develop a breed (chicken) adapted to farmers' management conditions (including management guide concerning the specific breed developed) and provide training and consultancy with respect to poultry production
- Technologies on poultry feed and feeding improvement and technologies on disease prevention and control strategies for small scale producers.
- We generated new technologies (like providing improved varieties, management practice) that brings a change to the livelihood of Ethiopian farmers.
- I have knowledge more in administration/research support areas that is change management and ethics expert to make the research process qualified and align to research rule and regulations/making ethical /especially I focused in respecting of research ethics.
- Policy related issues, adoption results, communication products.
- knowledge that identify technologies, and management practices that works for farmers
- New ways of mainstreaming gender in Livestock and Irrigated Crops value chains for smallholders in Tigra, Amhara, Oromia and SNNP Regional States.
- The impact of new technologies (e.g. agricultural water management technologies) on household livelihoods.

4.1.2.4. Knowledge Transfer

"Knowledge transfer" is a process by which research outputs were "pushed" by the producers of research to the users of research output. It is a process whereby relevant knowledge is made available and accessible to end users or stakeholders for application in practice, planning, and policy making. It occurs not only at the end of a process, project, or research study, but is active throughout the life of a project, from start to finish. Putting this into contemplation, the researcher intended to investigate the knowledge transfer practices that were in place in the agricultural research institutes of Ethiopia, the mechanisms used to transfer the generated agricultural knowledge, their impact assessment means, the inducements granted to the researcher due to transferring knowledge etc. This section discusses the output gained from the respondents in this regard.

Responses in terms of the Dissemination Mechanisms

Knowledge dissemination mechanisms, which are the major determinants of agricultural knowledge transfer, consist of all the means through which knowledge moves along the knowledge transfer process. They allow actors (i.e. researchers, Transfer agents and practitioners) to exchange knowledge and information. Based on this, respondents were asked to indicate how they disseminated the newly generated research output. A multiple choice question was posed to participants to indicate one or more of their definite transferring mechanisms. Furthermore, respondents were given an option to specify their own mechanism if the felt it is missed from the given alternatives. Of the total respondents of the survey, 57 endowed their answer and the rest 10 did not answer while the 13 respondents offered their own specifications in addition the options listed in the selection. The results of the responses were presented in figure 4.8

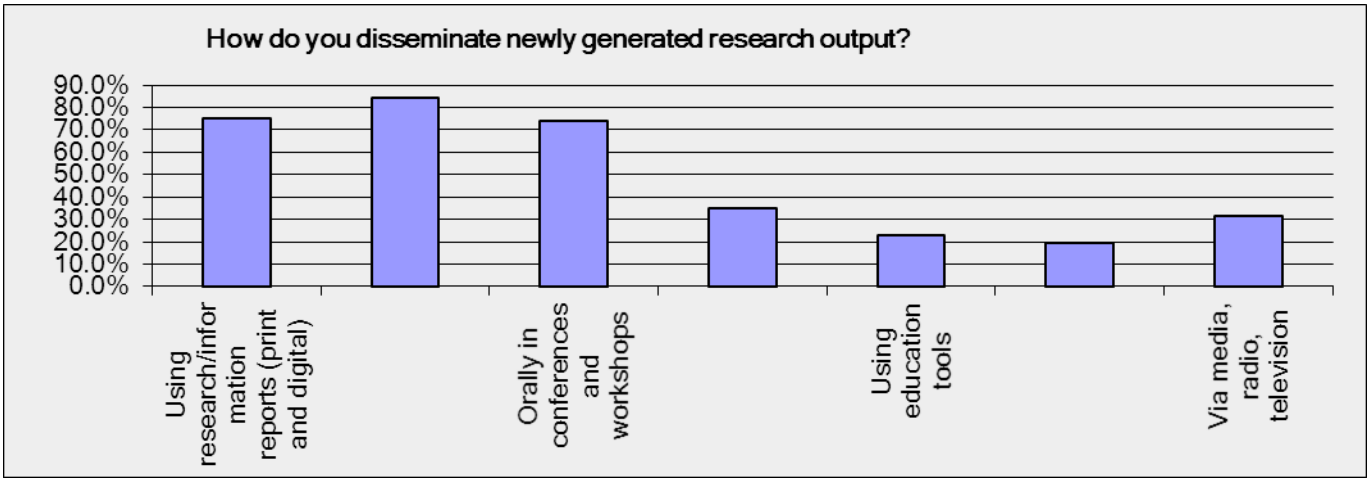

Figure 4.8 Agricultural Knowledge Transfer Mechanisms

As it can be seen clearly from the figure 4.8 above, agricultural research institutes utilized varieties of mechanisms to reach stakeholders with their knowledge. (48; 84.2%)of the respondents used scientific papers and professional journals to disseminate their knowledge, (43; 75.4%) of the respondents use research/information reports both in print and digital form to disseminate their knowledge, (42; 73.7%) of the respondents disseminated their knowledge orally in conferences and workshops, (20; 35.1%) of the respondents got in touch with their stakeholders by preparing best practice guides, (13; 22.8) of the respondents brought into play educational tools t disseminate their knowledge, (11; 19.3%) of the respondents disseminated their knowledge by posting to email lists, portals, blogs etc and (18; 31.6%) of the respondents made use of different medias like radio and television to disseminate their research output. In addition to these, there were respondents who put forward supplementary mechanisms and their results are described as follow:

- Using Community Based Educations
- Organizing one of the agricultural products' element days (like fish day, crop day…)
- Using field days , demonstrations and exhibitions
- Organizing group of users and providing training
- Using posters ,pictures and user manuals
- Consultations with relevant stakeholders such as ministries and policy makers

Responses in terms of Monitoring and Evaluations

After agricultural knowledge was disseminated to the end users for practice, its impact either positive or negative should be assessed to take any actions in line with its effect. In order to know whether or not research institutes perform the monitoring and evaluation on the effectiveness of their disseminated knowledge to practices, question involving this issue was posed to the participants. In addition to this, the researcher was also interested to know how the research impact assessments were undertaken at different agricultural research institutes. To get this insight, the researchers were first inquired to indicate whether or not they carried out impact assessments and then requested those who replied positive to explain the means of doing it. Of the total respondents of the survey, 55 participants answered this question while the other 12 respondents ignored it to answer. Based on this, the results obtained from the SurveyMonkey, which is illustrated in figure 4.9:

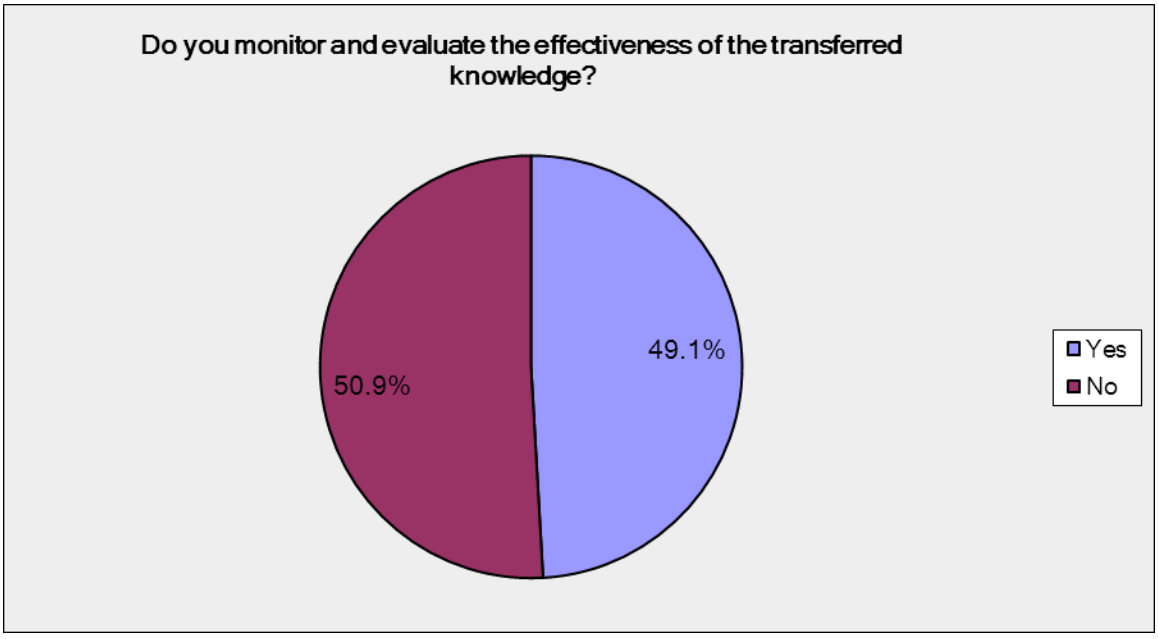

Figure 4.9 Monitoring and Evaluation of the Effectiveness of the Transferred Knowledge

As can be clearly seen from the figure 4.9 above, (27; 49.1%) researchers did the monitoring and evaluation of their research output's effectiveness while the remaining (28, 50.9%) researchers did not carry out assessment on their research output's impact. Of the total respondents, who gave affirmative answer to this question, 27 of them put forward the descriptions of how they did

monitoring and evaluation on the effectiveness of their research output and the details of their descriptions are given as follow:

- Taking feedback from users in organized workshop and similar meetings, evaluating the performance of the technologies together with stakeholders by organizing field days at farmers field during the crop growing periods, by undertaking associated socioeconomic studies, such us impact studies....
- During review of different research activities at center level and on national review
- By conducting field visit, through questionnaires, by using customer satisfaction forms and observations.
- By surveying each Woreda and through reports from each Woreda
- By doing different assessments that can be direct observation, especially during the promotion purpose and for journal purpose.
- By evaluating the new technologies on farmers field and by gathering information from the users side
- By continuous follow up weather the transferred knowledge practiced well or not and assessed that knowledge have positive impact well implemented.
- Periodic impact and adoption assessment, consultation with end-users (beneficiaries) and other stakeholders, and informal discussions with and visits to users
- By collecting stakeholder's opinion, feedback from alumni , by student evaluations

Responses Related to Incentives

To know the special incentives granted by the research institutes for the researchers who took part in the knowledge transferring, a question was posed to the participants stating as "***What special incentives or rewards does your institute provide for transferring knowledge?***" to describe the special rewards granted by their institute to encourage and motivate them to focus on knowledge transferring and applicative researches. Of the total respondents of the survey, 48 participants answered this question and the remaining 19 questions were skipped. Based on the responses obtained, summery of incentives accorded by the research institutes were described as follow although most of the respondents revealed that they did not offered any incentives because of transferring research outputs:

- Getting promotion
- Academic rank. example from lecturer to assistant professor etc
- By giving trophy, recognition& some money awards
- No more incentives from our institute but we have received gold Medal for outstanding problem solving research achievement by the government of Ethiopian in 2012
- Our institute gives different promotional aspects, like up grading the level of the researchers status, rewards, prizes, and adding responsibilities that may relevant for the researcher.
- It is a public institute. Knowledge transfer is part of our job. So there is no special reward. But published articles are used for promotion.
- None so far. but now it has devised an incentive scheme to remunerate based on scientific publications

Thus as can be observed from the responses, most of the institutes did not provide any special incentives for their researchers for performing a knowledge transfer activities, there were respondents who claimed that the institutes offered some incentives and recognitions due to their knowledge transfer activities instead of individuals, there were also individuals who considered transferring of knowledge as their own duty and hence needed no more incentives, some other respondents also verified that the institute planned to grant incentives in the future.

4.1.2.5. Contacts with the Stakeholders

This sub section discusses the interactions that existed among the agricultural research institutes and stakeholders. The researcher interested to investigate this issue mainly aimed at establishing the potential stakeholders of the Ethiopian agricultural research centers, how the relationship is constructed, the frequency of their interactions. The researcher also aspired to investigate whether or not the contacts set up between the research institute and the stakeholder was appropriate to boost knowledge transfer to practice. Based on the responses obtained, summaries of the results were described in category as follow:

Response Related to Immediate Stakeholders

In order to know the immediate stakeholders of the agricultural research institutes in Ethiopia, participants were inquired to describe their immediate stakeholders by posing this question to

them:" ***Who are the immediate stakeholders that acquire your research outputs?"*** Of the total respondents of the survey, 50 participants gave answer to this question while the rest 17 respondents skipped to answer. Responses obtained are described and summarized as follow:

- Scientific Communities and Students
- Primarily farmers, and then Investors, Agro-processing industries, Non-governmental organization and government may be for policy purpose
- Agricultural companies, researchers, NGOs working variety dissemination, agricultural offices, farmers cooperatives, etc
- Different type of stakeholders:, agricultural bureaus, enterprises, HLI, NGOs, etc...
- Students, researchers and university
- Vaccine producing institutes, pharmaceuticals, food industries
- Livestock keepers
- Government agencies in extensions and cooperatives in farming
- Commercial farms Multiplication centers and NGOs
- Agriculture Ministry, seed enterprise, NGOs etc
- In our case it is the research extension division of the institute.
- The public extension system, development NGOs , national research system
- Federal and Regional Agricultural Research Institutes, Ministry of Agriculture, Ministry of Livestock and Women Affairs offices within the Ministry of Agriculture.
- National Policy Makers, though in principle we are also supposed to be generating outputs that can be useful in generating outcomes at lower levels in government (local).
- MSc and PhD students, researchers
- Specific group of farmers then it will disseminate to the other by seeing the out put at the demonstration site on farm and on research station.

Responses Related to How the Relationship Established

To be knowledgeable about the basis on which the relationship was established between the research institutes and the stakeholders, the researcher requested the participants to point out their selection from the given alternatives by presenting a multiple choice question***:" How do you normally establish relations with stakeholders to exchange research outputs in the area of***

your expertise?" furthermore, respondents were given a privilege to state their own establishment means in addition to the listed alternatives if they felt it is missed from the list. Of the total respondents of the survey, 51 gave answer to this question and the remaining 16 overlooked to answer as shown in the following figure 4.10.

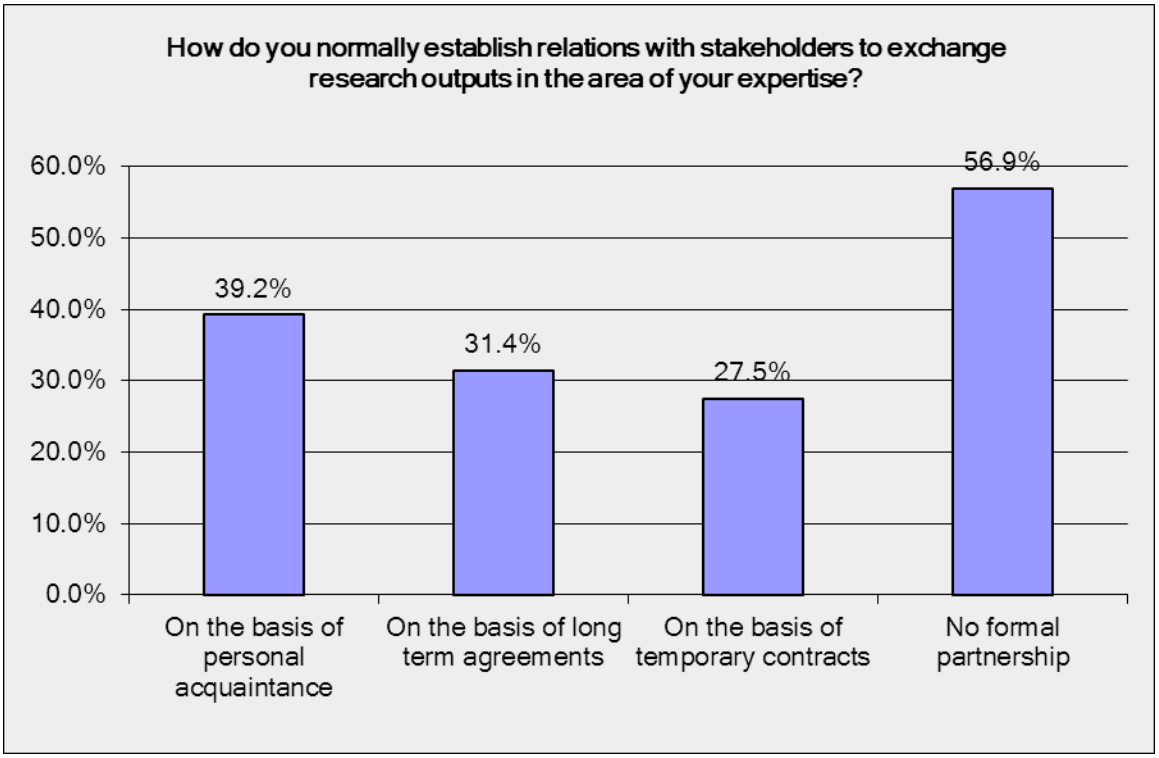

Figure 4.10 Basis of Contact Establishment

As reflected on the figure 4.10 above, (29; 56.9%) respondents revealed that they did not establish relationship with the stakeholders on the basis of formal partnership. (20; 39.2%) respondents established their relationship on the basis of personal acquaintances, (16; 31.4%) founded their relationship with stakeholders on the basis of long term agreement, (14; 27.5%) respondents disclosed that they established relationship with stakeholders on the basis of temporary contacts.

Responses Related to Frequency of Contacts

To be aware of how frequently researchers in the research institute and stakeholders came together for the purpose of exchanging agricultural technologies, a multiple choice question encompassing this issue was posed to the participants. Of the total respondents of the survey, 51 participants answered this question and the remaining 16 did not. Based on the responses obtained from the SurveyMonkey, the result was reflected in figure 4.11.

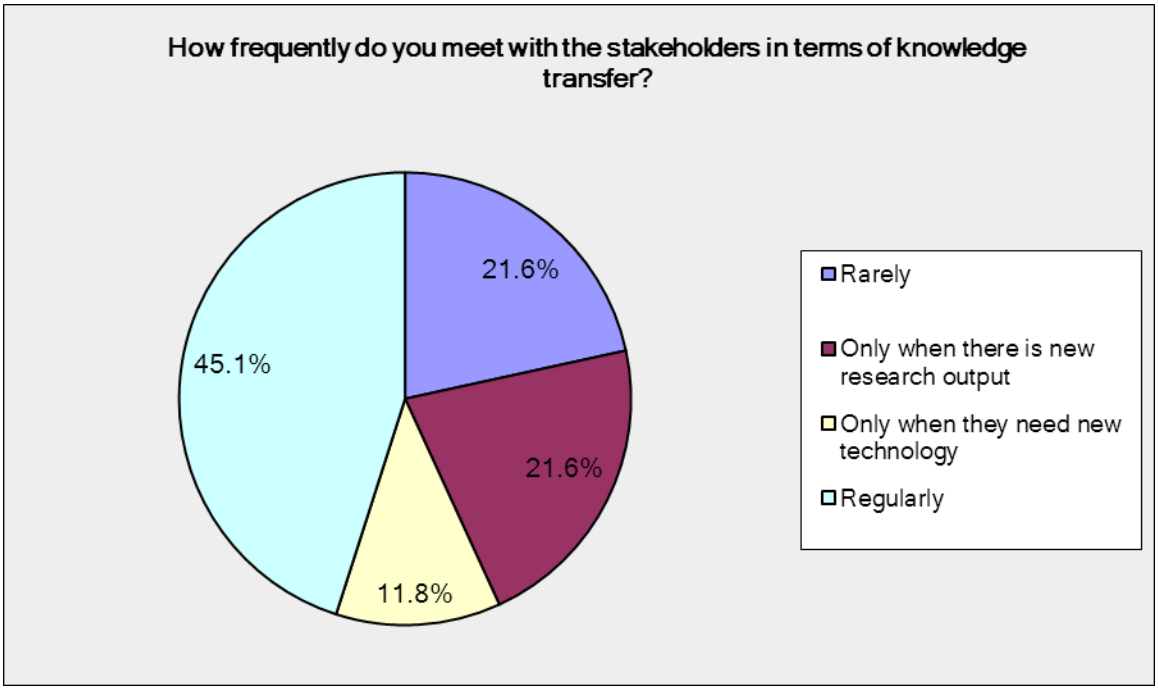

Figure 4.11 Frequency of Contact

As can be seen from the figure 4.12 above, the major respondents (23; 45.1%) disclosed that they meet with the stakeholders regularly (11; 21.6%) respondents interact with stakeholders Rarely, (11; 21.6%) researchers come together with their stakeholders Only when there is new research output, and (6; 11.6%) respondents stated that they meet with their stakeholders Only when they need new technology,

Responses in terms of the Appropriateness of the Relationship

In order to comprehend whether or not the relationship established between the research institutes and the stakeholders was appropriate to boost the knowledge transfer activities, the researcher inquired the participants to evaluate the appropriateness of the relationship they had

established with the stakeholders by presenting this question:" ***Do you think existing forms of cooperation and partnership between researchers/research institute and the stakeholders are appropriate to boost knowledge transfer activities?"***The respondents who responded "NO" were further asked to explain what should be done in order to improve the relationship. The responses obtained were illustrated in the following Figure 4.12.Based on this, majority of the respondents 56% of the respondents said that the relationship was inappropriate while 44% of the respondents valued it as appropriate.

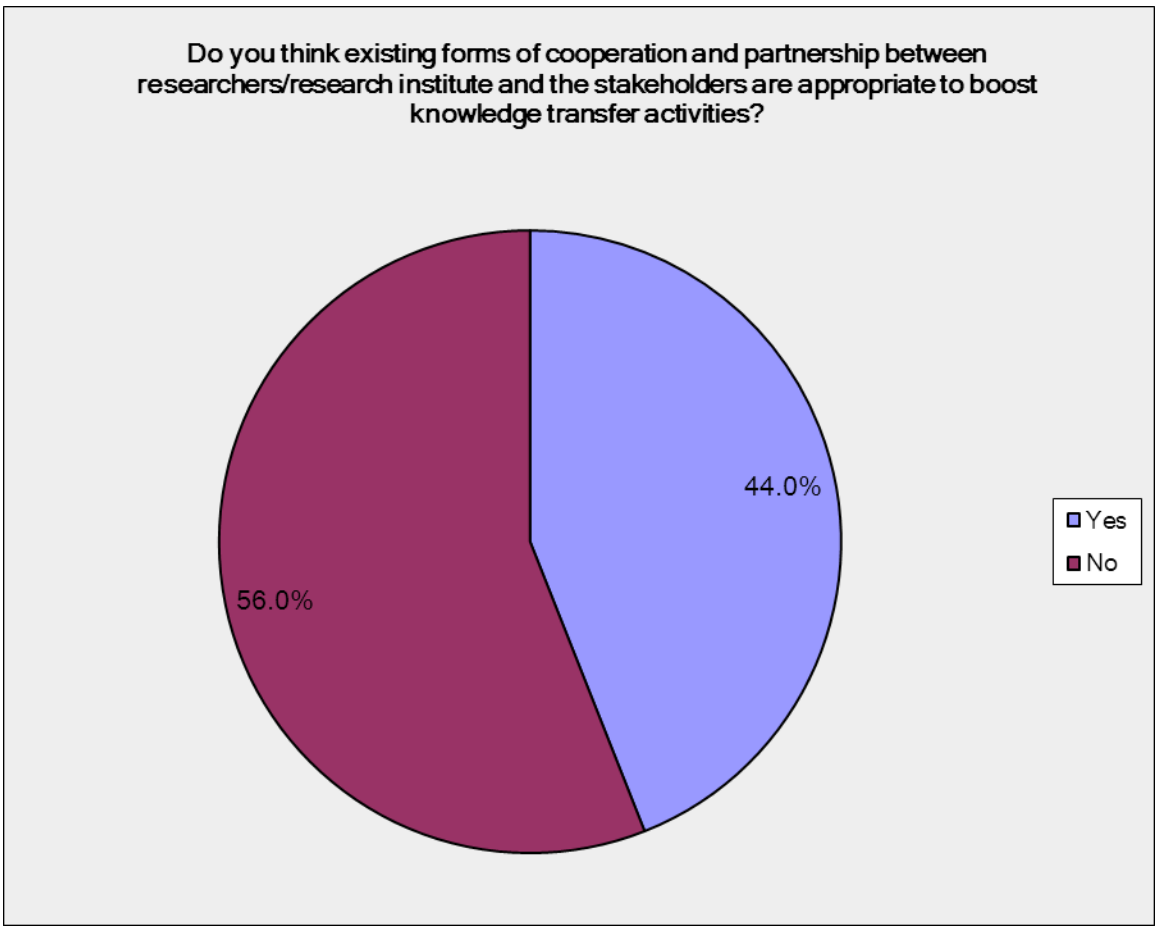

Figure 4.12 Appropriateness of the Relationship between Research Institutes and Stakeholders

Suggestions from the respondents who claimed that the relationships established with the stakeholders were inappropriate and summery of what should be done to enhance relationship were described as follow:

- Because the link between these institutions is so weak that it is not integrated in most cases. There is still duplication of effort and other resources
- It is good but still need further improvement especially should have rules and responsibilities that need to be followed
- Now research projects and activities are initiated from up to down, this is impossible to solve the farmers problem, rather it is best to develop the research proposals at center and approved at national level
- The researchers should go first and prioritize the problem of the community before doing research. There should be a forum where the researchers could get feedback from stakeholders on what the researchers are doing
- Strengthen the communication departments of the research institutes. Because under the current condition, the researchers who are not experts in communication are trying to communicate their research outputs
- Stakeholders and knowledge generators should be in regular meeting non disturbed meeting at least once a week and discuss requirement specifications and outputs
- Awareness must be given to the farmers to enhance knowledge transfer activities.
- Highly experienced researchers didn't have initiation to transfer knowledge, no enough practical training held.
- Encourage formation of Farmers Cooperative Self Help Groups and establish strong linkage with these groups
- Regular mutual panel of problem identification and research output review have to be made based on contractual agreement on technology release.
- As our institute primarily engaged on agricultural research technology generation - there should be multilateral and consistent cooperation and relationship in accordance with the real situation of stockholders
- Because the research output is disseminated to the stakeholders or users when there is only a new technology and when they seek that technology. This does not boost the knowledge transfer activities as the cooperation is not formal and the research dissemination activity are top down does not meet the interest of the stakeholders.

- To enhance Knowledge transfer activities the agricultural extension agents must use their maximum potentials and the researchers and stakeholders must be discuses regularly. The stakeholders must give a feed back for the new technology.
- There should be special forum for knowledge transfer one or two times a year. Program on technology transfer has to be developed for media on daily bases. Nationally information system has to be established
- Research priority areas must be set with key stakeholders the research must be done in collaboration on identified problems. This needs agreement whereby the research output could be immediately owned by the stakeholder.
- The stakeholders should be involved in research problem identification so they will easily adopt the technology.
- There is need for a binding linkage between the two with clearly identified roles and responsibilities, and accountability arrangements
- There is no problem in the framework, but it needs to be strengthened there should be a proper recognition in the form of incentives or award to the knowledge owners, and there has to be some very important modalities that links all users of technologies/ information generated.

Responses related to the Mode of Transfer

In order to find out whether or not the knowledge which is generated in the research institute and transferred to the end users through stakeholders were properly utilized and applied by the practitioners in accordance with the implementations procedures of the particular technology, participants were inquired to provide their suggestions from their experience by posing this question "***Do you think the knowledge generated by the research institute should reach the end user directly instead of through stakeholders?***" to them. Of the total respondents of the survey, 51 gave their answer to this question and the remaining 16 did not as illustrated in the figure 4.14

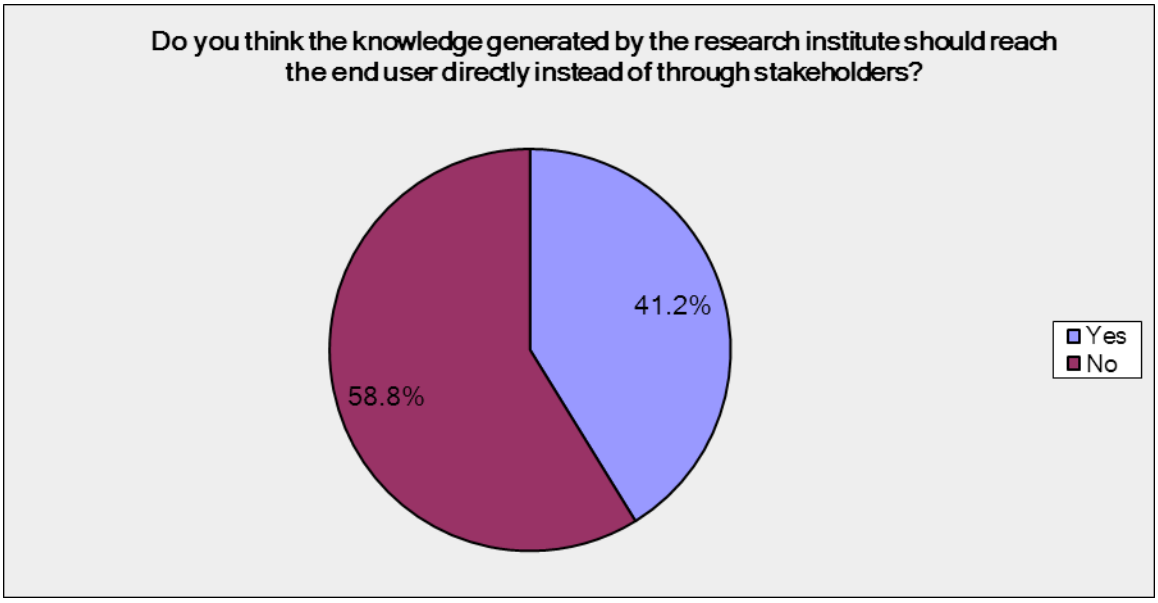

Figure 4.13 Mode of Agricultural Knowledge Transfer

As can be clearly seen from the figure 4.14 above, most of the respondents (58.8%) claimed that the research output should reach the end users indirectly through the stakeholders while the remaining respondents (41.2%) asserted the research output should reach the end users directly. In addition to indicating their views, respondents were also requested to justify their stands and the summaries of their suggestions were presented as follow:

- It will be very costly if the research institute tries to reach all target groups, in that case it is better if the research institutes focus on some stakeholders that have a capacity to take the research outputs to the end users.
- It is enough examples to tell the existing trends that we use transferring technologies through stakeholders is not as good as direct one. It is because of the emphasis given to it and the technical capacity difference.
- The answer may be all. Because the popularization and Demonstration works should be directly our responsibilities. But, the pre-scaling works will be shared with MoA-extension
- Because the technology generator lack the right knowledge and skill to communicate his output to the end users. Stakeholders know better about their end users and involving

stakeholders has a positive impact on dissemination of technology for a regulated and better results.

- Reduce the gap between research institute and end user although it is infeasible due to limitations in capacity, it would be fantastic if the researcher reaches end users directly. This is because the intermediate body may not correctly the practical aspect of the research output or may not understand it correctly.
- Knowledge from agricultural research has different(at least there) categories (knowledge for researcher or scientists, for development experts, and for the farming communities). Therefore, each category of recipient should get the right type and amount more directly than with the help of stakeholders (in this case the meaning of stakeholder should be synonymous with knowledge brokers)
- In the real situation it impossible to reach the knowledge generated to the individual end user. There are a lot of constraints - finance, human resource, and other related infrastructures.
- Because most of the time the activities that we perform with stakeholders is not as effective as direct contact with the end user due to negligence of stakeholders.
- Before reaching the end users the knowledge generated has to be verified in actual conditions since all the technology generated under research may not work for all purposes
- There is a lot of works that are done but there's a big gap to reach those research output to the end user because of not well organized research extension team.
- We/research institute has limited resources (land, fertilizer, financial lack...) to meet the demand of the end users. Because the target is to communicate all knowledge and technologies to farmers, which is hardly possible to be effective via direct involvement of the research team. Instead other stakeholders should involve heavily tobring all knowledge to the farming community, as it needs huge investment and capacity.
- Intermediaries can easily see future prospects for an invention and invest money on it. End users always want somebody to put his toe in the water to make sure that there are no sharks in that water.

- This is both a yes and no question. It depends on the type of research. Yes, because its only when the research institute involves actively with the end users that researchers learn their need and how to reach them. And No, because some research outputs are too technical and would require involvement of development stakeholders to bring it to action.

4.1.2.1. Factors Affecting the Transfer of Agricultural Knowledge

This section deals with the major factors which hampered the proper transfer of agricultural knowledge. In order to find out these factors, respondents were inquired to evaluate statements posed to them which deemed to affect the proper transfer of agricultural knowledge from research institutes to stakeholders on the basis of a scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) and obtained the following results shown in tables.

Table 4.12 Research Communication Strategy

My organization has a policy or strategy for Research communication and dissemination							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
:	2	2	8	19	18	4.00	49
						answered question	**49**
						skipped question	**18**

Table 4.13 Provision of Incentives

My organization provides incentives and encouragement for researchers to disseminate knowledge							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
	12	13	6	12	6	2.73	49
						answered question	**49**
						skipped question	**18**

Table 4.14 Cooperation

Cooperation between my organization and other stakeholders is based on long term agreements							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
:	6	14	11	13	5	2.94	49
						answered question	**49**
						skipped question	**18**

Table 4.15 Methods and Communication Tools to Present Agricultural Knowledge

The methods and communication tools and channels we use to present new knowledge are well-adapted to the interests of our stakeholders							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
:	5	7	12	17	8	3.33	49
						answered question	**49**
						skipped question	**18**

Table 4.16 Participations of Stakeholders

Stakeholders are engaged in our research projects from the start							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
:	6	14	10	10	9	3.04	49
						answered question	**49**
						skipped question	**18**

Table 4.17 Awareness of Stakeholders

Stakeholders know what knowledge they need from research institutes							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
:	3	9	11	19	7	3.37	49
						answered question	**49**
						skipped question	**18**

Table 4.18 Languages Used

The language used to communicate research findings is overly academic or full of jargon							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
:	7	8	12	18	4	3.08	49
						answered question	**49**
						skipped question	**18**

Table 4.19 Traditional Product Formats

Traditional formats (peer-reviewed journal articles, academic conference presentations, books, or final reports) fail to reach most stakeholders							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
:	2	6	7	24	10	3.69	49
						answered question	**49**
						skipped question	**18**

Table 4.20 Practical Implications of Research Findings

Researchers often fail to explain the practical implications or change recommendations of their findings							
Answer Options	**Strongly disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Strongly agree**	**Rating Average**	**Response Count**
:	8	18	9	11	3	2.65	49
Other Factors (please specify)							0
						answered question	**49**
						skipped question	**18**

"**My organization has a policy or strategy for Research communication and dissemination**" was the first statement posed to respondents to evaluate it as a key factor which affect the agricultural knowledge transfer from research institutes. Of the total respondents of the survey, 49 answered this question and the remaining 18 did not answer. As can be clearly seen from the table 4.12 above, 2 respondents strongly disagreed that their organization had a research dissemination policy or strategy**, 2** respondents disagreed about this statement, the other 8respondents were neutral about that, 19 respondents agreed and 18 respondents strongly agreed. A rating average 4.00 reflects that most respondents agreed research organizations had plan for research transfer as a key factor to affect knowledge transfer. Regarding the provision of incentives by the research organization to researchers who transferred knowledge, this statement was presented to the researchers to give their evaluations "**My organization provides incentives and encouragement for researchers to disseminate knowledge".** Of the total respondents of the survey, 49 provided their answers while 19 did not as shown on the above table 4.13

As can be observed from the table above, 12 respondents strongly disagreed that their organization provided incentives for researchers to disseminate knowledge, 13 respondents disagreed that their organization provided them incentive due to research transfer. 6 respondents remained unbiased about the issue, 12 respondents agreed about that, and 6 participants strongly agreed that their organization granted them an incentive due to their knowledge transferring activities with the rating average of 2.73. A rating average of 2.73 reflects that most of the respondents were neutral about the statement that their organization provides incentives to encourage them transfer research outputs. Concerning the cooperation established between their organization and stakeholders, participants were posed with this statement***" Cooperation between my organization and other stakeholders is based on long term agreements".*** The reaction of the respondents towards this statement was illustrated on the table 4.15 above.

As can be clearly viewed from the above table, 6 respondents strongly disagreed the statement, 14 respondents disagreed the statement, 11 were remained impartial about the issue, 13 respondents showed their agreement and 5 respondents agreed that .the cooperation between their organization and stakeholders is based on long term agreements with the rating average of 2.94. A rating average 2.94 reflected that most of the respondents still did neither agreed nor disagreed with the idea that their organization constructed cooperation with stakeholders based on long term agreements. With regard to the method of communication, participants were

requested to evaluate the mechanisms and tools that they used to transfer their knowledge were appropriate or not through this statement ***"The methods and communication tools and channels we use to present new knowledge are well-adapted to the interests of our stakeholders***". The responses of the respondents were demonstrated as on table 4.16 above.

As can be observed from the table 4.16 above, of the total respondents of the survey, 49 participants reflected their views on this statement while the remaining 19 remained ignorant to provide evaluation. Based on this, 5 respondents strongly agreed with the statement, 7 respondents disagreed, 12 respondents were on neutral state, 17 respondents greed that the communication mechanisms and the channels they used to present new knowledge were well adapted to the interest of the stake holders and the remaining 8 strongly agreed with this idea with the rating average of 3.33. A rating average of 3.33 thus obviously reflected that most of the respondents from research institutes were in confusion to accept or turn down the statement. Participants were also required to evaluate issues pertaining to the participation of stakeholders in their research activities. To get their evaluation as to this, they were posted with this statement "***Stakeholders are engaged in our research projects from the start".*** Based on this, of the total respondents of the survey who were eligible to provide their evaluation, only 48 were intentional for their response while the rest 19 were involuntary as shown on the table 4.17 above.

As can be comprehended from the table 4.17 above, 6 respondents strongly agreed with the statement, 14 respondents showed off their disagreement, 10 respondents were neither agreed nor disagreed with the statement posted, 10 respondents agreed while the remaining 9 participants strongly agreed as their institute invited the stakeholders to engage in their research projects from the very start with the rating average of 3.04. A rating average of 3.04 signified that most of the respondents were still unsure about this issue and thus did not take any sides. The next issue presented to the participants to evaluate was whether or not the stakeholders were aware of the knowledge they seek from the research institute. To acquire some views related to this issue, respondents were posted with this statement for evaluation: "***Stakeholders know what knowledge they need from research institutes***". The responses provided for this statement was demonstrated as it was obtained from the SurveyMonkey on the above table 4.18:

Based on the result demonstrated on the table above, 3 respondents strongly disagreed that stockholders know what knowledge they wanted from their institutes, 9 disagreed about the statement, 11 respondents were unable to take sides with regard to this issue, 19 respondents

agreed about the statement while 7 respondents strongly agreed with the rating average of 3.37 indicating that most of the respondents were in the middle of the road. The language used by research institutes to communicate their findings was the other issue which was sought by the research t find out the degree of impact this issue had in the transfer of agricultural knowledge. For this purpose, the respondents were posed by this statement:"***The language used to communicate research findings is overly academic or full of jargon***" Based on the results obtained from SurveyMonkey which is illustrated on the above table 4.19, descriptions were provided as follow:

As can be clearly seen from the table 4.19 above, of the total eligible survey respondents, 49 of them were among the repliers while the remaining 19 did not. Of these respondents, 7 respondents were strongly agreeing while 8 were disagreeing the statement and 12 respondents were neutral, 18 respondents agreed that the language used to communicate research findings were academic and full of jargons and 4 strongly agreed about this statement with the rating average of 3.08 which signified that most of the respondents were not courageous to accept or turn down this statement as a major factor affecting knowledge transfer. The researcher was also sought to find out the circumstances of traditional product format in affecting the knowledge transfer practices of agricultural research institutes. In order to comprehend the states of affairs in the research institutes with regard to this issue, respondents were inquired to pledge their view through this statement "***Traditional formats (peer-reviewed journal articles, academic conference presentations, books, or final reports) fail to reach most stakeholders"*** **and o**f the total participants 49 of them gave their view toward this issue while the remaining 19 didn't as shown on the table 4.20 above. Based on the results, most of the respondents agreed that traditional product formats used by their institute failed to reach most stakeholders. Of the total respondents, 2 were strongly disagreeing about the statement, 6 respondents disagreed, 7 were neutral , 24 respondents agreed about the statement while 10 participants strongly agreed with the rating average of 3.69.

Eventually, the researcher sought to find out the degree of practical implications of research findings in affecting the knowledge transfer activities of research institute. In order to attain this , respondents were queried to provide their view based on the states of affairs in their institutes by posing this statement ***"Researchers often fail to explain the practical implications or change recommendations of their findings"*** As the finding obtained from SurveyMonkey revealed,

majority of respondents were still unable to take side with regard to this issue with the rating average of 2.65. The evaluation results pertained to this statement was illustrated on the above table. As can be seen from the table4.20 above, 8 respondents strongly disagreed this statement, 10 showed off their disagreement, 9 were neutral, 11 respondents agreed that researchers often fail to explain the practical implications of their work and the reaming 3 consolidated this view by agreeing strongly.

4.1.3. Qualitative Findings

4.1.3.1. Face to Face Interviews Processes

To gain more in-depth understanding of the knowledge generation and transfer from research institutes to stakeholders and complement the results obtained from the quantitative survey, face-to-face interviews (see Appendix C and D) were conducted with selected individuals who were presumed to provide very important information from both research institutes and non research organizations.

The researcher explained to the participants the aim of the interviews, before the actual interviews. Participants were given the option to determine the venue that they were most comfortable in and all the interviews were held in the respondent's office except two of the informants from the international research institute who preferred to hold the interview in other place, at cafeteria. Informants were also asked permissions to record their responses and hence based on their good will all interviews were audio-tapped as it provided the exact responses and opinions of participants in addition to manual record. Although the participants were asked to introduce themselves at the beginning of the interview, the names, positions or other personal details of participants were not recorded in order to assure, maintain and respect their anonymity. Additionally, none were quoted or identified specifically with any responses. The researcher used only the ideas and opinions they expressed. The interview held with participants from the stakeholder's side and research institute's side lasted an average of 24 minute and 27 minutes respectively. These efforts produced important qualitative data to arrive at qualitative results.

4.1.3.2. Interview Results of Stakeholders

Interview results of the stakeholders are expressed in the sections that follow.

4.1.3.2.1. Characteristics of Interviewees of Stakeholders

Interview participants were key individuals of the organization who are serving as head of the organization or leading the agricultural extension office in their own organization. All the participants were more educated having masters and above in educational qualification with an experience of more than two years in the current position. The participants were selected for the interview from the organizations that were working closely with the research institutes in Ethiopia for the exchange of agricultural knowledge. These organizations were MOA, EMDTI, SNV, Ethiopian Economist Professionals Association and Eden Field Agro-Seed Enterprises.

The respondents of non research organizations or stakeholders consisted of the following key informants of the cited organizations:

- MoA's Director of the Extension Services,
- SNV's Head of Agricultural Department,
- EMDTI's institute director ,
- EEPA's head of the agricultural research section and
- The general manager of Eden Field Agro-Seed Enterprises

Using information from the write-ups generated from interview data, the meanings of comments made by respondents were analyzed in order to provide answers to the research questions for the study. The findings from the key informant interviews are presented in a narrative and descriptive form. In other words, the results are presented in the form of a verbal description of trends and themes, with quotations being taken verbatim from the interview write-ups.

4.1.3.2.2. Knowledge and Its Acquisitions Processes

To know the type of agricultural knowledge stakeholders seek from the research institute and how they do the acquisition of the knowledge they are looking for, respondents were asked to explain "***What knowledge is required by the organization and how does the organization acquire the knowledge? "***

All stakeholders require different types of knowledge and technologies from Ethiopian agricultural research institutes such as improved varieties, improved agricultural practices, farm implements, and technical field experiences by the time the research centers avail highly productive than ever existing one.

A respondent from other organization described the ways its organization acquires the new knowledge from the agricultural research institutes by saying that "*well to acquire agricultural knowledge from research institutes, the organization followed the value chain development approach. In this approach, one major aspect was undertaking value chain analysis. In doing so, one of the major stakeholders was the research institute. We usually perform an assessment or inventory about that specific value chain regarding the type technologies required by market. So in the value chain analysis, we identify the research centers which met the demands. Once we have identified the research center, we invite the researcher who generated the knowledge to share its technology in that particular value chain.* "

4.1.3.2.3. Involvement of Stakeholders in the Research Institute's Knowledge Generation and Transfer Activities

It is obvious that practitioners are more likely to adopt research products when they find them useful at least more likely than if they are simply told they should adopt them. For this to happen, stakeholders should not be left out of the research process, or included in discussions regarding knowledge generation and transfer strategies and activities. According to different scholars, often times, potential users of research knowledge are unconnected to those who do the research, and consequently a huge gap ensues between research knowledge and practice behaviors. Putting this into consideration, interviewees were asked whether agricultural research institutes involve their organization on agricultural knowledge generation and transferring activities.

Do the Research Institutes involve your organization as a stakeholder during knowledge generation and transfer activities sufficiently?

Almost all respondents representing different organizations as a stakeholder reacted to this question in similar fashion by articulating that most agricultural research institutes in Ethiopia do not involve the end users or stakeholders during knowledge generation and transfer activities. Some respondents argued that although few agricultural research institutes involve its

organization during knowledge generation and transfer activities, it is not sufficient. The respondents also highlighted the importance of involving stakeholders and other end users sufficiently to ensure the technological packages being generated and promoted are relevant and appropriate, and that strategies for addressing challenges that affect utilization are used.

4.1.3.2.4. Challenges Hampering Knowledge Acquisitions

Respondents **were asked a** question "***what problems and limitations hamper the knowledge acquisition practices from the research institute?"*** in order to obtain insights about the challenges that are hampering the knowledge acquisition practices of the stakeholders. From responses, it was possible to discern several problems and challenges which were linked to particular knowledge acquisition practices as presented beneath.

The respondents reported that a number of problems and challenges have been affecting their knowledge acquisition activities. A respondent from one organization stated that, "*in many cases when the knowledge is required, the new knowledge is not easily available it is scattered.' For example, you get a package of information about a certain research or technology. You get some important information at one institute and the rest in the other institute. It is very difficult to get these pieces of information from different organization from different organization to form a good package of information.' There is no repository for information in this country. For example, to apply a recommended package for crop product, you cannot get comprehensive information form one institute so that you visit different institute for the information. Getting information from several institutes is very difficult as there is no linkage between knowledge generating institutes thus a kind of information repository is necessary."* The other respondent said that, *"the scope of our participation is one limitation. Because most of the time, we do not know what is produced in the research institutes and the practitioners and regional offices do not know what technologies are already available in the research institute. The level of their intervention based on their own interest without the prioritized problem is another problem. Capacity gap is also another challenge to duplicate the new technology developed in the research institute. The capacity includes human capital, material and financial limitations. Limitation of communication medias are another big challenges that hamper the acquisitions of knowledge. "A respondent from other organization mentions lack of communication and*

cooperation with research centers as a major problem. He states that *"it was supposed that our sector has to approach all research institutes to work together but as I have seen there is no such trend so far. There is no any intermediary body responsible to make us communicate on our common interest and work together.*"The other interviewee remarked the limitation of capacity and negative attitudes as a major problem. He explained this as," *the research institutes we are working with have limited capacity both interns of material and human capital. The attitude of the research institute is the other one. They assume themselves as they know better than others and they are perfect in every aspect. Researchers focus on publication of their research outputs rather than applying it.* "

4.1.3.2.5. Direct and Indirect Knowledge Transferring

Due to the large number of agricultural practitioners, the agricultural research institutes disseminate their technologies through intermediaries or stakeholders. Hence, the knowledge transfer agents receive the knowledge produced by researchers, then, they adopt and adapt this knowledge to practitioners' conditions and context before disseminating it to knowledge practitioners. Participants were asked to put forward their views about the current course of transferring knowledge guarantee its utilization by the end user by asking this question: " ***Do you think the current knowledge transfer practice (research Institute-Stakeholders-End users) assure you the utilization and application of the knowledge by the end users effectively? "***

All respondents reflected that such mode of transferring agricultural knowledge does not guarantee the effective utilization and application of the technological packages by the end users but due to capacity limitations the research institutes have this is the option to go through. Several reasons were raised by the respondents to back their views. Capacities of transfer agent to make the end users understand the new technology, proper translation of the research, etc were the commons.

A respondent from one organization stated his views in this way: "*I don't think information reaches end users through stakeholders properly as there will be information dissipation in between. Information may be lost or distorted in between. It also in fact depends on the strength of the linkage between the stakeholders and the knowledge generators. If the linkage is very strong and they work together closely, the information dissipation may be minimized. There must*

be also a kind of crosschecking. Research institutes should not only give the knowledge to stakeholders and keep quite. There has to be a crosschecking mechanism weather that knowledge reached the end user very correctly. Ideally, if the research institute reaches the end user directly, the effectiveness can be very high. Due to the limited capacity of research institutes to reach each end user, they have to design some sort of mechanisms for their knowledge has reached properly end users through the stakeholders in different ways. One way is they can develop a direct transmission program within their capacity. Through that they can evaluate whether the direct information transfer is better than the indirect one. "For example, if you form a farmer research group and farmer extension group, this assures the direct involvement of the end users. The farmers' research group serves to the research institute by providing early information on what type of technology is necessary to improve their lives. Farmers' extension group will take up the final technology and can help in the dissemination of the technology among the farmers. This is a direct dissemination of information and it is a participatory approach. "

4.1.3.2.6. Best Suggestions for Successful Knowledge Acquisition

In order to overcome the listed challenges and enhance the knowledge acquisition process, interviewees were asked to forward their constructive suggestions through this question: "***What do you suggest for a more successful cooperation between research institutes and stakeholders for the overcoming of existing problems occurring during the process of knowledge transfer from Research Institute to stakeholders?"***

Almost all respondents urged that research institutes and stakeholders should work closely on common issues.

In support of this idea, one respondent remarked that, "*actually different stakeholders, research institutes, intermediaries and practitioners should come together and work together. First the stakeholder should be identified and form a kind of information sharing platform and they have to discuss among themselves starting from the generation of the knowledge up to utilization. At the end of the day they have to evaluate their activities. Monitoring and evaluation should be there together. And also regular information sharing should be there. Currently information sharing is occurring in a half third way, not systematical. So regular information sharing*

mechanism should be implemented and a certain information repository should be there where every new information is deposited and easily accessed by stakeholders may be free of charge. Joint workshops should be also organized regularly to consolidate the relationship among stakeholders and establish a successful cooperation among them.

The other informant stated that:"*In our directorate, we have a division called Development Partners Linkage Council (DPLC) which is led by senior staff. Its major task is cooperate and organize any development partner including research institutes to come together discuss as a schedule manner to come up with new solutions and approaches how to tackle agricultural problems. The council is structured from the federal level down to the kebele. As long as the partnership is kept stronger among each stakeholder, the knowledge acquisitions and transferring practices could be enhanced as it eases and facilitates communication."*

The other respondents put forward their suggestions as*:"To overcome the above listed challenges and enhance the knowledge acquisition practices, the research institutes should have a clear strategy of how they capture , generate and share their knowledge. The strategy should include how to generate the knowledge and who should be involved in the process. There has to be a web based system to share their knowledge. Research institutes should build up their capacity. The research institutes should work towards awareness creation about their work and whom they want to reach through different medias and other methods. Regular meetings should be there with the research institutes and stakeholders. The research institutes should make a thorough follow up on the proper usage of their disseminated knowledge. The research institutes should listen to the stakeholders' problems and demands. Research centers should avoid bureaucracy and make their system simple to be easily reached by stakeholders. To make the research outputs acquired by us in best way, we have to scale up our efforts and we have to identify and prioritize some important issues to work on in collaboration with the research centers as well we have to react to these issues together.*

4.1.3.2.7. Future Plans

Interviewees were finally asked about their future plan in order to enhance the knowledge acquisitions practices by posing this question to them: ***What is the future plan regarding knowledge acquisition from the research institute and transfer to the end users?***

Respondents focused in the future to have a strong relationship with research institutes and react together on common issues. They also have planned to identify researchable questions and deal on it with the research institutes so that they can participate in the problem identification.

A respondent from one organization explained his future plan as *:"our future plan is mainly to work with the research institutes closely as I say earlier to broaden our network and share our information and get information from them. We are also planning to involve policy makers as we are dealing with policy issues. We also have planned to organize quality workshops where by different stakeholders involve and also give ideas to enrich our future research. We are keen in the future to strengthen our relation with the research institutes, policy makers and end users. We also have planned to make government give a threshold attention for the research as in Ethiopia research is being under investment and the focus is only on transferring what is already generated although research is a dynamic process.*"

The other informant says, " *as an extension, the regular route continues and it never stops. We get research technologies from research stations, from abroad, from end users or practitioners, and private sectors. So we are supposed to gather all advantageous technologies from all sources. Our involvement will be then, modifying to the best advantageous of end users, approving it with research institutes and piloting it with selected users and then disseminating it to the larger community. This will be achieved by strengthening the DPLC and facilitating it in a more convenient way. "*

4.1.3.3. Interview Results of Research Institutes

This section presents findings from the interviewed researchers and knowledge workers in the research institutes both in the nation and international. The interview findings are mostly presented in narrative form although direct quotes are also provided.

4.1.3.3.1. Characteristics of Respondents

From both national and international research institutes, NINE interviews were conducted. The following is the breakdown of the composition of the interviewed researchers and knowledge workers from the research institutes:

- Five researchers and one knowledge worker from international research institutes-ILRI

- Research and technology coordinator of Jimma University Agriculture and Veterinary Medicine College
- Research and technology coordinator of Addis Ababa University Agriculture and Veterinary Medicine College
- Debrezeit Agricultural Research Center Coordinator
- Head of Ethiopian Institute of Agricultural Research Extension Division
- Hollota Agricultural Research Center Coordinator

4.1.3.3.2. Stakeholder's Demand Analysis

Once research institute has generated the knowledge and transferred it, defining its effectiveness and proper utilization by the practitioners depends on what the recipients' needs are. This is achieved by specifying the recipient target groups and investigating their needs. The demand analysis component of the interview aimed at finding out how the researchers in the research institutes analyze the stakeholder's or end user's knowledge demand and the appropriate mechanisms they prefer to make the generated knowledge reach them. The availability of mechanisms to do these analyses was sought.

In order to get this information, the following question was forwarded to all researchers:

> **"*Do you adequately analyze stakeholder's knowledge demands, attitudes and practices before generating and transferring best bet agricultural knowledge in your areas of expertise? How do you do this analysis if you do so?"***

Almost all researchers started responding to this question first by explaining the importance of analyzing end user's knowledge demand and interest instead of generating knowledge by the interest and views of the researchers only. Some of the interviewed researchers and research center coordinators stated that as their institutes make stakeholder's demand analysis. The others mentioned that their institute does this but not sufficiently. Others were of the view that they have failed in that angle and as they have decided to do it so in the future. There were also respondents who remarked that since they know what their stakeholders need they do not do demand analysis. Some explained that although their institute generates knowledge based on the

demands of the stakeholders, they generate knowledge based on government priorities and centrally identified problems.

The views expressed by the researchers on this question were as follow:

Somehow yes, analysis is usually through student research on some problems the clients encounter. We know what the stakeholders or our client need. One example in my area is that our clients and intermediaries usually look for improved semen for cattle breeding so we generate a new knowledge or technology that meet their interest.

Yes we usually do stakeholders demand analysis. This is done through group discussions in the field, key informants discussions. When it comes to large institutional projects, it is done through workshops. Once we gathered information about the demand environment, we sit together and prioritize the problem based on the severity of the problem, feasibility of the problem to be solved by our capacity and urgency of the problem. After we have prioritized the problem, we identify the potential researcher or researchers group to provide solutions. In addition to this, we group students from different study area together and assign them to some specific areas of intervention. During this also, the students identify the demands and concerns of that specific area and intervene on the problems identified systematically.

The other respondent stated as "*Well, if you come to different literatures and read different reports, one of the major challenges of research is that wing of the extension. Particularly we have recognized that and we have come to the conclusion that we have failed in that angle and now we have come to the conclusion that we have not involved the community and decided in the design implementation we are taking into considerations. Thus many of the projects we are designing this day geared towards working with the community. What that essentially means is that we analyze the demands of the community, we start by identifying what are the constraints, what are the opportunities and what are the way forwards within the community to make sure the communities are involved into there. Let me give you a practical example. "We developed a community based Breeding strategy. In this what we basically do is that we start by describing the production system of the area and we tried to define the Breeding objective as well as the Breeding trait of the community. In doing that the communities make sure that they identified the trait they want to work on and the direction they want move in." so that we did everything with*

the consultation of the community. In doing so, when we complete the project, we are guaranteed sustainability and ownership as what we do is we do in the consultation with the community and there is no big issue of the extension and there will be no gap in this regard. Finally implementations will be done easily.

Well, there are different dimensions of including the interest or demand of our stakeholders. The socio economic research in our institute performs the analysis of what our stakeholders demand and based on this we generate the knowledge. We are also told by our stakeholders on what we are supposed to do. The other is there are always emerging issues. We give priorities for commodities which are prioritized by the government. There are also formal platforms where we get feedback on which areas we should work and it is a platform where we tell our stakeholders what we have. The platform is called Agricultural Development and Partners Linkage Advisory Council (ADPLAC). There is also an approach where by research issues are centrally managed at federal level to address the communities' priorities.

4.1.3.3.3. Knowing the Availability of New Knowledge

In Agriculture, although knowledge could be generated from various sources including research institutes and indegeneous sources, for the purpose of this study researchers were the only producers of agricultural knowledge. After research institutes prodeced relevant knwledge, they have to make them accissable and understandable by the potential users. This is due to the fact that when the information coming from research institute is easily available and accessible, it then becomes important for the Transfer agent to assess the relevance of the available knowledge, and to make syntheses of pertinent research results before disseminating them. Putting this into consideration, researchers were asked how different knowledge seekers identify the availability of new agricultural knowledge in their institute.

Based on this, researchers were invited to explain the opinion through this question:

> ***"How do different knowledge seekers or stakeholders identify the availability of new knowledge in the Institute? "***

Most respondents explained that they use different types of Medias, printing materials and different communication platforms to inform their stakeholders the availability of new

agricultural technology in their institute. However, there were respondents who revealed that they do not use any means to let our stakeholders know the existence of new technology in their institute. Others also mentioned that stakeholders know the availability of new agricultural knowledge by the time they work closely with the researchers. Different technology tools and promotion works are utilized by others to make their stakeholders know the existence of new knowledge. Sentiments expressed by different researchers and knowledge workers in the research institutes include the following:

We use different means to make our potential users know the presence of agricultural technologies in our institutes. Through media, workshops, model farmers or model business person, other formal and informal ways. We also organize research conferences and on that occasion we inform our stakeholders or other interested bodies what we have in our stock.

…Disseminating our knowledge and introducing our self and what we have goes parallel. We use different tools and methods to do this such as wikis, websites, workshops, seminars etc.

…Our clients are usually livestock owners and they know where to go when they need some consultation on animal health. They know we are service providers in this area.

Number one, our stakeholders are those who have somehow stuck to the research teams in this center and know the agricultural areas we are working on. These stakeholders can easily know the existence of new knowledge and technologies. The other stakeholders are reached and informed through different media programs such as TV, Radios, Briefings, field trips, etc. we also use opportunities where different stakeholder groups come together and we make information to be transferred from the groups to secondary and tertiary bodies. This is done by producing different consultation manuals, leaf lets, brochures scientific publications, journals, books and etc so that stakeholders be aware of the availability of new knowledge and technology.

You know this depends on the stakeholders you deal with. For example, " if you work with the farming community, we usually go to them and they do not come to us. But when we target some enterprises, they come to us because they know where we are located and they come seeking for knowledge. " so we get to differentiate these two. As a research institute with a global mandate , we cannot reach and work with every practitioner all over the country. Our job is to produce global public good. So our main job is just to make sure to develop the evidence that a particular

technology works. Once that evidence is developed, we try to get in some development partners like big NGOs, Public institutes, etc who can upscale to the wider community. "For example, if we go to a particular village and work with may be 20 or 30 households, our job is just to develop evidence that particular technology works. When we do that, we make sure that the development partners are also involved. Once we developed the evidence that technology works on the smaller scale, the development partners can expand that technology to a wider community.

The first is we do research extension which is promotion of available technologies to stakeholders so that the extension workers are aware about what we have. The research extension department at each our centers do this. There is also a research extension activity called pre extension or pre scaling up activity where we do in a very special manner by prioritizing areas so called less addressed by technologies. The other is the platform I mentioned earlier called ADPLAC. Through this platform we inform our stakeholders what we have as new.

4.1.3.3.4. Transfer Mechanisms

Indeed, the availability of research results does not necessarily guarantee their adoption and utilization by potential users unless it is transferred to communities of practice. Transfer mechanisms are very important to ensure the success of knowledge transfer. Transfer mechanisms consist of all the means through which knowledge moves along the knowledge transfer process. They allow actors (i.e. researchers, Transfer agents and practitioners) to exchange knowledge and information. The reviewed literature shows that there are several mechanisms that could be used to promote knowledge transfer, but also that these transfer mechanisms have an impact on the effectiveness and the success of the knowledge transfer process**.** Failing to chose the right transferring mechanisms is often cited as one of the reasons why research results are under-utilized by practitioners.

In order to gain insight about what tools are mostly utilized by the research institute to dissimnate their research outputs after the stakeholders have identified the knowledge of their interest, the following question was forwarded to the researchers.

What tools are used and processes are employed to transfer knowledge from the Research Institute to stakeholders? Do you think these tools are effective in making the knowledge reachable to the user??

Almost all respondents put in plain words as they use varieties of tools like publications, in different format, videos, posters, radio programs, one to one communications and discussions. Others use practical engagement with end users, demonstration, and informal face to face discussions. Workshops, annual research review meetings with stakeholders and policy briefs were some of the opinions. Below are some of the narrations expressed by the interviewees:

…Since most of the practice in Ethiopia is traditional based knowledge/service/product is transferred to stakeholders by creating awareness and use of role models sponsored by government and NGOs. Technology transfer process includes identifying new technology (research) →technology disclosure → opportunity assessment→ intellectual property protection → commercializing strategy →agreement/start-up →license monitoring.

Basically we employ a lot of tools in the knowledge transfer practices. Usually the best way to convince the farmer and make them utilize the technology is to just show it works. Theoretically they may not understand and not accept it. You have to teach and engage with them practically. In addition to that, the usual tools like workshops, leaflets, field visits, seminars etc are used. "Above all the best one from my experience is to show them practically what they can get."

Well, one is doing demonstration. You identify selected farmers and demonstrate with them to others with the due target to the extension system. The other is we use seminars, conferences, publications, websites where you can get manuals and etc. we use also Medias like radio, television and sometimes newsletters. The informal face to face discussion is also held some times when it is necessary. We transfer our knowledge using group training for both end users and development agents too.

4.1.3.3.5. Problems Encountered

Respondents were asked to indicate some of the problems and challenges their institutes face during knowledge transfer through this question:

What problems and limitations hamper the knowledge transfer practices?

The main aim of this question was to identify the potential problems and limitation most agricultural research institutes in Ethiopia have and identify the possible solutions to tackle these problems. Based on this most of the interviewees raised difficulty of breaking the attitude of the recipients and make them accept the new technology due to their agrarian nature. All respondents reveal shortage of resources and infrastructure as well limited knowledge of stakeholders the main problems. Some raises the weak extension system as the basic problem. Furthermore limited support from top decision makers of the institute to support the knowledge transfer activities is also mentioned by others as big problem.

There are a lot of problems and challenges we face. Accepting change (public attitude), Policy issues, human capital, completion conditions, infrastructure, governance, market, information flow and etc are some of these problems and limitations.

The first challenge observed is because of the subsistence nature of our community. They are usually very careful in changing their mind and following you may be your technology could be perfect but it takes some time to be accepted. "For example, as a breeder one of the challenge I have is I cannot show the farmers benefit of the breeding in one season as it takes longer time. This complicates the whole issues because farmers need some time tomorrow not in a longer year. So the first challenge I would say is that based on the nature of the subject you are dealing with , you may not see the effects immediately. In fact you have solutions for this. One way is you need to identify quick wins. People call it low hanging fools. For instance, while I am working with breeding, in the mean time I need to intervene in some areas like health and nutrition which grant immediate benefit and ensure full participation. Because breeding take 3 years and if you tell them as they will get better result after three years, they will be very reluctant to accept it. So the strategy we follow is while we harvest the short term strategy, we work on our selection scheme that takes longer time." Number two, resource is the other major problem. There are important areas where we can make differences but resources are very limited and funding opportunities are becoming very low. The other one is some pastoral communities in Ethiopia remains reluctant to work with as they only focus on the temporary benefit that they earn from different NGOs.

I don't think we have a strong research extension system, the problem starts from here. That is why the technologies that are out in the hands of the end user are very low. We did an adoption

study recently for the main crops which is expected to have 90% of adoption. The result was an average of less than 10%. This shows our technology transfer mechanism is not appropriate and properly in place. The other biggest problem is the language barrier. Whenever our researchers go to communicate their research findings to the end users, they face big problem in communicating their result as the researchers use more of scientific and technical words which are very strange and difficult for the end users to understand and assimilate.

Of course this is an interesting question! You know we are dealing with agriculture and agriculture with new concept and you also know we are working with the agrarian nation and our farmers have in depth agricultural knowledge, skill and culture .in that case, it is very difficult to break the attitude of an individual who have grown through this culture to a new paradigm. In that context in all the cases we go through we get this challenges but the success is weather that resistance is broken or reduced. In addition, there are always interactions among different external sectors for our business and we need resources in different categories and when these resources are expected n time they may not even available in time. As we are not the one who administers the resources outside our territory, we are victim with the inefficiency of the overall interaction systems.

4.1.3.3.6. Monitoring and Evaluation

After knowledge has been transferred from research institutes and used by end users, their effectiveness and proper utilization should be measured by using appropriate monitoring and evaluation mechanisms. For agricultural knowledge transfer and Exchange to be to be effective, developing appropriate indicators for knowledge transfer effectiveness which are tractable for evaluation yet aligned with the Institute's objectives is useful. In view of this, the interviewees were asked to explain whether they evaluate and monitor the effectiveness of the transferred knowledge. Particular attention was paid for the availability of mechanisms for these activities were sought. To get information regarding this, the following question was presented to informants:

How does the Institute measure the effectiveness of the transferred knowledge?

Most of the research institutes do not perform the evaluation and monitoring of their disseminated knowledge systematically. Some do this operation by using adoption study, by

collecting feedback, by observing success scenarios. The following are some of the summaries of responses provided by interviewees about this issues:

The indications are the uptake of knowledge/service/idea is reflected by increasing number of end user. Increased demand for a particular item. We do impact study, observations, field visits, and feedbacks from the users

Ok, the checkpoint is the individual him/her self. By the time you changed the attitude, you concretely benefited him. By the time you changed the attitude, you concretely benefitted him that he realizes this type of business makes more benefit than I did and we have to verify that. To do so, we have the guy in our side who tells us about the success and how this success comes to this type of innovation and working modalities

We have never done systematically the measurement of the effectiveness of the transferred knowledge as it is a bit difficult to do it so. As this project is new, let me bring you back to the experience of its predecessor, the IPMS project which will be hopefully replicated to this project too. In the IPMS, we did try to capture how the knowledge was transferred, how it brought behavioral change but I am not sure whether it is enough or not.

We do adoptions study here and there and the research agenda is also determined based on these evaluations.

4.1.3.3.7. Direct versus Indirect Knowledge Dissemination

Because of large number of end users or practitioners in the country and reaching each end user is very difficult for the research institutes, there has to be an intermediary body between the knowledge generator and recipient for the knowledge transfer. Hence, the knowledge transfer agents or stakeholders receive the knowledge produced and disseminated by researchers, then, they adopt and adapt this knowledge to practitioners' conditions and context before disseminating it to knowledge practitioners. Interviewees were asked whether this mode of transferring the knowledge assure them that knowledge has been properly utilized by the end users. To get this insight, the following question was presented to the participants:

Do you think the current knowledge transfer practice (research Institute-Stakeholders-End users) assure you the utilization and application of the knowledge by the end users effectively?

Almost all respondents remarked that this way of reaching end users through stakeholders does not guarantee them the effective utilization of their knowledge by the end users although due to several reasons and capacity limitations the only option to go through is this. The others mentioned that the partners you selected to make the dissemination are very determinant.

Below are some of the opinions narrated by the respondents:

NO. There should be more efficient way of transferring, follow-up and dissemination, planning and preplanning process. As mentioned above technology transfer is a complex process and depends on many factors. It very difficult to say practices are fully operational.

It depends on which development partners you bring in and which national system you work with. I m a believer of that individuals can make differences. When you get a very strong national system , things work very properly. If you do not have that, things collapse. It is very obvious as our project cannot reach each end user due to capacity limitations. So the solution is to choose the right partner whether that is a development partner, NGOs or government institutions and it is a matter of capacitating these different institutes and tries to find champions to work with. You try different options to make sure that your technology has reached the end users.

No, no, it is not guaranteed us and that is why a lot of actions should be taken to strengthen the linkage between research and development. It is true that there a lot of research outputs and technologies in the national research institute that can be easily transferred. The systematic linkage and structural setup is not functional to deliver the whole thing. Thus the whole systems need to look into. For this purpose agricultural transformation agency should be established..

I think this is the only option we can go through as any business you are making is limited to your capacity. In our arrangement, there is a knowledge generator and there is a promotional extension component that makes the new technology reach end users through stakeholders as interface and each end user interact with each other to exchange the acquired knowledge. This Is

arrangement is perfect compared to our capacity. But, the direct contact between the source of knowledge and the beneficiaries is the better way of transferring knowledge and guarantee the effective utilization and application of the new knowledge by the end users as the chain and path of transferring increases, the complexity occurs which result in ineffectiveness and inefficiency.

4.1.3.3.8. Suggestions and Recommendations

To overcome the challenges and limitations encounter which hampered the knowledge transfer activities, researchers were requested to provide their constructive recommendations and suggestion that would enhance knowledge transfer activities and the cooperation with the stakeholders .In order to acquire this , researchers were presented by this questions:

> ***What do you suggest for a more successful cooperation between research institutes and stakeholders for the overcoming of existing problems occurring during the process of knowledge transfer from Research Institute to stakeholders?***

On this inquiry, the respondents provided their responses and the details of their discussion was presented as follow:

..Create awareness, an atmosphere of trust, encourage stake holders to sponsor research, engage them in proposal development. Improve these things: change public attitude, Policy issues, human capital, competition conditions, infrastructure, governance, market, information flow etc.

Cooperation or I would call partnership do not come easily. You know partners have to have some common goals around which that relationship is built on. One NGO and our project can be partners for example on some issues. So there has to be some common interest for both to build the partnership. The best thing is then to identify that common interest. "For example, we work with the national research system. If the technology we want to disseminate is not in line with the interest of the national research system, we can move nowhere. So that is the starting point. Something must be in the interest of the community, the research system and the partners you deal with. " once we have agreed on this common understanding, we make sure that this project is also registered at the national system as their own. Then they are accountable for it and whatever comes the credit also goes to the national system. So whenever we design a project t and we want to implement it somewhere, we usually deal with the national system and we have to

make sure that this project is accepted and registered in the national system. Thus its impact and output will be reported. If I summarize it in short, the best way is to plan and do it together and own it as ownership is very important to secure its sustainability. And also implementing together is the best way.

It is a very challenging question and I don't think it has a direct forward answer. It has to involve many bodies. It also requires policy dimensions which imply creation of efficient institutional setup and then strong monitoring and evaluation system. The organizational structure should be also revised in a way that supports these efforts. The best way is what are always thinking about. What new approach we need to do to better deliver our technologies. One best way is to establish a one window technology center at each research centers so that anyone can get the whole thing that research center owns. The other thing is to further strengthen the platform and utilization of ICT infrastructures. .

..Identify problems together , plan the solution together and make stakeholders part of the process , make it need based

I think we can improve the interactions and cooperation with our stakeholders in discharging and overcoming obstacles in front of us. One thing is the objective and for what extent the center is promoted well and should come to the knowledge of the beneficiaries' side that understands its demand. There are also gaps like media coverage best be programmed to transfer the knowledge in situation where the beneficiary can get the information at the right time and place. The other thing that can be improved is that the center should transfer its knowledge through formal training and showing or demonstrating that technology can be converted into development agenda or ground. There has to be improvements in where government has lack and those policy directions cannot get there in enhancing the system. There should be also improvements among all parties (both research center and stakeholders) in effective utilization of resources including human, material and financial. In overall, cooperation with the stakeholders can be improved in making the interaction further by qualifying the output into the timely demanded loophole.

Creating a close partnership with stakeholders is the primary solution. We have to sit together and identify priorities together. We have to decide on action plans together. Both of us should take equal responsibilities. We have to measure and monitor our common activities together.

4.1.3.3.9. Future Plans

The final inquiry presented to the respondents was future prospect with regard to enhancing knowledge generation and transfer practices. To attain what researchers planed in the future an interview question was posed to all participants.

What is the future plan regarding knowledge generation and transfer?

The details of their discussions are summarized as follow:

Increase human capital, identify technologies, research, and create an incubation center where the best product/service matures. Finally, disclosure of the technology to the stakeholder/industry for further development

In the future, we will like to continue the same way by engaging the beneficiaries from very beginning. When you do that you learn a lot of things from the stakeholders that helps even sharpen your project. Generally we planned to work together with our stakeholders from the very planning to implementation through a win -win approach.

As a future plan, this way or the other we want to strengthen the linkage among all stakeholders through different platforms. We are also planning to have a commodity based platform where our stakeholders sit together and discuss on specific commodity's issue together. Further building institutionally systematized and policy supported knowledge generation and transfer mechanisms. We have also planned to enhance the capacity of our researchers specially how they can make communication with their stakeholders during presenting their findings.

Well, what we have planned so far is, based on our lesson that we took we were focused more on the transfer of the knowledge. Of course transferring knowledge and learning together is a good thing but we have to somehow plan from the beginning strategically." For example we have planned to set up knowledge centers, what we will do is that we see what the situation looks like and document it, we will document the usability of the contents, who is using it, which publication is more used and soon. At the end we will compile all this and things and we will learn from it to take further corrective actions.

4.2. Discussions

This section presents discussions of the research findings based on the presented results of the study.

4.2.1. The Types of Knowledge Generated by the Research Institutes and Required by Stakeholders

According to the literature review of this study, if the research is conducted on the basis of the users' demand, the generated research will be more important and easily applicable by the practitioner (Boostrom et al., 1993). Based on the result of the present study, agricultural research institutes in Ethiopia produced varieties of knowledge and technologies, scientific information and management practices pertained to agriculture such as farming systems; improved agricultural productivity, animal husbandry, feeding improvement, technologies on disease prevention and control. They also generate knowledge more in administration/research support areas such as change management and ethics expert to make the research process qualified and align to research rule and regulations especially, the impact of new technologies etc.

The results of the study also revealed that, most stakeholders require different types of knowledge and technologies which are also generated by the agricultural research institutes in Ethiopia such as improved varieties, improved agricultural practices, farm implements, and technical field experiences by the time the research centers avail highly productive than ever existing one. The other sought research reports from agricultural research institutes to enrich their reports and to develop their proposal for their researches, human behaviour and promotion skills.

4.2.2. Stakeholders' Demand Analysis

As it is established in chapter two of this study, one the most important attribute of the knowledge that could have a significant impact on its effectiveness is relevance which can be achieved when the research is conducted according to users' needs and involves practitioners in the early stages of the research process, the results could be perceived as more relevant by users (Lloyd et al. 1997). The qualitative findings of the research institutes established how different

agricultural research institutes in Ethiopia performed analysis of their stakeholder's demand and interest before generating and transferring agricultural knowledge.

According to ASERCA (2011), in Central and Eastern Africa, effective agricultural knowledge management is often hampered mainly due to inadequate analysis of agriculture sector communication stakeholders and their knowledge needs. Based on the findings of this study, almost all researchers started responding to this question first by explaining the importance of analyzing end user's knowledge demand and interest instead of generating knowledge by the interest and views of the researchers only. Some institutes mentioned that their institute does this but not sufficiently. There were of the view that they have failed in that angle and as they have decided to do it so in the future. There were also respondents who remarked that since they know what their stakeholders need they do not do demand analysis. Some interviewees explained that though their institute generates knowledge based on the demands of the stakeholders, most of the time they generate knowledge based on government priorities and centrally identified problems.
Of few agricultural research institutes which perform user demand analysis, educational research institutes did the analysis usually through student research on some problems the clients' encounter, through group discussions in the field, key informants discussions and through workshops when it comes to large institutional projects. The other institutes performed this process through training program, visit, meetings, consultations and other relevant methods so that there was exactly a place to understand the situations from the stakeholders sides and they can make themselves align to the demand scenario in that context. Other research centers revealed that as they performed demand analysis identifying what are the constraints, what are the opportunities and what are the way forwards within the community to make sure the communities are involved into there by identifying the production systems of the community, defining the objectives of the research projects and the trends of the community on that particular project. There were also institutes which followed different dimensions of including the interest or demand of their stakeholders. The socio economic research in the institute performs the analysis of what the stakeholders demand, they were also told by their stakeholders on what they were supposed to do, there were also formal platforms such as ADPLAC where they got feedback on which areas they should work and where they tell their stakeholders what they have.

4.2.3. Establishment of Relationships

4.2.3.1. Contacts of Research Institutes with Stakeholders

Based on the study findings of the survey from research institutes, the immediate stakeholders of the agricultural research institutes in Ethiopia are: scientific communities , students, farmers, investors, agro-processing industries, non-governmental organization (NGOs), government organizations, agricultural companies, researchers, agricultural offices, farmers cooperatives, agricultural bureaus, enterprises, universities, vaccine producing institutes, pharmaceuticals, food industries, livestock keepers, government agencies in extensions , commercial farms multiplication centers , research extension division of the research institute, federal and regional agricultural research institutes, Ministry of Agriculture, Ministry of Livestock and Women Affairs offices within the Ministry of Agriculture, National Policy Makers and Specific group of farmers etc.

The literature review also revealed that the effectiveness the generated and transferred knowledge depends mainly upon existing resources, relationships, and networks to the maximum extent possible (Barwick et al, 2005). Based on this study, the relationship established between the research institutes and the stakeholders is based to some extent on personal acquaintance while majority of the respondents (56.9%) revealed that they did not establish relationship with the stakeholders on the basis of formal partnership.

Although the relationship between agricultural research institutes and their stakeholder was established informally, the frequency of contact among them was regular .The finding of the survey conducted at the research institutes showed that 45.1% respondents meet with the stakeholders regularly.

With regard to whether or not the relationship established between the research institutes and the stakeholders was appropriate to boost the knowledge transfer activities, the majority of the respondents from the research institute (56%) expressed the current relationship between the agricultural research and their stakeholders as inappropriate. The respondents who took this stand forwarded the following measures to be taken to make the relationship suitable to enhance knowledge transfer activities:

- There should be multilateral and consistent cooperation and relationship in accordance with the real situation of stakeholders , clearly identified roles and responsibilities, and accountability arrangements
- Strengthen the communication departments of the research institutes as currently inexpert individuals are performing this activity
- Encourage formation of Farmers Cooperative Self Help Groups and establish strong linkage with these groups
- Program on technology transfer has to be developed for media on daily bases. Nationally information system has to be established
- Regular mutual panel of problem identification and research output review have to be made based on contractual agreement on technology release.

Even if ideally the effective utilization and application of research outputs would be high if they reach end users directly by the knowledge generator, most of the researchers' respondents (58.8%) claimed that the research output should reach the end users indirectly through the stakeholders. They justified their stands as follow:

- Due o infrastructure constraints such as finance, human resource, and other related infrastructures.
- Because the technology generator lack the right knowledge and skill to communicate his output to the end users as stakeholders know better about their end users than researchers
- Because some research outputs are too technical and would require involvement of development stakeholders to bring it to action.

4.2.3.2. Relationship of Stakeholders with Research Institutes

Based on the survey finding of stakeholders, although some research institutes formed relationship with research institutes through government structure and using communication platforms, majority (40.5%), disclosed that there is no formal relationship established with the research institutes and (35.5%) revealed that they interact with the researchers/institutes when they only need new technology that could meet their own problems.

On contrary to survey respondents of agricultural research institutes, majority of respondents (76.5%) from the stakeholders said that research institutes should transfer their agricultural

knowledge directly to end users instead of through stakeholders. These respondents justify their claims as follow:

- End users find first hand information from the researcher, researchers also can observe the problem of the end user on the spot,
- This avoids distortion of information which might occur in the process of dissemination by intermediate stakeholders.
- It will simplify how to apply the theoretical findings as the intermediary body may not fully understand it and interpret
- Since the extension agents for technology transfer cannot be effectively move the work as needed.

4.2.4. Stakeholders' Involvement in Research Activities

The primary purposes of knowledge generation and transfer are to increase the likelihood that research output will be used in practice and to enable researchers to identify practice and policy-relevant research questions. Knowledge transfer theorists assert that knowledge is "not an inert object to be 'sent' and 'received,' but a fluid set of understandings shaped both by those who originate it and by those who use it" (NCDDR, 1996). This can be achieved mainly when the stakeholders or end users involved in the research activities of the research institutes.

The qualitative results of stakeholders strongly established that, almost all agricultural research institutes in Ethiopia do not involve the end users or stakeholders sufficiently during knowledge generation and transfer activities. Some respondents argued that although few agricultural research institutes involve its organization during knowledge generation and transfer activities, it is not sufficient. The respondents also highlighted the importance of involving stakeholders and other end users sufficiently to ensure the technological packages being generated and promoted are relevant and appropriate, and that strategies for addressing challenges that affect utilization are used.

4.2.5. Stakeholders Awareness of New Knowledge

Based on the qualitative findings of research institutes, most respondents explained that they use different types of medias, printing materials and different communication platforms to inform their stakeholders the availability of new agricultural technology in their institute. However,

there were respondents who revealed that they do not use any means to let their stakeholders know the existence of new technology in their institute. Others also mentioned that stakeholders know the availability of new agricultural knowledge by the time they work closely with the researchers. Different technology tools and promotion works are utilized by others to make their stakeholders know the existence of new knowledge.

Sentiments expressed on this issue by different researchers and knowledge workers in the research institutes included:

- Research institutes organize research conferences and on that occasion they inform their stakeholders or other interested bodies what they have in their stock.
- This is done in some research centers by producing different consultation manuals, leaf lets, brochures scientific publications, journals, books and etc so that stakeholders be aware of the availability of new knowledge and technology.
- Stakeholders are reached and informed through different media programs such as TV, Radios, policy briefs, field trips, etc.
- Research institutes also use opportunities where different stakeholder groups come together and they make information to be transferred from the groups to secondary and tertiary bodies.
- Some institutes explained that their main job is just to make sure to develop the evidence that a particular technology works. Once that evidence is developed, they try to get in some development partners like big NGOs, Public institutes, etc who can upscale to the wider community.
- The others do research extension which is promotion of available technologies to stakeholders so that the extension workers are aware about what we have. The research extension department at each our centers do this.
- The other is the platform such as ADPLAC. Through this platform they inform their stakeholders what they have as new.
- Some other centers do different types of promotion works. They do presentation in the field works, they have publications in different format, and they organize seminars, visits, exhibitions, etc so that they avail the necessary information to others.

4.2.6. Knowledge Transfer from Research to Stakeholders

Knowledge transfer is as an interactive process involving the interchange of relevant knowledge between research users and research producers. It occurs not only at the end of a process, project, or research study, but is active throughout the life of a project, from start to finish (Barwick et al, 2005).

According to the literature in this study, two categories of transfer mechanisms are distinguished in the literature: 1) the information mechanisms, and 2) the interaction mechanisms. Information mechanisms refer to the ways used to acquire or disseminate knowledge without personal interaction with other actors. This includes, for example, research reports, scientific papers, professional journals, information reports, best practices guides, education tools, emails, blogs, etc. (Argote et al. 2000; Bickel and Cooley 1985; Huberman 2002; Kirst 2000; Neville and Warren 1986). Abdoulaye (2003) suggested the creation of a central database of good practices and innovations developed in agriculture as a solution to optimize knowledge management and transfer. He argued that an adequate conception and presentation of these databases, along with an available access for practitioners, would encourage the latter to use new knowledge and practices.

As for interaction mechanisms, they consist of the ways used to acquire or disseminate knowledge by relying on personal interactions with other actors. Some examples of interaction knowledge transfer mechanisms are oral presentations, academic conferences, seminars, professional colloquiums, workshops, training sessions, formal meetings, informal discussions, social activities, etc. (Boostrom et al. 1993; Chazan et al. 1998; Hemsley-Brown and Sharp 2003; Neville and Warren 1986; Ozga 2004).

Based on the survey result of research institutes, agricultural research institutes utilized varieties of mixed mechanisms to reach stakeholders with their knowledge. (75.4%) respondents use research/information reports both in print and digital form to disseminate their knowledge, (84.2%0 respondents used scientific papers and professional journals to disseminate their knowledge and (73.7%) respondents disseminated their knowledge orally in conferences and workshops. In addition to these, there were respondents who put forward supplementary mechanisms and their results are described as follow:

- Using Community Based Educations
- Organizing one of the agricultural products' element days (like fish day, crop day…)

- Using field days , demonstrations and exhibitions
- Organizing group of users and providing training
- Using posters ,pictures and user manuals

Interview responses revealed that, almost all respondents put in plain words as they use varieties of tools like publications, in different format, videos, posters, radio programs, one to one communications and discussions. Others use practical engagement with end users, demonstration, and informal face to face discussions. Workshops, annual research review meetings with stakeholders and policy briefs were some of the opinions raised by other interviewees.

4.2.7. Knowledge Acquisition

On the type of research institutes, stakeholders' respondents were inquired to indicate from which agricultural research institute they obtain research outputs directly. Based on this, majority of respondents, (67.1%) stated that they acquire best bet agricultural knowledge from national research institutes, while (40.5%) revealed that their organization acquire agricultural research outputs from international research institutes. To acquire knowledge from these institutes, most of them (67.5%) responded that through research /information reports and (67.6%) revealed that they acquire agricultural knowledge orally in conferences and workshops.

The processes employed during acquiring new agricultural technologies as revealed by stakeholders' interviewees, stakeholders participate on workshops; during workshops interactions were there and thus they get the knowledge. Some stakeholders use informal ways to know what was available in the research organizations and access these research outputs. Using information sharing platforms and each new information was circulated among the participants of different stakeholders so that through that platform they received new knowledge or information."Other stakeholders acquire knowledge when research institutes contacted them and introduce to the organization's extension directorate by leaflets, publications, books, brochures, workshops, seminars and experience sharing by the time new knowledge is produced. The others followed the value chain development approach. In this approach, one major aspect was undertaking value chain analysis. In doing so, one of the major stakeholders was the research institute. The usually perform an assessment or inventory about that specific value chain regarding the type technologies required by market. So in the value chain analysis, they identify

the research centers which met the demands. Once they have identified the research center, they invite the researcher who generated the knowledge to share its technology in that particular value chain.

Stakeholders' respondents also recommended best tools and approaches that can be used to enhance knowledge transfer activities from research to development as follow:

- Researchers should prepare short and digestible policy briefs that can be easily understood by the stakeholders or practitioners
- Using meetings, stakeholders forum, medias like TV and Local Radio, workshops, distributing relevant bulletins, on job trainings, regular follow up, organizing regular forums, and field visits
- The research institutes should use a web based system like blogs, information sharing platforms etc to reach stakeholders,
- Face to face extension approach, using regional, zonal, wereda experts to deliver technologies to end users, using the place of model performers, like model farmers sharing of printed materials on regular basis etc
- Participation of farmers from identification of the research agenda to end results

4.2.8. Knowledge Transfer from Stakeholders to End Users

For the transfer of agricultural knowledge from stakeholders to end users, most of the stakeholders (44.1%) meet end users only when they have new thing to share based on the survey responses of stakeholders.

Stakeholders utilized different types of mechanisms which are described below to transfer knowledge to end users,

- Stakeholder platforms, web sites, publications, leaflets , modeling projects, multi-stakeholder joint action coaching, preparing manuals and packages
- Using visual aids like Pico flip charts , group discussions individual approaches demonstration sites Farmers training centers & pastorals training centers
- Trainings and workshops. Demonstrations in FTC's and on site.
- Using regional. zonal and wereda experts to deliver technologies. Face to face extension approach.

- By using group extension approaches through developmental and net working groups,

  with development agent

With regard to the effective utilization and application of agricultural knowledge by end users, most of the survey respondents of stakeholders (76.5%) did not think that the transferred knowledge is utilized effectively by the end users. They gave the following reasons:

- End users resist to accept it as it was not generated based on their demands
- Lack of knowledge by farmers, lack of capacity (financial, infrastructure etc), lack of commitment by experts, lack of awareness by end users
- The full package of the research output is not applied in many areas. That's why we see different results in applying the same technology.
- Research outputs are most of the time more scientific and follow scientific methods; however end users didn't utilize scientific methods.
- Because knowledge transfer in a sustainable manner and it is not participatory for all the farmers in all agro ecologies.

4.2.9. Direct Versus Indirect Knowledge Transfer

Financial, human, and physical resources are important determinants of knowledge transfer (McPherson and Nunes 2002; Patricia 2000; Abdoulaye 2003; Powers 2003; Hemsley-Brown 2004). Regarding how the research results should reach the end users, almost all interview respondents of research institutes and stakeholders remarked that the indirect way of reaching end users through stakeholders did not guarantee them the effective utilization of agricultural knowledge by the end users due to several reasons and thus trying different options to make sure that technologies have reached the end users was better. Some opined that the partners you selected to make the dissemination and the national systems to work with were very determinant to make the knowledge reach properly to the end users mentioning that a strong partner and national systems would enhance the process as revealed by some respondents. Others suggested that as there should be more efficient way of transferring than this, follow-up and dissemination, planning and preplanning process since the knowledge transfer was a complex process. Several respondents also revealed that due to the systematic linkage and structural setup was not functional to deliver the whole thing and due to the information was lost, misinterpreted,

dissipated and spoiled, the whole systems need to be looked into. For this purpose agricultural transformation agency should be established. Research institutes should not only give the knowledge to stakeholders and keep quite. There has to be a crosschecking mechanism weather that knowledge reached the end user very correctly.

There were also respondents who claimed the indirect way as the only option they can go through as any business they were making was limited to their capacity. In their arrangement, there was a knowledge generator and there was a promotional extension component that made the new technology reached end users through stakeholders as interface and each end user interacted with each other to exchange the acquired knowledge. This arrangement was perfect compared to their capacity even though they admitted that the direct contact between the source of knowledge and the beneficiaries is the better way of transferring knowledge and guarantee the effective utilization and application of the new knowledge by the end users as the chain and path of transferring increases, the complexity occurs which result in ineffectiveness and inefficiency decreases.

Based on the other stakeholders' response, ideally, if the research institute reaches the end user directly, the effectiveness can be very high. Due to the limited capacity of research institutes to reach each end user, they have to design some sort of mechanisms for their knowledge has reached properly end users through the stakeholders in different ways. One way is they can develop a direct transmission program within their capacity by forming end users research group that serves to the research institute by providing early information on what type of technology is necessary to improve their lives and end users extension group that will take up the final technology and can help in the dissemination of the technology among the farmers.

There were also views which stated that the research institute should participate in the knowledge transferring to the end users although the level of participation may vary, each partners should take part in making the knowledge reach the end user and guarantee its effective application. For example, the extension worker can participate in the transferring process by telling the end users the advantages of using the new technology. And the researcher should tell the extension worker and the end user how the new technology is utilized and applied to maximize productivity. The other partner or stakeholder can participate in shaping the end users to receive the technology".

4.2.10. Monitoring and Evaluation

As argued by Roy et al. (1995), the knowledge transfer process often requires continuous iterations, therefore feedback loops are necessary. For knowledge transfer and Exchange to be effective, developing appropriate indicators for knowledge transfer effectiveness which are tractable for evaluation yet aligned with the Institute's objectives is useful. Based on the interview respondents of research institutes, most of the research institutes do not perform the evaluation and monitoring of their disseminated knowledge systematically. Some do this operation by using adoption study, by collecting feedback, by observing success scenarios and by recording each activity from the beginning with the changes observed.

The questionnaire results of the research institutes revealed that above half research institutes (50.1%) did not perform monitoring and evaluation of their disseminated research results while (40.9%) performed the operation. And the monitoring and evaluation doings are carried out by taking feedback during workshops, by conducting field visit, through questionnaire, by using customer satisfaction form, by undertaking socio economic studies, by collecting reports, by making follow up from the very beginning, by making informal discussions with end users, by using regular impact and adoption assessment etc

In contrast to the research institutes, the stakeholders performed monitoring and evaluation of disseminated research results to end users as out of 40 respondents 30 pledged how they performed these activities based on the results of the questionnaire survey of the stakeholders. Although most of the means of doing these activities are identical with that of the research institutes, stakeholders carried out the monitoring and evaluation activities in the following ways:

- Monitor changes in practice and behavior, measuring outcome at productivity, income and usage of products, measure how empowering are new technologies
- Through consistent system based follow up and field visit programs and supervising or inspecting the activities done on the field
- By observing the availability of product on the market, end user's satisfaction and improved living standard and improved production system
- Through undertaking multi stake holder discussions
- Through random assessment after short trainings provided to development agents and the end users

- By using survey with check list/questionnaire/
- By collecting baseline data before and after intervention and comparing the results

4.2.11. Incentives

As can be observed from the survey responses of research institutes, most of the institutes did not provide any special incentives for their researchers for performing a knowledge transfer activities, there were respondents who claimed that the institutes offered some incentives and give recognitions due to their knowledge transfer activities instead of individuals, there were also individuals who considered transferring of knowledge as their own duty and hence needed no more incentives, some other respondents also verified that the institute planned to grant incentives in the future. Getting promotion, academic rank, trophy prizes, money awards, granting more relevant responsibilities to the researcher etc were the incentive and recognition types granted by some research institutes.

4.2.12. Challenges for knowledge Transfer

According to the literature finding of this research, there are a lot of challenges and problems that hampered the knowledge generation and transfer practices which are also supported by this study. The research community may rely on incorrect assumptions about the definition and purpose of dissemination. Most dissemination practices are based on a mechanistic, linear conception of dissemination as a process of "getting the word out". But dissemination is not synonymous with publication. Merely sending out information via an article in a scholarly journal or the World Wide Web will not get the job done (NCDDR, 1996). Stakeholders may be left out of the research process, or not included in discussions regarding dissemination strategies and activities (Addis, 2002). The language—often overly academic or full of jargon—used to communicate research findings and best and promising practices may not appeal to practitioners, administrators or policy-makers. Often, practitioners are not familiar with research language and methods, and therefore, it is important for researchers to present research in a clear manner (e.g., avoiding technical jargon and advanced statistics) (Dal Santo et al, 2002). The most frequently-used product formats—(peer-reviewed journal articles, academic conference presentations, books, or final reports) — may fail to reach much of the field, or may not appeal to practitioners, administrators or policy-makers (who may prefer newsletters, updates, or other summaries). Researchers write primarily for their academic colleagues, with little regard to the effectiveness

of this dissemination strategy (Martin et al, 1998). The most frequently employed communication method —the posting of a single document, project description or literature citation on an institution's website—may fail to reach much of the field with new information in a timely or systematic fashion. No matter how well the product or service is designed, priced and promoted, the process fails if the offering is not readily accessible to the client at a convenient time and place. In the marketing sense, place is synonymous with the goal of accessibility (Fine, 1986).

Based on the interview results of the research institutes, there were a lot of challenges and problems faced during knowledge transfer. Accepting change (public attitude), subsistence nature of the community, Policy issues, human capital, infrastructure, governance, market, information flow, weak research extension system, researchers' language barrier to communicate research findings, inefficiency of the overall interaction system, etc were some of these problems and limitations. In addition to these, there were also institutional challenges. The top decision makers may not be interested, do not encourage and give time for different publications or knowledge sources provided by researchers. Most Stakeholders do not implement the knowledge they acquired unless researchers push them,

The interview respondents of stakeholders also reported that a number of problems and challenges have been affecting their knowledge acquisition activities. The new knowledge is not easily available it is scattered, is no repository for knowledge in this country, getting information from several institutes was very difficult as there was no linkage between knowledge generating institutes, limited participation in the research institutes activities, unable to know what was available in the research institutes, the level of research institutes' intervention based on their own interest without the prioritized problem, capacity gap, limitations of communication medias, lack of intermediary responsible to coordinate the cooperation among research institute and stakeholders, negative attitudes of research institutes, Researchers focus on publication of their research outputs rather than applying it etc were some of the challenges and problems which hindered knowledge acquisitions "

4.2.13. Factors Affecting Knowledge Transfer

In line with the conceptual framework of this study, the transfer of agricultural knowledge are influenced by a number of factors that are broken down into three major categories: determinants

related to disseminated knowledge attributes, those related to the actors involved in the process, and determinants related to transfer mechanisms. Depending on this view, stakeholders' survey participants were inquired to evaluate factors which deemed to affect the proper acquisition of agricultural knowledge from research institutes.

Whatever the reason(s) for the gap between research/evidence and practice, as Martin and colleagues (1998) assert, "it has become clear that the world does not automatically beat a path to the researcher's door just because he or she has a good idea". Ensuring that research findings, best and promising practices, and other innovations reach, strengthen and support the field—and that the feedback loop remains unbroken—requires comprehensive, active knowledge generation and transfer planning, and a multi-faceted, strategic approach to carrying out transfer activities. Depending on this view, respondents from the research institutes were inquired to evaluate factors affecting the transfer of agricultural knowledge through different statement. Thus the first statement to be evaluated "**my organization has a policy or strategy for Research communication and dissemination"** was a major influencing factor to contribute for the success of knowledge transfer as most respondents with the rating average of 4.0 agreed that their research institutes had plan or strategy for research transfer.

According to the literature review of this study, knowledge transfer are mainly related to the experience of the research organization with knowledge transfer activities (Anis et al. 2004), as well as the importance and the recognition given by the organization to these activities (Abdoulay 2003). Therefore, research organizations willing to collaborate with transfer agents and/or practitioners, should implement incentive policies and release the necessary resources (time, funding, etc.) to encourage their researchers to engage in knowledge transfer activities. With regard to the provision of incentives by the research institute to researchers who contributed for knowledge transfer, "**my organization provides incentives and encouragement for researchers to disseminate knowledge"** was not taken side by the respondents to treat it as a major factor for knowledge transfer since most of the respondents with a rating average of 2.73 remained neutral about the statement although majority of respondents 58.1% disagreed that their organization did provide incentives and encouragements for researchers to disseminate knowledge.

The interactions, partnerships and collaborations developed between researchers and practitioners has a positive impact in influencing the outcome of successful knowledge transfer (Ozga 2004; Hammett and Collins 2002; Rynes et al). Concerning the cooperation established between their organization and stakeholders, ***"cooperation between my organization and other stakeholders is based on long term agreements",*** was still **not** courageous by the respondents to take baize to consider it as a major factor of agricultural knowledge transfer as most of the respondents with the rating average of 2.94 did neither agree nor disagree with the idea that their organization constructed cooperation with stakeholders based on long term agreements but most of the respondents (41%) disagreed that the cooperation established between their organization and other stakeholders is based on long term agreements.

The reviewed literature shows that there are several mechanisms and communication tools that could be used to promote knowledge transfer, and also that these transfer mechanisms have an impact on the effectiveness and the success of the knowledge transfer processes (Argote et al. 2000). With regard to the method of communication, the evaluation of ***"the methods and communication tools and channels we use to present new knowledge are well-adapted to the interests of our stakeholders***" revealed that most of the respondents from research institutes with the rating average of 3.3 were in confusion to accept or turn down the statement while majority of the respondents with 51% agreed that the communication tools and channels their institutes used to present new knowledge were well adapted to the interest of the stakeholders.

The literature review showed that, if stakeholders are involved in the research process, or included in discussions regarding dissemination strategies and activities, it enhances the knowledge transfer practices. Practitioners are more likely to adopt research products when they find them useful and can contribute creatively to their development and evaluation; at least more likely than if they are simply told they should adopt them because scientific knowledge is inherently better than indigenous knowledge (Addis, 2002). A statement, "***Stakeholders are not engaged in research projects from the start",*** was also not taken side to considered it as a major factor for agricultural knowledge transfer as most of the respondents with the rating average of 3.04 were neutral about the statement although majority of them with 41% disagreed that the research institutes involved stakeholders in research activities.

Pertaining to the stakeholders awareness of the knowledge they seek from the research institute, "***Stakeholders know what knowledge they need from research institutes***", was also not on the

position to be treated as either a major factor or as factor less for the transfer of agricultural knowledge since most of the respondents with the rating average of 3.37 were in the middle of the road even though majority of them (55%) agreed about the statement.

The language used by research institutes to communicate their findings was the other issue which was sought by the research to find out the degree of impact this issue had in the transfer of agricultural knowledge. To make knowledge transfer practices successful, mainly the transferred knowledge should be easy to understand by the receiver. It should use appropriate simple, precise and clear language and be supported by concrete examples and experiences (Kilgore and Pendleton 1993; Kirst 2000). Based on this, **"*the language used to communicate research findings is overly academic or full of jargon***", was neither been accepted nor turned down by most respondents as the rating average indicated 3.08 to be as a major factor for the knowledge transfer but majority of respondents with 45% believed that the language used to communicate research findings was overly academic or full of jargon**.**

The impressive number of scientific papers and research reports published on agriculture could be a serious barrier to their use by practitioners (Hemsley-Brown and Sharp 2003). It then becomes important for the transfer agent to assess the relevance of the available knowledge, and to make syntheses of pertinent research results before disseminating them in a simple and clear way to users. In connection with the traditional product formats, **"*Traditional formats (peer-reviewed journal articles, academic conference presentations, books, or final reports) fail to reach most stakeholders"*** was considered as one of the major factors which hindered the transfer of agricultural knowledge for most of the respondents with the rating average of 3.69 agreed about the statement that traditional product formats were not successful to reach most of the stakeholders

Eventually, the statement ***"Researchers often fail to explain the practical implications or change recommendations of their findings"*** was inquired to be measured its impact on knowledge transfer. With reference to this statement, most of the respondents with a rating average of 2.65 were unable to take sides while majority of them with 53% disagreed about the statement.

4.2.14.Factors affecting Knowledge Acquisition

Survey respondents of stakeholders were also inquired to make their evaluation with regard to factors related to the acquisition of knowledge. Based on this, ***"research organizations have no specific or formal plan for research transfer"*** was the first statement posed for respondents to evaluate it as a key factor which affect the agricultural knowledge acquisition from research institutes. Based on the results obtained, most of the respondents with the rating average of 2.91 were neither agreed nor do disagreed research organizations have no plan for research transfer as a key barrier to affect knowledge acquisition while majority of the respondents with 39.4% agreed about the statement.

The effectiveness of knowledge transfer in agricultural sector also depends on its accessibility. When the information coming from research is easily available and accessible, this makes it easier for practitioners to use it (Hemsley-Brown 2004).Regarding the easily availability of research knowledge, ***"Research knowledge is easily accessible***" was considered as a major factor that hindered the knowledge acquisition practices as most of the respondents with the rating average of 2.15 did not agree that research outputs was easily accessible.

The statement "***It is easy to know and contact researchers"*** was not taken side by the respondents to treat it as major factor since most of them with the rating average of 2.94 were neither agreed nor disagreed that it was easy to know and access researchers in the research institutes although majority of the respondents with 42.4% did not agree about the statement.

When the research is conducted according to users' needs and involves practitioners in the early stages of the research process, the results could be perceived as more relevant by users (Lloyd et al. 1997). Relating to the involvement of stakeholders in the research institutes research activities, ***"Research institutes fully involve stakeholders in their research"*** was another major factor that was identified by most of the respondents with rating average of 2.38 respondents did not agree that research institutes fully involve them in their research activities. Concerning the communication channel, ***"Research institutes use effective media and channels to communicate with the stakeholders"*** was also considered as the major factor to impact knowledge acquisition as most of the respondents with the rating average of 2.27 replicated that they did not agree that research institutes used effective media and channel to communicate with their stakeholders. Another issue posed for respondents for their evaluation of the factors that

hampered transfer of agricultural knowledge was the transparency of the research institutes. Inquiry of evaluation was presented to the respondents through this statement***" Research institutes and their work is well-known to stakeholders"***. As response from the survey clearly revealed, this statement was considered as a major factor for most of the respondents with the rating average of 2.35 did not agree that research institutes and their work is well known to stakeholders. Finally the researcher inquired respondents to evaluate the languages research institutes used to communicate their research findings with their stakeholders as a factor by posing this statement ***"the language used to communicate research findings is accessible and appealing***". Based on this, most of the respondents with the rating average of 2.59 showed their impartiality about the issue while majority of the respondents with 53% disagreed that the language used to communicate findings were accessible and appealing.

4.2.15. Measures to Overcome the Challenges

In order to alleviate or minimize the challenges and problems encountered during knowledge transfer and acquisition, interview respondents of both research institutes and stakeholders provided best suggestions and recommendations which were believed to enhance these processes.

Creating awareness by changing public attitudes, engaging the stakeholders in proposal development and encourage them to sponsor researches, improving policy issues, capacity, competition conditions, infrastructure, governance, market and information flows, partners have to have some common goals around which that relationship is built on and research must be conducted in the interest of the community, the research system and the partners , establishing a one window technology center at each research centers so that anyone can get the whole thing that research center owns, regular knowledge sharing mechanism should be implemented and a certain information repository should be there where every new knowledge is deposited and easily accessed, joint workshops and regular meetings should be also organized regularly to consolidate the relationship among them, there should be an intermediary organ which cooperate and organize any development partner including research institutes to come together discuss as a schedule manner to come up with new solutions and approaches how to tackle agricultural problems, both the research institutes and stakeholders should have a clear strategy of how they acquire, generate and share their knowledge and who should be included in the processes as well

they should also avoid bureaucracy and make their system simple to be easily reached by each other and they have to also scale up their efforts etc were some of the suggestions forwarded by the respondents.

4.2.16. Future plans

With the regard to the future plans of both research institutes and stakeholders to enhance their knowledge transfer and acquisition practices respectively, the study participants disclosed as they have planned to increase human capital and infrastructure, disclosure of technology to the stakeholders for further development, to engage the beneficiaries from the very beginning through a win-win approach, to strengthen the linkage among all stakeholders through different platforms, to have a commodity based platform, building institutionally systematized and policy supported knowledge generation and transfer mechanisms, to set up knowledge centers through which knowledge transfers, etc were some of the future plans stated by interviewees.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

Knowledge management in the agriculture sector is about the systematic connection of all stakeholders to the best practices, knowledge and expertise they need to create value by supporting creation, acquisition, transfer and utilization of knowledge. The main aim of this study was to investigate the knowledge generation and transfer practices that some Agricultural Research Institutes in Ethiopia have in place and assess the influencing factors involved in these processes. A mixed methods research methodology, encompassing questionnaires and interviews, was used to achieve this objective. Quantitative data were collected using questionnaires from both research institutes and their stakeholders using SurveyMonkey. Qualitative data were collected by means of interviews which were conducted with 15 key informants from both the research institutes and the stakeholders.

In Ethiopia, Agricultural research institutes produced varieties of agricultural knowledge and technologies, scientific information and management practices pertained to different agricultural sectors which were deemed to enhance the farming systems and boost agricultural productivity. This study showed that stakeholders required different types of knowledge and technologies mostly generated by Ethiopian agricultural research institutes but some stakeholders also needed additional knowledge such as human behaviour and promotion skills which were not mostly produced by the research institutes.

This study confirmed that even though all research institutes in Ethiopia admitted that doing demand analysis is very mandatory, only some of them performed end users demand analysis before generating and transferring agricultural knowledge while a few did this operation insufficiently and others were not totally doing the demand analysis. The study also revealed that there were some institutes which understood as they failed in this angle and planed to do it so in their future knowledge generation and transfer activities. The study also confirmed that varieties of mechanisms were utilized to perform this operation like group discussions and meetings, workshops and trainings, socio economic studies, formal platforms etc. From the study, it is

possible to conclude demand analysis done so far before conducting agricultural research is not enough.

Findings on the contacts of the research institutes in Ethiopia with the stakeholders indicated that almost all of the researches institutes reach the end users indirectly since their immediate stakeholders were scientific communities, NGOs, government organizations, research extension divisions, etc. The study also established that the relationship established between the research institutes and the stakeholders was mainly based to some extent on personal acutance while majority of them did not establish relationship with the stakeholders on the basis of formal partnership. Although the relationship between agricultural research institutes and their stakeholder was established informally, the frequency of contact among them was regular.

Moreover, the study showed that the relationship established between the research institutes and the stakeholders was inappropriate to boost the knowledge transfer activities. Establishing multilateral and consistent cooperation and relationships with a clearly identified roles and responsibilities, Strengthen the communication departments of the research institutes, forming Farmers Cooperative Self Help Groups and establish strong linkage with these groups, there has to be some very important modalities that links all users of technologies/ information generated, Regular mutual panel of problem identification and research output review have to be made based on contractual agreement on technology release etc were the suggestions forwarded in order to advance the relationship. It can be concluded that this very important issue, linkage between research institute and stakeholders in the process of knowledge transfer is currently not well defined.

According to this study, reaching end users directly instead of through stakeholders guarantees the effective utilizations of the technology as it minimizes information dissipation, misinterpretation, spoil and loss but due to capacity limitations the research institutes were forced to disseminate their research outputs to the end users through the stakeholders. In this regard, the partners selected to make the dissemination and the national systems to work with were cited as determinants to make the knowledge reach properly to the end users mentioning that a strong partner and national systems would enhance the process as revealed by some respondents. And hence can be concluded that this important step should be given due attention by the responsible bodies

The study also revealed that the relationship established between stakeholders and research institutes was not based on any formality and stakeholders made interactions with the researchers/institutes when they only need new technology that could meet their own problems.

Most of the agricultural research institutes in Ethiopia do not sufficiently involve the end users or stakeholders during knowledge generation and transfer activities. In order to make the knowledge generated by the research institute be effectively by the end users, the institutes should involve the practitioners sufficiently in the research activities.

Organizing research conferences and informing interested bodies what was available in their institutes, producing different consultation manuals, leaf lets, brochures scientific publications, journals, books and etc so that stakeholders be aware of the availability of new knowledge and technology, using different medias, involving partners during intervention for upscaling, using their research extension departments, using different platforms etc were the mechanisms used to make the stakeholders aware what was available in the research institutes. Some other centers did different types of promotion works. They did presentation in the field works, they have publications in different format, and they organize seminars, visits, exhibitions, etc so that they avail the necessary information to others.

Most stakeholders believed that the transferred knowledge to end users was not utilized and applied effectively due to lack of the availability of quality improved agricultural products, end users resist to accept it as it was not generated based on their demands, lack of knowledge by end users, lack of capacity (financial, infrastructure etc), lack of commitment by experts, lack of awareness by end users and research outputs are most of the time more scientific and follow scientific methods; however end users didn't utilize scientific methods.

Based on the results of this study, most of the research institutes did not fully perform the evaluation and monitoring of their disseminated knowledge systematically. In contrast to the research institutes, the stakeholders performed monitoring and evaluation of disseminated research results to end users.

Most of the institutes did not provide any special incentives for their researchers for performing a knowledge transfer activities.

This study confirmed that there were a lot of challenges and problems faced during knowledge transfer. Accepting change (public attitude), subsistence nature of the community, Policy issues, human capital, completion conditions, infrastructure, governance, market, information flow, weak research extension system, researchers' language barrier to communicate research findings, inefficiency of the overall interaction system, etc were some of these problems and limitations. In addition to these, there were also institutional challenges. The top decision makers may not be interested, do not encourage and give time for different publications or knowledge sources provided by researchers. Most Stakeholders do not implement the knowledge they acquired unless researchers push them,

Stakeholders also faced several challenges and problems during knowledge acquisitions, The new knowledge is not easily available it is scattered, there is no repository for knowledge in this country, getting information from several institutes was very difficult as there was no linkage between knowledge generating institutes, limited participation in the research institutes activities, unable to know what was available in the research institutes, the level of research institutes' intervention based on their own interest without the prioritized problem, capacity gap, limitations of communication medias, lack of intermediary responsible to coordinate the cooperation among research institute and stakeholders, negative attitudes of research institutes, Researchers focus on publication of their research outputs rather than applying it etc were some of the challenges and problems which hindered knowledge acquisitions "

With regard to the factors influencing the transfer of agricultural knowledge from the research institutes to stakeholders, Lack of provision of sufficient incentives and encouragement for researchers who contributed to knowledge transfer activities, the base of cooperation establishment with the stakeholders was not on long term agreement, the methods and communication tools and channels used to present new knowledge were not well-adapted to the interests of stakeholders, non engagement of stakeholders in the research projects from the start, the language used to communicate research findings is overly academic or full of jargon and Traditional formats (peer-reviewed journal articles, academic conference presentations, books, or final reports) fail to reach most stakeholders were the major established from this study.

Research knowledge was not easily accessible, difficulty to know and contact researchers, non involvement of research institutes stakeholders fully in their research works, lack of using

effective media and channels to communicate with the stakeholders", research institutes and their work was not well-known to stakeholders, and the language used to communicate research findings was not accessible and appealing were the major factors which hindered the acquisition of agricultural knowledge.

5.2. Recommendations

The study identified various factors and challenges which affected knowledge transfer practices from the Ethiopian Agricultural Research Institutes to Stakeholders. The study therefore makes recommendations to address the knowledge transfer and acquisition issues identified by the study in order to enhance the effectiveness of knowledge generation, transfer and acquisition practices.

Transformation of Ethiopian agricultural sector requires scaling up of efforts to increase agricultural production and productivity by among others promoting technology transfer and adoption. In order to achieve this, clear mechanisms for effective communication and knowledge management practices should be incorporated into Agricultural Research and Development programmes.

In Ethiopia, most Agricultural research institutes produced verities of agricultural knowledge and technologies, scientific information and management practices pertained to different agricultural sectors which were also required by the stakeholders. In order to make the knowledge generated by the research institute effectively applied and utilized by the practitioners, the knowledge should be easy to understand by the receiver, relevant i.e. the knowledge should be interesting, credible and produced at the opportune time, and also easily accessible and available.

Effective utilization and application of agricultural knowledge can also be achieved by specifying the recipient target groups and investigating their needs. When the research is conducted according to users' needs and involves practitioners in the early stages of the research process, the results could be perceived as more relevant by users and contribute to bring researchers and users closer. In order to achieve this, agricultural research institutes should perform demand analysis by:

- Organizing group discussions with key stakeholders , through workshops , visits, trainings, consultations etc

- Establishing socio economic research department in their institute to perform the analysis of what the stakeholders demand and based on this they should generate the knowledge. To do this, they start by identifying what are the constraints, what are the opportunities and what are the way forwards within the community to make sure the communities are involved into there.
- Building a formal communication platforms , like Agricultural Development and Partners Linkage Advisory Council (ADPLAC) which was used by some institutes, where research institutes get feedback on which areas they should work

Once the research institutes gathered information about the demand environment, they have to prioritize the problem based on the severity of the problem, feasibility of the problem to be solved by their capacity and urgency of the problem and then align themselves with the demand scenario before generating the knowledge.

After research institutes prodeced relevant knwledge, they have to make them accissable and understandable by the potential users. This is due to the fact that when the information coming from research institute is easily available and accessible, it then becomes important for the Transfer agent to assess the relevance of the available knowledge, and to make syntheses of pertinent research results before disseminating them. In order t do this, the research institutes should:

- Utilize different media, field trips, wikis, websites, organize research conferences, workshops, seminars, etc
- Produce different consultation manuals, leaf lets, briefings, brochures scientific publications, journals, books and etc
- Get in some development partners like big NGOs, Public institutes, etc who can upscale to the wider community during pilot testing
- Establish research extension department within the institute and do promotion of available technologies to stakeholders so that the extension workers are aware about what is available
- Building a formal communication platforms through where research institutes inform their stakeholders about what they have

Transfer mechanisms consist of all the means through which knowledge moves along the knowledge transfer process. They allow actors (i.e. researchers, Transfer agents and practitioners) to exchange knowledge and information. The present study and reviewed literature show that there are several mechanisms that could be used to promote knowledge transfer. In order to make the knowledge transferred effectively:

- First researchers should prepare short and digestible policy briefs and manuals, not general non-to the point talk for which research studies are known with lengthy introduction and also better interpretation of figures instead of mere tables nice graphs and other visual aids
- Once the policy briefs are prepared, the researcher can communicate them on time using different mechanisms like medias, through internet services, portals, through meetings, workshops Calling individual or mini meetings with stake holders, distributing bulletins relevant, on job trainings, regular follow up, and organizing regular forums, information sharing platforms, trainings etc
- Demonstration on farm (on farmers site) and on station like FTC (farmers training centers), full package extension teaching approach, orally on their place.

After agricultural knowledge was disseminated to the end users for practice, feedback on its impact either positive or negative should be assessed to take any actions in line with its effect because in Ethiopia most agricultural research instituted did not perform monitoring and evaluations of their research output while some the stakeholders did this to some extent. Thus, the researcher strongly recommends both the research institute and stakeholders to monitor and evaluate the impacts of the disseminated agricultural knowledge utilizing varieties of mechanisms such as:

- Performing adoptions study, using survey with check list, through customer satisfaction forms, measuring outcome at productivity, and measure how empowering were the new technology
- Through consistent system based follow up and field visit programs and supervising or inspecting the activities done on the field and also collecting feedbacks from user and DAs etc

- Collecting baseline data during intervene and when finishing a and compare the result to see if the transferred knowledge have impact

Practitioners are more likely to adopt research products when they find them useful and can contribute creatively to their development and evaluation; at least more likely than if they are simply told they should adopt them because the knowledge is inherently better. In Ethiopia, Stakeholders were left out of the research process, or not included in discussions regarding transfer strategies and activities. In order to alleviate this problem, it is strongly recommended that the research institutes should involve their stakeholders in the research activities.

In order to overcome or minimize the challenges observed during knowledge transfer and acquisition and to consolidate the relationship among the research institute and stakeholders the following are recommended:

- Research institutes should create a close partnership with stakeholders based on common goals and interest as the primary measure. The research to be conducted must be in the interest of the partners; the community and the national research system so that they have to sit together and identify priorities together and decide on action plans together. Both of them should take equal responsibilities. They have to evaluate and monitor their common activities together.
- To make the knowledge and information sharing systematical, a regular information sharing mechanism should be implemented and a certain information repository should be developed where every new knowledge and information is deposited and easily accessed by interested body. There has to be a web based system to share their knowledge.
- It also requires policy dimensions which imply creation of efficient institutional setup and then strong monitoring and evaluation system. The organizational structure of both stakeholders and research institutes should be also revised in a way that support this efforts
- Research institutes should establish a one window technology center at each research centers so that anyone can get the whole thing that research center owns from one place.
- Knowledge transfer agency should be established whose major task is cooperate and organize any research and development partner to come together and discuss as a

schedule manner to come up with new solutions and approaches to tackle agricultural problems.

- There should be also improvements among all parties (both research center and stakeholders) in effective utilization of resources including human, material and financial.
- The research institutes should have a clear strategy of how they capture, generate and share their knowledge. The strategy should include how to generate the knowledge and who should be involved in the process.
- The research institutes should work towards awareness creation about their work and whom they want to reach through different medias and other methods. Regular meetings and joint workshops should be there with the research institutes and stakeholders. The research institutes should make a thorough follow up on the proper usage of their disseminated knowledge. The research institutes should listen to the stakeholders' problems and demands. Research centers should avoid bureaucracy and make their system simple to be easily reached by stakeholders
- Research organization, should implement incentive policies and release the necessary resources (time, funding, etc.) to encourage their researchers to engage in knowledge transfer activities.

Thus, the researcher believes that the realization of the aforementioned suggestions and recommendations could contribute to a more efficient and frequent transfer of agricultural knowledge from agricultural research institutes to stakeholders and practitioners.

5.2.1. Recommendations for Future Works

This study recommended some actions that can be considered to enhance the agricultural knowledge generation, transfer and acquisition practices from the agricultural research institutes to stakeholders. The established gaps in the actual knowledge generation, transfer and acquisition practices at the agricultural research centers and stakeholders of Ethiopia formed a basis up on which the various knowledge generation and transfer mechanisms have been recommended. The recommended suggestions believed to make the knowledge generation and transfer practices in agricultural research institutes more efficient. However, implementing effective knowledge generation, transfer and acquisition practices require further understandings. Thus, there is a need that the recommended knowledge generation, transfer and acquisition mechanism should be

implemented. The implementation will certainly require the availability of systematic approach that must address aspects such as organizational culture, technology infrastructure, costs involved, etc. Given this understanding, the researcher proposes that a study be conducted to determine requirements for the implementation works.

This study mainly focused on the assessment of the knowledge generation and transfer practices that existed among only a few agricultural research institutes and their stakeholders excluding the end users or practitioners from the study as sources of information. Thus further research is needed to include the practitioners at large.

The study made recommendations based on the suggestions gained from the respondents to tackle the problems and challenges faced during knowledge generation and transfer processes as well the experience gained conducting the research. Further research in this area is required to assess best and efficient knowledge generation and transfer practices and models worldwide to be incorporated in Ethiopian context.

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Appendix A

Questionnaires for Researchers/Scientists in the Research Institute

Dear Sir/Madam,

My Name is Shimels Chala. As a postgraduate Student in Jimma University Information Science Department Information and Knowledge Management Program, I am currently undertaking a thesis study entitled "Study on Knowledge Generation and Transfer in Agricultural Research Institutes. The main aim of thesis study is to assess and evaluate the knowledge generation and transfer practices that research institutes in Ethiopia have in place and to investigate the factors involved in the transfer process which affect knowledge generation and transfer processes. This survey is designed for professionals in Agricultural Research. Because of your relevant expertise, you are kindly requested to take and complete this questionnaire at your earliest convenient time. Your responses to the questions below, which will assist in making this study a success, will be treated with utmost confidentiality. If you have any questions or concerns about completing the questionnaire or about being in this study, you can contact me on cell phone number **+251-911- 563102** or email shimels.chala@ju.edu.et .

1. **Name of your organization**

2. **Scope of your organization**

- Scope of your organization Local
- Regional (in Ethiopia)
- National
- International

3. **Your job title**

4. **Your highest educational qualification**

- Your highest educational qualification Doctorate or equivalent
- Master equivalent
- Bachelor or equivalent
- Diploma or equivalent

5. **What type of knowledge (inventions, innovations, novelties, discoveries) is generated from your area of expertise?**

6. **How do you disseminate newly generated research output?**

- Through scientific papers and professional journals
- Orally in conferences and workshops
- Preparing best practices guides
- Using education tools
- Posting to email lists, portals, blogs, internet etc
- Via media, radio, television

Other (please specify)

7. **Do you monitor and evaluate the effectiveness of the transferred knowledge?**

- Yes
- No

If Yes, How do you do this?

8. **What special incentives or rewards does your institute provide for transferring knowledge?**

By 'stakeholders' we mean intermediary organizations or individuals who take up research outputs and adapt or transform them for other end users (farmers, policy makers, etc) to use.

9. **Who are the immediate stakeholders that acquire your research outputs?**

10. **How do you normally establish relations with stakeholders to exchange research outputs in the area of your expertise?**

- ☐ On the basis of long term agreements
- ☐ On the basis of temporary contracts
- ☐ No formal partnership

Other (please specify)

11. **How frequently do you meet with the stakeholders in terms of knowledge transfer?**

- ○ Rarely
- ○ Only when there is new research output
- ○ Only when they need new technology
- ○ Regularly

12. **Do you think existing forms of cooperation and partnership between researchers/research institute and the stakeholders are appropriate to boost knowledge transfer activities?**

- ○ Yes
- ○ No

If the answer is 'No', what could be done to enhance knowledge transfer activities?

13. **Do you think the knowledge generated by the research institute should reach the end user directly instead of through stakeholders?**

Yes

No

Please justify your reason for selecting either 'yes' or 'No' for the question '5 above.

Factors Affecting Knowledge transfer

14. **My organization has a policy or strategy for Research communication and dissemination**
    A. Strongly Disagree
    B. Disagree
    C. Neither Disagree nor Agree
    D. Agree
    E. Strongly Agree
15. **My organization provides incentives and encouragement for researchers to disseminate knowledge**
    A. Strongly Disagree
    B. Disagree
    C. Neither Disagree nor Agree
    D. Agree
    E. Strongly Agree
16. **Cooperation between my organization and other stakeholders is based on long term agreements**
    A. Strongly Disagree
    B. Disagree
    C. Neither Disagree nor Agree
    D. Agree
    E. Strongly Agree
17. **The methods and communication tools and channels we use to present new knowledge are well-adapted to the interests of our**
    A. Strongly Disagree
    B. Disagree
    C. Neither Disagree nor Agree
    D. Agree
    E. Strongly Agree
18. **Stakeholders are engaged in our research projects from the start stakeholders**
    A. Strongly Disagree
    B. Disagree
    C. Neither Disagree nor Agree
    D. Agree

E. Strongly Agree

19. Stakeholders know what knowledge they need from research institutes

A. Strongly Disagree
B. Disagree
C. Neither Disagree nor Agree
D. Agree
E. Strongly Agree

20. The language used to communicate research findings is overly academic or full of jargon

A. Strongly Disagree
B. Disagree
C. Neither Disagree nor Agree
D. Agree
E. Strongly Agree

21. Traditional formats (peer-reviewed journal articles, academic conference presentations, books, or final reports) fail to reach most stakeholders

A. Strongly Disagree
B. Disagree
C. Neither Disagree nor Agree
D. Agree
E. Strongly Agree

22. Researchers often fail to explain the practical implications or change recommendations of their findings

A. Strongly Disagree
B. Disagree
C. Neither Disagree nor Agree
D. Agree
E. Strongly Agree

Others Please Specify_____

Appendix B

Questionnaires for Stakeholders/Non Research Organizations

Dear Sir/Madam,

My Name is Shimels Chala. As a postgraduate Student in Jimma University Information Science Department, I am currently undertaking a thesis study entitled "Study on Knowledge Generation and Transfer in Agricultural Research Institutes. The main aim of thesis study is to assess and evaluate the knowledge generation and transfer practices that research institutes in Ethiopia have in place and to investigate the factors involved in the transfer process which affect knowledge generation and transfer processes. This survey is designed for professionals in Agricultural Research. Because of your relevant expertise, you are kindly requested to take and complete this questionnaire at your earliest continent time. Your responses to the questions below, which will assist in making this study a success, will be treated with utmost confidentiality. If you have any questions or concerns about completing the questionnaire or about being in this study, you can contact me on cell phone no. 0911563102 or email shimels.chala@ju.edu.et .

1. **Name of your organization**

2. **Type of Your Organization**

- Type of Your Organization Extension Service provider
- NGO
- Government agency
- Private sector

Other (please specify)

3. **Your job title**

4. **Your highest educational qualification**

- Doctorate or equivalent
- Master equivalent
- Bachelor or equivalent
- Diploma or equivalent

5. My relations with research institutes are normally established:

- On the basis of personal acquaintances
- On the basis of long term agreement
- On the basis of temporary contract
- No formal partnership

Other (please specify)

6. I interact with researchers or research institutes:

- Rarely
- Only when there is new research output
- Only when we need new technology
- Regularly

Other (please specify)

7. I obtain research outputs and best agricultural practices directly from the following (select all that apply)

- Regional Research Institutes
- National Research Institutes
- International Research Institutes
- Educational Institutes
- An Intermediary

8. I obtain new knowledge of research:

- IThrough research/information reports (print and digital)
- In scientific papers and professional journals
- Orally in conferences and workshops
- From email lists, portals, blogs, internet etc
- Via media, radio, television

Other (please specify)

9. I obtain research information from the following institutes (give names please)

10. What tools or approaches can best be used to enhance knowledge transfer activities from research to development stakeholders?

11. I meet with end users (farmers, rural communities) to share or transfer knowledge:

- Rarely
- When someone contacts me
- If I have something new to share
- Regularly

Other (please specify)

12. Tools and approaches I use to transfer or share knowledge with end users are:

*

13. Should research institutes aim to transfer knowledge directly to end users?

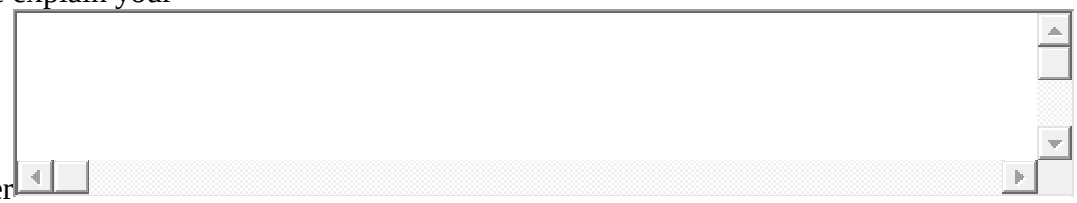
- Yes
- No

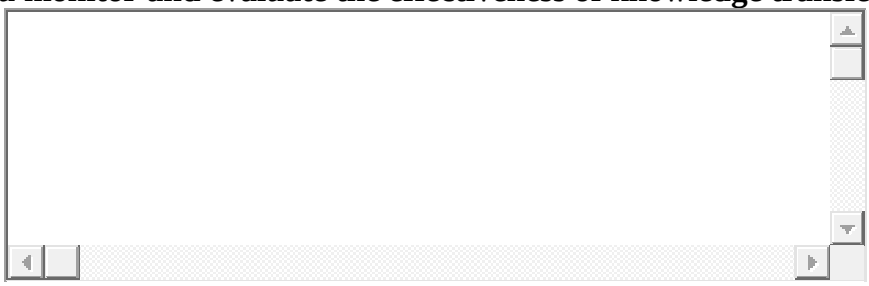
Please explain your answer

14. **Do you think that research knowledge is effectively utilized and applied by end users?**

Yes

No

Please explain your answer 

15. **How do you monitor and evaluate the effectiveness of knowledge transferred to end users?** 

16. **Research organizations have no specific or formal plan for research transfer**
    F. Strongly Disagree
    G. Disagree
    H. Neither Disagree nor Agree
    I. Agree
    J. Strongly Agree

17. **Research knowledge is easily accessible**
    A. Strongly Disagree
    B. Disagree
    C. Neither Disagree nor Agree
    D. Agree
    E. Strongly Agree

18. **It is easy to know and contact researchers**
    A. Strongly Disagree
    B. Disagree
    C. Neither Disagree nor Agree
    D. Agree
    E. Strongly Agree

19. **Research institutes fully involve stakeholders in their research**
    A. Strongly Disagree
    B. Disagree
    C. Neither Disagree nor Agree
    D. Agree
    E. Strongly Agree

20. **Research institutes use effective media and channels to communicate with the stakeholders**
    A. Strongly Disagree
    B. Disagree
    C. Neither Disagree nor Agree
    D. Agree
    E. Strongly Agree

21. Research institutes and their work is well-known to stakeholders

A. Strongly Disagree
B. Disagree
C. Neither Disagree nor Agree
D. Agree
E. Strongly Agree

22. The language used to communicate research findings is accessible and appealing

A. Strongly Disagree
B. Disagree
C. Neither Disagree nor Agree
D. Agree
E. Strongly Agree

Appendix C

Interview for Researchers

1. ***Do you adequately analyze stakeholder's knowledge demands, attitudes and practices before generating and transferring best bet agricultural knowledge in your areas of expertise? How do you do this analysis if you do so?***
2. ***How do different knowledge seekers or stakeholders identify the availability of new knowledge in the Institute?***
3. ***What tools are used and processes are employed to transfer knowledge from the Research Institute to stakeholders? Do you think these tools are effective in making the knowledge reachable to the user??***
4. ***What problems and limitations hamper the knowledge transfer practices?***
5. ***How does the Institute measure the effectiveness of the transferred knowledge?***
6. ***Do you think the current knowledge transfer practice (research Institute-Stakeholders-End users) assure you the utilization and application of the knowledge by the end users effectively?***
7. ***What do you suggest for a more successful cooperation between research institutes and stakeholders for the overcoming of existing problems occurring during the process of knowledge transfer from Research Institute to stakeholders?***
8. ***What is the best way of transferring research output into practice?***
9. ***What is the future plan regarding knowledge generation and transfer?***

Appendix D

Interview for Stakeholders

1. ***What knowledge is required by the organization and how does the organization acquire the knowledge?***
2. ***Do the Research Institutes involve your organization as a stakeholder during knowledge generation sufficiently***
3. ***What problems and limitations hamper the knowledge acquisition practices from the research institute?***
4. ***Do you think the current knowledge transfer practice (research Institute-Stakeholders-End users) assure you the utilization and application of the knowledge by the end users effectively?***
5. ***What do you suggest for a more successful cooperation between research institutes and stakeholders for the overcoming of existing problems occurring during the process of knowledge transfer from Research Institute to stakeholders?***
6. ***What is the best way of acquiring knowledge from the research institute?***
7. ***What is the future plan regarding knowledge acquisition from the research institute and transfer to the end users?***